KOREA INSTITUTE OF PUBLIC FINANCE

KIPF
Policy
Research
Series

2021 June Vol. 5

CONTENTS

Income Taxation and Efficiency Cost : Evidence from South Korea

Sung-oh Kwon and Sungjoon Kwon*

I. Introduction

The tax increase allows the government to increase its tax revenue and reduce income inequality. However, it may distort the decisions made by economic agents, thereby incurring unintended social costs. Taxpayers react to tax increases in different ways, in efforts to minimize their tax burden, and thus may end up making inefficient consumption/ production decisions. The efficiency costs of taxes originate from changes in transaction volumes. In other words, an efficiency cost is incurred when taxes discourage the transactions of goods and services of which marginal social costs exceed their marginal social benefits. The portion of the social surplus decrease that cannot be offset by tax revenue increase is commonly referred to as either the efficiency cost or the excess burden.

To date, tax non-compliance and efficiency costs have been key topics in public finance. Researchers in the United States, the United Kingdom, Denmark, and other countries have used administrative tax data to study the effect of income tax rate changes. In Korea, there is a relatively small number of studies on behavioral responses to taxation. This study uses administrative microdata from the Korean National Tax Service (NTS) to estimate the

* Sung-oh Kwon, Associate Fellow, of Korea Institute of Public Finance
Sungjoon Kwon, Associate Fellow, of Korea Institute of Public Finance

elasticity of taxable income and efficiency costs. For the estimation of taxable income elasticity, we use the difference-in-differences (DiD) method and the bunching analysis. The DiD method uses tax rate changes caused by tax reforms, and the bunching analysis uses discontinuity points in which marginal tax rates increase. Based on the elasticity estimates, we calculate the efficiency cost of income tax. The efficiency cost is estimated using the traditional Harberger's triangle method and the method proposed by Saez (2001).

This study represents the first attempts to analyze the income tax rate increase for high-income earners in 2017 and 2018 in Korea.[1] In 2017, the top individual tax rate was raised from 38% to 40%. In 2018, the tax rate in the top bracket and the next bracket were then raised to 42% and 40%, respectively. The 2020 Amendment to the Tax Act also increased the highest tax rate. As such, analyzing the effect of the latest tax rate increase may provide meaningful implications for policymakers. This study is distinguished from previous studies in Korea by its use of tax administration data, the bunching analysis, and the estimation method proposed by Saez (2001). Jun (2006) and Choi (2009) used household survey data to estimate the taxable income elasticity. However, household survey data do not provide accurate information for reported income and deductions, and their small sample size makes it unsuitable for analyzing the heterogenous effects of tax reforms and performing a bunching analysis. The bunching analysis is a method that has seen increased use after Saez (2010), and offers the benefit of estimating taxable income elasticity without previous tax reforms. We are not aware of any study in Korea that estimated the efficiency cost using the method proposed by Saez (2001).

This study consists of the following chapters. Chapter II estimates the elasticity of taxable income with respect to marginal tax rates, and Chapter III uses these estimate to compute the efficiency cost of income tax. Chapter IV summarizes the research findings and discusses their implications.

II. Estimation of Taxable Income Elasticity

In this chapter, we use the NTS microdata to estimate the elasticity of taxable income with respect to marginal tax rates. Korean tax microdata provide the most accurate information on

1 This study uses the National Tax Statistics Center data on general income tax and employment income tax for the 2015~2018 period.

taxable income, as well as a large number of observations. These characteristics make them suitable for analyzing the effect of tax reforms targeting high-income earners, or for performing a bunching analysis. The data used for the empirical analysis consist of 10% samples randomly selected from the global income tax for the 2015~2018 period. The table below presents the descriptive statistics of the data and the taxable income distribution.[2]

Table 1_Descriptive Statistics of Taxable Income by Year and Bracket

Year	Taxable income bracket	No. of observations	Average	Standard deviation
2015	All	2,337,187	1,855	7,088
	150~300 million	14,626	20,228	4,056
	300~500 million	3,753	37,498	5,471
	Above 500 million	2,754	115,002	149,641
2016	All	2,420,554	1,922	6,815
	150~300 million	15,822	20,241	4,089
	300~500 million	4,124	38,032	5,595
	Above 500 million	2,907	110,960	138,377
2017	All	2,499,324	2,056	16,501
	150~300 million	18,339	20,168	4,038
	300~500 million	4,767	37,818	5,607
	Above 500 million	3,353	121,935	425,772
2018	All	2,616,641	2,102	8,133
	150~300 million	20,139	20,105	4,043
	300~500 million	4,937	37,883	5,642
	Above 500 million	3,631	114,510	166,679

Source: Present study, based on 10% random samples from the 2015~2018 General Income Tax and Employment Income Tax data.

2 To identify the overall distribution, we restricted the scope of taxable income to between KRW 10 million and KRW 160 million.

Table 2_Descriptive Statistics of the General Income Tax Data

(unit: KRW 10,000)

	Observations	Average	Standard deviation
Total income	2,708,066	15,158	49,544
Business income	2,708,066	13,238	47,933
Rent income	2,708,066	542	4,414
Employment income	2,708,066	1,077	5,241
General income	2,708,066	2,774	13,179
Business income	2,708,066	1,421	6,422
Rent income	2,708,066	268	2,307
Employment income	2,708,066	838	4,969
Taxable income	2,708,066	2,289	13,068

Source: Present study, based on 10% random samples from the 2015~2018 General Income Tax and Employment Income Tax data.

Table 3_Descriptive Statistics of the Employment Income Tax

	Observations	Average	Standard deviation
Total wages	7,165,652	3,442	4,315
Employment income	7,165,652	2,552	4,055
Taxable income	7,165,652	1,868	3,751

Source: Present study, based on 10% random samples from the 2015~2018 Employment Income Tax data.

1. DiD Method

In this section, we estimate the taxable income elasticity using the DiD method, which compares the taxable income of taxpayers in taxable income brackets with increased tax rates and other brackets. Specifically, we used repeated cross-sectional data to estimate the 2SLS DD model represented by the equation below.

$$\log z_{it} = e \cdot \log(1-\tau_{it}) + \alpha \cdot 1(t=t_1) + \beta \cdot 1(i \in T) + \varepsilon_{it}$$

The instrument variable is the interaction term between the post-reform dummy and the dummy variable for the treatment group, $\log(1-\tau_{it})$. Here, T is the treatment group affected by the tax reforms, t_0 refers to the pre-reform years, and t_1 refers to the post-reform years.[3]

3 In this study, we used repeated cross-sectional data for the DiD analysis, and defined the treatment groups

A 2SLS estimate using the DiD is unbiased if it can be shown that the treatment group and the control group had the same rate of taxable income growth, if the tax reform had not been instituted. If, in the same period, other elements existed that might have had a different effect on the taxable incomes of the treatment group and the control group, such DiD results could biased. In particular, due to the short time series of the data, group-specific trends before the tax reforms could not be controlled for. Therefore, caution is advised when interpreting the findings of this type of study.

Table 4 shows estimates of taxable income elasticity for the KRW 500 million~KRW 1 billion bracket using the tax rate changes in 2017.[4] In 2017, the tax rate for the "above KRW 500 million" bracket was raised from 38% to 40%. The control group was defined as the KRW 300 million~KRW 500 million bracket, which is expected to have similar characteristics to the treatment group. The treatment group was then defined as the KRW 500 million~KRW 1 billion bracket, given the increasing heterogeneity between the treatment group and the control group.[5] As of 2018, the number of taxpayers in the KRW 500 million~KRW 1 billion bracket accounted for 0.1% of all taxpayers. Columns 1 to 5 of the table present the estimated results when adding taxpayer gender, age, area of residence, and occupation as control variables.[6] 17 si/do (city/province) areas were used for the area of residence variables, and 18 occupation variables were used, including manufacturing, construction, and transport.

---

and the control groups based on taxable incomes, which can be adjusted by economic agents. In such cases, changes in the composition of each group may affect the findings.

4 The 2016 data were excluded for being the year immediately preceding the tax reform (Saez, Slemrod, and Giertz, 2012).

5 As repeated cross-sectional data are used, whether a taxpayer falls in the treatment group or the cross-sectional data is determined by the taxable income in each year.

6 Specifically, we added the fixed effect of gender, age, area of residence, and occupation. In the case of using repeated cross-sectional data, a higher level of accuracy can be expected by utilizing appropriate control variables.

Table 4_Taxable Income Elasticity in the KRW 500 Million~KRW 1 Billion Bracket Based on the 2017 Tax Reform

	(1)	(2)	(3)	(4)	(5)
1. All					
Taxable income elasticity	0.461** (0.205)	0.435** (0.207)	0.411** (0.207)	0.411** (0.206)	0.315** (0.160)
No. of observations	12,726	12,531	12,531	12,531	10,832
2. Wage earner					
Taxable income elasticity	0.258 (0.372)	0.258 (0.372)	0.311 (0.374)	0.338 (0.375)	0.432* (0.234)
No. of observations	4,082	4,075	4,075	4,075	4,012
3. The self-employed					
Taxable income elasticity	0.372 (0.277)	0.338 (0.279)	0.266 (0.279)	0.258 (0.278)	0.295 (0.210)
No. of observations	6,886	6,820	6,820	6,820	6,787
Gender		O	O	O	O
Age			O	O	O
Area of residence				O	O
Occupation					O

Source: Present study, based on 10% samples from the 2015~2018 General Income Tax and Employment Income Tax data.

For the full sample, the taxable income elasticity was between 0.32 and 0.46, indicating that a 1% increase in the after-tax income rate (1–marginal tax rate) increases the taxable income by 0.32~0.46%.[7] However, caution is advised when interpreting and using these findings. In order to estimate the effect of the 2017 tax rate reform, the year 2017 must be defined as a post-reform year. However, the behaviors of economic agents in 2017 are also affected by the 2018 tax reform. For example, if an economic unit anticipated the 2018 tax reform based on the Tax Act amendment announced in 2017, the actor may have accelerated their income realization in order to lower their tax burden. Some taxpayers may prepare for a tax rate increase by adjusting the timing of their stock options to be exercised. Table 5 shows a sizable increase in stock option income in 2017, which is particularly high in the above KRW 500 million bracket.

7 It should be noted that the findings are significant at a 10% significance level.

Table 5_Percentages of Stock Option Income in Total Wages

1. Percentage in no. of workers

(unit: %)

Total wages	2012	2013	2014	2015	2016	2017	2018
All	0.05	0.05	0.04	0.04	0.05	0.05	0.05
KRW 10 million or lower	0.03	0.01	0.00	0.00	0.00	0.00	0.00
KRW 20 million or lower	0.01	0.00	0.00	0.00	0.00	0.00	0.00
KRW 40 million or lower	0.01	0.01	0.01	0.01	0.01	0.01	0.01
KRW 60 million or lower	0.06	0.05	0.04	0.05	0.05	0.04	0.05
KRW 80 million or lower	0.11	0.11	0.08	0.10	0.11	0.08	0.09
KRW 0.1 billion or lower	0.25	0.21	0.17	0.17	0.15	0.17	0.16
KRW 0.2 billion or lower	0.55	0.49	0.36	0.41	0.40	0.49	0.45
KRW 0.3 billion or lower	1.42	1.42	1.14	1.31	1.27	1.52	1.37
KRW 0.5 billion or lower	2.02	1.79	1.43	1.65	2.02	2.12	2.25
Above KRW 0.5 billion	4.05	3.30	4.16	2.88	2.60	3.28	3.64

2. Percentage in amount

(unit: %)

Total wages	2012	2013	2014	2015	2016	2017	2018
All	0.07	0.06	0.08	0.08	0.05	0.18	0.08
KRW 10 million or lower	0.02	0.01	0.00	0.00	0.00	0.00	0.00
KRW 20 million or lower	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KRW 40 million or lower	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KRW 60 million or lower	0.01	0.01	0.00	0.00	0.00	0.00	0.00
KRW 80 million or lower	0.01	0.01	0.01	0.01	0.01	0.01	0.01
KRW 0.1 billion or lower	0.03	0.03	0.02	0.02	0.02	0.02	0.02
KRW 0.2 billion or lower	0.09	0.07	0.06	0.08	0.08	0.10	0.07
KRW 0.3 billion or lower	0.37	0.40	0.31	0.45	0.40	0.43	0.35
KRW 0.5 billion or lower	0.75	0.61	0.52	0.76	0.83	0.77	0.78
Above KRW 0.5 billion	3.27	2.70	4.24	3.58	1.58	8.09	3.15

Source: Present study, based on Statistical Yearbook of National Tax.

Table 6 presents estimates of taxable income elasticity for the KRW 500 million~KRW 1 billion bracket using the tax rate changes in 2018. In 2018, the tax rate for the above KRW 500 million bracket was raised from 40% to 42%. The control group is defined as the KRW 150 million~KRW 300 million bracket, in which the tax rate did not change. The 2016 and 2017 data were excluded from the analysis, as the two years immediately precede the tax reforms implemented in 2017 and 2018, respectively (Saez, Slemrod, and Giertz 2012).

For the full sample , the taxable income elasticity estimate ranges between 0.07 and 0.14, depending on the model, but these findings were not statistically significant. For wage earners, the coefficient estimate had a negative value. However, it was not statistically significant. For the self-employed sample, when adding all control variables, the taxable income elasticity was 0.24, indicating that a 1% increase in the after-tax income rate translates into a 0.24% increase in taxable income.[8]

Table 6_Taxable Income Elasticity in the KRW 500 Million~KRW 1 Billion Bracket Based on the 2018 Tax Reform

	(1)	(2)	(3)	(4)	(5)
1. All					
Taxable income elasticity	0.0710 (0.0926)	0.0810 (0.0932)	0.0801 (0.0932)	0.0837 (0.0930)	0.136 (0.103)
No. of observations	39,190	38,994	38,992	38,992	32,296
2. Wage earner					
Taxable income elasticity	-0.0690 (0.171)	-0.0629 (0.171)	-0.0494 (0.172)	-0.0448 (0.172)	-0.0106 (0.180)
No. of observations	16,365	16,360	16,359	16,359	13,905
3. The self-employed					
Taxable income elasticity	0.182 (0.126)	0.178 (0.126)	0.184 (0.126)	0.182 (0.126)	0.235* (0.127)
No. of observations	18,492	18,391	18,391	18,391	18,299
Gender		O	O	O	O
Age			O	O	O
Area of residence				O	O
Occupation					O

Source: Present study, based on 10% samples from the 2015~2018 General Income Tax and Employment Income Tax data.

2. Bunching Analysis

In the preceding section, we estimated the taxable income elasticity using tax rate changes caused by tax reforms. In this section, we estimate taxable income elasticity using cross-sectional variance, in which the marginal tax rate increases along with the taxable income. The tax rate for the "KRW 150 million or less" bracket has remained unchanged since 2010.

8 It should be noted that the findings are significant at a 10% significance level.

Therefore, the elasticity calculated using the bunching analysis and the data from 2015 and subsequent years is closer to the long-term elasticity than the DiD estimates.

The figure below shows a counterfactual distribution estimated using the following equation, in conjunction with the taxable income distribution around the KRW 12 million point, where the tax rate jumps from 6% to 12%.

$$C_j = \sum_{i=0}^{p} \beta_i (Z_j)^i + \sum_{i=-R}^{R} \gamma_i \bullet 1[Z_j = i] + v_j$$

Figure 1 presents the findings from the full sample, wage earners, and the self-employed,[9] dots indicate the number of observations in each band. The size of each band is KRW 300,000. The red sold lines represent the counterfactual distributions estimated by when setting p (the order of the multi-term equation) at 7, and R (the size of the section capturing the bunch) at 6. In the case of using the full or the wage earner sample, no bunching was observed around the KRW 12 million point. It should be noted that the distribution spikes at points other than those where the marginal tax rate changes. As such, the hypothesis used for this bunching analysis may not apply (the distribution should have no bunching when there is no tax rate increase). Therefore, caution is advised when interpreting these findings.

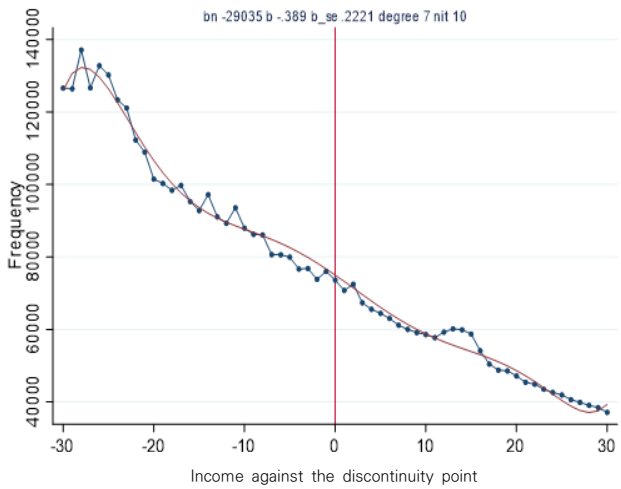
When using the self-employed sample, we find evidence of bunching around the kink point. The size of the bunching is 0.57, which means the size of the bunching around the KRW 12 million point is 57% of the average height of the counterfactual distribution. The standard error, when measured with bootstraps, is 0.17. When we applied the size of the bunching to the following equation, the estimated taxable income elasticity was 0.14. This finding means that a 1% increase in the after-tax income rate translates into a 0.14% increase in the taxable income.

$$e = \frac{\hat{b}}{k \bullet \log\left(\frac{1-t}{1-t-\triangle t}\right)}$$

9 In this study, we define the wage earner as the taxpayer indicated in employment income tax data, and define the self-employed as a taxpayer whose business income (total income) indicated in the general income tax data has a positive value.

Figure 1_Bunching Analysis around the KRW 12 Million Point

1. All



2. wage earner

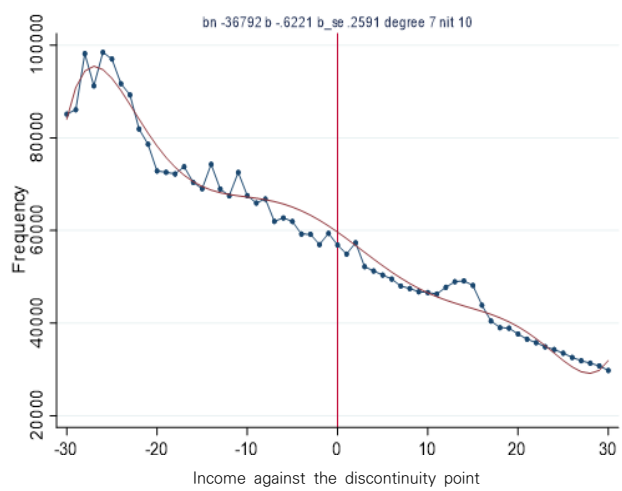
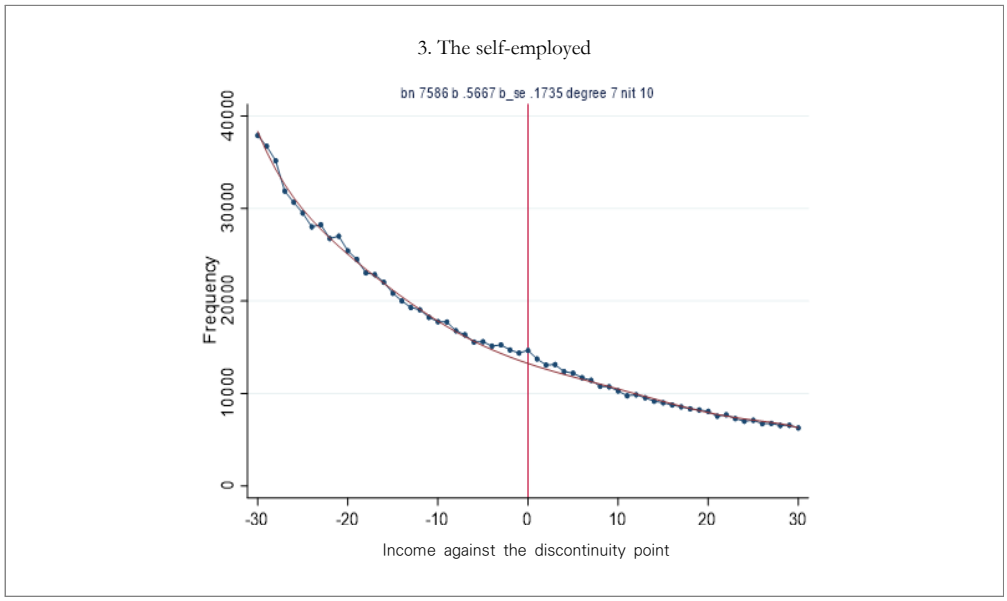


Figure 1_Bunching Analysis around the KRW 12 Million Point(continued)

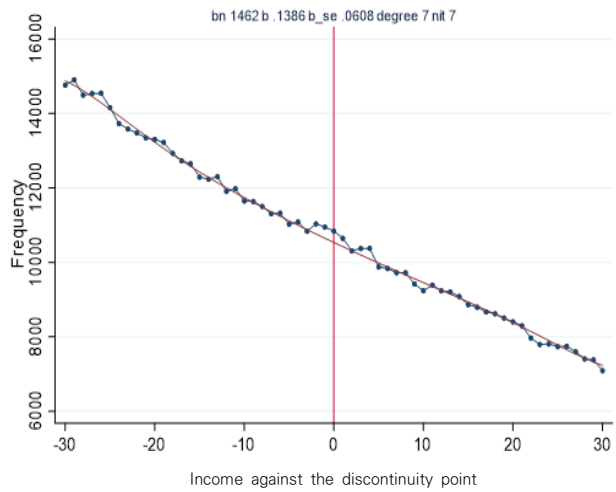


Source: Present study, based on 10% samples from the 2015~2018 General Income Tax and Employment Income Tax data.

Self-employeds are known to be in a better position to adjust their reported income and evade taxes (Saez, Slemrod, and Giertz, 2012), which appears to be consistent with the findings of our bunching analysis. No bunching is observed when analyzing tax payers with no business income at around the KRW 12 million point. Similarly, the bunching analysis around the KRW 46 million point showed significant bunching only for the self-employed sample. The bunching size was 0.44, at a significance level of 5%. The elasticity was estimated to be 0.1.

Figure 2_Bunching Analysis around the KRW 46 Million Point

1. All



2. Wage earners

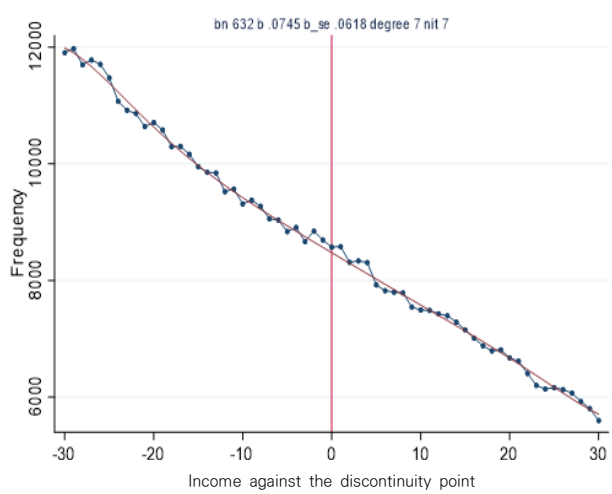
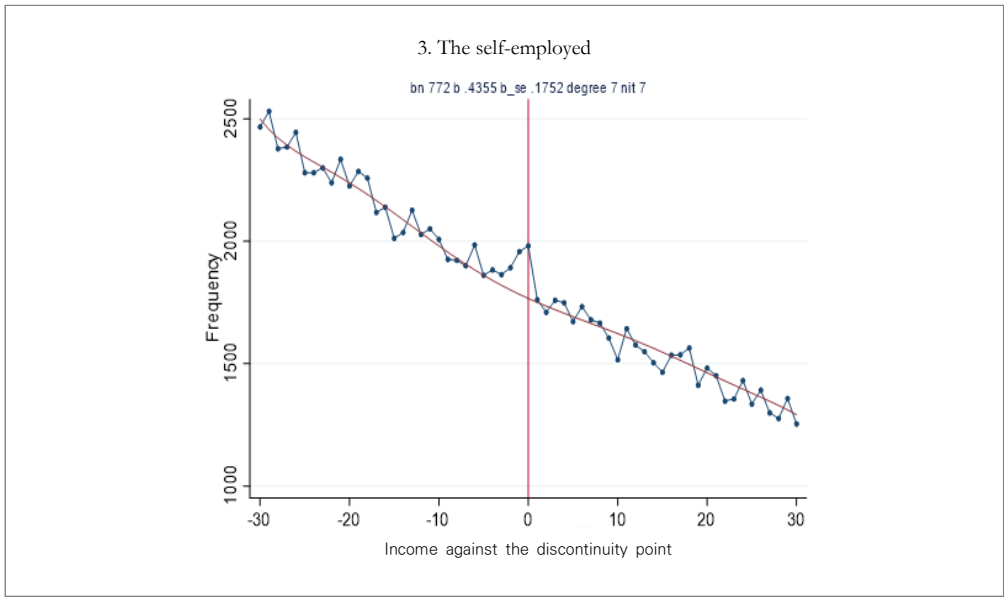


Figure 2_Bunching Analysis around the KRW 46 Million Point(continued)

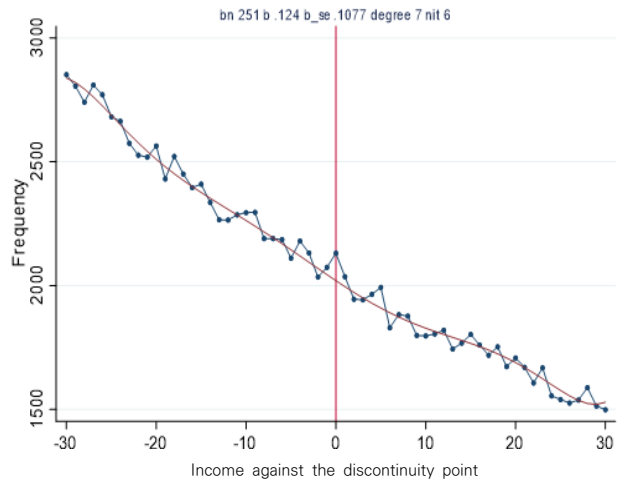


Source: Present study, based on 10% samples from the 2015~2018 General Income Tax and Employment Income Tax data.

No bunching was observed around the KRW 88 million point. The self-employed group does not include the sufficient number of observations required to perform a bunching analysis. Similarly, the threshold between the KRW 150 million taxable income and the higher taxable incomes does not seem to have sufficient observations for a bunching analysis. The taxable income distribution is not smooth, and significantly differs from the estimated distribution. which makes us difficult to derive meaningful results through the bunching analysis.

Figure 3_Bunching Analysis around the KRW 88 Million Point

1. All



2. Wage earners

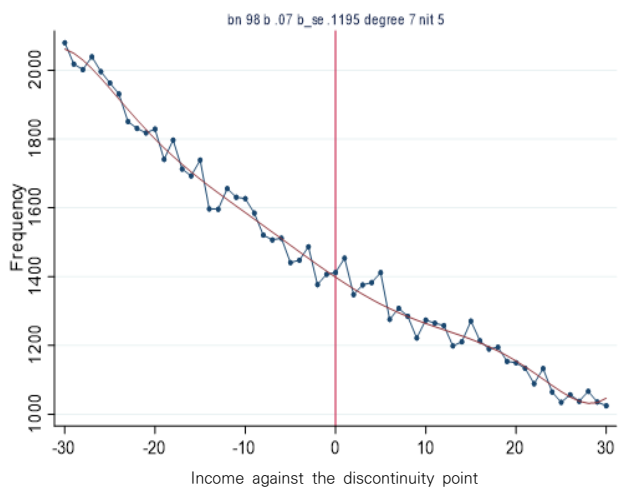
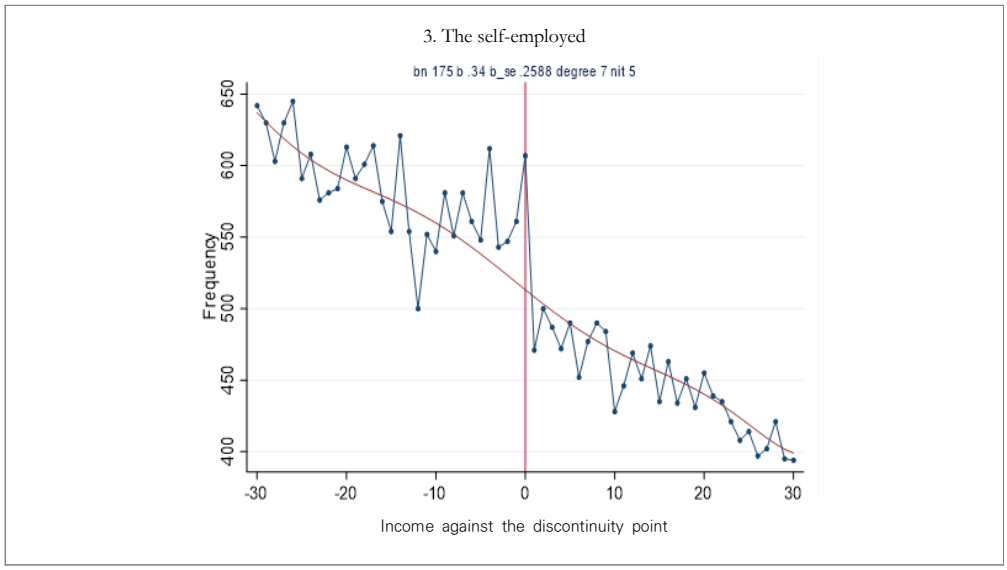
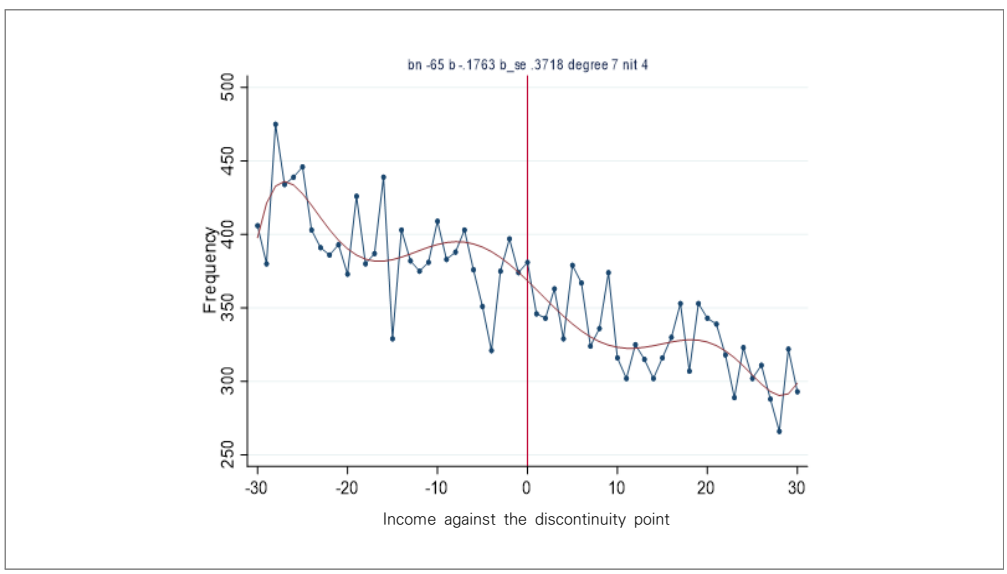


Figure 3_Bunching Analysis around the KRW 88 Million Point(continued)



Source: Present study, based on 10% samples from the 2015~2018 General Income Tax and Employment Income Tax data.

Figure 4_Bunching Analysis around the KRW 150 Million Point



Source: Present study, based on 10% samples from the 2015~2018 General Income Tax and Employment Income Tax data.

3. Comparison and Interpretation of the Findings

In this chapter, we estimate the elasticity of taxable income with respect to marginal tax rates using microdata obtained from the NTS.[10]

Previous studies from outside of Korea reported similar patterns, where the elasticity is the highest in the top income group, and the elasticity of the medium-income group is lower than that of the low-income group. For example, in Gruber and Saez (2002), the elasticity was the highest in the top income group (> USD 100,000), though the elasticity of the low-income group (USD 10,000~50,000) was higher than that of the medium-income group (USD 50,000~USD 100,000).

Saez, Slemrod, and Giertz (2012) argued that there is no credible evidence that high-income earners respond to tax rate changes by actually changing their economic behaviors, and that the high elasticity in the high-income group could be attributed to the high percentage of business income. Table 7 below provides an overview of the income type composition by taxable income in the global income tax payer group. The findings are consistent with Saez, Slemrod, and Giertz (2012): in the top group the percentage of labor income is the lowest, and the percentage of business income is the highest. In addition, the percentage of employment income in the "KRW 12 million or lower" bracket is lower than the percentage in the KRW 12 million~KRW 88 million bracket, whereas the business income comprises a higher percentage in the former. These differences in income type composition may explain the behavioral differences at different tax rates. In addition, the low-income group may be more sensitive to tax rate changes because of the higher percentage of part time workers in this bracket.

10 Unfortunately, in this study, we were not able to apply both the DiD and the bunching analysis to estimate the taxable income elasticity in specific income groups. The DiD was only applied to the tax increase for high-income earners included in the latest tax reforms, on account of the short time series of the data. In contrast, the bunching analysis was not applicable to the high-income earner group, on account of the small number of samples. Caution is thus advised when interpreting the data, because these findings are not directly comparable to the findings derived using other methodologies.

Table 7_Income Type Composition by Taxable Income (General Income Tax)

(unit: %)

Taxable income	Employment income	Business income	Other income
All	77.3	21.8	0.9
KRW 12 million or lower	72.5	26.5	1.0
KRW 12 million~KRW 46 million	85.0	14.6	0.4
KRW 46 million~KRW 88 million	84.4	14.7	0.9
KRW 88 million~KRW 150 million	74.3	23.3	2.4
KRW 15 million~KRW 300 million	58.5	37.0	4.5
KRW 300 million~KRW 500 million	49.4	43.0	7.6
KRW 500 million~KRW 1 billion	44.5	40.8	14.7
Above KRW 1 billion	41.9	36.3	21.8

Source: Present study, based on 10% random samples from the 2015~2018 general income tax data.

A few studies in Korea have attempted to estimate the taxable income elasticity (Jun, 2006; Choi, 2009). However, their findings are not directly comparable to the findings of this study. The previous studies in Korea commonly relied on questionnaire surveys, and the findings presented in Choi (2009) have not been tested for statistical significance. In Jun (2006), the statistical significance was not high for most of the findings. For example, the estimated elasticity of the top 5% income earners (which was derived using a similar method to the method used in this study[11] was around 0.99.

In previous studies outside of Korea, taxable income elasticity ranges from negative values to over 1 (Neisser, 2018). The difference in the findings between this study and the previous studies may stem from differences in the data analyzed and the models, or may be caused by other differences in tax administration or economic behaviors. Given the large number of studies undertaken globally, and the wide range of resulting estimates.

We explain the differences in elasticity by focusing on how taxpayers respond to a tax rate increase. First, an economic agent can adjust their labor supply in response to a tax increase, depending on their preferences and given situation (Cheety et al., 2011). Their working hours may increase or decrease depending on the relative sizes of both the income effect and the substitution effect (Manski, 2014). In addition, the effect of labor supply may significantly change depending on the adjustment costs and hours constraints (Chetty et al., 2011). For example, with all other conditions being equal, a more flexible labor market may result in more elastic responses from taxpayers to a tax increase. Unfortunately, the tax information used in

11 Both Jun (2006) and this study used tax rate variations originating from tax reforms.

this study does not include information on working hours, which prevented us from empirically analyzing the effect of labor supply. A subsequent researcher could use questionnaire survey results to obtain information on working hours. However, such an approach may not provide a sufficient number of observations in the high-income group for either the DiD or the bunching analysis.

Taxpayers may respond to a tax rate increase by resorting to tax evasion. In other words, taxable income elasticity may vary depending on the level of tax compliance. In fact, in previous studies, the self-employed was found to be quite sensitive to a tax increase (Saez, Slemrod, and Giertz, 2012). The self-employed can reduce their tax burden by adjusting their revenues and necessary expenses, or by establishing a corporation (Jun, 2013). In contrast, it is extremely difficult for wage earners to evade taxes, particularly in countries that withhold taxes on employment income such as Korea, the United States, and the United Kingdom. High-income earners can also respond to a tax rate increase by using fringe benefits. Fringe benefits refer to benefits other than wages paid for by employers. Typical examples include subsidies for houses and private vehicles. In response to a tax rate increase, a high-income earner can negotiate with their employer to lower their cash wages and increase their fringe benefits instead.

The difference in taxable income elasticity can be explained as being due to a difference in the taxpayers' understanding of the tax system. The 10th Fiscal Panel studied whether taxpayers are aware of the highest income tax rates. The respondents were asked to answer "Yes," "No," or "Do not know" to questions pertaining to whether the highest income tax rate is higher than 35%. Less than 40% chose "Yes" in both the wage earner and the self-employed groups. At the time of the survey (2017), the tax rate for the "above KRW 88 million" bracket was 35% or higher. Therefore, we need to examine the percentage of correct answers by restricting the respondents with an "above KRW 88 million" taxable income. The percentage is 58% for wage earners, and 51% for self-employeds, which are higher than the average of the full sample.[12] However, caution is needed when interpreting these findings because high-income earners may have a better understanding of the overall tax system. Notably, more than 40% of high-income earning taxpayers did not know the tax rates that were being applied to them, which explains their limited behavioral responses to marginal tax rate increases.

---

12 However, a higher taxable income is correlated with the level of knowledge in other areas, such as the value added tax. It is difficult to clearly discern whether the effect is correlated with the overall knowledge level of the individuals.

III. Estimation of Efficiency Cost

1. Taxable Income Elasticity and Parameters

One of the key parameters for the efficiency cost estimation is the taxable income elasticity. In this report, we estimated the taxable income elasticity in some taxable income brackets using a bunching analysis and the DiD method. In the business income earner group, we were able to use the bunching analysis to calculate statistically significant taxable income elasticity estimates that are consistent with theory, at around the KRW 12 million and KRW 46 million points. The estimates were 0.14 and 0.10, respectively. As for the DiD findings, the taxable income elasticity estimate for business income earners with taxable incomes above KRW 500 million was statistically significant, and also consistent with theory. The estimate was 0.24. In this study, we used these significant and consistent estimates as a basis for the efficiency cost estimation.

Table 8_Taxable Income Elasticity Parameters

Taxable income bracket (KRW million)	Above 12, 46 or lower	Above 46, 88 or lower	Above 500
Taxable income elasticity	0.14	0.10	0.24

Source: Present study

We used the taxable income brackets from 2018 to estimate the efficiency cost in the KRW 12 million~KRW 46 million bracket, the KRW 46 million~KRW 88 million bracket, and the above KRW 500 million bracket, which correspond to the taxable income elasticity estimates.[13] Table 8 shows the taxable income elasticity set for each taxable income bracket. The taxable income elasticity for the KRW 12 million~KRW 46 million bracket and the KRW 46 million~KRW 88 million bracket were set at 0.14 and 0.10, respectively. The taxable income elasticity for the above KRW 500 million bracket was set at 0.24, which is estimated using the DiD method. The taxable income elasticity for the KRW 12 million~KRW 46 million bracket and the KRW 46 million~KRW 88 million bracket were estimated using the bunching analysis,

13 There are no taxable income elasticity estimates for the other brackets. Therefore, the efficiency cost estimation should rely on assumptions about the taxable income elasticity. However, it is difficult to assume the taxable income elasticity based on reasonable and valid bases, whereas the efficiency cost estimation based on less persuasive assumptions would be meaningless. Therefore, we did not estimate the efficiency cost for taxable income brackets where taxable income elasticity estimates do not exist.

and thus require caution when interpreting the findings. The bunching analysis uses taxpayers from around the lowest threshold of a taxable income bracket as the analysis samples. Therefore, it should be noted that the efficiency cost calculated using these taxable income elasticity estimates may result in an overestimation. In other words, taxpayers farther away from the threshold may show less response to changes in marginal tax rates, resulting in lower taxable income elasticity estimates than those listed in Table 8. As a result, the efficiency costs may actually be lower than those estimated in this study.

The equations for efficiency cost, average efficiency cost, and marginal efficiency cost require information including the max/min amounts, the number of taxpayers, the tax rates, and the average taxable income in each taxable income bracket. This information was secured using the global income statistics from the 2018 Statistical Yearbook of National Tax. Table 9 highlights the summary statistics used for the analysis. In 2018, the Korean income tax regime consisted of seven taxable income brackets. The statutory marginal tax rate began with 6% in the KRW 0~KRW 12 million bracket, and increased in higher brackets. The marginal tax rate in the top bracket (above KRW 500 million) was 42%. As previously mentioned, Harberger's triangle method typically uses the average marginal tax rate to calculate the efficiency costs. Therefore, the calculation also requires information on the average marginal tax rate in each bracket, which was calculated by dividing the total calculated tax amount in each bracket by the total taxable income in each bracket. Table 9 lists the percentage of taxpayers in each taxable income bracket, as well as the percentage of taxable income. According to the table, the sum of the taxpayer percentages of the KRW 12 million~KRW

Table 9_Summary Statistics for Efficiency Cost Estimation

(unit: million, %, no. of taxpayers)

Taxable income bracket	Statutory marginal tax rate	Average marginal tax rate	No. of taxpayers		Average taxable income	Taxable income total	
			No. of taxpayers	%		Amount	%
KRW 0~12 million	6	6.0	3,706,937	58.0	5	16,889,724	9.5
KRW 12~46 million	15	10.4	1,880,609	29.4	23	43,608,104	24.4
KRW 46~88 million	24	15.6	450,740	7.0	63	28,337,149	15.9
KRW 88~150 million	35	21.4	189,453	3.0	113	21,371,976	12.0
KRW 150~300 million	38	28.0	109,178	1.7	204	22,323,572	12.5
KRW 300~500 million	40	32.9	32,720	0.5	380	12,419,004	7.0
Above 500 million	42	38.9	26,199	0.4	1,288	33,737,250	18.9

Notes: 1. Average marginal tax rate = calculated tax amount / taxable income
2. Total taxable income = no. of taxpayers × average taxable income
Source: Present study, based on Statistical Yearbook of National Tax (2019)

46 million bracket, the KRW 46 million~KRW 88 million bracket, and the above KRW 500 million bracket was 36.9%, and the sum of the taxable income percentages of the three brackets was 59.1%.

2. Estimation Using Harberger's Triangle Method

Table 10 summarizes the findings derived using Harberger's triangle method. The first row presents the estimated efficiency cost when the income tax is first adopted. The efficiency cost incurred by the income tax adoption was KRW 36.8 billion in the KRW 12 million~KRW 46 million bracket, KRW 40.9 billion in the KRW 46 million~KRW 88 million bracket, and KRW 1,026 billion in the above KRW 500 million bracket. Overall, the efficiency cost of the income tax adoption was significantly higher in the above KRW 500 million than the KRW 12 million~KRW 88 million brackets. These findings can be explained by the fact that taxpayers in the above KRW 500 million bracket show higher levels of behavioral responses to tax rate increases and a higher average marginal tax rate than taxpayers in the other brackets, in addition to having a higher average taxable income and a higher total taxable income. To confirm this possibility, we calculated the efficiency costs by applying the taxable income elasticity and average marginal tax rate of the above KRW 500 million bracket to the other taxable income brackets. As shown in Table 11, the efficiency costs in the brackets other than the KRW 12 million~KRW 46 million bracket were lower than the efficiency costs of the above KRW 500 million bracket.

Table 10_Results of Estimation Using Harberger's Triangle Method

(unit: million, %, no. of taxpayers)

Taxable income bracket	Above 12, 46 or lower	Above 46, 88 or lower	Above 500
Efficiency cost of tax adoption	36,849	40,854	1,002,649
Average efficiency cost	0.8	0.9	7.6
Efficiency cost in case of 1%p tax rate increase	7,927	5,960	69,764
Marginal efficiency cost	1.8	2.1	20.7
Taxable income elasticity	0.14	0.10	0.24
Average marginal tax rate	10.4	15.6	38.9
No. of taxpayers	1,880,609	450,740	26,199
Average taxable income	23	63	1,288
Total taxable income	43,608,104	28,337,149	33,737,250

Notes: 1. The average efficiency cost was calculated by dividing the efficiency cost per 100 of tax revenue by the tax revenue.
2. The marginal efficiency cost was calculated by dividing the efficiency cost per 100 of tax revenue incurred by tax rate increase by the tax revenue increase.
3. The taxable income elasticity is as shown in Table 8, and the average marginal tax rate, the number of taxpayers, the average taxable income, and the total taxable income are as shown in Table 9.

Source: Present study

Table 11_Effect of Number of Taxpayers and Taxable Income Size

(unit: KRW million, no. of taxpayers)

Taxable income bracket	Efficiency costs	No. of taxpayers	Average taxable income	Taxable income total
KRW 0~12 million	501,952	3,706,937	5	16,889,724
KRW 12~46 million	1,296,004	1,880,609	23	43,608,104
KRW 46~88 million	842,162	450,740	63	28,337,149
KRW 88~150 million	635,161	189,453	113	21,371,976
KRW 150~300 million	663,442	109,178	204	22,323,572
KRW 300~500 million	369,085	32,720	380	12,419,004
Above 500 million	1,002,649	26,199	1,288	33,737,250

Note: The efficiency costs of all taxable income brackets were calculated using the taxable income elasticity of the above KRW 500 million bracket, and the average marginal tax rate.
Source: Present study

The second row of Table 10 shows the estimated average efficiency cost for income tax calculated using Harberger's triangle method. The average efficiency cost was 0.8 in the KRW 12 million~KRW 46 million bracket, and 0.9 in the KRW 46 million~KRW 88 million bracket. These estimates are equivalent to KRW 0.8 and 0.9 per 100 of tax revenue, or 0.8% and 0.9% of the income tax revenue, and indicate minimal levels of average efficiency cost. The average efficiency cost in the above KRW 500 million bracket was KRW 7.6 per KRW 100 of tax revenue, or 7.6% of the tax revenue, which were higher than the efficiency costs of the KRW 12 million~KRW 46 million bracket and the KRW 46 million~KRW 88 million bracket. The findings can be attributed to the relatively high levels of taxable income elasticity, as well as the average marginal tax rate in the top bracket.

A comparison of the findings of this study with those of other studies that used similar methods shows that the average efficiency cost estimates obtained in this study are lower than those of previous studies. For example, Browning (1987) and Feldstein (1999) estimated the average efficiency cost of the United States income tax at 8~29% and 32~52% of the tax revenue, respectively. In Korea, when Choi (2009) reported the average efficiency cost of each income bracket, the estimates were generally higher than the findings of this study. For example, the average efficiency estimates obtained using the effect of the 2002 Tax Act amendment were 7.1~29.0% of the tax revenue in the KRW 40 million~80 million bracket. These discrepancies may be explained by various factors, most notably by differences in the taxable income elasticity and in labor supply elasticity estimates used for the estimation. Browning (1987) set the labor supply elasticity at 0.2~0.4, and Feldstein (1999) set the taxable income elasticity at 1.04. Choi (2009) applied different taxable income elasticities to different

income brackets, ranging from 0.14 to 0.65.

The average efficiency cost is a measure of the efficiency cost of the income tax regime. However, the efficiency cost of a tax rate increase offers a more useful and meaningful indicator for policy purposes. The third row of Table 10 lists the estimated efficiency costs of a 1%p increase in the average marginal tax rate for each bracket under the 2018 tax rate structure. The efficiency cost incurred by the tax rate increase was KRW 7.9 billion in the KRW 12 million~KRW 46 million bracket, KRW 6.0 billion in the KRW 46 million~KRW 88 million bracket, and KRW 69.8 billion in the above KRW 500 million bracket. As was the case with the average efficiency cost, the efficiency cost of the top bracket was the highest, which originates from the higher taxable income elasticity and average taxable income of the bracket.

The fourth row of Table 10 lists the estimated marginal efficiency costs for a 1%p increase in the average marginal tax rate of each bracket. The marginal efficiency cost refers to the percentage of the efficiency cost in the tax revenue increase originating from a tax rate increase. The marginal efficiency cost was around 2% of the additional tax revenue in both the KRW 12 million~KRW 46 million bracket and the KRW 46 million~KRW 88 million bracket, whereas the percentage was higher at 20.7% in the above KRW 500 million bracket. These findings can be attributed to the high levels of taxable income elasticity and the average marginal tax rate in the top bracket.

3. Estimation Using Saez's Method

In this section, we use the efficiency cost estimation method proposed by Saez to estimate the efficiency cost of a marginal tax rate increase under the Korean income tax regime in 2018. The estimates are listed in Table 12. In the first row, the efficiency cost for a 1%p increase in the marginal tax rate in each taxable income bracket was KRW 10.8 billion in the KRW 12 million~KRW 46 million bracket, KRW 8.9 billion in the KRW 46 million~KRW 88 million bracket, and KRW 58.6 billion in the above KRW 500 million bracket. Similar to the findings obtained from Harberger's triangle method, the efficiency cost was the highest in the above KRW 500 million bracket, on account of the high levels of taxable income elasticity and marginal tax rate, as well as the sizable taxable income.[14]

---

14 When estimated using Saez's method and Harberger's triangle method, the efficiency costs incurred by a tax rate increase show similar patterns for each taxable income bracket, and the efficiency cost differences among the different brackets are low. These findings seem to support the argument in Rosen (1978) that an

Table 12_Estimation Using Saez's Method

(unit: million, %, no. of taxpayers)

Taxable income bracket	Above 12, 46 or lower	Above 46, 88 or lower	Above 500
Efficiency cost in case of 1%p tax rate increase	10,774	8,949	58,633
Marginal efficiency cost	2.3	4.1	39.7
Additional tax revenue	474,453	217,254	147,744
Taxable income elasticity	0.14	0.10	0.24
Marginal tax rate	15	24	42
No. of taxpayers	1,880,609	450,740	26,199
Average taxable income	23	63	1,288
Total taxable income	43,608,104	28,337,149	33,737,250

Notes: 1. The marginal efficiency cost was calculated by dividing the efficiency cost per 100 of tax revenue incurred by tax rate increase by the tax revenue increase.
2. The taxable income elasticity is as shown in Table 8, and the marginal tax rate, the number of taxpayers, the average taxable income, and the total taxable income are as shown in Table 9.

Source: Present study

The second row of Table 12 shows marginal efficiency costs estimated using Saez's method. The marginal efficiency cost is the highest at 39.7 in the above KRW 500 million bracket, which is KRW 39.7 per 100 of additional tax revenue, or 39.7% of the additional tax revenue. The marginal efficiency cost in the KRW 12 million~KRW 46 million bracket and the KRW 46 million~KRW 88 million bracket were 2.3% and 4.1%, respectively. The higher marginal efficiency cost in the above KRW 500 million bracket seems to be attributable to two factors. First, the taxable income elasticity of taxpayers in the above KRW 500 million bracket is higher than that in the KRW 12 million~KRW 88 million bracket, so the size of efficiency cost is relatively larger for the above KRW 500 million bracket. Second, the marginal tax rate of the above KRW 500 million bracket applies only to taxpayers in that bracket (indicating a narrow tax base). In contrast, in the KRW 12 million~KRW 46 million bracket and the KRW 46 million~KRW 88 million bracket, both the taxpayers in the brackets and those in the higher brackets have the marginal tax rate applied (indicating a broad tax base). Hence, the amount of the tax revenue increase is relatively smaller for the above KRW 500 million bracket. This is confirmed by the third row of Table 12. Subsequently, given these two factors, the marginal efficiency cost in the above KRW 500 million bracket is higher because of the higher efficiency cost and the lower tax revenue increase.

The marginal efficiency cost estimates obtained based on Saez's method are somewhat

appropriate use of Harberger's triangle method would result in satisfactory efficiency cost estimation results.

different from those based on Harberger's triangle method. This difference increases in the above KRW 500 million bracket, potentially caused by the inability of Harberger's triangle method to reflect the progressiveness of the tax structure.

A comparison between the marginal efficiency cost estimates of this study (using Saez's method) and those of Saez, Slemrod, and Giertz (2012) shows close similarities. Saez, Slemrod, and Giertz (2012) estimated the marginal efficiency cost of the top marginal efficiency cost bracket in the United States, which was 38% of the additional tax revenue. The figure is close to the Korean estimate calculated in this study, which is 39.7% in the top marginal tax rate bracket. These similarities are likely the result of the similarities in the taxable income elasticity and marginal tax rate used in the two studies.

4. Sensitivity by Taxable Income Elasticity

As mentioned at the beginning of this section, the taxable income elasticity is a key parameter in determining the efficiency cost. Therefore, a change in the taxable income elasticity may result in a significant change in the efficiency cost. In this section, we analyze the sensitivity of the efficiency cost to changes in the taxable income elasticity by examining three scenarios, each having a different level of taxable income elasticity. The first scenario (baseline scenario in Table 13) uses the taxable income elasticity estimated in this study. The second scenario (scenario 1 in Table 13) uses a taxable income elasticity that is 0.10 lower than the estimate obtained in this study. The third scenario (scenario 2 in Table 13) uses a taxable income elasticity that is 0.10 higher than the estimate obtained in this study.

Table 13 lists the estimated changes in efficiency cost and marginal efficiency cost caused by changes in the taxable income elasticity, based on Saez's method.[15] For the efficiency cost estimates, the efficiency costs in scenario 1 are lower than the base scenario by KRW 7.7 billion, KRW 8.9 billion, and KRW 24.4 billion in the KRW 12 million~KRW 46 million bracket, the KRW 46 million~KRW 88 million bracket, and the above KRW 500 million bracket, respectively. The efficiency cost in scenario 2 was higher than for the baseline scenario, though the gaps were identical to those between the baseline scenario and scenario 1.

The marginal efficiency cost was lower in scenario 1 than for the baseline scenario, and higher in scenario 2 than for the baseline scenario. In this case, the gap between scenario 2 and

15 The findings based on Harberger's triangle method are not included in the report, as they are similar to those based on Saez's method.

the baseline scenario was larger than the gap between scenario 1 and the baseline scenario. In the above KRW 500 million bracket, the gap between scenario 1 and the baseline scenario was 19.8, whereas the gap between scenario 2 and the baseline scenario was 27.7.

A noteworthy aspect of this sensitivity analysis is the high variation in the efficiency cost and the marginal efficiency cost, depending on changes in the taxable income elasticity in the above KRW 500 million bracket. This analysis considered a 0.10 change in taxable income elasticity, i.e., in the case of a 1% change in the marginal tax rate, taxpayers adjust their taxable income by 0.1%. Note that though 0.1% of the taxable income may seem small, as shown in Table 9, the size of the average taxable income is quite large in the above KRW 500 million bracket, so even 0.1% of the taxable income would be significant. Therefore, the high variation in the efficiency cost and the marginal efficiency cost in the above KRW 500 million bracket seems to be the result of the high level of the average taxable income.

Table 13_Sensitivity by Taxable Income Elasticity (Saez's method)

(unit: KRW million)

Taxable income bracket	Baseline scenarios	Scenario 1	Scenario 2
Taxable income elasticity			
KRW 12~46 million	0.14	0.04	0.24
KRW 46~88 million	0.10	0.00	0.20
Above 500 million	0.24	0.14	0.34
Efficiency cost in case of 1%p tax rate increase			
KRW 12~46 million	10,774	3,078	18,469
KRW 46~88 million	8,949	0	17,897
Above 500 million	58,633	34,203	83,063
Marginal efficiency cost			
KRW 12~46 million	2.3	0.6	4.0
KRW 46~88 million	4.1	0.0	8.6
Above 500 million	39.7	19.9	67.4

Note: The marginal efficiency cost was calculated by dividing the efficiency cost per 100 of tax revenue incurred by tax rate increase for the tax revenue increase.
Source: Present study

5. Section Conclusion

In this section, we estimated the efficiency cost of Korea's income tax using Harberger's triangle method and the method proposed by Saez. To summarize, the efficiency cost of taxpayers' behavioral change in response to a marginal tax rate increase was smaller in the

lower taxable income brackets, but increased to around 40% of the additional tax revenue in the top bracket (based on Saez's method).[16] These findings seem to be mainly attributable to the higher tax rate and the higher level of behavioral responses to tax changes in the top bracket, as well as their higher level of taxable income. It was also found that the efficiency cost is sensitive to the taxable income elasticity. Again, the level of variation was higher in the top taxable income bracket due to the high level of taxable income.[17]

This study did not estimate the efficiency cost for all taxable income brackets. However, the efficiency cost of the brackets not included in this study are expected to be lower than the efficiency cost in the above KRW 500 million bracket. Notably, even though the lowest bracket has the largest number of taxpayers, the efficiency cost would be limited by the low level of the taxpayers' taxable income. In the brackets ranging from KRW 88 million to KRW 500 million, the efficiency cost incurred by the behavioral responses of high-income earners is expected to be significant, as the brackets include those generally recognized as high-income earners. However, as shown in Table 9, the total taxable income in those brackets is not significant, and it is likely that the efficiency cost would not be as high as for the above KRW 500 million bracket.

IV. Conclusion

Increasing taxes may incur unintended social costs by distorting the decisions made by economic agents. Taxpayers can respond to tax increases by changing their working hours, unobserved efforts, career choices, and their level of tax compliance. This study estimated the effect of tax rates on reported taxable income and calculated the excess burden of income taxation using Korean administrative data. We found that the behavioral response to changes in income tax rates is concentrated among self-employed and high-income individuals who have substantial ability to shelter income.

In Chapter II, when limiting the sample to self-employeds, the findings indicated a statistically significant positive elasticity of taxable income with respect to marginal tax rates.

---

16 This study focused on the estimates based on Saez's method, because Harberger's triangle method cannot consider the progressiveness of the tax structure.

17 It should be noted that the efficiency cost estimation in this study is likely to be biased by its limitations in the analysis. In particular, the efficiency cost was estimated using the global income tax statistics obtained from the Statistical Yearbook of National Tax, which includes taxpayers with no business income.

In Chapter III, we estimated efficiency cost incurred by an income tax rate increase, and the findings indicated that the efficiency cost is affected by behavioral response in self-employeds. In terms of taxable income brackets, social costs were the highest in the top bracket. These findings can be explained by the high tax rates, larger taxable incomes, and higher elasticity in that bracket.[18]

Saez, Slemrod, and Giertz (2012) argued that the high taxable income elasticity in the top bracket stems from their high accessibility to means of tax evasion, and the most appropriate policy response would be to increase the level of tax compliance. We hope that future studies will further analyze the different paths of behavioral responses to tax increases, and propose effective policy alternatives.

We would also like to draw the readers' attention to the limitations in the methods and data used in this study. The findings on efficiency cost should be interpreted with caution because they may vary significantly depending on the taxable income elasticity. The income elasticity estimates based on the DiD method may include effects from other institutional and non-institutional changes that occurred during the same period. In particular, due to the short time series of the data, group-specific trends before the tax reforms could not be controlled for.

18 The top bracket also recorded the highest marginal efficiency cost, caused by a KRW 1 increase in tax revenue.

References

Browning, E. K., "On the Marginal Welfare Cost of Taxation," *American Economic Review*, 71(1), 1987, pp. 11~23.

Chetty, R., Friedman, J. N., Olsen, T., and Pistaferri, L., "Adjustment Costs, Firm Responses, and Micro vs. Macro Labor Supply Elasticities: Evidence from Danish Tax Records," *Quarterly Journal of Economics*, 126(2), 2011, pp. 749~804.

Choi, Seong-eun, "Elasticity of Taxable Income and Deadweight Loss," *Health and Social Welfare Review*, 29(2), 2009, pp. 213~242.

Feldstein, Martin, "Tax Avoidance and the Deadweight Loss of the Income Tax," *Review of Economics and Statistics*, 81(4), 1999, pp. 674~678.

Gruber, Jon, and Emmanuel Saez, "The Elasticity of Taxable Income: Evidence, Implications." NBER Working Paper No. 7512, 2000.

Jun, Byung-mok, *A Study on Taxable Income Elasticity, Korea Institute of Public Finance*, 2007a.

Jun, Byung-mok, *A Study on the Income Shifting Between the Personal Income Tax and the Corporate Income Tax*, Korea Institute of Public Finance, 2007b.

Kwon, Sung-oh, *Taxpayers' Behavioral Response Caused by Income Tax Rate Increase Using the Bunching Analysis Method*, Korea Institute of Public Finance, 2019.

Kwon, Sung-oh, Lee, Dong-gyu, and Jun, Byung-wuk, *2019 Special Case Tax Rules In-Depth Assessment: Tax Credit for Compliance Confirmation Costs*, Korea Institute of Public Finance, 2020.

Manski, C. F., "Identification of income–leisure preferences and evaluation of income tax policy," *Quantitative Economics*, 5(1), 2014, pp. 145~174.

National Tax Service, *Statistical Yearbook of National Tax*, 2019.

Neisser, Carina, "The elasticity of taxable income: A meta-regression analysis," *IZA Discussion Paper* No. 11958, 2018.

Piketty, Thomas, Emmanuel Saez, and Stefanie Stantcheva, "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities," *American Economic Journal: Economic Policy*, 6(1), 2014, pp. 230~271.

Rosen, Harvey S., "The Measurement of Excess Burden with Explicit Utility Functions," *Journal of Political Economy*, 86(2), 1978, pp. S121~S135.

Saez, E., Slemrod, J., and Giertz, S. H., "The Elasticity of Taxable Income with respect to Marginal Tax Rates: A Critical Review," *Journal of Economic Literature*, 50(1), 2012, pp. 3~50.

Saez, Emmanuel, "Using Elasticity to Derive Optimal Income Tax Rates," *Review of Economic Studies*, 68(1), 2001, pp. 205~229.

Saez, Emmanuel, "Do Taxpayers Bunch at Kink Points?" *American Economic Journal: Economic Policy*, 2(3), 2010, pp. 180~212.

Korea Institute of Public Finance, *National Survey of Tax and Benefit*, https://www.kipf.re.kr/panel.

Appendix

Appendix Table 1_Percentages of Business Income and Employment Income Reporters as General Income Reporters

By general income size	No. of general income reporters	Business income	Employment income
All	6,911,088	73%	31%
0 or lower	250,643	9%	10%
KRW 10 million or lower	2,763,987	84%	14%
KRW 20 million or lower	1,538,240	74%	36%
KRW 40 million or lower	1,190,732	69%	46%
KRW 60 million or lower	438,013	65%	49%
KRW 80 million or lower	234,896	59%	54%
KRW 0.1 billion or lower	142,023	57%	55%
KRW 0.2 billion or lower	232,760	56%	54%
KRW 0.3 billion or lower	56,951	59%	50%
KRW 0.5 billion or lower	35,409	61%	48%
Above KRW 0.5 billion	27,434	54%	56%

Source: Statistical Yearbook of National Tax (2019)

The Effect of Speculative Investment Zone and Overheated Zone Designations on the Housing Market : Seoul Housing Market and August 2 Policy

Kyungho Song*

I. Introduction

The current administration of Korea recently announced a series of measures to stabilize the housing market for citizens. These stabilization measures encompass a vast range of concepts, though they can be largely grouped into three categories: 1) measures to suppress speculative investment; 2) measures to control the housing demand based on actual needs; and 3) measures to control the housing supply. To prevent speculative investors from flocking to certain areas, the government has frequently set up Adjustment Zones, Overheated Speculative Investment Zones (Overheated Zones), and Speculative Investment Zones in areas reporting a steep housing price increase. In addition, the government has introduced the Surplus Profit Collection for Renovated Apartments, in an attempt to deter speculative investments in rebuilt apartments. Other policies aimed at reorganizing the housing market for people who require housing units include: imposing higher transfer tax rates on multi-home owners (10%p increase for two-house owners; 20%p increase for

---

* This article is an excerpted summary of Song, Kyungho and Kwon, Sung-oh, *The Effect of the Government Real Estate Policies on the Housing Market: Seoul Housing Market, August 2 Policy, and September 13 Policy* (to be published in December 2020).

Kyungho Song, Associate Fellow, of Korea Institute of Public Finance

three-house owners and exclusion from special tax credit); introducing stricter requirements for transfer income tax exemption for single-family households in Adjustment Zones (two-year residence instead of two-year ownership); increasing financial regulations on multi-home owners (higher loan-to-value and debt-to-income requirements); and reforming the housing subscription system for people buying housing units to live in. The government has also made efforts to expand the housing supply for low-income earners, resulting in Public Rental Housing and "Newlywed Hope Towns." However, despite these multi-faceted efforts and measures, neither the housing market nor citizens significantly benefited from them.

To help the government develop and design more effective housing policies, we need to closely examine the effects of past policies on the housing market. For this task, this study carries out a careful empirical analysis on the effect of various housing market stabilization policies; in particular, the policy to designate certain areas as regulation zones (Adjustment Zone, Overheated Zone, and Speculative Investment Zone).

This study consists of the following chapters. Chapter 2 outlines the August 2 Policies announced in 2017, focusing on the designation of Adjustment Zones, Overheated Zones, and Speculative Investment Zones. Chapter 3 discusses the effect of Speculative Investment Zone/Overheated Zone designation in Seoul from multiple angles. Chapter 4 summarizes the findings of this study, and provides further policy implications.

II. Summary of the Regulation Zone Designation and the August 2 Policies

On August 2, 2017, the Korean government announced Housing Market Stabilization Policies to Protect People With Actual Needs for Houses and Deter Short-Term Speculative Investment (the "August 2 Policies"). Table 1 summarizes the key elements of the August 2 Policies.

Table 1_Housing Market Stabilization Policies to Protect People with Actual Needs for Houses and Deter Short-Term Speculative Investment

Deter speculative investments and foster a market led by actual needs		Increase supply for low-income earners and people with actual needs for housing	
Deter speculative investment in Overheated Zones	Control housing supply based on actual needs, and enhance the investigation function for speculative investments	Increase housing supply for low-income earners	Reform the housing subscription system and other systems for people with actual needs
● Designate Overheated Zones - Seoul, Gwacheon (Gyeonggi-do), Sejong ● Designate Speculative Investment Zones - 11 gu's (districts) in Seoul; Sejong ● Improve requirements for the Sale Price Cap ● Reform renovation/ redevelopment regulations - Implement the Surplus Profit Collection for Renovated Apartments - Restrict reselling of pre-completion housing ownership rights in redevelopment areas - Increase the rental housing percentage requirement for redevelopment areas - Introduce stricter restriction on multiple pre-completion housing ownership rights in renovated apartments	● Raise the transfer income tax rates - Raise tax rates for multi-home owners and exclude them from special tax credits - Introduce stricter requirements for non-taxable housing sale - Raise the transfer tax rates for pre-completion housing ownership rights ● Reinforce financial regulations against multi-home owners - Reinforce restrictions on mortgage loans for housing units in Speculative Investment Zones - Raise LTV/DTI requirements (multi-home owners) - Reinforce requirements for interim payment loans (individual → household) ● Encourage housing lease registration by multi-home owners ● Introduce reporting requirements for financing plans, and the Special Judicial Police	● Secure public housing sites for increased supply of various housing types in the Seoul Capital Area (SCA) ● Supply 170,000 Public Rental Housing units per year - 100,000 units per year in the SCA ● Supply housing units in Newlywed Hope Towns - 50,000 units (30,000 units in the SCA)	● Reform the housing subscription system - Introduce stricter requirements for first-priority subscribers; increase the scope of the point-based subscription system ● Restrict reselling of pre-completion housing ownership rights in non-SCA areas - Ownership transfer restricted for six months (metropolitan areas) or 1.5 year (Adjustment Zones) ● Improve on office-tel supply/management

Source: Relevant Ministries, "Housing Market Stabilization Policies to Protect People With Actual Needs for Houses and Deter Short-Term Speculative Investment," August 2, 2017 press release, p. 4.

One of the defining features of the August 2 Policies is the massive designation of regulation zones (Overheated Zones and Speculative Investment Zones). All of Seoul (25 gu's), Gwacheon, and Sejong were designated as Overheated Zones. Among them, 11 gu's in Seoul (Gangnam, Seocho, Songpa, Gangdong, Yongsan, Seongdong, Nowon, Mapo,

Yangcheon, Yeongdeungpo, and Gangseo) and Sejong were also designated as Speculative Investment Zones. Gangnam, Seocho, and Songpa (the so-called "Three Gangnam Districts") were designated as Overheated Zones/Speculative Investment Zones for the first time since December 2011 and May 2012, respectively. The other gu's in Seoul and were released from the Overheated Zone/Speculative Investment Zone designation in November 2008, and were then re-designated under the August 2 Policies in 2017. The designation criteria for the Overheated Zone and the Speculative Investment Zone are listed in Annex: Table 1, and the specific regulations applied to those zones are summarized in Table 2.

Table 2_Effect of Adjustment Zone/Speculative Investment Zone/Overheated Zone Designation

<table>
<tr><th></th><th>Adjustment Zone</th><th>Overheated Zone</th><th>Speculative Investment Zone</th></tr>
<tr><td rowspan="2">Before August 2 Policies</td><td colspan="2">● Restricted eligibility for first-order subscriber
- Member of household that won a pre-completion ownership right within previous five years
- Person who is not a householder; member of household owning two or more housing units
● Restricted eligibility for re-winning pre-completion ownership rights for private housing
● Restricted number of renovated housing units supplied to each member of a renovation association (single unit)</td><td rowspan="2">● Higher transfer tax rates
- Transfer tax rate raised by 10%p for a household owning a housing unit and three or more pre-completion apartment ownership rights, or a non-business land
● Restriction on maturity extension for mortgage loans
● Restriction on business loans
● Excluded from special case rules for housing acquisition in rural areas
- Housing units and rural areas included in calculating the number of housing units for transfer tax purposes</td></tr>
<tr><td>● Restriction on reselling
- After ownership transfer (Seoul, Gwacheon, Gwangmyeong) / 1.5 years (Seongnam)
● Control on short-term investments
- Stricter requirements for interim payment loan guarantees; bank account for apartment application required for second-order application; separate dates for first-order applications
● LTV and DTI lowered by 10%p
- Overheated Zone, Speculative Investment Zone, etc.</td><td>● Restriction on reselling
- After ownership transfer
● No assignment of reconstruction association member status
- After the establishment of the association is approved
● Disclosure of sale price for housing units subject to the Sale Price Cap</td></tr>
<tr><td>Newly added or Reinforced (August 2 Policies)</td><td colspan="2">● Introduced stricter eligibility requirements for first-order subscriber
- 2 years or longer since opening a subscription account; made 24 or more deposits
● Expand the scope of the score-based subscription system
- 75% of Adjustment Zones; 100% of Overheated Zones
● Reinforced restriction on office-tel reselling (until ownership transfer); preferred sale to actual residents (20%)</td><td>● Restricted number of mortgage loans
- 1 per borrower → 1 per household</td></tr>
</table>

Table 2_Effect of Adjustment Zone/Speculative Investment Zone/Overheated Zone Designation(continued)

	Adjustment Zone	Overheated Zone	Speculative Investment Zone
Newly added or Reinforced (August 2 Policies)	● Higher transfer tax rates - 2-home owner +10%p - 3 or more home owner: +20%p ● Multi-home owners excluded from special tax credit for prolonged ownership ● Stricter requirements for tax exemption for single-family households - At least 2 years of residence ● Transfer tax rate for pre-completion housing ownership right reselling: 50% in all cases	● Redevelopment/ renovation regulation reform - Restriction on reselling of pre-completion housing ownership rights by renovation association members (after ownership transfer) - Restriction on multiple winnings for housing units under refinement projects (association members/ others) - Reinforced requirements for exception to ban on renovation association member status ● New reporting requirement for financing plans and move-in plans - Housing units sold for KRW 300 million or more	
		● LTV·DTI 40% - 30% for households with one or more mortgage loans; 50% for people with actual needs	
Applicable areas	40 areas Seoul (all 25 gu's), Gyeonggi-do (Gwacheon, Seongnam, Hanam, Goyang, Gwangmyeong, Namyangju, Dongtan 2), and Busan (Haeundae, Yeonje, Dongnae, Busanjin, Nam, Suyeong, and Gijang), Sejong	27 areas Seoul (all 25 gu's), Gyeonggi-do (Gwacheon), and Sejong	12 areas Seoul (Gangnam, Seocho, Songpa, Gangdong, Yongsan, Seongdong, Nowon, Mapo, Yangcheon, Yeongdeungpo, and Gangseo)

Source: Relevant Ministries, "Housing Market Stabilization Policies to Protect People With Actual Needs for Houses and Deter Short-Term Speculative Investment," August 2, 2017 press release, p. 30.

The designation of Overheated Zone or Speculative Investment Zone comes with a variety of regulations for tax (transfer tax rate surcharge), finance and loans (restrictions on mortgage loans and stricter LTV/DTI requirements), and transactions (no reselling). Higher transfer income tax rates were increased for 11 gu's in Seoul and Sejong, which were designated as both Overheated Zones and Speculative Investment Zones. Also included were rural

housing units when counting housing units for transfer tax purposes, and stricter restrictions on the number of mortgage loans, maturity extension, and business loans.

Other noteworthy elements of the August 2 Policies include the transfer income tax increase for housing in Adjustment Zone, and encouraged multi-home owners to register rental housing units. In addition, a "two-year residence" requirement was added to the requirements for transfer tax exemption for single-family households, and transfer income tax was increased for the resale of pre-completion housing ownership rights.

III. Effect of Speculative Investment Zone and Overheated Zone Designation

As mentioned above, the government has frequently resorted to Adjustment Zone, Speculative Investment Zone, and Overheated Zone designations in attempts to stabilize the housing market. This practice continued on June 17, 2020, when the government added the designated of Adjustment Zones and Overheated Zones.[1] However, few reliable studies exist that have examined the effect of the government's housing market regulation policies. To address this lack of academic treatment, this study performed an empirical analysis of the effect of regulation zone designation using accurate methodologies, and used these findings to provide data to inform future government policies.

Chapter III includes an empirical analysis on the effect of Speculative Investment Zone and Overheated Zone designation in Seoul under the August 2 Policies. For this task, we developed short-term micro-level panel datasets based on the percentage and characteristics of multi-household housing units and apartments in Seoul, and then used the data to address any bias issues related to the omitted variables and unobserved housing unit information. In addition, by controlling key factors affecting housing prices (mortgage loan interest rates) and other supply-side factors at the individual housing level, we identified policy implications related to interest rates and the housing supply. To identify government policies related to regulation zone designations with more accuracy, we applied the boundary discontinuity

---

1 Adjustment Zones: Incheon, Goyang, Gunpo, Ansan, Anseong, Bucheon, Siheung, Osan, Pyeongtaek, Uijeongbu, Daejeon, and Cheongju.
Adjustment Zones and Overheated Zones: Suwon, Suseong (Seongnam), Anyang, Danwon (Ansan), Guri, Gunpo, Uiwang, Suji and Giheung (Yongin), Dongtan (Hwaseong), Yeonsu (Incheon), Namdong, Seo, Dong (Daejeon), Jung, Seo, and Yuseong.

design (BDD) to the panel data in order to identify any additional policy implications. In addition, we analyzed housing markets (housing units worth more than KRW 900 million; housing units less than KRW 900 million) in the Three Gangnam Districts and other areas in order to paint a multi-angled picture of the effect of the designation, and to discuss differences in prices and areas. Lastly, we briefly discuss the effect of regulation zone designations in Busan, as well as related issues including the use of the housing price index and regulation zone designation.

1. Data and Methods for Empirical Analysis

The majority of previous studies on the Korean housing market used housing price indexes for the metropolitan or municipal (si/gun/gu) level for their cross-sectional analysis, or used a vector auto-regression (VAR) model for policy impact analysis. However, these approaches are unable to control for endogeneity or addressing the bias issue, or even clearly identifying the policies subject to analysis. Some researchers have attempted to control endogeneity using the difference-in-differences (DID) method. However, the credibility of their findings has been restricted by the absence of the verification of the parallel trend assumption or the control over different pre-trends among different groups.

In this study, we controlled the endogeneity issue by building and using a micro-level panel dataset, rather than using area-level housing price indexes. In addition, to address issues arising from the use of long-term panel data,[2] we built short-term panel datasets based on the percentage of apartment residents (which is characteristically high in Seoul).[3] This approach allows for the building of an ultra short-term panel dataset for three or six months before and after the adoption of the government policies in order to test their short-term effect, and then considering medium and long-term effects by adjusting datasets for different periods in order to fit the purpose of analysis.[4] In this study, we built a dataset that encompassed a year before

---

2 See Song (Korea Institute of Public Finance, March 2020) for issues with the use of long-term panel data.

3 We built the panel datasets by grouping housing units with similar floor areas, types, and floor numbers, and identifying repeated transactions within each group. See Song (Korea Institute of Public Finance, March 2020) for a detailed account of the methodology.

4 As for the basic data for building the panel datasets, we used the transaction price data for multi-household housing unit from the Ministry of Land, Infrastructure and Transport (MOLIT). The data include information on detailed addresses, exclusive areas, contract dates, prices, floor numbers, and construction years of the housing units sold and purchased.

and after the August 2 Policies in order to investigate the effect of the August 2 Policies, and a dataset encompassing three months before and after the policies in order to analyze the policies' short-term effects. For the Seoul area, we analyzed a total of 155,639 transactions during the year before and after the August 2 Policies, and 40,471 transactions over three months before and after the adoption.

In this study, we used micro-level panel datasets in conjunction with the BDD method to obtain a more accurate identification. In addition, using the geographical information system (GIS), we studied the effect of regulation zone designation by building a panel dataset consisting of housing units located within 1,000m, 500m, and 200m from the boundaries between different types of zones.[5] We also controlled for the housing supply, a factor that greatly affects housing prices, at the individual housing unit level.[6]

2. Micro-Level Panel Data Analysis

Figure 1 shows the change of regulation zones in Seoul and the nearby areas before and after the August 2 Policies. Under the August 2 Policies, all 25 gu's in Seoul were designated as Overheated Zones,[7] and 11 were also designated as Speculative Investment Zones.[8]

---

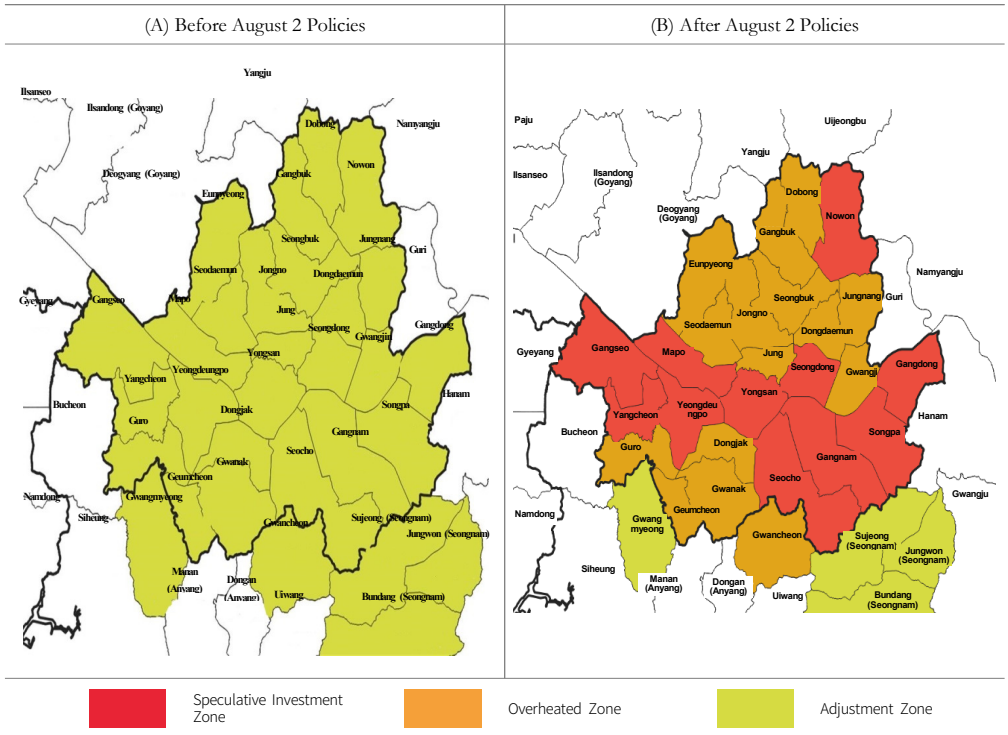
5 Using such discontinuity as a variation offers the benefit of specifying the factors to analyze (good school, school district, government regulations applicable to each area, etc.). However, at the same time, the BDD can only show local treatment effects along the boundaries, rather than the target areas in their entirety.

6 The model was controlled for the total number of housing units supplied within a certain radius (0.5km/1km/2km) from, with an exclusive are similar to (80~120% of the reference housing unit), and within a specific time from the transaction of (3 or 6 months), the relevant housing unit.

7 Restrictions for Speculative Zones applied on top of the restrictions for Adjustment Zones and Overheated Zones.

8 Gangnam, Gangdong, Gangseo, Nowon, Mapo, Seongdong, Seocho, Songpa, Yangcheon, Yeongdeungpo, and Yongsan.

Figure 1_Changes in Regulation Zones Before and After Implementation of the August 2 Policies



Source: Present study, based on the government press release cited above.[9]

A. Baseline Model

In this study, we used the baseline model represented by Equation (1) to analyze changes in housing prices before and after the Overheated Zone/Speculative Investment Zone designation.

9 Relevant Ministries, "Housing Market Stabilization Policies to Protect People With Actual Needs for Houses and Deter Short-Term Speculative Investment," August 2, 2017 press release.

$$\log(housing\ \ price)_{ijt} = \alpha + \beta_1 \bullet \mathrm{Pre} - trend + \beta_2 \bullet Speculative\ \ Investment\ \ Zone * Pre - trend + \beta_3 Overheated\ \ Zone * Post - trend + \beta_4 Speculative\ \ Investment\ \ Zone * Post - trend + \mu_i + Z_j + \epsilon_{it} \quad (1)$$

- μ_i: micro-level fixed effect
- Z_j: j area-level fixed effect

The dependent variable is the log value of micro-level transaction prices. The coefficient for <Pre-trend> is the common time trend in the Speculative Investment Zones and the Overheated Zones before the August 2 Policies. The coefficient for <Speculative Investment Zone *Pre-trend> is the time trend in the Speculative Investment Zones under the August 2 Policies before the adoption of the policies. The coefficient for <Overheated Zone *Post-trend> is the change in the trend in the Overheated Zones under the August 2 Policies before and after the adoption of the policies. The coefficient for <Speculative Investment Zone *Post-trend> is the change in the time trend in the Speculative Investment Zones under the August 2 Policies before and after the adoption of the policies. Therefore, the time trend values in the areas designated as the Speculative Investment Zones before and after the August 2 Policies are calculated as $\beta_1+\beta_2$ and $\beta_1+\beta_2+\beta_3$, respectively. The time trend values in the areas designated as Overheated Zones before and after the August 2 Policies are calculated as β_1 and $\beta_1+\beta_3$, respectively. In the model, the dependent variable is denoted as a log value (housing price) and the time interval is 1 month. Then, the estimated coefficient values can be converted to annual growth rates, as shown in Table 3.[10]

Table 3_Housing Price Growth Rate by Area Before and After Implementation of the August 2 Policies

(unit: %)

	Before (C)	△ Change (D–C)	After (D)
Overheated Zone (A)	9.45***	0.11***	9.56***
Difference (A–B)	3.68***	0.24***	3.92***
Speculative Investment Zone (B)	13.13***	0.35***	13.48***

Notes: 1. *** p < 0.01, ** p < 0.05, * p <0.1
2. p-values were calculated from the clustered standard deviation.
Source: Present study

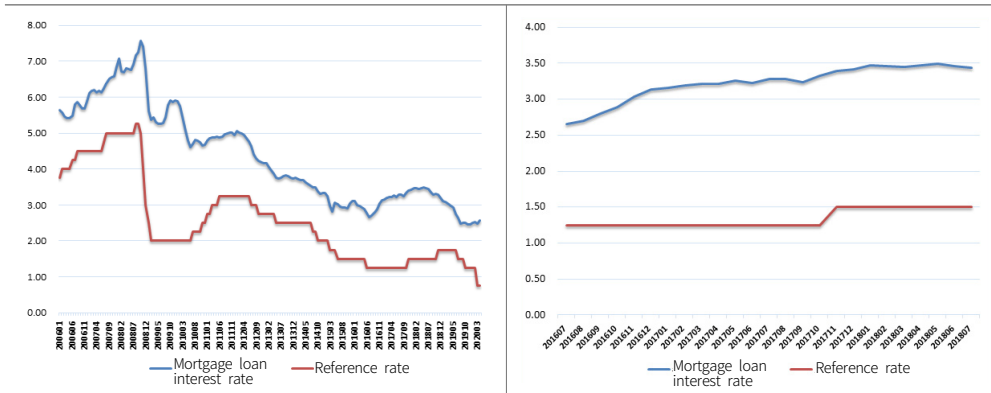
10 The following equation was used to covert the values to annual growth rates: $\left[\left\{\exp\left(\frac{\beta}{100}\right)\right\}^{12} - 1\right] \times 10^e$

The housing price growth rates in the Overheated Zones and the Speculative Investment Zones before the August 2 Policies were 9.45% per year and 13.13% per year, respectively. The housing price growth rate subject to stricter regulations recorded a significantly higher housing price growth rate (by 3.68%). After the August 2 Policies, in the Overheated Zones, the housing price growth rate increased by 0.11%p to 9.56% per year, which represents a statistically significant change at the 1% significance level. In other words, housing prices increased at a faster rate after the regulations were applied to those areas. In the areas designated both as Overheated Zones and Speculative Investment Zones (thereby being subjected to even stricter regulations), the housing price growth rate increased by 0.35%p after the policies were adopted (to 13.48%), which represents a statistically significant change at the 1% significance level. Before the August 2 Policies, the housing price growth rate difference between the Speculative Investment Zones and the Overheated Zones was 3.68%p, which increased by 0.24%p to 3.92%p after the policies, which also represents a statistically significant change at the 1% significance level. Overall, the gap in housing prices between the two groups of areas was found to increase after the implementation of the August 2 Policies.

B. Interest Rate and Additional Housing Supply as Control Variables

Mortgage loan interest rates and the housing supply have major impact on housing prices. Therefore, these factors need to be controlled for in order to determine the net effect of the government policies. In Figure 2, (A) shows the changes in the mortgage loan interest rate and the reference rate between 2006 and 2020, and (B) shows the changes in the interest rates before and after the August 2 Policies. Before and after the August 2 Policies (July 2016 to July 2018) the Bank of Korea raised the reference rate by 0.25%p, from 1.25% to 1.5%. In the same period, the mortgage loan interest rate increased from 2.66% to 3.44%.

Figure 2_Mortgage Loan Interest Rate and Reference Rate

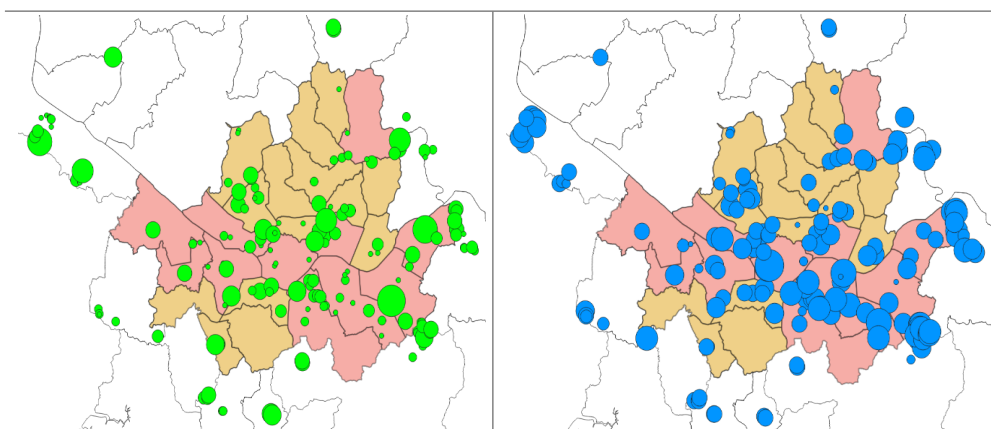


(A) 2006~2020 (B) July 2016~July 2018

Source: Present study, based on the Economic Statistics System (ECOS) of the Bank of Korea.

Figure 3 represents the status of housing supply in Seoul and Gyeonggi-do between 2016 and 2018. Each circle represents an apartment complex, and its size reflects the number of apartment units in each complex in (A), and the average exclusive private area in each complex in (B). The housing supply data were matched with the micro-level transaction data based on

Figure 3_Housing Supply Status(Housing supply in Seoul and Nearby Areas between 2016 and 2018)



(A) No. of units supplied (B) Exclusive area

Source: Present study, based on the move-in data from the Korea Housing Association, http://housing.or.kr, accessed on May 4, 2020.

distance, area, and transaction time. For example, the supply data (explanatory variable) matched with the e-Pyeonhansesang Apartment unit (82㎡) in Wollyoro1-dong, Yongsan-gu, Seoul sold in July 2017 is the total number of apartment units with an exclusive private area between 65.6㎡ and 98.4㎡ located within a 0.5km, 1km, 2km, or 5km radius from the apartment complex where move-in began between January and July 2017.

Table 4_Regulatory Effect After Controlling for Interest Rates and Housing Supply

Dependent variable = log(housing price), Obs. 155,639			
Variable	Coefficient ($\beta \times 100$)		
	(1)	(2)	(3)
Before Regulation Common trends	0.7523*** (0.0136)	1.2440*** (0.0215)	1.4323*** (0.0229)
Speculative Investment Zone Pre-trend	0.2761*** (0.0178)	0.2966*** (0.0179)	0.2986*** (0.0180)
Overheated Zones Post-trend	0.0093*** (0.0007)	-0.0010 (0.0008)	-0.0071*** (0.0008)
Speculative Investment Zone Post-trend	0.0257*** (0.0006)	0.0144*** (0.0007)	0.0077*** (0.0007)
Mortgage loan interest rate (t)		-13.1729*** (0.3152)	4.4003*** (0.4565)
Mortgage loan interest rate (t–1)		-	-19.4813*** (0.4605)
Housing supply 1km		-0.9177*** (0.1847)	-
Housing supply 0.5km		-	-2.095*** (0.4381)
Housing supply 0.5~1km		-	-0.8406*** (0.2168)
Housing supply 1~2km		-	-0.2536** (0.1262)
Housing supply 2~5km		-	-0.1360** (0.0604)

Notes: 1. Figures in ( ) represent clustered standard deviations.
2. *** p < 0.01, ** p < 0.05, * p <0.1
Source: Present study

After controlling for the interest rate and housing supply factors, we estimated a model using Equation (2) to assess the effect of the government policies. Table 4 lists the estimated values of the model, where interest rates and the housing supply were used as the control variables.

$$\log(housing\ price)_{ijt} = \alpha + \beta_1 \bullet \mathrm{Pre} - trend + \beta_2 \bullet Speculative\ Investment\ Zone^{*}\mathrm{Pre} - trend + \beta_3 \bullet Overheated\ Zone^{*}Post - trend + \beta_4 \bullet Speculative\ Investment\ Zone^{*}Post - trend + \gamma \bullet Mortgage\ loan\ interest\ rate + \theta \bullet Housing\ supply + \mu_i + Z_j + \epsilon_{it} \quad (2)$$

For the mortgage loan interest rates, according to the values shown in Column (2), a 1%p increase in the interest rate lowered the housing price by 13%. Interest rates may affect housing prices over time. When accounting for time difference, by including both the interest rate at (t) and the interest rate at (t+1) in the model, a 1%p increase in the mortgage loan interest rate lowered the housing price by around 15%, and the housing price temporarily overshoots expectations.[11] Throughout the period under analysis, the mortgage loan interest rate increased by 0.78%p. Therefore, if the interest rate had not increased at the time, the housing price would have increased even further.

In terms of the effect of housing supply,[12] in cases where 1,000 apartment units are newly built (with similar exclusive private areas; six months before or less), the prices of apartment units within 500m, 0.5~1km, 1~2km, and 2~5km decreased by 2.1%, 0.84%, 0.25%, and 0.14%, respectively, which represent statistically significant effects that diminish over an increase in distance. These findings are consistent with our intuition-based expectations.

The changes in the housing price growth rates in the Speculative Investment Zones and the Overheated Zones, after controlling for the interest rates and housing supply, are represented in Column (3). The estimated coefficients are somewhat different from the values without interest rate/housing supply control. However, as in Column (1), the housing price growth rate increased in the Overheated Zones, which are subject to stricter regulations. A further multi-angled robustness verification is required before concluding that the increase in housing price gap is attributable to the August 2 Policies. However, we can at least conclude that the August 2 Policies did not achieve a modicum of meaningful success in stabilizing the housing prices in Seoul and, in particular, the Speculative Investment Zones.

C. Effect of Regulation Zone Designation by Housing Price

The August 2 Policies may have had different effects on housing prices for different

---

11 In other words, the price drops below or rises above the equilibrium price, before gradually approaching the equilibrium price.

12 The 1,000 units were converted to 1 for use as a variable. Therefore, a single-unit increase in the explanatory variable actually means 1,000 more apartment units.

housing price groups. Therefore, we performed the same analysis on housing units worth KRW 900 million or higher, and housing units worth below KRW 900 million. Table 5 lists the annual growth rates converted from the estimates calculated using Equation (1) for each group. From the table, in the areas designated as Speculative Investment Zones, the price growth rate for housing units worth KRW 900 million or higher increased by 0.55%p, representing the greatest change in growth rate among the four groups: KRW 900 million or higher Speculative Investment Zones; KRW 900 million or higher Overheated Zones; below KRW 900 million in Speculative Investment Zones; and below KRW 900 million in Overheated Zones. Overall, high-priced apartment units in areas subject to stricter regulations were found to record the highest increase in housing price growth rate after the implementation of the August 2 Policies.

Table 5_Policy Effect by Housing Price(Without controlling for interest rates or housing supply)

(unit: %)

[Panel A] Housing units worth KRW 900 million or higher			
	Before (C)	Change (D–C)	After (D)
Overheated Zone (A)	11.63***	0.17	11.80***
Difference (A–B)	4.73***	0.38***	5.11***
Speculative Investment Zone (B)	16.36***	0.55***	16.91***
[Panel B] Housing units worth KRW 900 million or lower			
	Before (C)	Change (D–C)	After (D)
Overheated Zone (A)	9.46***	0.13***	9.59***
Difference (A–B)	3.10***	0.18***	3.28***
Speculative Investment Zone (B)	12.56***	0.31***	12.87***

Notes: 1. *** p < 0.01, ** p < 0.05, * p <0.1
2. p-values were calculated from clustered standard deviation.
Source: Present study

Table 6_Effect of Housing Supply and Interest Rates by Housing Price

	KRW 900 million or higher	Below KRW 900 million
Mortgage loan interest rate	-16.69***	-12.92***
Housing supply (within 1,000m)	-2.53***	-0.852***

Notes: 1. *** p < 0.01, ** p < 0.05, * p <0.1
2. p-values were calculated from clustered standard deviation.
Source: Present study

Table 6 shows the estimations obtained using Equation (2), where the interest rate and housing supply serve as the control variables, and the estimation coefficients of the interest rate and housing supply variables are grouped by housing price. The findings indicate that high-priced housing units are sensitive to changes in the mortgage loan interest rate and housing supply. For housing units worth KRW 900 million or higher, a 1%p increase in the mortgage loan interest rate lowered the housing price by around 17%p, which represents a higher level of sensitivity than units below KRW 900 million (13%). In addition, a supply of 1,000 units of similar exclusive private areas within a 1 km radius lowered the prices of units worth KRW 900 million or higher by 2.5%, and those of units below KRW 900 million by 0.85%. Overall, high-priced units are seen to be around three times more sensitive to changes in the housing supply in the nearby areas.

D. Effect of Regulation Zone Designation by Area (Three Gangnam Districts and Other Areas)

The following section analyzes the effect of regulation zone designation on the Three Gangnam Districts, and other areas. Using Equation (1), Table 7 shows the annual growth rates converted from the price trends before and after the August 2 Policies for the Three Gangnam Districts and other areas.

Table 7_Policy Effect by Area(without controlling for interest rates and housing supply)

(unit: %)

[Panel A] Three Gangnam Districts			
	Before (D)	Change (E–D)	After (E)
Speculative Investment Zone (A)	16.72***	0.52***	17.24***
Difference (A–C)	4.58***	0.25***	4.83***
[Panel B] Other Areas			
	Before (D)	Change (E-D)	After (D)
Overheated Zone (B)	9.45***	0.11***	9.56***
Difference (C–B)	2.69***	0.16***	2.85***
Speculative Investment Zone (C)	12.14***	0.27***	12.41***

Notes: 1. *** p < 0.01, ** p < 0.05, * p <0.1
2. p-values were calculated from clustered standard deviation.
Source: Present study

The Speculative Investment Zones in the Three Gangnam Districts recorded a 0.52%p increase in the housing price growth rate after the implementation of the August 2 Policies, which is the largest in Seoul. In other areas designated as Speculative Investment Zones, the housing price growth rate increased by 0.27%p, which indicates a greater gap than between the Three Gangnam Districts and other areas after the implementation of the August 2 Policies. Specifically, the housing price growth rate gap between the Three Gangnam Districts and the other areas designated as Speculative Investment Zones (A–C) increased from 4.58% to 4.83%, for an increase of 0.25%p. Overall, findings pertaining to the price trends by housing price (KRW 900 million or higher / below KRW 900 million) and area (Three Gangnam Districts and other areas) indicate an increase in the housing price growth rate after the implementation of the August 2 Policies, especially in the Three Gangnam Districts and among housing units worth KRW 900 million or higher, thereby increasing the gap between the other areas and housing units below KRW 900 million.

Using Equation (2), Table 8 compares the effect of interest rates and housing supply on housing price in the Three Gangnam Districts and other areas, by controlling for the interest rate and housing supply factors.

Table 8_Effect of Interest Rates and Housing Supply in the Three Gangnam Districts

	Three Gangnam Districts (sample size: 27,111) (1)	Other Areas (sample size: 128,528) (2)	Other Areas (sample size: 27,111) Bootstrap (3)
Mortgage loan interest rate (t)	9.086***	2.989***	2.904***
Mortgage loan interest rate (t–1)	-29.93***	-17.28***	-17.40***
Housing supply 500m	-2.866**	-2.002***	-2.053**
Housing supply 0.5~1km	-0.6065	-0.6520***	-0.7096

Notes: 1. *** p < 0.01, ** p < 0.05, * p <0.1
2. Columns (1) and (2) represent clustered standard deviations, and Column (3) represents p-values calculated from bootstrap standard deviations.
Source: Present study

A comparison of Columns (1) and (2) shows that the Three Gangnam Districts are more sensitive to interest rate changes than the other areas. The three districts also react more sensitively when new apartments are built in the vicinity. However, the effect of housing supply is not significant for the Three Gangnam Districts in cases where the new apartments are built at a distance from an existing apartment. This finding may be explained by the small number of samples in these areas compared with the other areas, or actually my indicate that the effect of building new apartments at a distance from existing apartments is lower in the Three Gangnam Districts than in the other areas.

To control for the sample size difference between the Three Gangnam Districts and the other areas, we randomly selected 27,111 samples from the 128,528 samples in areas other than the Three Gangnam Districts, and then performed a regression analysis. This process was repeated 1,000 times, and Column (3) shows the resulting parameters and standard deviations. While the values in Column (3) are similar to Column (2), the estimates for new apartments between the 0.5 km and 1 km radiuses are not found to be statistically significant, as is the case with the values for the Three Gangnam Districts. This finding suggests that the low statistically significance of the <housing supply 0.5~1km> variable for the Three Gangnam Districts may be caused by the small sample size. In fact, the overall findings suggest that the housing supply in the vicinity of a new apartment results in a larger price drop in the Three Gangnam Districts than in the other areas.

3. Micro-level Panel-Boundary Discontinuity Design Analysis

In addition to the micro-level panel datasets, this section uses a Panel-Boundary Discontinuity Design (Panel-BDD) to analyze the effect of regulation zone designation. Housing prices can be affected by a multitude of factors. A failure to control for omitted variables and/or unobserved variables may result in estimation bias issues. To address these issues, in this study, we controlled for the estimation bias by considering the micro-level fixed effect by using micro-level panel datasets. However, even with the panel datasets, it is impossible to completely control for changing and/or different factors in different areas not included in the model during the analysis period (e.g., development projects in each area, construction of key facilities, and improvement in transport conditions). Changes in unobserved factors may be mixed with the effect from the government policies, which may ultimately cause bias in the estimation of the net effect of the policies being implemented.

To address these issues and ensure the precise identification of the effects of these policies, we used the Panel-BDD method to analyze housing units located near the boundaries between areas subject to different regulations, thereby removing any uncontrolled factors and identifying the net effects of the policies. Figure 4 shows the boundaries among the different regulation zones in Seoul. In this study, we analyzed only the housing units within certain bandwidths from the boundaries between Speculative Investment Zones and Overheated Zones. Specifically, we used the boundaries between Seocho ‖ Dongjak/Gwanak, Mapo ‖ Seodaemun/Eunpyeong, Yongsan ‖ Jung, Seongdong ‖ Jung/Dongdaemun/Gwangjin, and Nowon ‖ Dobong/Seongbuk/Jungnang.

The BDD offers the benefit of more precise identification of the net effects of the government policies (zone regulation). However, the estimation results represent only the local treatment effect within the specified bandwidths, which cannot be generalized for the rest of the areas. In this study, we performed the Panel-BDD by incrementally narrowing the bandwidths,[13] in addition to the micro-level panel datasets analysis for the entire areas.

13 Narrowing the bandwidths enhances both the benefits and weaknesses of the BDD method.

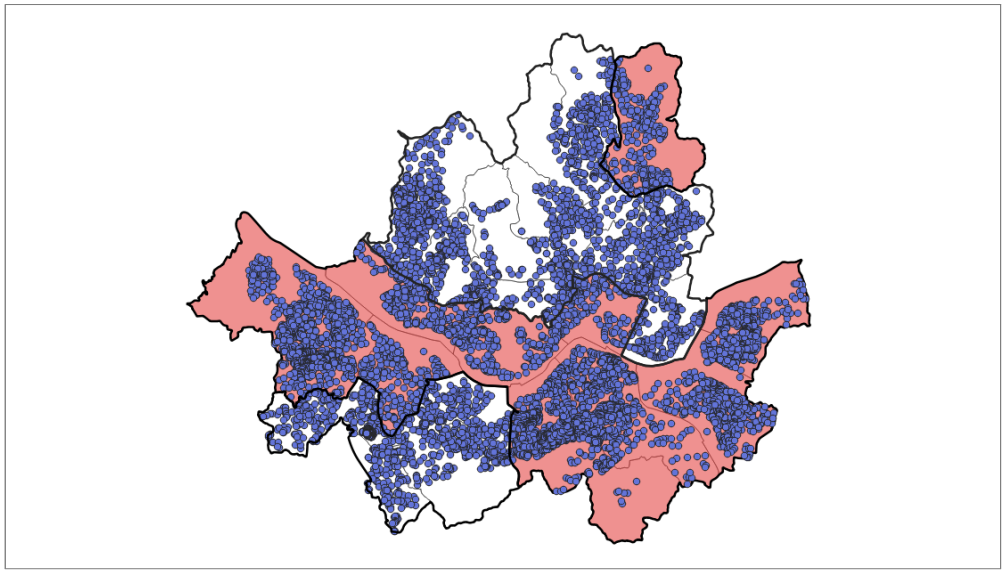
Figure 4_Boundaries Used for the BDD Analysis

Source: Present study

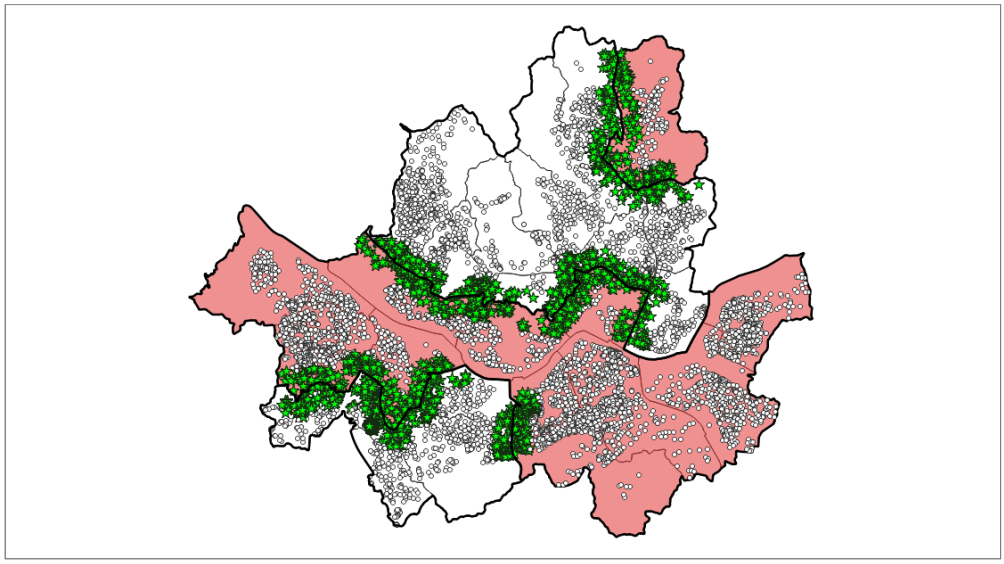
Figure 5 shows the locations and number of housing units within each distance (1,000m, 500m, and 200m)[14] used for the Panel-BDD analysis, as well as the locations of apartment complexes across Seoul. The sample size is 155,639, of which 48,445, 26,057 and 10,280 are analyzed at the 1,000m, 500m, and 200m distance, respectively.

14 Black (1999) set the bandwidths around the boundaries at 0.35 miles (560m), 0.20 miles (320m), and 0.15 miles (240m).

Figure 5_Boundary Discontinuity Design Samples

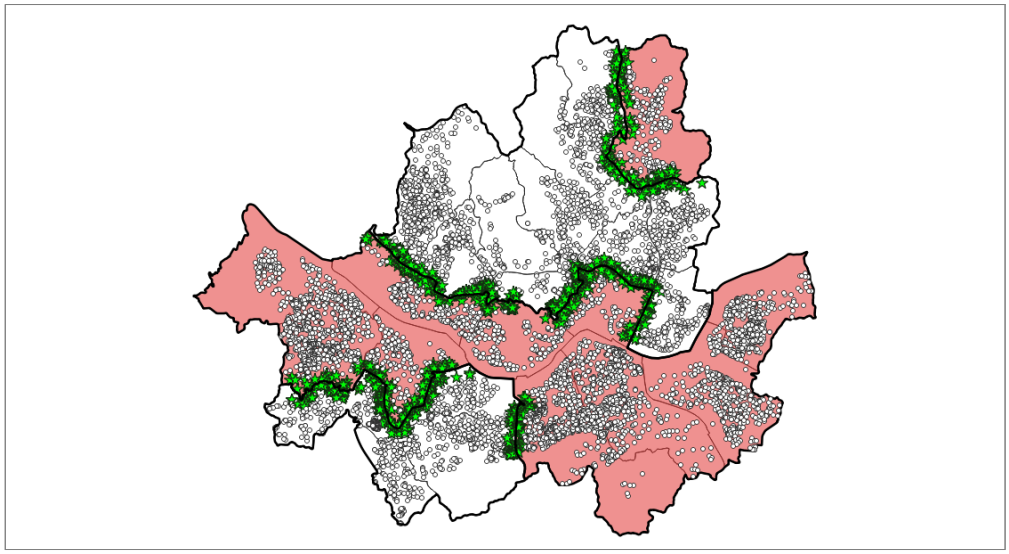


(A) All samples
(sample size: 155,639)

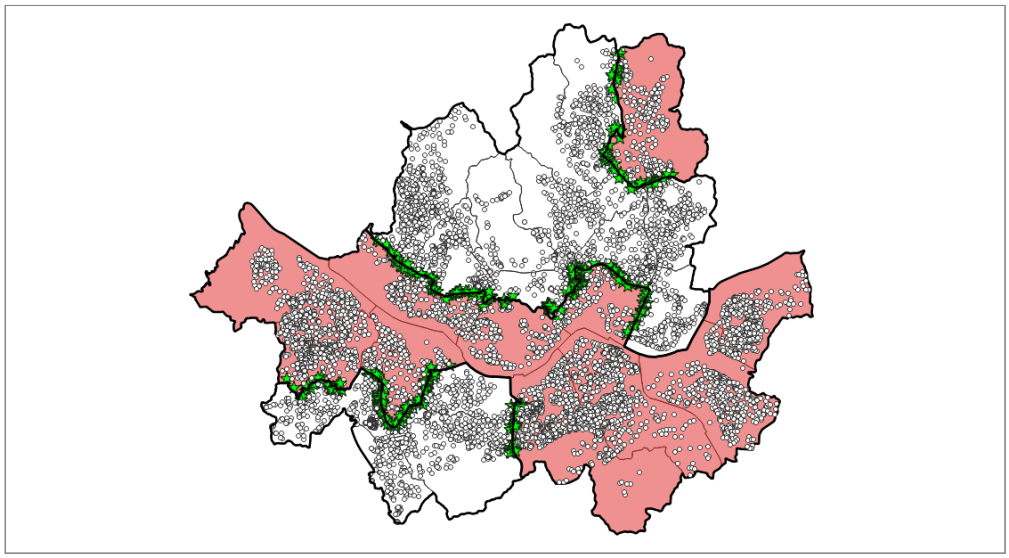


(B) BDD Bandwidth = 1,000m
(sample size: 48,445)

Figure 5_Boundary Discontinuity Design Samples(continued)



(C) BDD Bandwidth = 500m
(sample size: 26,075)



(D) BDD Bandwidth = 200m
(sample size: 10,280)

Source: Present study

Table 9 shows the estimation results of the BDD analysis of the micro-level panel datasets. Column (1) lists the values based on all samples in Seoul, and Columns (2) and (3) show the Panel-BDD results for housing units within 500m and 200m from the discontinuity boundaries between different regulation zones.

Table 9_Panel-BDD Estimation Results

Dependent variable = log(housing price)				
Variable	Coefficient value ($\beta \times 100$)			
	(1) All areas	(2) BDD (500m)	(3) BDD (200m)	(4) All areas
Before regulation Common trends	0.7523*** (0.0136)	0.8323*** (0.0424)	0.9365*** (0.0818)	0.7516*** (0.0746)
Speculative Investment Zone Pre-trend	0.2761*** (0.0178)	0.0645*** (0.0502)	0.0498 (0.0918)	0.2894*** (0.1018)
Overheated Zones Post-trend(A)	0.0093*** (0.0007)	0.0129*** (0.0019)	0.0131*** (0.0038)	0.0099* (0.0057)
Speculative Investment Zone Post-trend(B)	0.0257*** (0.0006)	0.0236*** (0.0018)	0.0166*** (0.0037)	0.0267*** (0.0059)
Post-trend (B – A)	0.0164*** (0.0010)	0.0107*** (0.0027)	0.0034 (0.0052)	0.0178** (0.0086)
Obs.	155,639	26,075	10,280	10,280

Notes: 1. In Columns (1), (2), and (3), figures in ( ) represent clustered standard deviations.
2. In Column (4), figures in ( ) represent bootstrap standard deviations.
3. *** p < 0.01, ** p < 0.05, * p <0.1
Source: Present study

As the distance decreases, the pre-trend difference between the Speculative Investment Zones and the Overheated Zones disappeared after the implementation of the August 2 Policies. In Column (1), the pre-trend difference between the two types of zones stands at 0.276***, whereas the 200m Panel-BDD analysis (Column (3)) shows a smaller coefficient (0.0498), which is not statistically significant. After the implementation of the August 2 Policies, the post-trend difference between the two zones was 0.0034, which is smaller than the 0.0164*** calculated from all samples. In addition, the findings do not eliminate the null hypothesis (p-value = 0.51).

Across all samples, the housing price growth rate before the implementation of the August 2 Policies was higher in areas subject to stricter regulations (i.e., Speculative Investment Zone, Overheated Zone) than in the other areas. After the implementation of the policies, the housing price growth rate in these areas increased significantly faster, increasing the gap between the two groups of areas. However, in the Panel-BDD (200m) analysis, the difference

in this trend decreased after the implementation of the August 2 Policies, along with the statistical significance. In other words, even though the housing price growth rate significantly increased in all areas after the regulations were implemented, no difference in (net) regulatory effect was found between the Overheated Zones and the Speculative Investment Zones. For example, between housing units with similar conditions in different regulation zones, the price growth rates did not significantly differ before or after the implementation of the regulations. As such, this finding suggests that the policies did not induce a different effect between the two types of zones.

A comprehensive review of the micro-level panel dataset analysis and the Panel-BDD analysis can be interpreted to indicate that the housing price growth rate increased after the implementation of the August 2 Policies in both the Overheated Zones and Speculative Investment Zones. In addition, the growth rate increased faster in areas subject to stricter regulations, resulting in a wider gap after the implementation of the policies. However, this effect was not observed among similarly situated housing units in areas around the zone boundaries.

The sample size for Panel-BDD (200m) was 10.280, which only accounted for 6.6% of the total sample size (155,639). Note that the above interpretation would not be persuasive if the lack of statistical significance in the Panel-BDD analysis was merely caused by the smaller sample size. To verify whether the different findings originate from the actual effect or was due to the smaller sample size, we randomly selected 10,280 samples from the total 155,639 samples, and then estimated the coefficient values. This process was repeated 1,000 times, and Column (4) shows the resulting estimates and standard deviations. Importantly, the values from Equation (4) are similar to coefficient estimates from Equation (1), albeit with a slight increase in the standard deviations. Therefore, it can be reasonably concluded that the decrease in estimates and the loss of statistical significance resulted from the difference in actual policy effects, and not the smaller sample size.

When key housing fundamentals are the same, the regulation zone designation under the August 2 Policies did not have a statistically significant effect on the housing price growth rate. However, in areas where the housing price growth rates were traditionally higher, on account of their better living environments, the growth rate significantly increased after the implementation of the policies. These findings indicate that there is a higher demand for housing units in better environments, which seems to be the effect of stricter regulations on multi-home owners. As such, the regulations may have changed the housing demand in the market (owning multiple housing units vs. owning a so-called "singlet yet smart" housing unit).

4. Short-Term Effect of the Policies and Their Effect Outside of Seoul

A. Short-Term Effect of the August 2 Policies in Seoul

This study analyzed the effects of regulation zone designation by area and housing price, and performed a Panel-BDD analysis to accurately identify the effects of these policies. The findings suggest that the designation policy did not achieve a statistically significant success in stabilizing the housing prices in Seoul. However, the designation may have contributed to temporarily dampening the short-term explosion of housing prices, and may have had a significant effect in areas other than Seoul. To test this hypothesis, we analyzed the short-term effect of the policies within three months before and after the implementation of the August 2 Policies. Table 10 shows the estimates calculated using Equation (1), within three months before and after the implementation.

Table 10_Changes in Housing Price Trends by Regulation Zone(Short-term analysis)

Dependent variable: log(housing price)		
Variable	Coefficient value ($\beta \times 100$)	
	12 months before/after (1)	3 months before/after (2)
Before Regulation Common Trends	0.7523*** (0.0136)	1.476*** (0.0535)
Speculative Investment Zone Pre-Trend	0.02761*** (0.0178)	1.136*** (0.0737)
Overheated Zones Post-Trend	0.0093*** (0.0007)	-0.0082*** (0.0012)
Speculative Investment Zone Post-Trend	0.0257*** (0.0006)	-0.0256*** (0.0013)
Obs.	155,639	40,471

Notes: 1. Figures in ( ) represent clustered standard deviations.
2. *** p < 0.01, ** p < 0.05, * p <0.1
Source: Present study

A comparison of the estimates in Column (2) with Column (1) shows that before the regulations, a short-term housing price increase was observed in the Speculative Investment Zones. In addition, the regulation zone designation resulted in a statistically significant decline in the housing price growth rate in the regulation zones, at least for a short period after the August 2 Policies. However, the magnitude of the short-term effect was very small; the housing price growth rate decreased by 1% from the three-month period prior to the

implementation of the August 2 Policies.[15] Furthermore, a comparison of the figures in Column (1) (12 months before and after the implementation of the policies) and those in Column (2) (three months before and after the implementation of the policies) indicates that the three-month stabilization effect was overshadowed by the growth rate increase over the nine months that followed. When controlling for the interest rates and housing supply, the Panel-BDD analysis of different housing prices (KRW 900 million or higher/below KRW 900 million) and areas (Three Gangnam Districts/other areas) revealed a similar short-term effect.

B. Effect of Regulation Zone Designation in Busan

The same regulations may display different effects in Seoul and in other areas. To test this possibility, we used the same methods to analyze the effect of regulation zone designation in Busan. Haeundae, Yeonje, Dongna, Nam, and Suyeong in Busan were designated as Adjustment Zones on November 3, 2016. On June 19, 2017, Gijang and Busanjin were added to the list. In this section, we analyze the housing price trends in the designated Adjustment Zones and the other areas within six months before and after November 3, 2016.

Table 11_Effect of Regulation Zone Designation in Busan(as of November 3, 2016)

(unit: %)

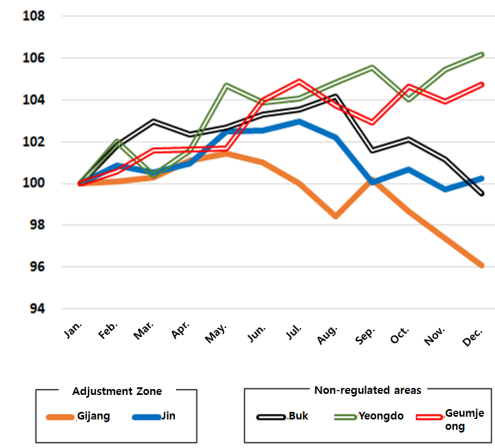
	6 months before the policies (C)	Change (D–C)	6 months after the policies (D)
Non-regulated areas (A)	12.41***	0.07***	12.48***
Difference (A–B)	10.91***	-0.23***	10.68***
Adjustment Zone (B)	23.32***	-0.16***	23.16***

Notes: 1. *** p < 0.01, ** p < 0.05, * p <0.1
2. p-values were calculated from clustered standard deviation.
Source: Present study

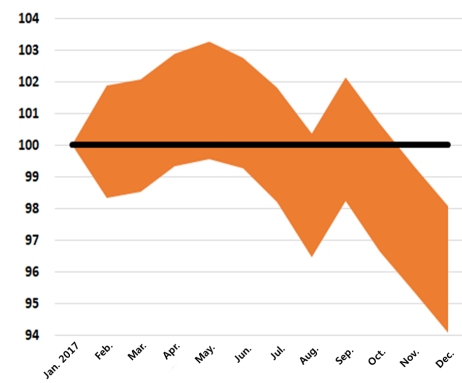
Table 11 lists the estimates from Equation (1), converted to annual values. Unlike Seoul, Busan saw a statistically significant decline in the housing price growth rates in the Adjustment Zones. However, the housing price growth rates increased in the non-regulated areas, indicating a so-called "balloon effect." As a result, the housing price growth rates steeply increased in some of the non-regulated areas, resulting in the subsequent Adjustment Zone designations for Gijang and Busanjin.

15 0.0256 / (1.476+1.136) = 0.98%

Figure 6_2017 Housing Price Index in Busan (January 2017=100)



(A) Housing price index in each area



(B) Housing price index in Gijang (95% confidence interval)

Source: Present study, based on the transaction data from the Ministry of Land, Infrastructure and Transport.

The analysis of the additional Adjustment Zone designation in June 2017, however, revealed an issue not found with the other cases of regulation zone designation. In June 2017, Gijang and Busanjin were designated as Adjustment Zones. In Figure 6(A), in the first half of 2017, Buk, Yeongdo, and Geumjeong areas in Busan are seen to record higher housing price growth rates than for the two areas. Even though the differences are not statistically significant, the average housing price growth rate in Gijang and Busanjin over the six months before the designation was lower than the average growth rate in the non-regulated areas. Even after the designation, the housing price growth rates did not significantly differ between the two areas.[16] Subsequently, Gijang (with the exception of Ilgwang-myeon) was released from the Adjustment Zone designation in August 2018. Busanjin and Gijang (Ilgwang-myeon) were released in December of the same year, which seems to be not unrelated to the issue with the initial regulation zone designation.

16 See the final report to be published in December 2020 for detailed estimates.

C. Issues with the Use of Housing Price Indexes

Figure 6 explains the issues with the area-specific housing price indexes used for selecting the regulatory areas. Price indexes for apartments are calculated by building panel datasets based on housing price data, and estimating prices at different time points using weights using a method similar to that explained above, invariably creates a confidence interval. However, when statistical data are applied, only the median values are reported without taking account of the confidence intervals. In Gijang, Busan, housing prices did not significantly increase or decrease between January and October 2017 from the January price (=100) at a 95% confidence interval. No significant decline in housing prices from the January prices occurred until November. The prices in May, before the Adjustment Zone designation, include the housing price in January at a 95% confidence level. In other words, at that time, it was impossible to conclude that housing prices significantly increased.

Another concern is that housing price indexes may vary depending on the weights used, in addition to the grouping of housing units used for the panel datasets. The housing price index of the Korea Appraisal Board likely served as the basis for the Adjustment Zone designation of Gijang, which is different from the price index used above. However, when viewing only medial values, caution should be used not to include areas with no significant housing price growth rates, especially because regulation zones are subject to restrictions on reselling, higher transfer tax rates, stricter LTV and DTI requirements, and restrictions on mortgage loans.

In addition to these issues, the government's arbitrary judgments may cause additional problems in the designation of regulation zones. According to the regulation zone designation criteria in Annex: Table 1, an area where housing prices increased by 2% per month over five months is less likely to be designated as a regulation zone than an area where housing prices increased by 10% in the last month of the five-month period. In the case of Busan, as shown in Figure 6, Busanjin was included in the list of Adjustment Zones on account of its higher housing price growth rate in the month immediately preceding the designation. However, the cumulative growth rate during the period starting in January is lower in Busanjin than in some of the non-regulated areas (e.g., Buk, Yeongdo, and Geumjeong).

A short-term price increase is likely to be caused by speculative investments, rather than by improved fundamentals. However, in some cases, short-term spikes can be caused by the construction of factories operated by large enterprises, subway lines, or department stores, or other positive changes in the local region. In such cases, it is difficult to distinguish between

the natural level of price increase, and an excessive price increase caused by speculative investments, and as a result the government's judgment in this matter may be arbitrary. Indeed, suppressing a price increase in areas where prices are driven by improvements in fundamentals may only result in negative side effects.

IV. Conclusions and Policy Implications

This study analyzed the effects of regulation zone designation (Adjustment Zones, Overheated Zones, and Speculative Investment Zones) using micro-level panel datasets. The findings suggest that, at least in Seoul, the zone designation, which is one of the most frequently used tools in the government arsenal, failed to mitigate a steep increase in housing prices. It was found that Speculative Investment Zones subject to stricter regulations recorded higher growth rates than in other areas. In fact, the August 2 Policies increased the housing price growth rate and widened the housing price gaps among the different areas. Similar findings were derived from the analysis of price growth rates based on housing price and area. Housing units worth KRW 900 million or higher, and the Three Gangnam Districts recorded higher price growth rates than housing units below KRW 900 million in other areas in Seoul. The implementation of a regulation zone designation failed to dampen these trends. In fact, the designation appeared to accelerate the price increase in the Three Gangnam Districts.

In Busan, the housing price growth rates in the Adjustment Zones were significantly lower than in other areas. However, even in the Adjustment Zones, the housing price growth rate declined by a mere 1%, while the housing price growth rates in non-regulated areas increased. The case of Gijang revealed an issue where some areas with less significantly higher price growth rates were designated as Adjustment Zones, only to be released from the designation before other areas. These issues suggest the need for the government to deepen its understanding of the issue of confidence interval regarding housing price indexes, which forms one of the bases for selecting areas for regulation zone designation. There is also a need to have more meaningful discussions on the criteria for designating regulation zones.

Under the current statutes, an area with a short-term spike in housing prices meets the criteria for being designated as a regulation zone. However, in some areas, a steep increase in price may be attributed to improved fundamentals in the area, although this effect is also likely to be mixed with the effect of incoming speculative investments. Nevertheless, we do not

believe that the government is equipped to distinguish between a normal price increase and an abnormal price increase that is driven by speculative investments.

In addition, the government needs to reflect on whether the zone designation policy is providing speculative investors with an opportunity to benefit from price gaps created by the regulation, by simply moving the target area. As is stands, the zone designation policy is bound to create a vicious cycle of price increase → regulation zone designation → speculative investors moving to new areas → price increase in the new areas → more zone designations.

Overall, the findings of this study provide important policy implications pertaining to two control variables: interest rate and housing supply. Housing prices were found to show statistically significant reactions to changes in the mortgage loan interest rates and the housing supply. Here, high-priced housing units worth KRW 900 million or higher and housing units in the Three Gangnam Districts were found to be sensitive to changes in the interest rates and housing supply. However, it should also be noted that interest rates are in the realm of fiscal policies, where the central bank exercises its own judgment. In other words, interest rates are a policy instrument that cannot be used solely for implementing policies in the housing market. Thus, the current zone designation policy has many issues and may cause various side effects. In this regard, the government's recent decision to provide more housing units and shift the focus of its real estate policies to improving the housing supply is a welcome sign of change.

However, caution is needed when trying to stabilize the housing market through supply-side measures. This study estimated the effects of supply-side factors, and the findings show that the effect of housing supply on housing prices rapidly decreases over distance.[17] This indicates that the stabilization effect of housing supply can be expected only when new housing units are supplied in the very area where the price stabilization is needed. Building new housing units further away from the area would have a very limited effect on the housing prices in a specific area. For example, if the government attempts to stabilize housing prices in the Three Gangnam Districts by supplying new housing units in Gyeonggi-do, it would have a minimal effect, but only raise the housing prices in newly developed towns far away from the Gangnam Districts. Therefore, this study recommends that to stabilize the housing prices in key areas in Seoul would require the government to increase efforts to provide a massive number of housing units in those very areas.

---

17 The estimates in this study suggest that supplying 1,000 housing units would decrease the housing prices in the 500m radius by 2.1%, whereas the housing prices between the 2km and the 5km radiuses would decline by a mere 0.13%.

References

Black, S. E., "Do better schools matter? Parental valuation of elementary education," *The Quarterly Journal of Economics,* 129, 1999, pp. 577~599.

Ministry of Land, Infrastructure and Transport and Ministry of Economy and Finance, "Stable Control of the Housing Market Through the Fostering of a Housing Market Focused on Actual Needs," press release, November 3, 2016.

Ministry of Land, Infrastructure and Transport and Ministry of Economy and Finance, "Reinforcement of the Market Stabilization Policy Through Increased Housing Supply and Speculative Investment Zone Designation in the Seoul Capital Area," press release, August 27, 2018.

Relevant Ministries, "Selective and Tailored Measures for Stable Control of the Housing Market," press release, June 19, 2017.

Relevant Ministries, "Housing Market Stabilization Policies to Protect People with Actual Needs for Houses and Deter Short-Term Speculative Investment," press release, August 2, 2017.

Song, Kyungho, "Housing Price Premiums for Educational Environment and Neighbors," Public Finance Forum, Korea Institute of Public Finance, March 2020, pp. 8~27.

Song, Kyungho, "Education and neighborhood premium in housing price and its dynamics," *Working paper,* 2019a.

Song, Kyungho, *Essays on Applied Microeconomics*, *Ph.D. Dissertation,* Michigan State University, 2019b.

Song, Kyungho and Kwon, Sung-oh, *The Effect of the Government Real Estate Policies on the Housing Market: Seoul Housing Market, August 2 Policy, and September 13 Policy,* Korea Institute of Public Finance, 2020.

Bank of Korea Economic Statistics System, http://ecos.bok.or.kr/, accessed on May 4, 2020.

Korea Housing Association, http://housing.or.kr, accessed on May 4, 2020.

Appendix

Annex Table 1_Speculative Investment Zone/Overheated Zone/Adjustment Zone Designation Criteria

Zone	Speculative Investment Zone	Overheated Zone	Adjustment Zone
Statute	Article 104-2, Income Tax Act; Article 168-3, Enforcement Decree of the Act	Article 63, Housing Act; Article 25, Enforcement Rules of the Act	Article 63-2, Housing Act; Article 25-2, Enforcement Rules of the Act
Designation criteria	**Quantitative criteria:** Common criteria + at least one optional criteria **(Common criteria)** Price growth rate of the housing unit in the previous month > national consumer price inflation rate × 130% **(Optional criteria)** 1. Average price growth rate of the housing unit in two previous months > national housing price growth rate % ket 2. Average price growth rate of the housing unit in the previous year > national annual housing price growth rate in the three previous years • However, if the inflation rate × 130% / consumer price inflation rate × 130% is below 0.5%, then 0.5% is applied. **Qualitative criteria:** The quantitative criteria are satisfied, and the real estate price increase in the relevant area is likely to continue or spread to other areas.	**Quantitative criteria:** Common criteria + at least one optional criteria **(Common criteria)** Areas where the housing price growth rate is markedly higher than the inflation rate **(Optional criteria)** 1. The ratio between housing subscribers and winners in the previous two months exceeds 5:1 (10:1 for National Housing) 2. Number of units scheduled for sale declines by 30% or more from the previous month 3. The number of housing construction project approvals or housing construction permits significantly declines from the previous year 4. Housing security is threatened by project approvals or housing construction permits significantly declines from the previous yearo other areas.reased Housing Supply and he number of housing units supplied is markedly lower than the number of first-priority subscribers. **Qualitative criteria:** Areas where speculative investment is, or likely to be, prevalent, considering the current status of the local housing market and other factors	**Quantitative criteria:** Common criteria + at least one optional criteria **(Common criteria)** An area where the housing price growth rate over the three months starting with the preceding year is more than 1.3 times higher than the consumer price inflation rate in the Si/Do areas, and: **(Optional criteria)** 1. The ratio between housing subscribers and winners in the previous two months exceeds 5:1 over two months starting with the preceding month (10:1 for National Housing) 2. The total volume of pre-completion housing ownership right reselling over three months starting with the preceding month increased by 30% or more from the same period in the previous year 3. The housing supply rate or home ownership rate is below the national average **Qualitative criteria:** The housing market is, or likely to be, overheated considering housing prices, subscriber-winner ratio, housing supply ratio, and other factors

Note: The same criteria apply to 2017 and 2018.

Source: Ministry of Land, Infrastructure and Transport and Ministry of Economy and Finance, Reinforcement of the Market Stabilization Policy Through Increased Housing Supply and Speculative Investment Zone Designation in the Seoul Capital Area," press release, August 27, 2018, p. 9.

Fiscal Decentralization, Interregional Economic Disparities, and Migration

Hyun-A Kim and Im-Gon Cho*

I. Introduction and Issues

In recent years, the Korean central government has transferred tax revenues to local governments by converting national taxes into local taxes. This study points out the possibility that this decentralization of revenue may exacerbate fiscal disparities between regions/areas. The Korean government has pursued these fiscal decentralization policies as a way to set their medium and long-term agenda, with respect to the fiscal burdens and roles of different levels of government, and to promote balanced national development among different regions/areas. In fact, balanced national development has been a key policy goal for revenue transfer policies, and has included the adoption of local consumption tax and the legal proportion of local shared tax increases.

Under the First Fiscal Decentralization Policy, the value added tax (VAT)–local consumption tax conversion rate was raised in 2020. The Second Fiscal Decentralization Policy was implemented under the Fiscal Decentralization Acceleration Roadmap[1]

* Hyun-A Kim, Senior Fellow, Korea Institute of Public Finance
Im-Gon Cho, Professor, Department of Administration, Kyonggi University

1 Office for Government Policy Coordination, Prime Minister's Secretariat, Press Release, "The Government to Accelerate Fiscal Decentralization: Finalized the Fiscal Decentralization Plan for Improving Local Government's Autonomy and Accountability and Ensure Balanced Development," October 30, 2018.

announced in 2018. The roadmap explains the guiding principles and phased implementation measures of the Moon Jae-in administration's fiscal decentralization policies. According to the roadmap, the policies are aimed at improving local governments' autonomy and accountability, in addition to balanced national development. Specifically, the 2018 Roadmap is focused on the government's fiscal decentralization goal of achieving a 7:3 ratio between national taxes and local taxes. It also involved raising the VAT–local consumption tax conversion rate to 15% by 2019 and then to 21% by 2020 (the rate was 5% in 2010, and was later raised to 11% in 2013), and expanding the autonomy and accountability of local governments by transferring some central functions to local governments.

In particular, to address the possibility that fiscal decentralization through an increase in the local consumption tax rate increases the disparity between the Seoul Capital Area[2] (SCA) and regions/areas outside the SCA, the roadmap mentioned a plan to promote balanced national development and reducing interregional fiscal disparities by raising the Local Fund for Mutual Development of Municipalities in 2020. These follow-up measures were ongoing at the time of adopting the local consumption tax. The Local Consumption Tax Adoption Plan, which was announced by the Lee Myung-bak administration in September 2009, was aimed at strengthening the ties between the local consumption tax and local economies in order to achieve a virtuous cycle of economic boost, increased local tax revenues, and reinvestment. It also involved lowering local governments' reliance on financial resources transferred from the central government, and increasing regional tax revenues and accountability by building an incentive structure. Similar to the 2018 Roadmap, the Local Income Tax Adoption Plan included an alternative to lower interregional disparities and improving mutual growth (the Local Fund for Mutual Development of Municipalities was used to support non-SCA regions/areas using development profits from the SCA).

Korea achieved stellar economic growth with policies focused on growth and efficiency based on targeted selection and concentration. However, these policies also increased the congestion cost in the SCA (including housing issues, traffic congestion, and environmental pollution). Subsequent Korean administrations have addressed the challenge by trying to boost the local economies outside of the SCA through balanced national development policies. These policies included various regulations targeting the SCA, the relocation of the administrative capital, and the development of innovative cities. The emphasis on balanced regional development is also reflected in Chapter 9 (Economy) of the Constitution of the

2 The capital region of Korea

Republic of Korea, and the 2004 Special Act on Balanced National Development (the "Balanced Development Act") linked the emphasis on balanced national development with fiscal decentralization. The Roh Moo-hyun administration (also called the "Participatory Government") was the first administration to put forward "balanced growth" as one of its main state agendas. However, the efforts to deconcentrate the country's population through balanced national development actually began as early as the 1960's. However, the level of population concentration in the SCA is alarmingly high compared to other developed countries, and various indicators have highlighted growing disparities between the SCA and other areas.

The primary purpose of this study is to assess the impact of the balanced national development and fiscal decentralization policies on Koreans' quality of living. The fiscal decentralization policies and the balanced national development policies are assessed using two assessment indicators: interregional economic and fiscal disparities, and migration. Through these assessments, this study seeks to provide policymakers and experts with data pertaining to tax sharing for fiscal decentralization, which has been ongoing since the establishment of the first modern tax regime in Korea, and to then enhance the local autonomy in taxation policies that began with the "local autonomous system." In particular, since it has been almost ten years since the adoption of the local consumption tax, it is high time that we assessed how successful the fiscal decentralization policies have been in achieving their goals. It is also important to examine how the support for underdeveloped areas/regions under the fiscal decentralization and balanced national development policies affected the living conditions in non-SCA regions/areas and ultimately, determine their correlation with migration, which serves as an indicator for the policy of balanced national development.

II. Fiscal Decentralization and Balanced National Development Policies

1. Fiscal Decentralization and Balanced National Development Policies

A. Fiscal Decentralization: Status and Evaluation

The Fiscal Decentralization Acceleration Roadmap announced in October 2018 specifies plans to convert national taxes to local taxes (tax sharing) in order to achieve the 7:3 national tax–local tax ratio. In the past, the Korean government often relied on the transfer of financial

resources to local governments to increase local public finances, and this practice has been widely blamed for undermining the fiscal autonomy of local governments. For this reason, tax sharing has been pursued as a key agenda for fiscal decentralization across multiple administrations.

In fact, any good government would strive to enhance the fiscal capabilities of local governments by increasing their tax revenues. Academically speaking, local taxes represent a mechanism for local autonomy and decentralization by which local residents undertake the responsibility for providing public services in their areas. A local tax truly represents the cost of public services enjoyed by local residents, when the local government is free to raise or lower the local tax rate depending on the residents' fiscal needs, as well as to determine tax bases and targets of taxation. As for local taxes in Korea, the National Assembly determines the tax bases and tax rates, and tax rate adjustments are restricted to the adjustment of taxes with flexible tax rates. In addition, even though the Korean government has used tax sharing as a means of fiscal decentralization, such conversion is far from fiscal decentralization in its true sense. Tax sharing constitutes a quantitative fiscal transfer, whereby the central government increases the fiscal space of local governments so that they can exercise more fiscal authority independently.

However, in Korea, tax revenues are excessively concentrated in the SCA, and tax sharing has worsened the disparity between the SCA and the other areas. As a result, the conversion has reduced the fiscal space and power of relatively underdeveloped regions. The concentration of economic power and tax revenues in the SCA has severely undermined fiscal decentralization in Korea. Therefore, policy efforts to achieve a 7:3 ratio need to be accompanied by measures to ensure mutual growth and balanced national development between the SCA and the non-SCA regions/areas.

The attempt at conversion, which began in 2010 with a partial transfer of the VAT to local governments, is closer to a transfer of fiscal resources than decentralization, because the local VAT does not come from local sources, and its taxation targets, filing and payments, tax bases, and tax rates are determined under the Value Added Tax Act. In addition, most previous literature on the local consumption tax has focused on the "interregional distribution of the VAT" and "indicators and methods of distribution." Given these facts, the VAT–local consumption tax conversion is closer to subsidies aimed at promoting equity among different areas than decentralization. In other words, Korea cannot achieve decentralization without addressing the tax revenue disparity between the SCA and the other areas. With half of the total population of Korea living in the SCA, and an even higher percentage of economic

power being concentrated in the area, converting certain national taxes to local taxes would inevitably require an interregional adjustment of tax revenues.

The conversion of the local income tax to independent tax in 2014 marked another significant moment in Korea's attempt for fiscal decentralization. The change represented a tax structure reform for the local income tax that meaningfully strengthened the tax autonomy of local governments. The conversion expanded the local governments' power over income tax sources, thereby providing them with a platform for tax revenue-based fiscal management. At the time of adoption, the policy was expected to increase local governments' fiscal autonomy and improve the linkage between the growth of local economies and the increase in local tax revenues.

However, the local governments were only allowed to control tax rates, tax credits, and tax reduction rates.[3] The local income tax still shares the same taxation targets and tax bases as the national income tax and corporate tax. The local income tax also shares the resident tax rate that was set under the old tax regime (10% of income tax), with no tax rate adjustment between the central and local governments or changes in the taxpayers' burden. As a result, the adoption of the local income tax policy in 2014 did little to ensure meaningful local autonomy.

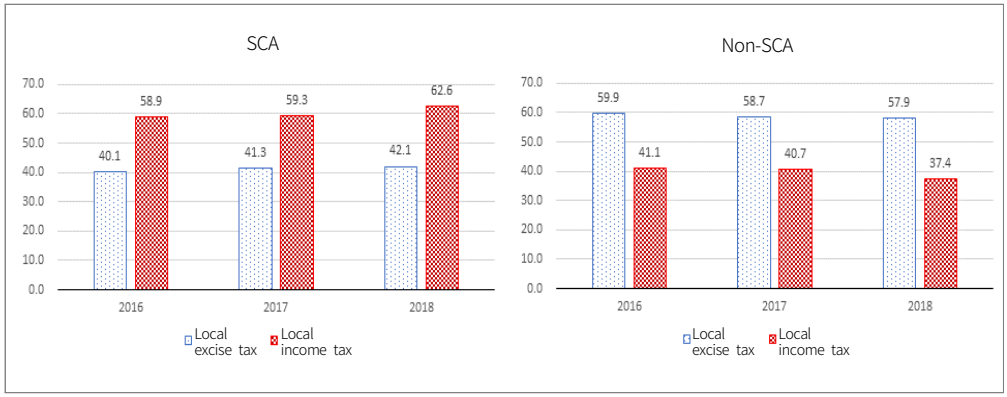
One of the characteristics of the Korean local income tax revenues is the high concentration of tax sources in the SCA. As of 2018, the SCA accounts for 42% and 62% of the local consumption tax and the local income tax, respectively. The degree of SCA concentration is higher for the local income tax. Seoul and cities with populations over a million in Gyeonggi-do (Suwon, etc.) comprise more than half of the total local income tax revenue. The local consumption tax was adopted before the local income tax partially because of this tax resource disparity.

---

3 Yoo (2018) states the following: "The conversion of the local income tax to independent tax greatly increased tax collection and compliance costs…we should ask ourselves a fundamental question, that is, whether the benefits of increasing tax autonomy of local governments outweigh the issues caused by the conversion, including the increased collection costs and inconveniences experienced by taxpayers"(p.891).

Figure 1_Distribution of Local Income Tax and Local consumption tax : SCA and Non-SCA(2016~2018)

(unit: %)



Source: Ministry of the Interior and Safety (MOIS) Local Tax Settlement Data

The percentages of the local shared tax and the financial grants for local education have also increased at a steady pace. As of 2020, the statutory rate of the two subsidies is 40.03% of the domestic tax (=19.24%+20.79%). The statutory rate of the local shared tax is important for the fiscal management of local governments. The grant tax rate increases in 2000 and 2005 expanded the fiscal space of local governments. The local shared tax accounts for the absolute majority of fiscal resources in underdeveloped cities and districts (si/gun), which have suffered from a drastic population decrease. The decentralization revenue sharing system, adopted in 2005, was a transfer adopted in the course of the state-funded projects to local governments. It lasted 10 years before being merged with the general subsidy in 2015.

The national subsidy is a transfer from the central government used to support the budgetary programs of local governments. The national subsidy increased at a faster rate after 2000, driven by the increase in national income and welfare programs, which in turn expanded local public finances. Most studies on this issue take a negative stance against this increase in fiscal transfer, however, citing the pressure on local public finances, infringement on fiscal autonomy due to unilateral decisions made by the central government, and restrictions on the decision-making power for budgetary programs. Experiences in developed countries also suggest the possibility that an increase in local tax expenditures through increased fiscal transfers may work to undermine fiscal decentralization by deepening the vertical disparity between the central and local governments.

The Korean government organized a taskforce to examine two-phase fiscal decentralization, between 2019 and the second half of 2020, and discussed specific measures required to convert more national taxes to local taxes and to transfer central government functions to local governments. The demand for fiscal decentralization is expected to continue in the future. For this reason, the efficacy of the first and second phases of fiscal decentralization needs to be analyzed. The original purpose of the fiscal decentralization policies was to build a stronger foundation for local autonomy by increasing local tax revenue, while also promoting balanced national development at the same time. In light of the purpose, this study examines current attempts at fiscal decentralization and the resulting changes in the interregional fiscal disparities, as well as in the migration in Korea, in order to measure the success of the policies against the relevant state goal (evenly developed regions) and the policy task (balanced development for all).

B. Key Issues Regarding Fiscal Decentralization and Balanced National Development

Since the Roh Moo-hyun administration, the terms "fiscal decentralization" and "balanced national development" have been regarded as the main pillars for the decentralization of governing power. However, these two pillars differ in terms of specific content and institutional design. In fact, fiscal decentralization and balanced national development may be in direct conflict with each other because they benefit different areas. To elaborate, while the two aim for the same values (better quality of living for all), the programs and policies for balanced national development are led by government ministries, whereas decentralization programs and policies are led by local governments.

Korea's attempts at balanced national development policies include a vast range of policies. The legal bases for these policies that are closely related to the subject matter of this study include the Special Act on Balanced National Development (the "Balanced Development Act," enacted in 2004), and the Special Act on Local Autonomy and Decentralization and Restructuring of Local Administrative Systems (the "Autonomy and Decentralization Act," enacted in 2013). These two Acts are based on Articles 119 (2), 120 (2), 122, and 123 (1) and (2) of the Constitution of the Republic of Korea (Lee, 2018, p. 38). Song (2018, p. 9) described the Balanced Development Act as "a framework law for balanced national development specified in the Constitution," and stressed the need to "ensure internal completeness as well as clear connection with other laws." With regard to fiscal decentralization, the Balanced Development Act is significant in that it provides for the Special Accounts for Balanced National Development as a separate means of fiscal support.

While the Balanced Development Act represents the legal basis for the balanced national development initiative of the Roh Moo-hyun administration, the 2018 Autonomy and Decentralization Act represents the Moon Jae-in administration's commitment to decentralization. Article 13 of this Act (Expansion of Local public finance and Improvement of Soundness) requires the state to secure new tax items for converting national taxes into local taxes, in order to raise the ratio of local taxes and to assume more responsibility for financial adjustment for underdeveloped regions. The Act forms a legal basis for the 7:3 national tax–local tax ratio, and prescribes the state's obligation to expand the taxation rights of local governments and ensure balanced national development for underdeveloped regions.

The following paragraphs summarize the characteristics of the fiscal decentralization and balanced national development policies, with a focus on the relationship between the two groups of policies. First, the fiscal decentralization polices and the balanced national development policies were implemented using different governance and policy instruments —even though they share the same goals. Both groups are ultimately geared toward building a balanced national development system. In Korea, fiscal transfers and balanced national development have always gone hand in hand. For example, both the Autonomy and Decentralization Act, and the Special Act on Local Decentralization (enacted in 2004) specifically called for increases in the local shared tax rate. The balanced national development policies mostly relied on physical regulations to lower the population concentration in the SCA, including the impositions of regulations on business locations, higher tax rates, and the development of administrative and innovative cities outside of the SCA (including Sejong). These regulations were aimed at expanding the industrial foundations in non-SCA regions/areas and ensuring balanced national development through migration.

The balanced national development and fiscal decentralization policies were implemented through different governance structures, which separates the two groups of policies in the eyes of the law. The fiscal decentralization policies and the balanced national development policies were implemented by different groups of ministries and committees (the Presidential Committee for Balanced National Development and the Committee on Autonomous Decentralization). Though the leading ministries of these respective policies have continually discussed the need to align the two groups, the discussions have not resulted in meaningful outcomes to date. In fact, the two governance structures feature different policy instruments and targets, and talks of alignment may be less fruitful than they are time-consuming. In this regard, this study emphasizes the need for mutual growth between the two agendas: fiscal decentralization and balanced national development.

Second, the fiscal decentralization and balanced national development policies target different areas. Fiscal decentralization is mainly achieved by fiscal transfers through tax sharing and fiscal adjustments at the subnational level. Therefore, these policies target "metropolitan cities and provinces (territorial level 3, or TL3)" at the highest, and municipalities (si/gun/gu) at the lowest. On the other hand, balanced national development policies target various regions, metropolitan areas, and hyper-metropolitan areas outside the administrative boundaries. Reflecting these initiatives, Korea has seen a decline in interregional economic disparities among metropolitan areas or regions after 2000. However, the disparity between the SCA (Seoul, Gyeonggi-do, and Incheon) and other areas in Korea paints a starkly different picture. As such, this study first examines the differences between the targets of fiscal decentralization (metropolitan areas) and balanced national development (regions).

Third, this study stresses the need for an analysis and assessment of the relationship between various fiscal measures under both the fiscal decentralization policies and the balanced national development policies. These policies need to be assessed for their outcomes, especially considering the high likelihood that redistributive fiscal policies such as fiscal decentralization and balanced national development will only increase in the future. For this reason, this study also aims to provide a framework for improving the efficacy of the balanced national development policies, by aligning them with fiscal decentralization.

2. Significance of the Balanced National Development Policies

The Economist (2016) stated that evading the national agenda of "interregional disparity" is a politically dangerous choice. The International Monetary Fund (Gbohoui et al., 2019) pointed out that, despite this danger, policies aimed at lowering interregional disparities have been granted at a lower priority than other policies. Interregional disparities tend to be persistent, and it has been pointed out that 70% of underdeveloped regions are likely to suffer from a vicious economic cycle of low growth rate and employment.

Most countries have experienced economic and income disparities among different areas, to which their governments have responded by making massive investments into balanced national development policies. In the Europe Union (EU), for example, a third of the EU budget between 2014 and 2020 was executed on cohesion policies based on creating balanced development. An analysis of the EU's role and influence may thus provide reference points for Korean policies. At the time, one of the crucial issues for the EU was whether the union

promotes economic growth and lowers interregional disparities.[4]

A review of the fiscal transfer policies in Korea shows a rapid increase in both people-based distribution policies and place-based distribution policies. Many studies on EU member states have touched on this same issue, resulting in the "place-sensitive distributional development policy" being proposed in 2020. Even though both policies are important, the people-based and place-based distribution policies differ in terms of "political interest." Expenditures on welfare benefits, by their nature, have an immediate effect on the people, which raises their perceived efficacy. On the other hand, expenditures on interregional disparities are long-term expenditures in specific places, and their benefits are not directly felt by the people.

Policies that do not directly increase people's income or incur costs enjoy less political interest from the people, which may lead to higher risks of policy distortion and fiscal waste. However, the recent COVID-19 pandemic brought about some changes in this regard. For example, numerous governments have introduced interregional disparity policies such as Korea's Emergency Disaster Subsidies. The low birth rate and social aging have increased the fiscal demand for welfare in Korea. Unless the country addresses the underdevelopment of non-SCA regions/areas, the cost for lowering interregional disparities will only increase in the future. Under these circumstances, this study discusses whether fiscal expansion through the transfer of tax revenues was urgently required, and attempts an analytic assessment of fiscal decentralization through tax sharing.

3. Previous Literature on Fiscal Decentralization and Interregional Disparities

According to previous literature, the effect of fiscal decentralization on interregional economic disparities is "inconclusive." The findings of studies that attempted international comparisons are restricted by limitations in fully considering the institutional characteristics of the different countries under scrutiny. In particular, the scope and details of local taxes vary from country to country, which puts the accuracy of revenue decentralization measurements into question. As for the relationship between local taxes and interregional disparities, researchers are still divided on the issue of "whether revenue decentralization decreases

4 In the same period, in the United States, the free trade under the North American Free Trade Agreement (NAFTA), coordinated monetary and fiscal policies, and free trade of production elements greatly contributed to lowering interregional disparities in the United States.

interregional economic disparities by promoting free competition over tax rates." To date, there is no concrete way to confirm whether local governments compete with each other to lower tax rates, except in some countries such as the Nordic countries, the United States, and Switzerland. Even in countries where tax rate competition exists, its effect on interregional economic disparity cannot be stated for certain.

Previous studies provide conflicting outcomes, depending on the period of analysis (long-term or short-term), target country (OECD countries or emerging countries), and area/region classification (OECD TL2 or country-specific territorial units). It is worth noting that even recent studies by the IMF (Gbohoui et al., 2019) and the Organisation for Economic Co-operation and Development (OECD) (Bartolini et al., 2016) do not provide consistent conclusions on the effect of revenue decentralization on interregional disparities. For example, in Korea, if the increase in the local consumption tax revenue through the transfer of the VAT constitutes a transfer of fiscal resources (rather than a tax revenue increase driven by local economic activities), the positive effect on interregional disparities may be cancelled out.

The IMF (2019, p.31, Table B.2) showed that a large vertical fiscal imbalance (VFI) increases the interregional disparities. The findings indicate that tax revenues originating from local economic growth drives interregional competition, in which case the economic powers of different regions/areas converge, lowering the level of interregional polarization. As Rodriguez-Pose and Ezcurra (2010) and Lessmann (2012) suggest, this relationship between fiscal decentralization and interregional disparities is related to the qualitative content of the decentralization policies and the political and institutional acceptance in the country. It also means that fiscal decentralization policies have limited influence as a means to mitigate interregional disparities, and thus must be accompanied by balanced national development policies.

III. Status of Fiscal Decentralization and Interregional Disparities

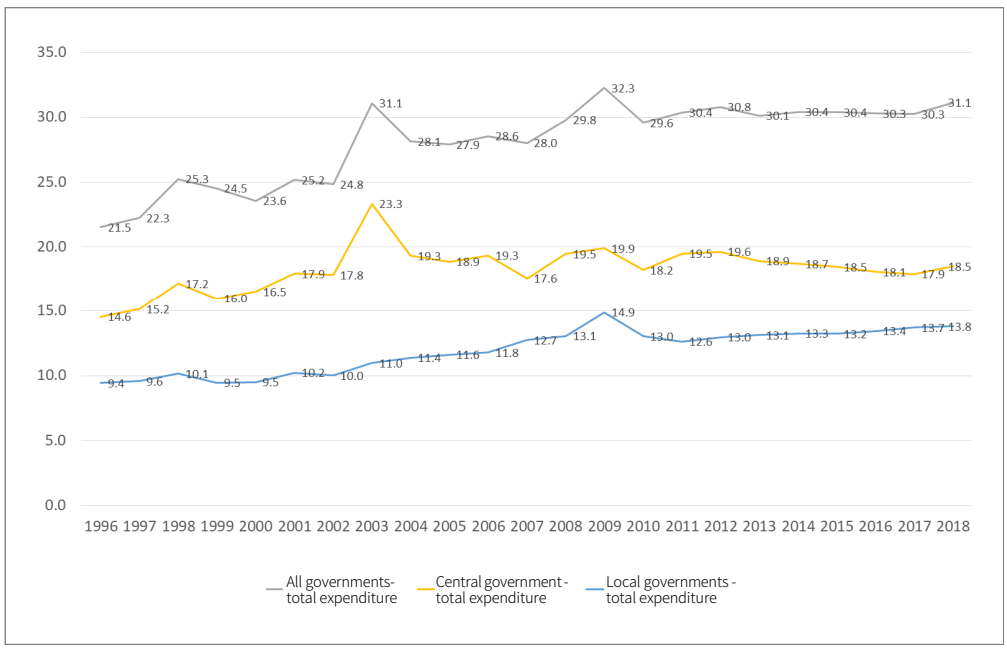
1. Fiscal Decentralization: Local Taxes and Transfers to Local Governments

The percentage of local tax revenues in terms of total tax revenue was 23.8% in 2020, and the fiscal transfer between governments stood at around KRW 177 trillion, which accounts for around a third of Korea's national budget (KRW 512.3 trillion). The amounts of local

shared taxes and the financial grants for local education were around KRW 52.2 trillion and KRW 59.4 trillion, respectively, totaling around KRW 111.6 trillion. The growth rate of fiscal transfers is higher than Korea's GDP growth rate and the increase in average expenditures by sector. The percentage of all-government expenditures against the nominal GDP has remained at around 30% since 2010. The expenditure growth rate for local governments exceeded both the growth rates of Korea's GDP and the central government expenditures, even after the financial crisis in 2009.

Figure 2_Percentage Against Nominal GDP

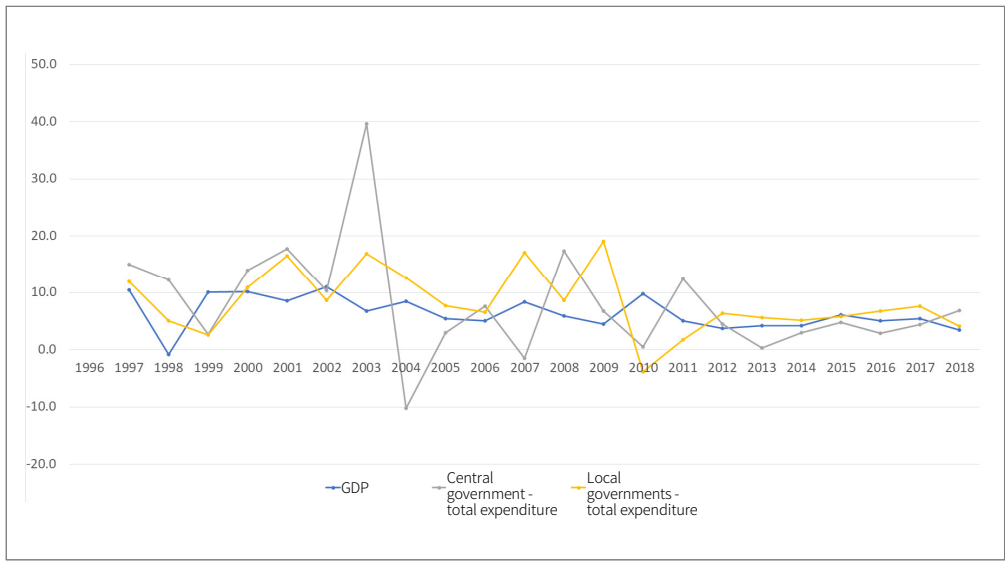
(unit: %)



Source: Statistics Korea, Government Expenditure By Area and Function (nominal, annual) http://kosis.kr/statHtml/statHtml.do?orgId=301&tblId=DT_111Y066&conn_path=I3, accessed on September 22, 2020.

Figure 3_Year-Over-Year Growth Rates of GDP, Central Government Expenditures, and Local Government Expenditures

(unit: %)

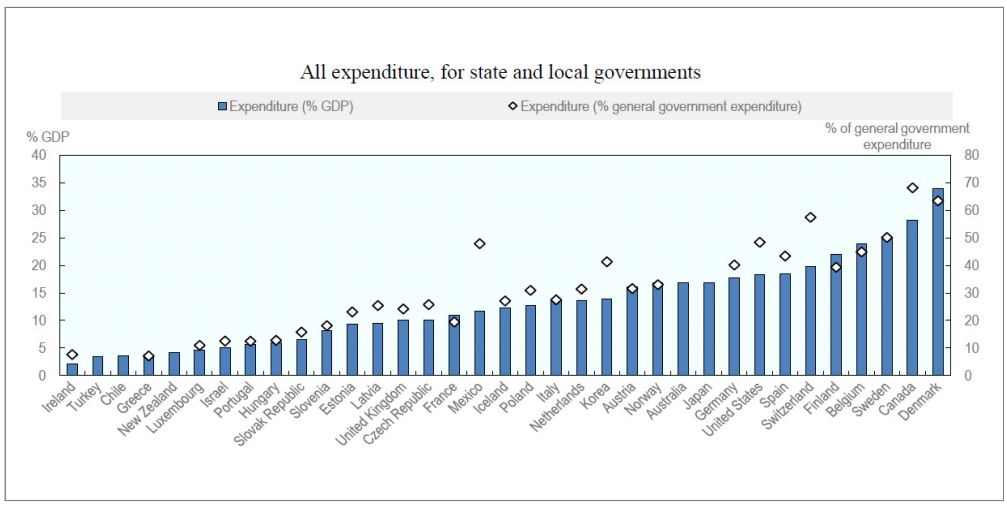


Source: Statistics Korea, Government Expenditure By Area and Function (nominal, annual) http://kosis.kr/statHtml/statHtml.do?orgId=301&tblId=DT_111Y066&conn_path=I3, accessed on September 22, 2020.

The ratio of central government spending, local government spending, and local education spending in 2020 was around 39.3:46.4:14.2. The percentage of central government finances decreased after 2005, due to the increase in fiscal transfers. The percentage then somewhat increased in 2008 and 2009, before again declining in recent years.

Compared with other developed countries, the ratio of local government expenditures against all-government expenditures or GDP is above average. The size of government expenditures is quite high, considering the country's low tax burden ratio and low public expenditures. For reference, an increase in the per capita GDP decreases the percentage of central government expenditures, while raising the percentage of local governments' expenditures in other developed countries, as well.

Figure 4_International Comparison of Local Government Expenditures based on 2016 Data



Note: 2016 data from OECD Regional Statistics Database; Korean data are for 2012.
Source: Kim and Dougherty (OECD, 2020), p. 24, Figure 1.4.

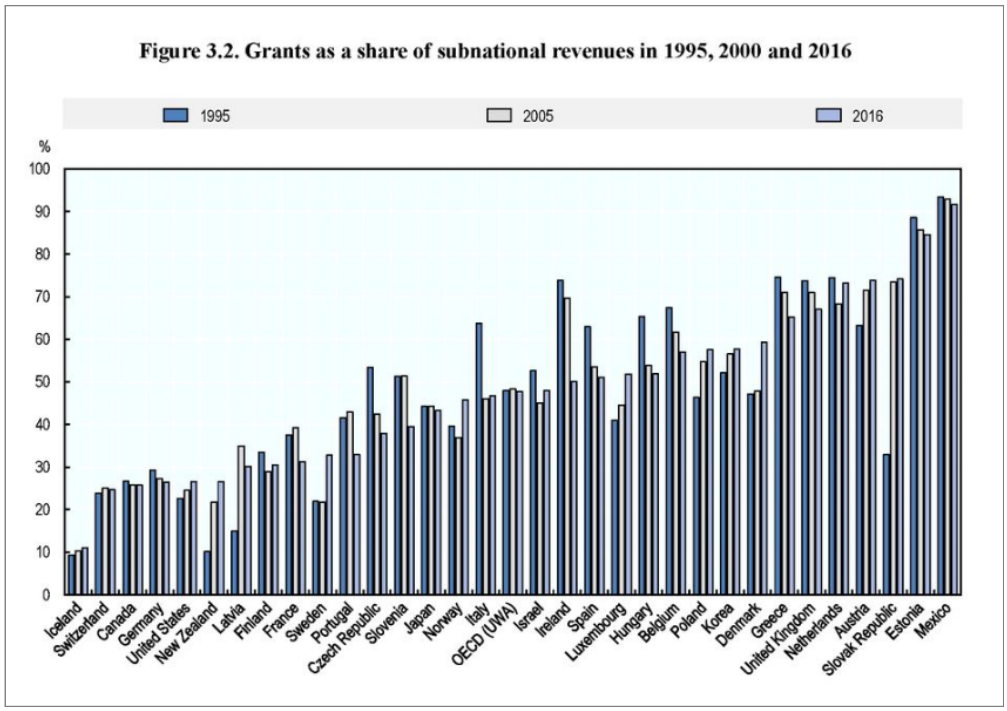
A review of the local public finances, local taxes, and fiscal transfers in Korea shows that the total size of local public finances has been quite stable. The percentage of local public finances against the country's GDP declined to around 3% during the foreign exchange and financial crises in 1997. Other than those periods, the percentage has remained stable at around 4% to 5%. Overall, Korea's local taxes and fiscal transfers account for around 5% of the country's GDP, and the percentage of all general accounts for all local governments was around 13% in 2017.

As for the percentage of subsidies in terms of total local government revenue, Korea recorded a higher percentage than the OECD average, though somewhat lower than in the United Kingdom, the Netherlands, and Denmark. However, these figures do not include the financial grants for local education. When including these grants, the percentage of all fiscal transfers against GDP stands at around 7.8% (KRW 150 trillion/KRW 1,900 trillion, as of 2019,[5] which is high among OECD countries. An increase in welfare benefit expenditure transfers are expected to local governments, which is likely to further accelerate the growth of fiscal transfers.

5 The 2019 GDP was projected based on the national account, as of 2015.

Figure 5_Percentage of Fiscal Transfers in terms of Local Public Finances for 1995, 2000, and 2016

(unit: %)



Source: OECD (2019b), p. 64, Figure 3.2

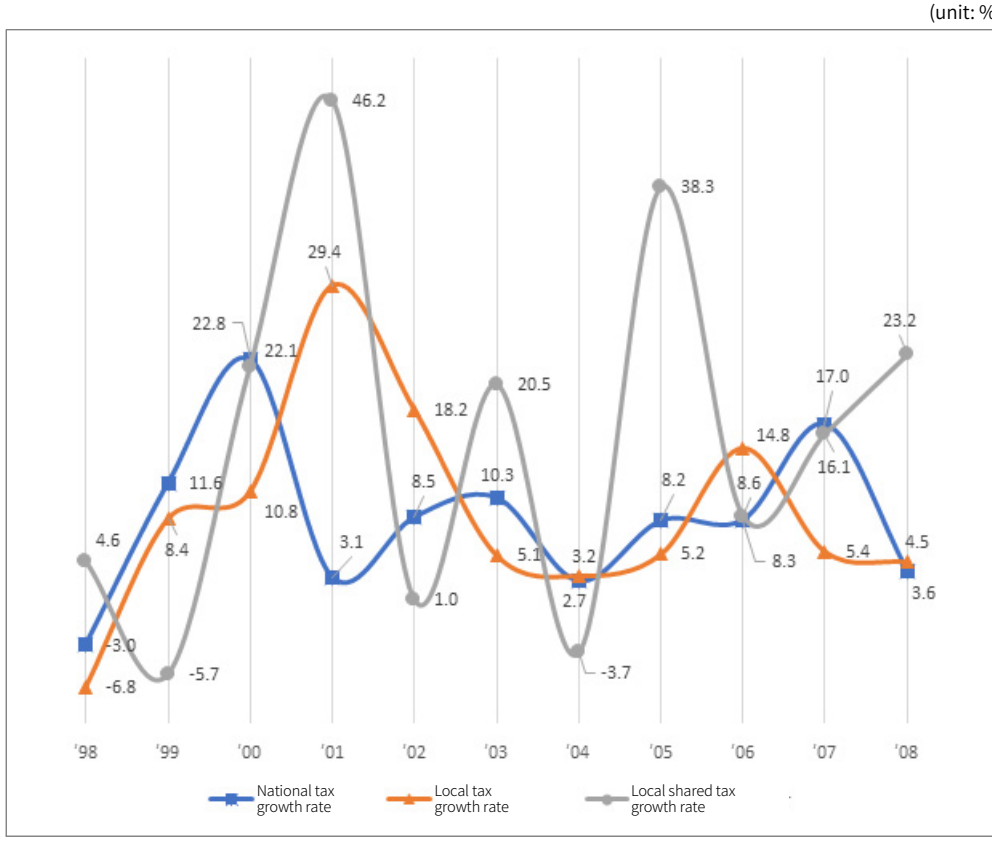
The following paragraphs examine the quantitative growth of national taxes, local taxes, and local shared taxes, as well as their annual growth rates after the full implementation of the local autonomous system in 1997. Between 1999 and 2008, the total amount of national taxes increased 2.2 times from KRW 75.7 trillion to KRW 167.3 trillion, whereas the local taxes increased 2.4 times from KRW 18.6 trillion to KRW 45.5 trillion. The amount of local shared taxes increased 4.5 times from KRW 6.9 trillion to KRW 31.1 trillion during the same period. The growth rate of the local shared taxes was more than twice as high as that of the national taxes, which is mainly attributable to the increase of the legal proportion of local shared tax in 2000 and 2005. The annual growth rates of national taxes, local taxes, and local shared taxes were 9.6%, 10.5%, and 16.7%, respectively.

Between 2010 and 2018, the annual growth rates of national taxes and local taxes were 6.7% and 7.3%, respectively. The local tax revenues increased 1.7 times from KRW 49.2 trillion

to KRW 84.3 trillion between 2010 and 2018. The national tax revenues increased 1.6 times from KRW 177.7 trillion to KRW 293.6 trillion during the same period, and the local shared tax revenues increased around 1.7 times from KRW 28.2 trillion to KRW 49 trillion. After 2010, the revenue growth rates somewhat declined due to the lower GDP growth rate. Overall, the amount of local public finances steadfastly increased, with the effect of the decline in the local tax revenues dampened by the local shared taxes. In addition, the annual growth rate of the operational fiscal balance between 2010 and 2018 was –22%.

Figure 6_National Tax, Local Tax, Local Shared Tax Growth Rates (Year-Over-Year): 1998~2008

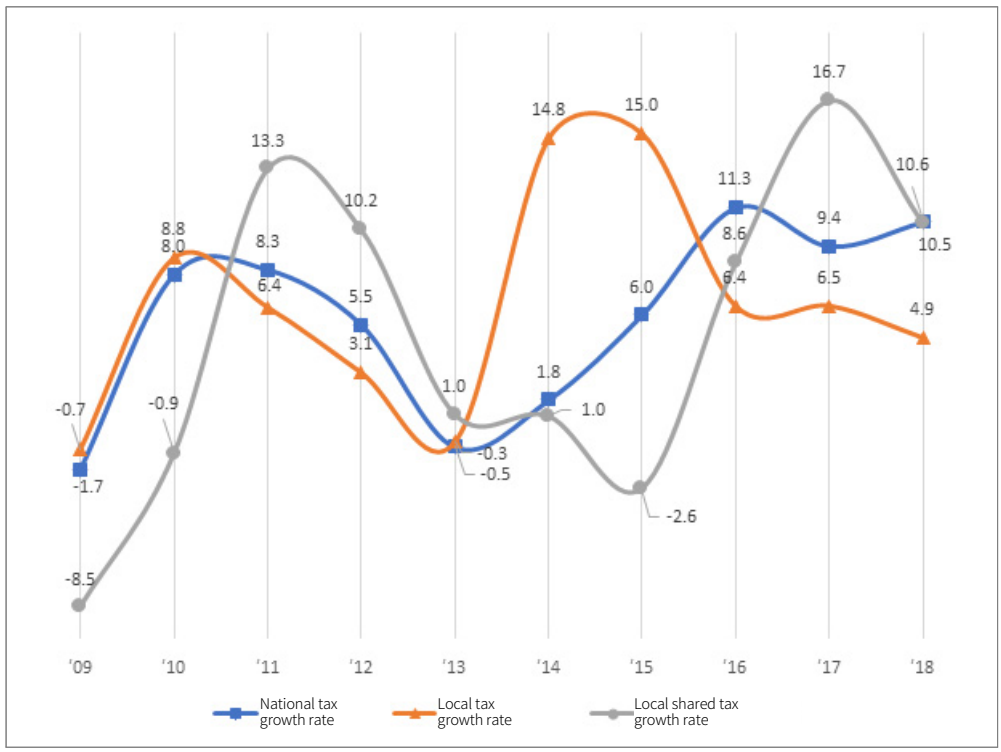
(unit: %)



Source: Present study, based on Statistics Korea (KOSIS), MOIS (Statistics Yearbook on Local Taxes), MOIS (Yearbook of Local public finance).

Figure 7_National Tax, Local Tax, Local Shared Tax Growth Rates (Year-Over-Year): 2009~2018

(unit: %)



Source: Present study, based on Statistics Korea (KOSIS), MOIS (Statistics Yearbook on Local Taxes), MOIS (Yearbook of Local public finance).

In 2019, the local consumption tax increased by KRW 3.2 trillion (4%p increase from 2018), and by KRW 8.6 trillion in 2020 (10%p increase from 2018). Previous studies indicate that there were additional transfers coming from the increased percentage of local consumption tax transfers. The additional transfers were calculated by applying the transfer percentage to the VAT projections from the 2020 Government Budget Draft (KRW 81.2 trillion for 2019, and KRW 86.4 trillion for 2020). The analyses showed that, of the additional transfers in 2020 (KRW 8.6 trillion), KRW 4.1 trillion was included in the local consumption tax revenues after excluding the change in fiscal transfers (KRW 0.9 trillion) and the transfer from government-funded projects to standard projects (KRW 3.6 trillion). In conclusion, the 20-year trend of the local taxes and the local shared taxes indicates that the total amount of

local public finances increased faster than either the GDP or national taxes. In the future, the local tax revenue is expected to further increase through the tax sharing, driven by fiscal decentralization and political demands.

Previous studies have touched on the issue of tax sharing. However, discussions on fiscal disparities between the SCA and non-SCA regions/areas, and the resulting pressure to increase fiscal transfers, have been lacking. In this study, we recognize that tax revenue transfers based on tax sources may lead to larger gaps among different regions/areas, and that non-SCA regions/areas are likely to demand increases in the legal proportion of local shared tax and the national subsidy rates (including full coverage of state-funded projects by the central government).

2. Interregional Disparities and SCA Concentration

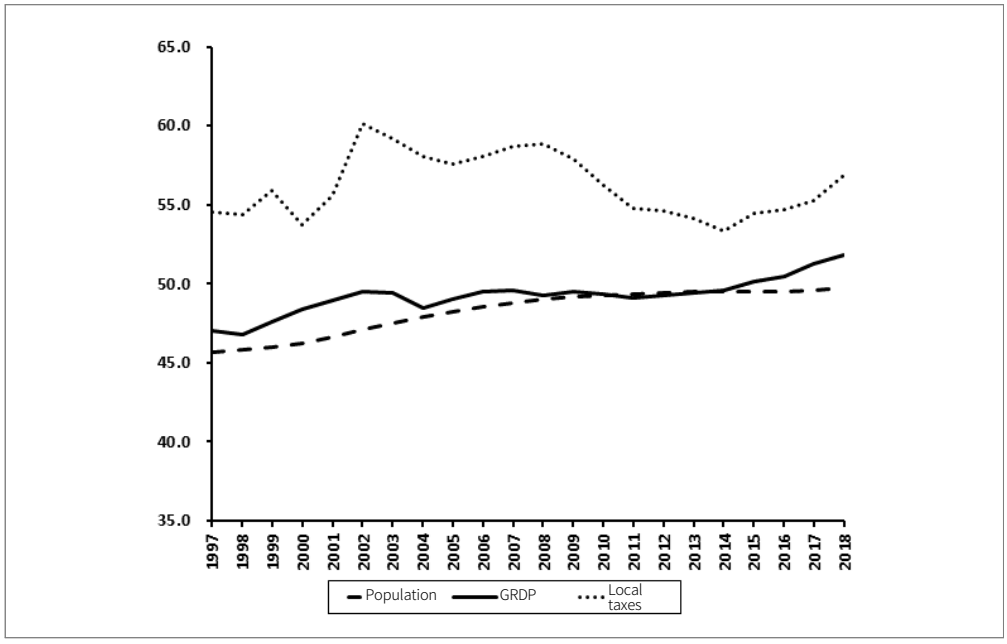
According to the Migration in the SCA over the Last 20 Years and Population Projection report announced by Statistics Korea on June 29, 2020, the SCA began to report a net inflow in 2017, after the net outflow to non-SCA regions/areas in 2011. In the report, Statistics Korea projected that, "with the current trends in migration, the population in the SCA may exceed that of the non-SCA regions/areas in 2020, and will continue to do so in the future."

First, as for the percentage of the gross regional domestic product (GRDP) and population in the SCA, the concentration of the population in the SCA was lower than the GRDP concentration in the area. The concentration levels were highly similar between 2008 and 2014. However, the GRDP concentration in the SCA gradually increased after 2015. As the urban concentration is driven by production efficiency, the GRDP concentration, which is the direct result of production efficiency, is typically higher than population concentration. Figure 8 compares the concentration of local tax revenues in the SCA between 1997 and 2018. The local tax concentration is seen to be higher than those of either the population or GRDP. As of 2018, the percentages of the SCA in terms of population and GRDP were 49.8% and 51.8%, respectively, and the percentage in terms of the local tax revenue was 56.9%. The financial crisis in 1997 and changes in the real estate tax bases resulted in high fluctuations in the SCA concentration level of the local tax revenues. In particular, the contribution rate of the SCA for the local tax revenues in 2002 was 58.1%, and the difference between the local tax revenue contribution rate and the GRDP contribution rate was 13%p. In 2014, the difference between the two indicators hit its lowest point since 1997, at 3.9%p. The local tax revenue contribution rate increased in the following years, and the difference now stands at

around 7.1%p. Given the high percentage of tax revenues from real estate in the local tax revenues in Korea, differences with the GRDP contribution rate seems to stem from the high fluctuation in real estate tax bases. In addition, the 2016 data from Seoul Capital Area shows that 73.6% of the top 1,000 enterprises' headquarters and 68.7% of savings/deposits are located in the SCA. These disparities between the SCA and the non-SCA regions/areas in terms of town gas, performing art events, emergency medical facilities, etc., are all significant.

Under a market economy, there are bound to be interregional disparities caused by differences in regional economic activities. However, the trend of the contribution rates requires the government's attention. The following paragraphs analyze changes in key indicators in Seoul and Gyeonggi-do in the SCA. The percentages of Seoul in terms of population, GRDP, and local tax revenues are declining, whereas Gyeonggi-do reports growth in all three percentages. The economic power has been concentrated in the SCA over the last 12 years. Within the SCA, the percentage of Seoul declined while Gyeonggi-do showed clear signs of growth. These findings suggest the need to investigate economic disparities between the regions as well as the other areas.

Figure 8_Population, GRDP, and Local Tax Percentages in the SCA



Source: Present study, based on Kim (2010), p. 62, Figure Ⅲ-8 and Statistics Korea, Korean Statistical Information Service (http://kosis.kr/)

Figure 9_SCA's Economic Power Percentage

(unit: %)

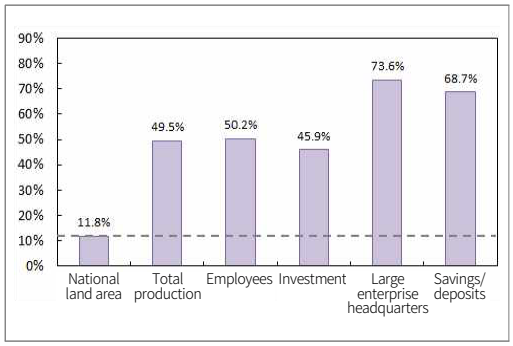
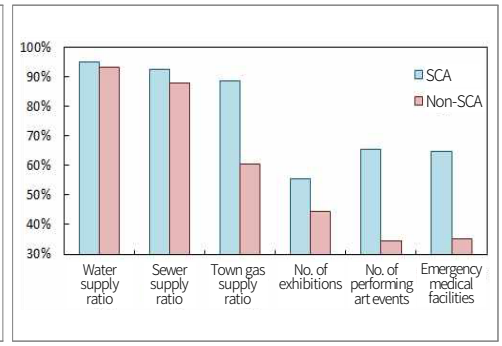


Figure 10_Accessibility to Services by Area

(unit: %)



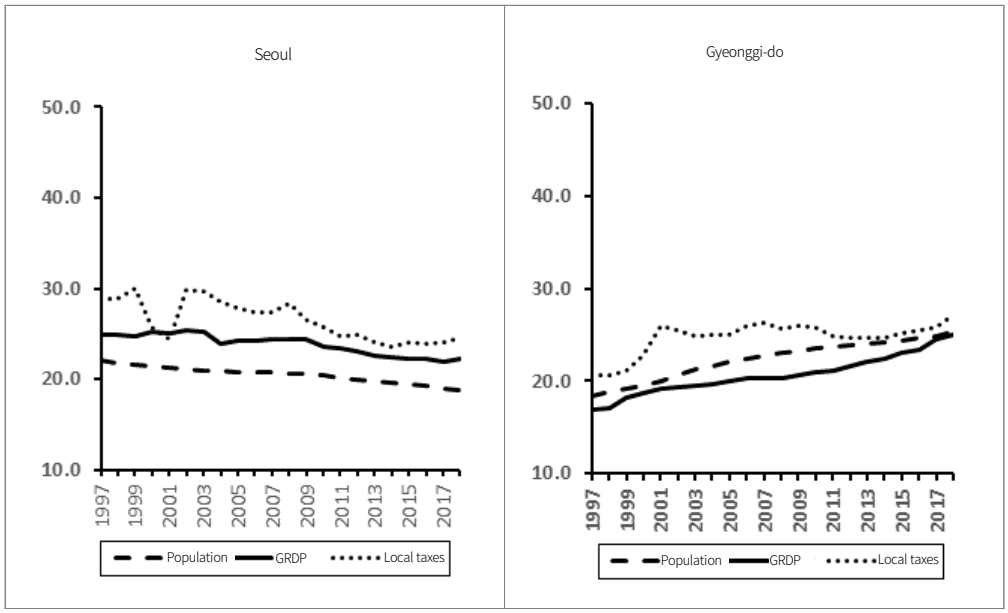
Source: Presidential Committee for Balanced National Development, Ministry of Trade, Industry and Energy (January 2019), and 4th 5-Year Plan for National Balanced Development (2018~2022), p. 1, Figure

Table 1_Concentration in the SCA 2009 and 2018

Category		Unit	Nationwide (A)	SCA (B)	SCA percentage (2018, %)	SCA percentage (2009, %)
Population/ housing	Area	㎢	100,379	11,856	11.8	11.8
	No. of households	1,000	20,500	10,038	49.0	47.1
	No. of housing units	1,000	17,633	8,061	45.7	43.7
Local economy	Local total production	KRW 1 billion	1,900,007	984,630	51.8	48.6
	No. of businesses	1,000	4,103	1,935	47.2	46.8
	No. of employees	1,000	22,235	11,456	51.5	50.8
	Savings/deposits	KRW 1 billion	1,394,987	979,889	70.2	69.2
	Loans	KRW 1 billion	1,600,285	1,043,604	65.2	69.6
Others	No. of headquarters	1	52,687	30,499	57.9	59.2
	No. of universities /colleges	1	340	116	34.1	35.0
	No. of university /college students	1,000	2,721	1,073	39.4	40.9
	No. of hospitals	1	66,316	34,449	51.9	51.4
	No. of research institutions	1	51,769	33,382	64.5	61.5
	No. of registered vehicles	1,000	23,203	10,320	44.5	54.0

Note: The number of hospitals is based on the 2017 data, and other figures are based on the 2018 data.
Source: Statistics Korea, Korean Statistical Information Service (http://kosis.kr/), the 2009 data are based on Park (2009), p. 114, Table 1.

Figure 11_Population, GRDP, and Local Tax Percentages in Seoul and Gyeonggi-do

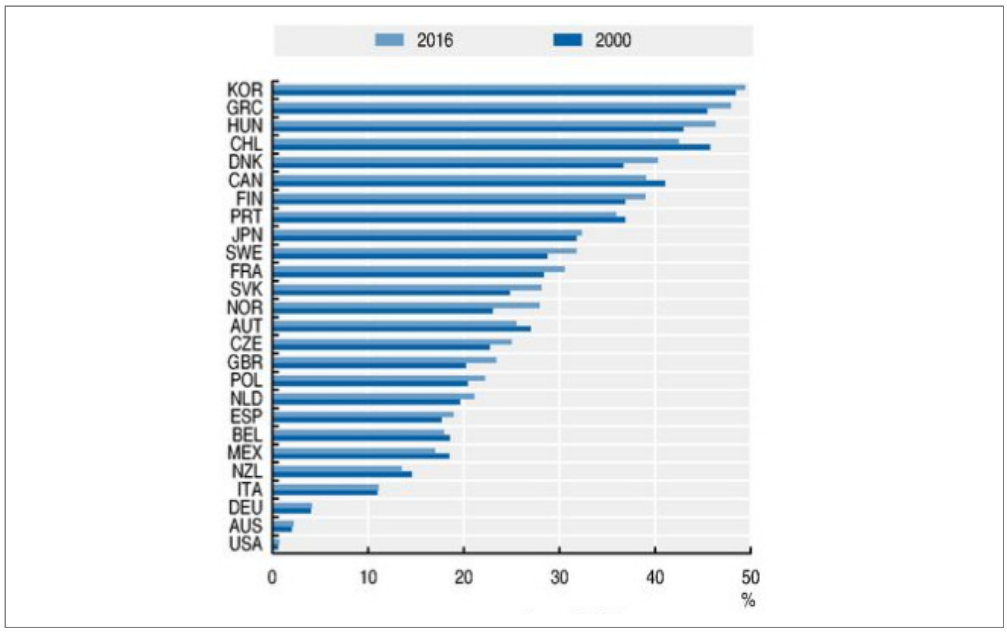


Source: Present study, based on Statistics Korea, Korean Statistical Information Service (http://kosis.kr/)

Compared with other developed countries, the capital city region contribution rate in Korea is higher than most. In countries other than Chile, Canada, and the Czech Republic, the capital region contribution rate increased between 2010 and 2016. Among those countries, Germany and the United States offer the most noteworthy examples. Germany is often referred to as a joint tax system in policy studies on intergovernmental fiscal institutions. And the United States is one of the most frequently mentioned countries in academic discussions on local autonomy. The case of Germany, a tax source-centered system under an even population distribution, and the case of United States, the most opposed system in the intergovernmental fiscal relation, can be used to explain why the previous studies based on the experiences of these two countries are not compatible with the Korean experience.

Figure 12_GDP Contribution of Capital City Regions: 2000 and 2016

(unit: %)



Source: OECD, Regions and Cities at a Glance (2018), p. 21, Figure 1.2, "The contribution of capital city regions to national GDP, TL2 regions."

IV. Empirical Analysis

1. Framework

This chapter quantitatively analyzes how fiscal decentralization affected the interregional disparities in Korea. The analysis is focused on the period between 1997 and 2018. To study the effect of fiscal decentralization, this study analyzed the data between 1997 and the latest year with available data. As such, the analysis period was determined based on the beginning of the local autonomous system in Korea and the GRDP data availability. The data consisted of the following components: (i) panel data from metropolitan areas (17 areas in 22 years; and 16 areas (excluding Sejong) until 2011); and (ii) regional data (7 regions: SCA, Chungcehong, Honam, Daegyeong, Dongnam, Gangwon, and Jeju), because the fiscal decentralization and balanced national development policies were implemented based on these regions. The

analysis also considered the gradual expansion of regions, as evidenced by the Hyper-Metropolitan Economic Region (4+α) initiative of the current Local Development Committee,[6] and the "Hyper-Metropolitan Economic Foundation for the Fight Against COVID-19," announced by the Presidential Committee for Balanced National Development and the Korea Institute for Industrial Economics & Trade.

The model for this analysis assumed a linear equation. It was also assumed that regional disparities (RD) are affected by the private and market sector (P_{it}), the public sector (G_{it}), and the socioeconomic sector (D_{it}). First, the regional disparities for the production base and income are represented by the production, consumption, and income-earning activities of economic actors. It was also assumed that the government can affect the disparities in production infrastructure and migration, based on the supply of public services and fiscal transfers. In addition, the model also included the relationship between socioeconomic factors (migration, birth rate, etc.) and interregional disparities.

$$RD_{jt} = F(P_{it} : G_{it} : D_{it}) \Rightarrow RD_p > 0, RD \leqq 0$$
$$RD_{jt} = \beta_0 + \beta_1 P_{jt} + \beta_2 G_{jt} + \beta_3 D_{jt} + \mu_j + \lambda_t + \nu_{jt}$$

The data were then analyzed using the fixed effect model, the random effect model, and the generalized least squares (GLS) model. A Houseman test of the models revealed significant F values across all models. However, the random effect model offered the benefit of considering the effects for specific periods, such as during the foreign exchange and financial crises. We also considered the GLS model in order to account for cross-sectional characteristics across regions/areas. Ultimately, we chose the random effect GLS regression model to account for year-specific effects and regional characteristics at the same time.

(Hypothesis 1) The same local tax rate applies to all regions/areas in Korea, with the only difference found in the tax base levels. Therefore, an increase in the local tax revenue will exacerbate interregional economic disparities.

---

6 Local Development Committee, "Local Development and Metropolitan Economic Region Strategies, December 2009; "Presidential Committee for Balanced National Development to Form Hyper-Metropolitan Economic Regions to Prevent Regional "Hollowing Out", Daegu Ilbo, October 23, 2019, http://www.idaegu.com/newsView/idg201910230085, accessed on: June 30, 2020.
"Achieving Synergy for National Development Strategies Through Decentralization and Balanced Development", *Seoul Shimmnun*, January 1, 2020, https://go.seoul.co.kr/news/newsView.php?id=20200101011004&wlog_tag3=naver, searched on: June 30, 2020.

(Hypothesis 2) The local shared tax (national subsidy) and the "capital expenditure" programs were concentrated in underdeveloped regions. Therefore, they had a positive effect on mitigating interregional disparities.

(Hypothesis 2-1) The national subsidies are distributed based on the fiscal space of each region/area, and are therefore conducive to mitigating interregional disparities. However, the recent increase in national subsidies for welfare expenditures (proportionate to population) may undermine the mitigating effect of national subsidies.

(Hypothesis 3) The local consumption tax was adjusted for each region in order to mitigate interregional disparities. Therefore, the local tax at least partially undermined the increase in interregional economic disparities.

The hypotheses to be verified by this study are as follows. First, Hypothesis 1 assumes that an increase in the local tax revenue will exacerbate interregional economic disparities. The hypothesis is based on empirical studies on Korea's local taxes, including IMF (2019), Jung et al. (2018), Moon (2017), and Kim and Kim (2007). Counterevidence against the hypothesis includes reports by Rodriguez-Pose and Excurra (2010) and Bellofatto and Besfamille (2019), who argue that revenue decentralization will help prevent excessive spending and enhance fiscal discipline.[7] Bartolini et al. (2016) presented empirical evidence that an increase in local taxes lowers interregional disparities, as did Kim (2019).

Hypotheses 2 and 2-1 are based on the purpose and details of fiscal transfer distribution. It was assumed that equalization grants mitigate interregional disparities, while national subsidies for welfare expenditures are not conducive to lowering interregional disparities. It was also assumed that capital expenditures for infrastructure development will be conducive to narrowing interregional gaps, because it is likely to be primarily distributed to underdeveloped regions.

Hypothesis 3 was derived from the distribution of the local consumption tax, based on Lim (2019), Kim (2011), and Park (2008). In particular, Lim (2019) advocated for improving the local consumption tax to enhance its function as a local tax. He explained that improving the tax autonomy through local taxes cannot be fully achieved without addressing the dual nature of the local consumption tax (local tax + equalization grant).

As for the dependent variables, this study used the "GRDP coefficient of variation," "per

---

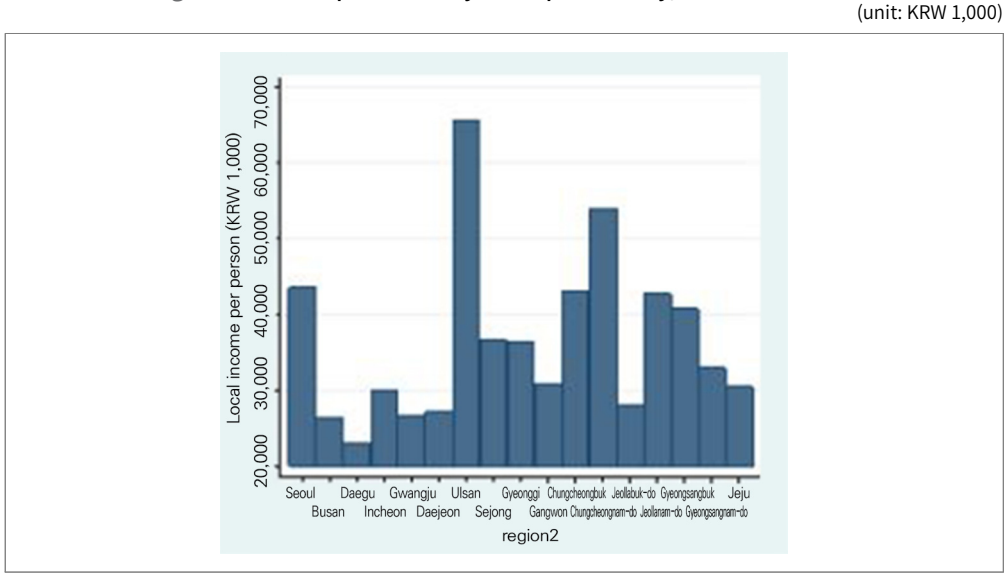
7 "By limiting the ability of the central government to redistribute resources towards regions in financial needs, decentralization curbs incentives for excessive subnational spending and enhances fiscal discipline, but may also widen interregional disparities by triggering tax competition for mobile tax bases."

capita GRDP coefficient of variation," "gross regional national income (GRNI) coefficient of variation," and "per capita GRNI coefficient of variation " as variables that represent regional disparities. Different studies have used different variables to assess the economic power of each region/area. This study focused on a wide range of indicators, including GRDP, GRNI, personal income, and private consumption. These variables ultimately showed similar levels of explanatory power, and we then used the GRDP indicator along with the differences from income variables.

Level variables and per capita variables: This study confirmed that the implications for the fiscal decentralization policies vary depending on whether "per capita variables" or "level variables" are used. Even though large gaps in production base exist among different regions/areas, the population disparities are found to exert a greater effect. For this reason, the distribution of the regional aggregate GRDP may differ greatly from that of the per capita GRDP. Figures 13 and 14 indicate that the disparity in GRDP is slightly lower than the GRNI disparity when based on the per capital GRDP and per capita GRNI, while the overall distributions were similar. However, Figures 13 and 15 show significant differences in the local distributions of the aggregate GRDP and per capita GRDP, with starkly different region/area rankings.

Figure 13_Per Capita GRDP by Metropolitan City/Province in 2018

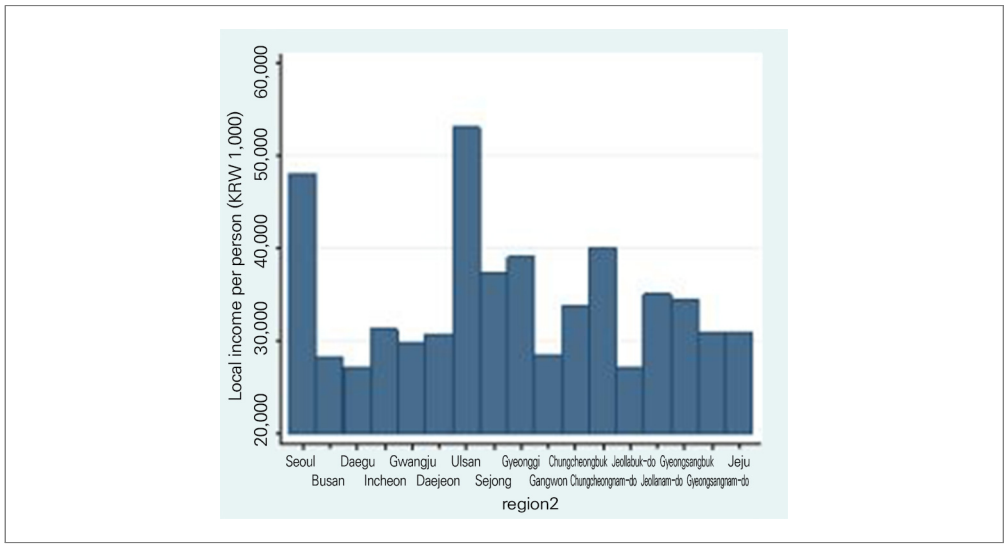
(unit: KRW 1,000)



Source: Present study, based on Statistics Korea data.

Figure 14_Per Capita GRNI by Metropolitan City/Province in 2018

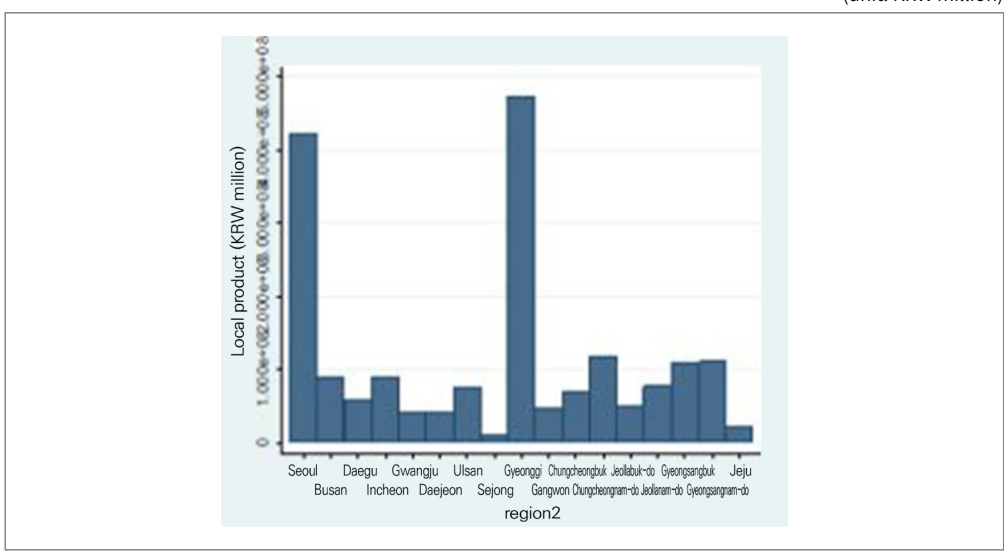
(unit: KRW 1,000)



Source: Present study, based on Statistics Korea data.

Figure 15_GRDP Distribution by Metropolitan City/Province in 2018

(unit: KRW million)

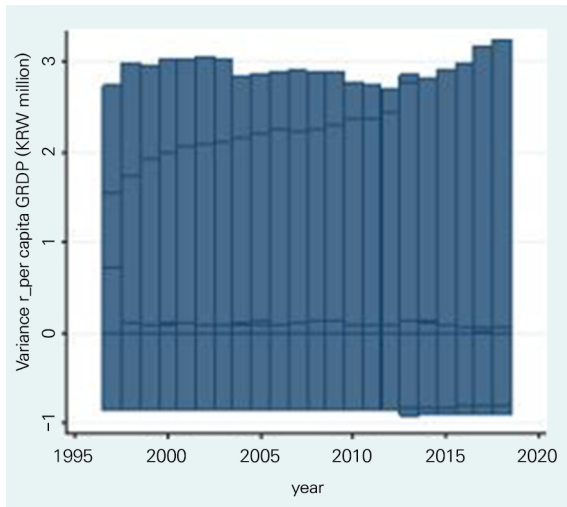


Source: Present study, based on Statistics Korea data.

Increase in GRDP coefficient of variation and decline in per capita GRDP coefficient of variation: The disparities in the GRDP coefficient of variation have been increasing since 2014, and the rate of increase is higher than the rate over the last 20 years. On the other hand, the GRNI coefficient of variation has changed little since 2000. The rate somewhat increased after 2015, but is still lower than the growth rate of GRDP disparities. The data also revealed a decline in per capita GRNI/GRDP disparities, which can be attributed to the decrease in the per capita GRDP and per capita GRNI in wealthier areas/regions.

Figure 16_Changes in GRDP Coefficient of Variation by Metropolitan City/ Province and Year: 1997~2018

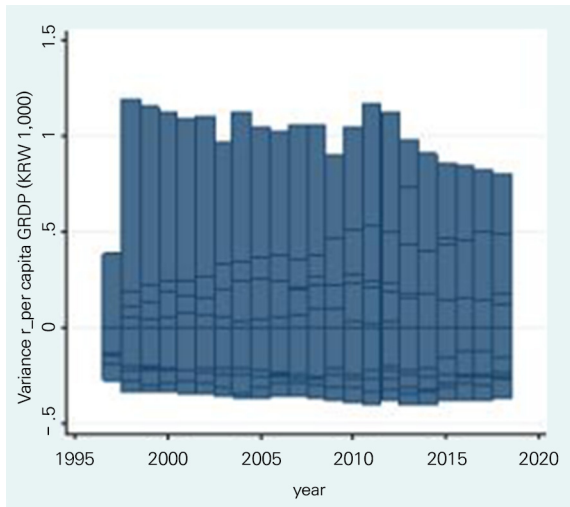
(unit: KRW million)



Source: Present study, based on Statistics Korea data.

Figure 17_Changes in Per Capita GRDP Coefficient of Variation by Metropolitan City/Province and Year: 1997~2018

(unit: KRW 1,000)



Source: Present study, based on Statistics Korea data.

The coefficient of variation s ($S_{it}/\mu_t, S_{it} = X_{it} - \mu_t$) were calculated by dividing the differences between the measurements and averages (deviations) by the averages, and then normalizing the results based on the relative sizes of the deviations. For example, the difference between the per capita GRDP X_{it} of the region/area and the average ($=\mu_t$) of the year was divided by the mean value ($=\mu_t$). The explanatory variable was the fiscal variables related to the public sector and fiscal transfer (G_{it}). The control variables consisted of the private market variables P_{it}, and the socioeconomic variables D_{it}. The private market variables were: number of businesses (1997 onwards); number of university/college students (1999 onwards); land prices (1997 onwards); land price change (1997 onwards); apartment house sales prices (2003 onwards); income tax withholding (1997 onwards); and personal income (2000 onwards). Personal income refers to income that can be disposed by households and non-profit organizations that support households. The personal income in Seoul was KRW 20.51 million in 2016, which is higher than in any other region/area in Korea. With regard to fiscal transfer and public services (G_{it}), we used the following variables: local tax percentage; local consumption tax percentage; capital expenditure

percentage; income tax percentage; and local expenditures. The socioeconomic variables (D_{it}) included: population; net migration (= move ins – move outs); net migration ratio [= (move ins – move outs)/population]; area; and private consumption. Level variables were used after converting them to log values, whereas the percentage values and difference values were used without modification. In addition, these variables represent macro data, which suggests that the correlation among these variables is bound to be high. For this reason, however, the analysis is not free from issues pertaining to multicollinearity, reverse causality, or endogeneity.[8]

8 It should be noted that we attempted to increase the statistical significance of the coefficient variables by controlling for endogeneity when the correlation among variables was 0.5 or higher. For example, the correlation coefficient between the local excise tax and the local expenditure is 0.83, and we removed one of the two variables or using it as an instrumental variable.

Table 2_Variables

Variable name		Unit	Use	Source	Period
Dependent variables	per capita GRNI_variance	KRW 1,000	$\frac{\text{1per capita GRNI}_{it}-\mu_t}{\mu_t}$	Statistics Korea, *Local Income*	2000~2018
	GRNI_variance	KRW million	$\frac{\text{GRNI}_{it}-\mu_t}{\mu_t}$	Statistics Korea, *Local Income*	2000~2018
	per capita GRDP_variance	KRW 1,000	$\frac{\text{1per capita GRDP}_{it}-\mu_t}{\mu_t}$	Statistics Korea, *Local Income*	1997~2018
	GRDP_variance	KRW million	$\frac{\text{GRDP}_{it}-\mu_t}{\mu_t}$	Statistics Korea, *Local Income*	1997~2018
Fiscal variables (G)	Revenue decentralization (percentage of local tax)	%	$\frac{\text{Local taxes}_{it}}{\text{General account tax revenue}_{it}} \times 100$	MOIS, *Financial Yearbook of Local Governments*	1997~2018
	Totalexpenditure of Local public finance	KRW million	$\text{total expenditure}_{it}$	MOIS, *Financial Yearbook of Local Governments*	1997~2018
	National subsidy percentage	%	$\frac{\text{National subsidy}_{it}}{\text{General account tax revenue}_{it}} \times 100$	MOIS, *Financial Yearbook of Local Governments*	1997~2018
	Capital expenditure percentage	%	$\frac{\text{Capital expenditure}_{it}}{\text{total expenditure}_{it}} \times 100$	MOIS, *Financial Yearbook of Local Governments*	1997~2018
	Local consumption tax percentage	%	$\frac{\text{Local consumption tax}_{it}}{\text{Local tax revenue}_{it}} \times 100$	MOIS, *Financial Yearbook of Local Governments*	2010~2018
	Property tax percentage	%	$\frac{\text{Property tax}_{it}}{\text{General account tax revenue}_{it}} \times 100$	MOIS, *Financial Yearbook of Local Governments*	1997~2018
	Local shared tax	KRW million	$\text{Local shared tax}_{it}$	MOIS, *Financial Yearbook of Local Governments*	1997~2018
Market variables (P, D)	Apartment sales price index	November 2017 (baseline)=100.0	$\text{Apartment sales price index}_{it}$	Korea Appraisal Board, *National Housing Price Trend Survey*	2003~2018
	Population	No. of persons	Population_{it}	Statistics Korea, *Population Projections*	1997~2018
	GRDP growth rate	%	$\frac{\text{GRDP}_{it}-\text{GRDP}_{i,t-1}}{\text{GRDP}_{i,t-1}} \times 100$	Statistics Korea, *Local Income*	1997~2018
	No. of businesses	1	$\text{No. of businesses}_{it}$	Statistics Korea, *National Business Survey*	1997~2018

Table 2_Variables(continued)

Variable name		Unit	Use	Source	Period
Market variables (P, D)	Personal income	KRW million	Personal income$_{it}$	Statistics Korea, *Local Income*	2000~2018
	Personal income per capita	KRW 1,000	$\frac{\text{Personal income}_{it}}{\text{Population}_{it}}$	Statistics Korea, *Local Income*	2000~2018
	Private consumption	KRW million	Private consumption$_{it}$	Statistics Korea, *Local Income*	1997~2018
	Private consumption per capita	KRW 1,000	$\frac{\text{Private consumption}_{it}}{\text{Population}_{it}}$	Statistics Korea, *Local Income*	1997~2018
	total tax revenue (General account)	KRW million	General account tax revenue$_{it}$	MOIS, *Financial Yearbook of Local Governments*	1997~2018
	total tax revenue of Local Pulbic Finance	KRW million	total tax revenue$_{it}$	MOIS, *Financial Yearbook of Local Governments*	1997~2018
	Unemployment rate	%	Unemployment rate$_{it}$	Statistics Korea, *Economically Active Population Survey*	2000~2018
	Employment rate	%	Employment rate$_{it}$	Statistics Korea, *Economically Active Population Survey*	2000~2018
	Land price index	December 2016 (baseline) =100.0	Land price index$_{it}$	Korea Appraisal Board, *National Land Price Trend Survey*	1997~2018
	Land price change	%	Land price change$_{it}$	Korea Appraisal Board, *National Land Price Trend Survey*	1997~2018
	Income tax withholding	KRW million	Income tax withholding$_{it}$	National Tax Service (NTS), *National Tax Statistics*	1997~2018
	No. of employees	No. of persons	No. of employees$_{it}$	Statistics Korea, *National Business Survey*	1997~2018
	No. of university/ college students	No. of persons	No. of university/college students$_{it}$	Korean Educational Development Institute, *Basic Education Statistics Survey*	1999~2018
	No. of domestic migrants	No. of persons	No. of domestic migrants$_{it}$	Statistics Korea, *Korea Population Movement Statistics*	1997~2018

Notes: 1. i refers to territorial units (TL2 or TL3), t is year.
2. Fiscal variables are based on settlement data and net total.
Source: Present study

Table 3_Changes in Mean Values of Key Variables by Metropolitan Government

Variable name	2016 mean	2010 mean	2017 mean	2006~2017 change
Population	3,027,393	3,097,132	3,026,247	0.99
per capita GRDP (KRW 1,000)	20,145	26,209	33,760	1.67
Local income per person (KRW 1,000)	19,461	24,977	33,876	1.74
No. of businesses	201,660	209,716	236,463	1.17
No. of employees	964,733	1,102,936	12,72,171	1.31
Withholding income (KRW 1 million)	1,138,768	1,429,087	2,807,307	2.46
No. of university/college students	-	181,759	162,299	-
Apartment house sales price index	70.14	80.30	99.96	1.42
Land price index	86.21	89.61	104.39	1.21
Private consumption	9938	12116	15450	1.55
Local total tax revenue (KRW 1 million)	8,739,013	10,400,000	15,400,000	1.76
Local tax percentage	0.36	0.34	0.34	0.94
Capital expenditure percentage	0.41	0.38	0.30	0.73
National subsidy percentage	0.22	0.26	0.23	1.00
Local consumption tax percentage	-	0.07	0.10	-
Property tax percentage	0.06	0.08	0.11	1.83
Unemployment rate	3.12	3.21	3.21	1.02
Employment rate	60.11	58.99	61.11	1.01

Source: Present study, based on relevant data source.

2. Findings

A. Findings for Metropolitan Areas

1) Relationship between Fiscal Decentralization and per Capita GRDP and GRNI Disparities

In terms of Hypothesis 1, based on the per capita GRDP in Table 4, an increase in local tax revenues in Korea was found to increase interregional economic disparities.[9] Jung et al. (2018, p.8) argued that the decrease in the local shared tax revenues led to greater fiscal disparities after the national tax–local tax adjustment, because the tax revenue concentration

9 For the purpose of this study, the local tax includes the local excise tax. It would be technically correct to exclude the local excise tax from the local tax. However, we used the two variables as they were considering the low correlation between the two and the significance of the effect of the size of the local tax revenue.

due to increased local tax revenue had a greater effect than the equalization effect of the equalization grant. In other words, even though the increase in public services driven by increased fiscal transfers contributed to lowering the economic disparities, the increase in economic disparities caused by the tax revenue concentration remained greater, which is consistent with the findings of this study. Without tax rate competition among areas/regions, the local tax revenues merely represent "tax base levels" as a proxy variable for local economies.

The source-based tax sharing refers to the concentration of additional financial resources in areas/regions already enjoying greater tax revenues. In terms of the amount of financial resources, it refers to a decline in the local shared tax revenues caused by a decline in the domestic tax revenues. Cho and Lee (2018, pp. 65~66) used this poverty rate analysis to prove that fiscal decentralization led by revenue decentralization is one of the main causes of interregional inequalities. Kim et al. (2019) then analyzed interregional disparities using the per capita GRNI as a dependent variable, and found that interregional disparities may be mitigated even when the percentage of local tax revenues increases.

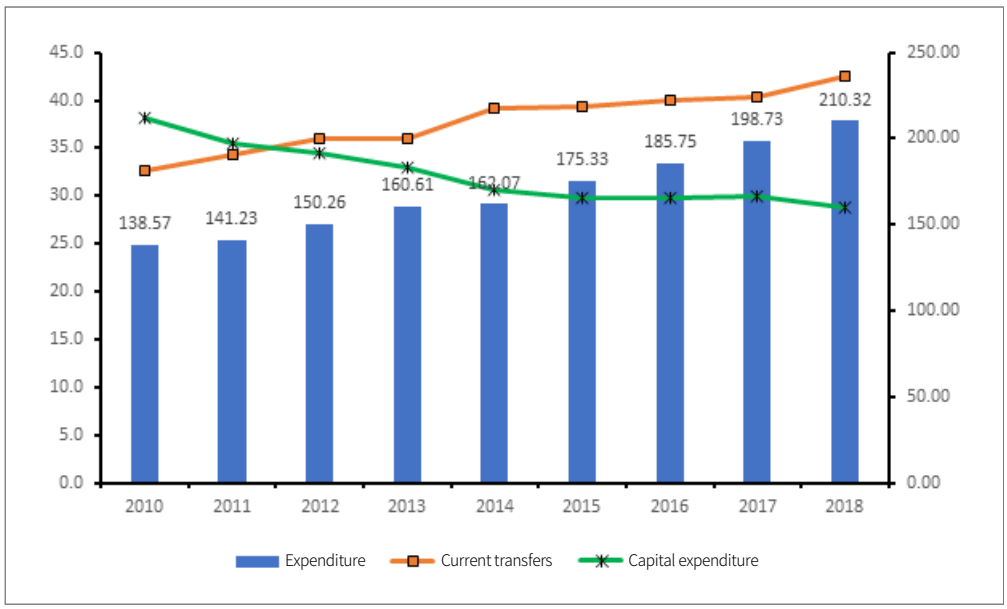
For reference, however, studies comparing OECD countries fail to provide consistent findings on the effect of increased local tax revenues on interregional disparities. The OECD (2019) found that a higher level of tax autonomy results in decreased interregional economic disparities, whereas the IMF (2019) concluded that a higher level of revenue decentralization raises interregional disparities. Previously, Rodriguez-Pose and Ezcurra (2010) studied developed countries, and found that local taxes serve as a mechanism for improving efficiency in the supply of public goods through an interregional "tax rate competition." While this may result in a convergence of tax rates among different regions, an increase in interregional disparities was observed in both developing countries and countries in transition.

Hypothesis 2 is concerned with the effect of fiscal transfers on interregional disparities. Specifically, national subsidies, local shared taxes, and capital expenditures were analyzed as transfer items. First, national subsidies, local shared taxes, and capital expenditures are primarily assigned to underdeveloped areas/regions, which is likely to have a positive effect on mitigating interregional disparities. However, the mitigating effects may have been undermined by the increased percentage of national subsidies assigned to highly populated areas, driven by increases in welfare expenditures. In this study, the "national subsidy percentage" and "local shared tax percentage" were found to have a positive effect on mitigating interregional disparities in the per capita GRDP. The increase in the national subsidies may have a lesser effect than the local shared tax, though this effect may change

in the future. As for capital expenditures, its explanatory power was found to potentially vary depending on the analysis model, which is inconsistent with the findings of previous studies.

Figure 18_Analysis of Expenditure Settlements of Local Governments from 2010 Onwards (general account + special account)

(unit: %, KRW trillion)



Source: Present study, based on Local Public Finance Integrated Disclosure System, "Tax Revenue and Expenditure Settlement Data by Local Government."

Hypothesis 3 was designed to assist in the understanding of the role of the local consumption tax, after controlling for the market effect. In this study, the local consumption tax was found to be negatively correlated with interregional economic disparities. These findings are within the expected scope, because the local consumption tax has been distributed based on the consideration of interregional equalization over the last nine years. Previous studies also discussed the nature of the local consumption tax as a fiscal transfer. To account for the continuing fiscal decentralization, we used years as an explanatory variable. In most models, interregional disparities significantly declined in each year.

Table 4_Relationship between per Capita GRDP Disparities and Key Variables: 1997~2018

	(1)	(2)	(3)	(4)	(5)	(6)
GRDP growth rate per person	0.004*** (0.00)	0.005*** (0.00)				
GRDP per person$_{t-1}$			0.25*** (0.00)	0.03*** (0.00)	0.05* (0.06)	
Income tax withholding						0.004* (0.58)
Revenue decentralization (local tax percentage)	0.25*** (0.00)	0.34*** (0.00)				
National subsidy percentage	-0.16* (0.05)				-0.81*** (0.00)	
Capital expenditure percentage (capital expenditure percentage $_{t-1}$)		0.08 (0.34)		-0.04** (0.00)		
Local consumption tax percentage			-2.11** (0.03)			
Local shared tax percentage						-0.25** (0.02)
Population	-0.50*** (0.00)	-0.50*** (0.00)	-0.90*** (0.00)	-0.48*** (0.07)	-0.44*** (0.00)	0006 (0.10)
Change in official land price		-0.002** (0.01)			-0.002 (0.79)	0.006 (0.73)
Year	0.0008 (0.21)	0.002 (0.14)				
Area	-0.32*** (0.00)	-0.31*** (0.00)	0.20* (0.03)	-0.29*** (0.00)		
Constant	7.63*** (0.00)	5.67*** (0.00)	9.31*** (0.00)	9.11*** (0.00)	-0.002*** (0.00)	0.008 (0.94)
No. of observations	355	355	149	355	355	351
Analysis model	FE	FE	FE	FE	FE	RE
Hausman Stat.	59.86	59.61	91.28	53.78	10.00	-
(Within) R^2	0.33	0.34	0.58	0.23	0.17	0.04

Note: P value in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Present study

Table 5_Relationship between per Capita GRNI Disparities and Key Variables: 1997~2018

	(1)	(2)	(3)	(4)	(5)	(6)
Per capita GRNI Growth rate	0.005*** (0.00)	0.005*** (0.00)				0.01*** (0.00)
Per capita $GRNI_{t-1}$			0.15*** (0.00)	0.06*** (0.00)	0.02** (0.01)	0.15*** (0.00)
Income tax withholding						
Revenue decentralization (local tax percentage)	0.26*** (0.00)	0.27*** (0.00)				
National subsidy percentage	-0.17** (0.04)				-0.22** (0.01)	
Capital expenditure percentage (capital expenditure percentage $_{t-1}$)		-0.02 (0.65)		-0.06* (0.00)		
Local consumption tax percentage			-2.25*** (0.03)			
Local shared tax percentage						-0.63*** (0.00)
Population	-0.12*** (0.00)	-0.15*** (0.00)	-0.54*** (0.00)	-0.05** (0.04)	-0.33*** (0.00)	-0.17*** (0.00)
Change in official land price	-0.004** (0.01)	-0.003* (0.05)			-0.002* (0.09)	-0.004 (0.10)
Year	0.001*** (0.02)	0.0009 (0.42)				
Area	-0.001 (0.88)	-0.001 (0.86)	0.08 (0.31)	-0.004 (0.90)		
Constant	-1.47*** (0.30)	0.26 (0.91)	5.83*** (0.00)	0.68** (0.04)	4.71*** (0.01)	-0.20*** (0.00)
No. of observations	293	293	149	293	309	293
Analysis model	RE	RE	RE	RE	RE	RE
Hausman Stat.	-	-	-	-	-	-
(Overall) R^2	0.26	0.26	0.63	0.23	0.13	0.39

Note: P value in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Present study

2) Relationship between Fiscal Decentralization and Aggregate GRDP and GRNI Disparities

Table 6 presents findings in which the interregional disparities in aggregate GRDP were used as a dependent variable. The effect of the explanatory variable in Hypothesis 1 (local tax) and the explanatory variable in Hypothesis 2 (local shared tax) reveal the same trends as the findings for the per capita GRDP. However, the effects of the "national subsidy" and the "increased capital expenditure" on the interregional disparities in aggregate GRDP and GRNI were different from the effect on "interregional disparities in the per capital GRDP," in terms of statistical significance. The national subsidy was significantly correlated with the "interregional disparities in the per capita GRDP," whereas the "interregional disparities in the aggregate GRDP" was statistically significant only in Model 3. On the other hand, "capital expenditures" were found to have a more significant effect on mitigating the aggregate GRDP in each Metropolitan city/province than in mitigating the per capita GRDP. Overall, these findings statistically show that the national subsidy, which is assigned to "individuals," and capital expenditures, which are assigned to "areas/regions," had different effects.

The effect of the local consumption tax in Hypothesis 3 provides interesting policy implications. An increase in the local consumption tax mitigated "disparities in the per capita GRDP," while increasing the disparities in the aggregate GRDP. For the per capita GRDP, the local consumption tax served as an equalization fiscal source similar to the local shared tax, whereas for the aggregate GRDP, it served as a "local tax." Both effects were found to be statistically significant, which can be interpreted to imply that the local consumption tax has dual nature of being a "local tax" and an "equalization grant," and may negate the effect of local taxes on per capita variables in highly populated areas/regions.

Changes in the statistical significance of the explanatory variable "population" also indicate its importance in terms of understanding fiscal decentralization in Korea. A population increase tended to mitigate interregional disparities in the per capita variables, whereas it increased disparities in the level variables. Both effects were found to be statistically significant. These issues were not seen to occur when the population is evenly distributed among regions/areas. However, in an uneven distribution, the effect may be reduced in highly populated areas.

Table 6_Relationship between GRDP Disparities and Key Variables: 1997~2018

	(1)	(2)	(3)	(4)	(5)	(6)
Population	0.97*** (0.00)	1.00** (0.00)			0.74*** (0.00)	0.73*** (0.00)
GRDP growth rate	0.004*** (0.00)	0.002** (0.03)		0.001 (0.29)	0.007*** (0.00)	0.008*** (0.00)
$GRDP_{t-1}$			0.33*** (0.00)			
Property tax percentage						0.004 (0.46)
Revenue decentralization (local tax percentage)	**0.32** (0.03)**	**0.30* (0.06)**				
National subsidy percentage		**0.12 (0.44)**	**-0.09*** (0.00)**		**-0.21 (0.62)**	**-0.20 (0.63)**
Capital expenditure percentage	**-0.28* (0.08)**			**-0.67*** (0.00)**		
Local consumption tax percentage					**2.87*** (0.00)**	**2.88** (0.01)**
Local shared tax percentage			**-0.97** (0.00)**	**-0.84*** (0.00)**		
Change in official land price	**-0.005** (0.01)**		-0.002 (0.42)			
Area percentage		-0.01 (0.28)	0.01 (0.35)		-0.004 (0.78)	
Year	-0.001 (0.39)	-0.002 (0.80)		-0.0004 (1385)		
Constant	-10.56** (0.02)	-14.10*** (0.00)	-0.45*** (0.00)	1.30 (0.79)	-10.81*** (0.00)	-10.83*** (0.00)
No. of observations	355	355	355	355	149	149
Analysis model	RE	RE	RE	RE	RE	RE
Hausman Stat.	-	-	-		-	
(Within/Overall) R^2	0.74	0.74	0.75	0.15	0.71	0.72

Note: P value in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Present study

Table 7_Relationship between GRNI Disparities and Key Variables: 1997~2018

	(1)	(2)	(3)	(4)	(5)	(6)
Population (No. of university/college students)	0.33*** (0.00)	1.46** (0.00)			0.88*** (0.00)	0.86*** (0.00)
Net migration rate	-0.64 (0.21)					
Unemployment rate		0.01 (0.83)				
GRNI growth rate		0.005** (0.03)		0.003** (0.02)	0.0079** (0.00)	0.009*** (0.00)
$GRNI_{t-1}$			0.29*** (0.00)			
Property tax percentage						0.009 (0.29)
Revenue decentralization (local tax percentage)	**0.41** (0.01)**					
National subsidy percentage		**0.08 (0.54)**	**-0.08*** (0.00)**		**-0.57 (0.17)**	**-0.51 (0.21)**
Capital expenditure percentage	**-0.65*** (0.00)**			**-0.90*** (0.00)**		
Local consumption tax percentage					**2.08* (0.06)**	**2.15* (0.05)**
Local shared tax percentage			**-0.77** (0.00)**	**-0.54*** (0.00)**		
Change in official land price	**-0.007** (0.01)**		-0.009*** (0.00)			
Area percentage	**-0.006 (0.80)**	-0.03* (0.05)	0.08 (0.71)	-0.005 (0.98)	-0.02 (0.26)	
Year	-0.001 (0.50)	-0.001 (0.87)		-0.003 (0.20)		
Constant	-0.45 (0.93)	-20.81 (0.87)	-3.80*** (0.00)	6.84 (0.20)	-12.75*** (0.00)	-12.58*** (0.00)
No. of observations	310	290	309	293	149	149
Analysis model	RE	RE	RE	RE	RE	RE
Hausman Stat.	-	-	-	-	-	-
(Within/Overall) R^2	0.55	0.76	0.71	0.17	0.73	0.73

Note: P value in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Present study

B. Analysis by Region

A regional analysis is required in order to understand the relationship between fiscal variables and economic disparities. The Korean government has steadfastly implemented purported balanced national development policies over the last decade or so, which warrants an evaluation of the relationship between core fiscal variables and the outcomes of these policies. Using Hypothesis 1, the local tax revenue was found to increase the interregional economic disparities. A noteworthy variable in this context is the change in GRDP growth rate (Year-over-Year). The per capita GRDP, aggregate GRDP, and GRDP growth rate were all found to exacerbate the interregional disparities. In other words, these variables further increased the growth rates in regions with high year-over-year growth rates, thereby widening their gaps relative to more underdeveloped regions. Therefore, an economic convergence mechanism (such as the β convergence) is not applicable, in terms of understanding year-over-year growth rates in regions.

In addition, in the regional data for verification of Hypothesis 2, the increase in the national subsidy and capital expenditure were found to have statistically significant negative values. A review of variables across the seven regions confirmed that both the national subsidy and capital expenditures had a positive effect on mitigating the interregional economic disparities. Notably, the local shared tax showed the same results across all analyses, which means it has a significant equalization effect at the regional level as well.

The findings pertaining to the effect of the local consumption tax are also interesting. When the dependent variable was the "per capita GRDP," the equalization effect of the tax was emphasized, resulting in lower interregional disparities. On the other hand, disparities increased when the dependent variable was the "aggregate GRDP." However, the effect on the regional level was not deemed to be statistically significant. These findings show the dual nature of the local consumption tax. On the regional level, the local consumption tax is distributed virtually as an equalization grant, which is quite similar to the local shared tax. However, the equalization effect is almost negated by the GRDP growth rates, unemployment rates, net migration, and other market and socioeconomic variables, and these net results are not statistically significant.

The findings showed that the increase in the number of university/college students may also cause interregional disparities, and that the "net migration" had a positive effect on the interregional disparities in GRNI. The unemployment rates, on the regional level, had statistically significant positive values, which means that they can be regarded as a cause of

economic disparities. These findings indicate that the majority of the working age population is moving into the SCA and the Chungcheong region, which have better opportunities for production bases, education, and employment conditions.

Table 8_Relationship between GRDP Disparities by Area and Key Variables: 1997~2018

	(1)	(2)	(3)	(4)	(5)	(6)
Net migration		**0.04 (0.55)**		**0.02 (0.66)**		
GRDP growth rate	0.008** (0.02)		0.004*** (0.00)			0.005*** (0.00)
$GRDP_{t-1}$	0.10*** (0.00)	0.81 (0.31)	0.54** (0.00)	-0.92 (0.16)	0.10 (0.74)	0.60*** (0.00)
Unemployment rate	0.03 (0.10)	1.11*** (0.00)	0.03*** (0.00)	0.20*** (0.00)	0.009*** (0.00)	
Private consumption						**0.16 (0.48)**
Revenue decentralization (local tax percentage)	1.17*** (0.00)					
National subsidy percentage		**-6.94*** (0.00)**				
Capital expenditure percentage			**-0.28** (0.03)**			
Local consumption tax percentage					**-0.69 (0.39)**	**0.69 (0.15)**
Local shared tax percentage				**-10.42*** (0.00)**		
No. of university/college students			0.43*** (0.00)		**0.68*** (0.00)**	
Area percentage	**-0.05 (0.69)**	**-0.08*** (0.00)**	**0.02 (0.48)**	**0.05 (0.10)**		-0.06*** (0.00)
Year		-0.03 (0.36)	-0.03*** (0.00)	0.06* (0.09)	0.00 (0.78)	0.03 (0.06)
Constant	-2.26*** (0.00)	71.28 (0.38)	-58.33*** (0.00)	-121.17* (0.09)	-19.20 (0.55)	65.40*** (0.00)
No. of observations	133	50	133	50	63	63
Analysis model	RE	RE	RE	RE	RE	RE
Overall R^2	0.88	0.91	0.27	0.94	0.56	0.85

Note: P value in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Present study

Table 9_Relationship between GRNI Disparities by Region and Key Variables: 1997~2018

	(1)	(2)	(3)	(4)	(5)	(6)
Net migration	**-0.13*** (0.00)**				**-0.20*** (0.00)**	
GRNI growth rate	0.08*** (0.05)		0.02 (0.20)		-0.02 (0.85)	-0.003 (0.84)
$GRNI_{t-1}$	0.02* (0.05)	0.02 (0.44)	0.10* (0.0)	-0.01 (0.78)	0.03 (0.42)	-0.02 (0.66)
Unemployment rate	0.50*** (0.00)	-0.12 (0.11)	1.00*** (0.00)	-0.11 (0.20)	0.63*** (0.00)	
Private consumption		0.22** (0.04)		0.84*** (0.00)	0.76*** (0.00)	**1.10*** (0.00)**
Revenue decentralization (local tax percentage)	8.77*** (0.00)	**6.88*** (0.00)**				
National subsidy percentage		**-2.41*** (0.00)**				
Capital expenditure percentage			**-6.22*** (0.00)**			
Local consumption tax percentage					**-8.13*** (0.00)**	**-16.81*** (0.00)**
Local shared tax percentage				**-3.35*** (0.00)**		
No. of university/college students			0.43*** (0.00)			
Area percentage	**0.02* (0.08)**	**0.01 (0.47)**	**-0.05*** (0.00)**	**-0.05*** (0.00)**	**-0.07*** (0.00)**	-0.02 (0.21)
Year			-0.04** (0.00)	-0.03*** (0.00)		0.32 (0.37)
Constant	-4.66*** (0.00)	-5.71*** (0.00)	-92.20** (0.02)	48.72** (0.01)	-12.26*** (0.00)	-79.59*** (0.28)
No. of observations	49	131	131	131	30	63
Analysis model	RE	RE	RE	RE	RE	RE
Overall R^2	0.99	0.89	0.60	0.87	0.97	0.88

Note: P value in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Present study

3. Chapter Conclusion

In this analysis, we presented statistical data pertaining to results of using the tax sharing as a foundation for fiscal decentralization policies. Specifically, we attempted to identify the effect of fiscal decentralization on interregional economic disparities in Korea. The findings were presented in terms of dependent variables that included: disparities in per capita GRDP/GRNI, aggregate GRDP/GRNI on the metropolitan level, and GRDP on the regional level. In all cases, the local tax revenues were shown to increase the economic disparities. In this analysis, unlike that of previous studies, we focused on the difference between level variables and per capita variables, rather than on the effect of fiscal decentralization on interregional disparities based on dependent variables.

First, we confirmed that a quantitative increase in the local tax revenue, i.e., the tax sharing, increases the interregional economic disparities by itself. The equalization effect of the local shared taxes was strong in all cases, and that the national subsidy and capital expenditure projects had a statistically significant effect of mitigating interregional disparities.

The effect of the local consumption tax revenues on the interregional disparities provides important evidence of the characteristics of local consumption taxes in Korea and the level of population concentration. While the local consumption tax is technically a local tax, in practice, it plays the role of a fiscal transfer that is provided as an equalization subsidy, which is evident from its interregional distribution and allocation. The adoption of the local consumption tax was rationalized by the premise that an increase in the local tax revenue is more desirable for the autonomy and accountability of local governments than increasing fiscal transfers. Generally, the local consumption tax revenues were distributed to each metropolitan government as a transfer to "increase local fiscal resources." These findings indicate that an increase in the local consumption tax serves the same function as an equalization subsidy, by mitigating interregional economic disparities. On a regional level, the two effects tended to cancel each other out, however, resulting in no statistically significant effects. Many studies on this issue have highlighted the fact that the local consumption tax is a tax revenue sharing mechanism in practice, and that a further increase in the local taxes would not be desirable (Ahn, 2015, p. 164).

Ⅴ. Fiscal Decentralization and Migration

1. Empirical Analysis Framework for Interregional Migration

This chapter discusses the effect of changes in the fiscal environment on migration into the SCA. The changes in the fiscal environment include the increased percentage of the local taxes driven by fiscal decentralization, and the increase in the national subsidies driven by increased social welfare expenditure. The fiscal independence of local governments declined to 46.8 in 2018 and 44.3 in 2019 after a slight increase from 46.6 to 47.2 between 2016 and 2017. The fiscal autonomy of local governments also declined to 68.4 in 2019 after a slight increase from 69.0 in 2016 to 69.1 in 2017, and 69.3 in 2018. These results are attributable to the increase in the national subsidies driven by the welfare policies that accompanied fiscal

Table 10_Households in Each Metropolitan City/Province Moving in from Other Metropolitan Cities and Provinces

(unit: no. of households)

Category	2013	2014	2015	2016	2017	2018	2019
Gangwon-do	4,634	4,836	5,327	5,544	5,754	5,942	6,143
Gyeonggi-do	28,879	30,261	35,614	36,756	35,679	39,108	36,628
Gyeongsangnam-do	6,408	7,044	7,531	7,762	8,575	7,974	7,800
Gyeongsangbuk-do	7,490	8,176	8,409	8,205	8,549	9,047	9,618
Gwangju	2,528	3,039	2,771	2,589	2,614	2,972	2,930
Daegu	3,712	3,955	3,602	3,614	3,627	3,963	3,755
Daejeon	2,391	2,629	2,647	2,852	2,907	3,171	3,062
Busan	4,842	5,567	5,526	5,123	5,368	4,968	5,049
Seoul	18,547	19,712	19,255	18,503	18,554	19,119	20,460
Sejong	684	1,260	1,997	1,693	2,077	2,123	1,964
Ulsan	1,546	1,537	1,632	1,457	1,474	1,548	1,729
Incheon	7,011	7,122	7,772	7,458	7,451	8,017	7,910
Jeollanam-do	5,986	6,231	6,367	6,251	6,525	6,956	7,103
Jeollabuk-do	3,940	4,097	4,136	4,021	4,136	4,327	4,457
Jeju	1,175	1,412	1,895	2,046	1,962	2,011	1,812
Chungcheongnam-do	6,203	6,676	7,247	7,564	7,946	7,955	7,816
Chungcheongbuk-do	4,104	4,414	4,613	4,920	5,159	5,433	5,254
Total	110,080	117,968	126,341	126,358	128,357	134,634	133,490

Source: Present study, based on Statistics Korea MDIS, "Domestic Population Migration Statistics (Annual Data Related to Households)" (searched on: September 10, 2020).

decentralization. This study focuses on how these changes affect the population inflow into the SCA. The previous literature on migration in Korea mainly stressed education and housing prices as main culprits for the population inflow. Instead, this study elucidates the effect of fiscal factors by analyzing the population inflow into the SCA on the municipal level, and show which municipalities are attracting new residents.

In particular, in this chapter, we look into various environmental factors of each area to determine which factors drive the inflow of households into the SCA. We divided the move in households into the households moving in from other municipalities in the same metropolitan city or province, and the households moving in from other metropolitan cities and provinces. The households moving in from other metropolitan cities and provinces are assumed to have determined that target metropolitan cities and provinces have appealing residential environments. Table 10 shows the number of households in each metropolitan city or province moving in from other metropolitan cities and provinces, and the number of move in households are particularly high in Gyeonggi-do and Seoul.

For independent variables affecting household movement, we used variables commonly used for migration analysis. We analyzed data between 2013 and 2018. 2013 is the first year with analyzable data on migration among 17 metropolitan cities and provinces, and 2018 is the latest year with available local public finance data. As for economic variables, we collected data on social spending per person, local taxes per person, difference in unemployment rate (move in unemployment rate - move out unemployment rate), unemployment rate among move in households, unemployment rate among move out households, GRDP among move out households, GRDP among move in households, difference in GRDP (move in GRDP - move out GRDP), economic participation rate between 2013 and 2018 (%), unemployment rate (%), employment rate (%), employment rate of people aged 15~64 (%), and price index. As environmental variables, we collected mean data on ozone and PM10 contamination (August average) in each region, and collected housing-related variables including median sales price, mean sales price, mean deposit-based lease rent, and median deposit-based lease rent. Education-related data included education spending and the Ministry of Education data regarding educational attainment. Fiscal data were collected from Local finance Integrated Open System and Statistics Korea, and data on local taxes per person, local taxes per household, local taxes, and local education taxes were collected from Statistics Korea. We used the net total data from Local finance Integrated Open System for data on local taxes, current non-tax revenues, local shared taxes, national subsidies, and local taxes. For spending in each area, we used net total expenditure of Local public finance data from Local finance Integrated

Open System. Expenditures per resident were calculated by dividing the total general account expenditure from the Local finance Integrated Open System financial indicators by the number of residents. Data on educational expenditure were collected from the Local Education Finance Alert System, and the 2013 data were estimated based on the average growth rate between 2014 and 2019.

2. Empirical Analysis Model and Findings

Using the 2013~2018 data, we examined the effect of environment, economy, education, housing, GRDP, number of junior colleges or higher, and average deposit-based lease rent. The fiscal surplus was defined as the log of the general account expenditure per person minus the local taxes per person, and attracted population was defined as the population that moved in from other metropolitan cities and provinces. Table 11 summarizes the factors affecting the attracted population. The national subsidies, local shared taxes, and local taxes included in the analysis are the same as those used in Chapter IV. The data on GRDP were collected from Statistics Korea. The regression equation was estimated as follows.[10] As for the dependent variables, we took the log of the number of move-in households. A test showed that fixed effect is more suitable than pooled effect, and random effect is more suitable than fixed effect. It also confirmed the existence of heteroscedasticity. In addition, an augmented Dickey–Fuller test (ADF test) was performed, and there was no need to calculate differences. (1) means pooled effect, (2) means fixed effect, (3) means random effect, and (4) means standard deviation corrected for heteroscedasticity.

$$\begin{aligned}\log(move\ \ ins) = {} & constant + \beta_1 O\,zone + \beta_2 Unemploymentrate + \\ & \beta_3\ \log(Average\ \ sales\ \ price) + \beta_4\ \log(No.of\ \ juniorcolleges \\ & /colleges/universities) + \beta_5\ \log(National\ \ subsidy) \\ & + \beta_6\ \log(Local\ \ taxes)\end{aligned}$$

The findings on household movement represent the same responses to environmental, economic, and educational variables as those identified by the previous literature. As for the housing variable, the effect of average lease rent had a negative value, which means a high rent deters a household's decision to move to another Metropolitan city/province. Other than the

10 We performed a Granger test (time difference = 1), and found that the local taxes have significant effect on the number of move in households, but not vice versa.

environmental, economic, and educational factors, fiscal surplus (general account spending per person minus local taxes per person) also had significant effect. The finding shows that the fiscal environment changes in Gyeonggi-do attracted more households into the SCA.

The national subsidies also had significant effect on fiscal surplus; the increase in the percentage of cash subsidies in national subsidies has raised the share of the SCA in the national subsidies. In 2001, the SCA received 20.71% of the total national subsidies. The percentage was 34.72% in 2020. The percentages of Seoul and Gyeonggi-do in the subsidies provided to the SCA rapidly increased, which increased fiscal surpluses in the SCA. The positive effect of the national subsidies reflect these factors.

Table 11_Factors Affecting Migration of Householders from Other Metropolitan Cities/ Provinces

	Dependent variable			
	log (move ins)			
	OLS	Panel linear		coefficient test
	(1)	(2)	(3)	(4)
Ozone	-8.675 (8.346)	-4.733* (2.576)	-3.696 (2.493)	-3.696* (1.938)
Unemployment rate	-0.050 (0.051)	-0.029 (0.024)	-0.045** (0.022)	-0.045** (0.022)
log (average sales price)	-0.834*** (0.212)	-0.224** (0.109)	-0.194** (0.098)	-0.194* (0.103)
Year	0.013 (0.021)			
log (no. of junior colleges/colleges/universities)	0.136** (0.066)	0.579*** (0.185)	0.263*** (0.089)	0.263** (0.112)
log (national subsidy_KRW million)	-0.217 (0.151)	-0.121 (0.140)	-0.001 (0.112)	-0.001 (0.143)
log (local tax_KRW million)	1.083*** (0.161)	0.874*** (0.129)	0.748*** (0.109)	0.748*** (0.184)
Constant	-22.347 (40.494)		-3.028** (1.364)	-3.028* (1.525)
Observations	102	102	102	
R^2	0.881	0.707	0.736	
Adjusted R^2	0.872	0.625	0.719	
Residual Std. Error	0.293 (df=94)			
F Statistic	99.224*** (df=7; 94)	31.709(df=6; 79)	264.898***	

Note: P value in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Present study

A study on the effect of fiscal factors on migration shows that the national subsidy and the local tax have positive effect on the choice of place of residence by householders. The positive effect of the local tax is unique to Korea, which suggests that the local tax is closely related to economic wealth. For this reason, in Model 4, the statistical significance of GRDP disappears with the inclusion of the local tax.

Table 12_Change in the SCA Percentage in the National subsidies

(unit: %)

Year	SCA percentage	Seoul percentage	Gyeonggi-do percentage	Incheon percentage
2001	20.71	5.11	12.36	3.23
2002	18.59	4.14	11.95	2.50
2003	20.41	4.32	13.63	2.45
2004	22.77	5.21	14.56	2.99
2005	23.87	5.78	14.66	3.42
2006	23.43	5.73	14.24	3.46
2007	24.74	5.59	15.21	3.93
2008	25.70	6.61	15.05	4.04
2009	25.32	6.31	14.61	4.41
2010	25.29	6.38	14.62	4.29
2011	25.56	6.70	14.38	4.47
2012	26.62	7.14	15.09	4.39
2013	27.56	8.17	14.97	4.42
2014	29.28	9.12	15.47	4.69
2015	30.04	9.76	15.67	4.62
2016	30.32	10.04	15.71	4.57
2017	31.15	10.51	16.06	4.58
2018	32.58	10.84	16.93	4.81
2019	33.56	11.17	17.41	4.98
2020	34.72	11.48	17.96	5.28

Source: Present Study, based on MOIS Local Public Finance Integrated Disclosure System, "Financial Statistics (Local Finance Yearbook)" (searched on: October 10, 2020).

Table 13_Fiscal Factors Affecting Migration of Householders from Other Metropolitan Cities /Provinces

	Dependent variables:Log (move ins)			
	(1)	(2)	(3)	(4)
O zone	-12.182*** (3.487)	-1.886 (1.630)	-2.282 (1.728)	-2.458 (1.707)
log (GRDP)	0.669*** (0.119)	0.539*** (0.099)	0.952*** (0.234)	0.090 (0.281)
log (no. of junior colleges/colleges/universities)	0.180* (0.101)	0.167 (0.175)	0.072 (0.216)	0.256** (0.125)
log (average deposit-based lease rent)	-0.386** (0.168)	0.185 (0.129)	0.105 (0.128)	-0.140 (0.179)
Fiscal surplus 1	0.038** (0.017)			
log (national subsidy)		0.299** (0.134)		
log (local shared tax)			-0.102 (0.101)	
log (local tax)				0.596** (0.273)
Constant	-1.309 (2.953)	-13.713*** (2.672)	-7.737*** (2.624)	-11.464*** (2.441)

Source: Present Study

VI. Conclusions and Policy Implications

This study examined the current status of fiscal decentralization in Korea, and confirmed that the fiscal transfer from the central to local governments has increased, and stands on par with other countries. However, the interregional distribution of financial resources in Korea is at a concerning level, especially with the high concentration of economic power in the SCA. This study focused on whether the country's fiscal decentralization policies have been conducive to mitigating the high level of concentration. Fiscal decentralization and balanced national development have been key agendas for all Korean administrations. However, none of the policies have successfully dealt with the serious interregional disparities. Therefore, fiscal decentralization is the least that the public sector can do to address the issue, and fiscal decentralization policies must be implemented with maximum effort.

However, in reality, the fiscal decentralization policies implemented in Korea focused on increasing the quantity of fiscal transfer. The Korean government used tax sharing as the main

tool of its fiscal decentralization policies because it was the most efficient way to increase fiscal resources at local governments. Since the adoption of the local consumption tax in 2010, Korea has not achieved markedly visible success in securing revenue sources for local governments and ensuring their accountability. On the other hand, metropolitan and provincial governments have achieved a marked increase in fiscal scale. Such disparity resulted in decreased local shared taxes and declining financial resources in underdeveloped areas/regions, which warrant further improvements in the future.

In light of the above, this study assessed the effect of Korea's fiscal decentralization policies on interregional economic disparities. We assumed that, under the Moon Jae-in administration's fiscal decentralization roadmap, the amount of fiscal transfer will increase in the future. We also confirmed that, the percentage of fiscal transfer is higher in Korea than in other countries A review of previous literature on the relationship between fiscal decentralization, interregional economic disparities, and balanced national development showed that none of the reviewed studies provided a clear theoretical or empirical conclusion on the relationship between the variables. Some of the previous studies used the traditional model of fiscal relationship between the central and local governments that assumes interregional tax rate competition. However, their findings were starkly different from the reality in Korea. Empirical studies centered on inter-national comparison provide different conclusions depending on the institutional variables included in their research models. Furthermore, this study examined various indicators including population and economic concentration to show the high contribution rate of the SCA, and emphasized that the disparity between the SCA and non-SCA areas is caused by the lack of organic connection between the fiscal decentralization policies and the market mechanism.

In this regard, the empirical findings of this study give rise to a fundamental question of whether tax sharing is the best option for fiscal decentralization policies aimed at mitigating interregional economic disparities (Kim, 2019). Driving decentralization through fiscal requires a well-functioning "public goods pricing mechanism by local tax," which means that the supply and demand of public goods (services) provided by local governments can be adjusted by changing local tax rates. The experiences of some countries show that a well-functioning pricing mechanism helps the local government to increase tax revenue, attract residents and businesses, and mitigate interregional economic disparities, ultimately promoting sustainable local development (Kim, 2019). The findings of this study raise a question of whether fiscal decentralization through tax revenue increase is a desirable and sustainable approach for Korea, a country where more than half of the population and most

of the industrial foundations are concentrated in the SCA.

This study also looked into Korea's fiscal decentralization policies and migration, because the policies are mainly aimed at balanced national development, that is, ensuring that people can access high-quality public services and perform socioeconomic activities anywhere in Korea. The outcomes of these policies are ultimately represented by interregional migration. In this context, it is important to identify the effect of fiscal transfers (aimed at mitigating interregional economic disparities) on interregional migration. The empirical analysis found, using intuitive hypotheses, that population attraction increases with the amount of fiscal surplus and the difference between local taxes and local expenditures. In other words, when a local government provides public services exceeding the service cost paid by the residents, that is, the taxes, it has positive effect on migration. These findings are consistent with public finance theories. However, it should be also noted that the distribution of fiscal surplus in Korea is inversely related with the distribution of local tax revenue. When controlled for market factors, lease rents serve as the entry costs for living in the relevant area. However, at the same time, areas reporting increase in national subsidies had larger surpluses, resulting in significant population influx into the areas.

The findings of this study also indicate increased migration into areas with higher surpluses. When controlled for market factors, between 2013 and 2018, metropolitan cities and provinces with higher percentages of national subsidies or local tax bases recorded more population influx. The recent increase in population-proportionate national subsidies, which as been driven by the increase in welfare spending, may be significantly correlated with migration. The areas with growing local tax revenues are areas with more population, better living conditions, and higher tax bases. A reasonable economic actor would be motivated to move to an area with higher tax base levels, that is, an area with better public services, as long as he/she pays for public services at the same rate anywhere in the country. The finding shows that the SCA holds advantage over the non-SCA regions/areas in terms of population attraction.

The contributions of this study are as follows. First, in this study, we attempted to show that fiscal decentralization is a policy agenda with ongoing demand, and "promotion of local autonomy through fiscal decentralization" can be achieved when implemented in coordination with other balanced national development policies, and may not be as successful on its own.

Second, in empirically analyzing the fiscal decentralization policies and the mitigation of interregional disparities, we attempted to clarify that the effect of fiscal decentralization

policies can be differentiated along different levels of "population concentration" by comparing per capita variables and level variables. Thirdly, when considering the migration motivated by market factors, the findings show that population is attracted to regions/areas with high fiscal surpluses. At the same local tax rate (which represents the cost of moving into a certain region/area), the findings indicate a high level of sensitivity to the quality of public services. A country working toward decentralization will have to aim for linking the improvement of public service quality with local taxes. However, given the grossly imbalanced population distribution in Korea, decentralization through fiscal means are bound to face limitations in Korea.

In this study, in lieu of structural models, we used the reduced form of each model to understand specific parts of the relationship among fiscal decentralization, interregional disparities, and migration, which restricted our ability to analyze the overall relationship in an organic manner. Second, this study mostly relied on macrodata to analyze various factors, and is thus limited by the absence of discussions on actual needs for decentralization identified through microdata. Third, on account of the limited capabilities of the researchers, we were not able to specifically discuss balanced national development policies, which are as important as fiscal decentralization. A more organic and concrete analysis of the decentralization policies, and suggestion of meaningful balanced national development policies would require expertise on both fronts, as well as discussions on local industries and population mixes. We hope that these limitations can be addressed in future analyses.

This study looks for the main issue with Korea's current fiscal decentralization policies in the imbalanced interregional distribution of population, rather than the quantitative fiscal growth of local governments. The findings of the empirical analysis highlight the urgency of policies for balanced national development among regions/areas, which may be as crucial as tax sharing for quantitative growth. If the Korean population were not as excessively concentrated in the SCA as it is today, there would be no theoretical or logical reason that the country cannot rely on tax sharing as the most ideal method for fiscal decentralization. However, unfortunately, the majority of revenue sources are located in the SCA, and the extreme imbalance makes it impossible to rely on the transfer of revenue sources. To address this issue, the Korean government has continued to work toward balanced national development through fiscal decentralization. However, the findings of this study reaffirm the limitation of a fiscal decentralization-only approach. Improving on the policy settings driving such disparities, including industries, education, and population, requires painstaking efforts for balanced national development. Therefore, the fiscal decentralization policies need to be

implemented as the country proceeds with its balanced national development efforts. At least today, given the ongoing concentration in the SCA, tax sharing cannot be assigned a higher priority than other policies.

To achieve the original purpose of fiscal decentralization, that is, the expansion of fiscal authority at the local level, Korea may consider improving on its governance decentralization. A viable alternative under the current central-local fiscal framework would be a "comprehensive national subsidy." The empirical analysis of the 20-year data highlights the national subsidy as an effective alternative for mitigating fiscal disparities. Then, a comprehensive national subsidy, which involves the expansion of local governments' fiscal authority by improving on the allocation of national subsidies, may be another alternative for fiscal decentralization. A comprehensive national subsidy for capital expenditure and infrastructure development may provide local governments with more power to decide on the relevant projects, and manage the project process and performance. Such approach would be more desirable in terms of fiscal accountability as well. Despite this possibility, if local governments continue to make political decisions favoring quantitative growth, the findings of this study serve as a warning that they will have to deal with increase in fiscal costs driven by interregional disparities.

On a more fundamental level, this study suggests that the means of fiscal decentralization policies should be assessed by considering the overall fiscal transfers and budgetary programs, because fiscal decentralization targets the overall nation and all the people living in it. Adopting policies for institutional reforms requires consensus among stakeholders, which can be achieved when results are visible. This results in governments focusing on "feasible goals" that are visible and short-term, with more fundamental and long-term reforms seldom progressing beyond mere discussion. We also would like to stress that fiscal decentralization requires considerations for more fundamental policies such as the provision of authorities on fiscal expenditure that befit the size of local public finance, active efforts to secure tax revenues for autonomous tax rate adjustment, and restructuring of joint affairs and expenses borne by the central and local governments.

References

Ahn, Jong-seok, *Local Tax Policies in the Age of Local Self-Government: Evaluation and Directions for Development*, Korea Institute of Public Finance Research, 2015.

Cho, Ki-hyun and Lee, Jang-wook, *Reestablishment of the Role of the Local Shared Tax System for Effective Fiscal Decentralization*, Korea Research Institute for Local Administration, 2018.

Jung, Chang-sui, Lee, Sang-mion, Lee, Wang-jae, and Park, Seung-man, *An Analysis of Changes in the Local Shared Tax After National Tax-Local Tax Ratio Adjustment, and the Improvement of the Local Shared Tax System for Enhanced Fiscal Decentralization*, National Assembly Special Committee on Budget and Accounts Research, May 2018.

Kim, Hyun-A, "A Study on Fiscal Decentralization and Interregional Economic Disparity," *Monthly Public Finance Forum*, 278, Korea Institute of Public Finance, August 2019.

Kim, Jong-sun, *A Study on Improvement of the Local Excise Tax*, National Assembly Budget Office, 2011.

Kim, Jung-hun, *Fiscal Decentralization and Convergence of Local Economy Growth*, Korea Institute of Public Finance Research, 2010.

Kim, Jung-hun and Dougherty, Sean (Eds.), "Ageing and fiscal challenges across levels of government," OECD Fiscal Federalism Studies, OECD Publishing, Paris, 2020.

Kim, Jung-hun and Kim, Hyun-A, *Population Concentration in the SCA and Fiscal Policies*, Korea Institute of Public Finance Research, 2007.

Kim, Pil-hun, Han, Jae-myung, Choi, Jin-sub, Kim, Byung-nam, and Kim, Jin-ah, *An Analysis of the Effect of Fiscal Decentralization on Fiscal Efficiency and Interregional Disparity*, Korea Institute of Local Finance Research, 2019.

Lim, Sang-su, "The Study on the Making Local Consumption Tax Closer to the Local Tax," *Journal of Budget and Policy*, 8(2), November 2019, pp. 103~135.

Local Development Committee, *Local Development and Metropolitan Economic Region Strategies*, December 2009.

Ministry of the Interior and Safety, *Fiscal Overview of Local Governments in 2019 (Volume 1)*, 2019.

Ministry of the Interior and Safety, *Fiscal Overview of Local Governments in 2020 (Volume 1)*, 2020.

Ministry of the Interior and Safety, "Local Excise Tax To Be Adopted in 2010," Press Release, September 16, 2009.

Moon, Kwang-min, "Impacts of Fiscal Decentralization on Regional Income Disparity - Distribution Effects Using Panel Quantile Regression Model," *The Korean Journal of Local Government Studies*, 21(3), 2017, pp. 1~37.

Office for Government Policy Coordination, "The Government to Accelerate Fiscal Decentralization: Finalized the Fiscal Decentralization Plan for Improving Local Government's Autonomy and Accountability and Ensure Balanced Development," Prime Minister's Secretariat, October 30, 2018, Press Release.

Park, Wan-gyu, "Has the Economic Gap Among Regions been Decreasing?," *Korea Review of Applied Economics*, 10(1), 2008, pp. 197~223.

Park, Wan-gyu, "Economic Gap between Metropolitan and Non-Metropolitan Areas in Korea," *Legislation and Policy Studies*, 1(1), December 2009, pp. 109~134.

Presidential Committee for Balanced National Development, Ministry of Trade, Industry and Energy, *4th 5-Year Plan for National Balanced Development (2018~2022)*, January 2019.

Presidential Committee for Balanced National Development and Korea Institute for Industrial Economics & Trade, "Balanced National Development Monitoring Issue Brief: Post-COVID-19 Changes in Local Economies and Balanced National Development Policies," Issue 2, June 2020.

Presidential Committee for Balanced National Development and Korea Institute for Industrial Economics & Trade, Press Release, "Post-COVID-19 Changes in Local Economies and Balanced National Development Policies," July 2, 2020.

Yoo, Jae-gwon, "A Study on the Problem Analysis and the Improvement Measures in relation to the Conversion of Local Income Tax into Independent Tax," *Asia-Pacific Journal of Multimedia Services Convergent with Art, Humanity and Sociology*, 8(12), December 2018, pp. 889~898.

Statistics Korea, "Population Movement in the SCA Over the Last 20 Years and Population Outlook in the Future," Press Release, June 29, 2020.

Statistics Korea, "Population Movement in the SCA Over the Last 20 Years and Population Outlook in the Future," Statistics, June 29, 2020.

Bartolini, David, Stossberg, Sibylle and Blöchliger, Hansjörg, "Fiscal decentralization and regional disparities," OECD Economics Department Working Papers No. 1330, 2016.

Bellofatto, Antonio Andrés and Besfamille, Martin, "Tax decentralization notwithstanding regional disparities," CESifo Working Papers No. 7607, April 2019.

Gbohoui, William, Lam, W. Raphael and Lledo, Victor, "The great divide: Regional policy and fiscal policy," IMF Working Paper WP/19/88, 2019.

Lessmann, Christian, "Regional inequality and decentralization: An empirical analysis," *Environment and Planning A*, 44(6), 2012, pp. 1363~1383.

OECD, *OECD regions and cities at a glance 2018*, OECD Publishing, Paris, 2018.

OECD, *Equalisation in the OECD countries: Some key facts*, 2019a.

OECD, "Making decentralisation work: A handbook for policy-makers," *OECD Multi-Level Governance Studies*, OECD Publishing, Paris, 2019b, pp. 135~187.

Rodriguez-Pose, Andrés and Ezcurra, Roberto, "Does decentralization matter for regional disparities? A cross-country analysis," *Journal of Economic Geography*, 10(5), Oxford University Press, 2010, pp. 619~644.

Daegu Ilbo, "Presidential Committee for Balanced National Development to Form Hyper-Metropolitan Economic Regions to Prevent Regional 'Hollowing Out,'"October 23, 2019, http://www.idaegu.com/newsView/idg

201910230085, accessed on June 30, 2020.

Seoul Shimmnun, "Achieving Synergy for National Development Strategies Through Decentralization and Balanced Development," January 1, 2020, https://go.seoul.co.kr/news/newsView.php?id=20200101011004&wlog_tag3=naver, accessed on June 30, 2020.

Ministry of Government Legislation, National Law Information Center, Enforcement Decree of the Special Act on Balanced National Development (Presidential Decree No. 30823), https://www.law.go.kr/LSW/lsInfoP.do?lsiSeq=219973&ancYd=20200707&ancNo=30823&efYd=20200708&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000, accessed on July 23, 2020.

Ministry of Government Legislation, Reason for the Revision of the Special Act on Balanced National Development, https://www.law.go.kr/LSW/lsRvsRsnListP.do?lsId=009603&chrClsCd=010202&lsRvsGubun=all, accessed on September 18, 2020.

Ministry of Government Legislation, Special Act on Balanced National Development (Act No. 107191), https://www.law.go.kr/LSW/lsSc.do?section=&menuId=1&subMenuId=15&tabMenuId=81&eventGubun=060101&query=%EA%B5%AD%EA%B0%80%EA%B7%A0%ED%98%95%EB%B0%9C%EC%A0%84%ED%8A%B9%EB%B3%84%EB%B2%95#undefined, accessed on July 23, 2020.

Ministry of Government Legislation, Subsidy Management Act (Act No. 17339), https://www.law.go.kr/LSW//lsInfoP.do?lsiSeq=218691&ancYd=20200609&ancNo=17339&efYd=20200609&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000, accessed on July 23, 2020.

Ministry of Government Legislation, Reason for the Revision of the Subsidy Management Act, https://www.law.go.kr/LSW/lsRvsRsnListP.do?lsId=000729&chrClsCd=010202&lsRvsGubun=all, accessed on September 18, 2020.

Ministry of Government Legislation, Reason for the Revision of the Local Subsidy Act, https://www.law.go.kr/LSW/lsRvsRsnListP.do?lsId=001006&chrClsCd=010202&lsRvsGubun=all, accessed on September 18, 2020.

Ministry of Government Legislation, Reason for the Revision of the Local Education Subsidy Act, https://www.law.go.kr/LSW/lsRvsRsnListP.do?lsId=000880&chrClsCd=010202&lsRvsGubun=all, accessed on September 18, 2020.

Ministry of Government Legislation, National Law Information Center, Enforcement Decree of the Local Tax Act (Presidential Decree No. 30728), https://www.law.go.kr/LSW//lsInfoP.do?lsiSeq=218503&ancYd=20200602&ancNo=30728&efYd=20200602&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000, accessed on July 23, 2020.

Ministry of Government Legislation, Reason for the Revision of the Local Tax Act, https://www.law.go.kr/LSW/lsRvsRsnListP.do?lsId=001649&chrClsCd=010202&lsRvsGubun=all, accessed on September 18, 2020.

Ministry of Government Legislation, Local Tax Act (Act No. 16855), https://www.law.go.kr/LSW//lsInfoP.do?lsiSeq=210347&ancYd=20190827&ancNo=16568&efYd=20200828&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000, accessed on July 23, 2020.

Ministry of Government Legislation, Reason for the Revision of the Local Transferred Tax Act, https://www.law.go.kr/LSW/lsRvsRsnListP.do?lsId=001004&chrClsCd=010202&lsRvsGubun=all, accessed on September 18, 2020.

Ministry of Government Legislation, Reason for the Revision of the Framework Act on the Management of Local Government Funds, https://www.law.go.kr/LSW/lsRvsRsnListP.do?lsId=009996&chrClsCd=010202&lsRvsGubun=all, accessed on September 18, 2020.

Ministry of Government Legislation, Special Act on Local Autonomy and Decentralization, and Restructuring of Local Administrative Systems (Act No. 15501), https://www.law.go.kr/LSW//lsInfoP.do?lsiSeq=202769&ancYd=20180320&ancNo=15501&efYd=20180320&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000, accessed on July 23, 2020.

Ministry of Government Legislation, Reason for the Revision of the Local Finance Act, https://www.law.go.kr/LSW/lsRvsRsnListP.do?lsId=001652&chrClsCd=010202&lsRvsGubun=all, accessed on September 18, 2020.

Ministry of Education Local Education Finance Information System, Local Education Finance Settlement Data, http://www.eduinfo.go.kr/portal/intg/intgInfTColClsgPage.do?goMainDisp=2#, accessed on November 11, 2020.

Nation Tax Service, National Tax Statistics, Withheld Income Tax Amount, https://stats.nts.go.kr/data/data.asp?type=data&page=1, accessed on September 22, 2020.

Statistics Korea, Government Expenditure by Area and Function (Nominal, Annual), http://kosis.kr/statHtml/statHtml.do?orgId=301&tblId=DT_111Y066&conn_path=I3, accessed on September 22, 2020.

Statistics Korea, Korean Statistical Information Service, Economic Activity Participation Rate (Metropolitan Cities and Provinces), https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=INH_1DA7014S_02&vw_cd=MT_GTITLE01&list_id=106&seqNo=&lang_mode=ko&language=kor&obj_var_id=&itm_id=&conn_path=MT_GTITLE01, accessed on June 17, 2020.

Statistics Korea, Korean Statistical Information Service, Number of Migrants by Municipality, https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1B26001_A01&conn_path=I3, accessed on April 6, 2020.

Statistics Korea, Korean Statistical Information Service, Number of Businesses and Employees by Metropolitan City, Province, Industry, and Business Type (Until 2005), https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1K51002&conn_path=I3, accessed on April 6, 2020.

Statistics Korea, Korean Statistical Information Service, Number of Businesses and Employees by Metropolitan City, Province, Industry, and Business Type (2006–2018), https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1K52C01&vw_cd=MT_ZTITLE&list_id=K22_4&seqNo=&lang_mode=ko&language=kor&obj_var_id=&itm_id=&conn_path=MT_ZTITLE, accessed on April 6, 2020.

Statistics Korea, Korean Statistical Information Service, Local Gross Product per Capita by Metropolitan City and Province, https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1C86&conn_path=I, accessed on June 17, 2020.

Statistics Korea, Korean Statistical Information Service, GRDP Statistics by Metropolitan City and Province, https:

//kosis.kr/statHtml/statHtml.do?orgId=101&tblId=INH_1C81&conn_path=I3, accessed on June 17, 2020.

Statistics Korea, Korean Statistical Information Service, Income Accounts by Metropolitan City, Province, and Institutional Sector, https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1C84&conn_path=I3, accessed on June 17, 2020.

Statistics Korea, Korean Statistical Information Service, Expenditure to Local Gross Product by Metropolitan City and Province, https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1C83&conn_path=I3, accessed on April 6, 2020.

Statistics Korea, Korean Statistical Information Service, Annual Indicators (National Account), https://kosis.kr/statHtml/statHtml.do?orgId=301&tblId=DT_111Y002&conn_path=I3, accessed on May 11, 2020.

Statistics Korea, Korean Statistical Information Service, Population Projection (Metropolitan Cities and Provinces), https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1BPB001E&conn_path=I3, accessed on July 1, 2020.

Statistics Korea, Korean Statistical Information Service, Economically Active Population by Administrative Area (Metropolitan Cities and Provinces) (Unemployment/Employment), https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1DA7004S&conn_path=I3, accessed on April 6, 2020.

Statistics Korea, Microdata Integration Service, Population Movement Statistics, https://mdis.kostat.go.kr/extract/extYearsSurvSearchNew.do?curMenuNo=UI_POR_P9012, accessed on September 10, 2020.

Statistics Korea, Korean Statistical Information Service, Monthly Particulate Matter (PM10) Air Contamination Levels, https://kosis.kr/statisticsList/statisticsListIndex.do?menuId=M_01_01&vwcd=MT_ZTITLE&parmTabId=M_01_01&outLink=Y&parentId=T.1;T_7.2;#content-group, accessed on June 17, 2020.

Statistics Korea, Korean Statistical Information Service, Consumer Price Index (Metropolitan Cities and Provinces), https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=INH_1J17112&vw_cd=MT_GTITLE01&list_id=105&seqNo=&lang_mode=ko&language=kor&obj_var_id=&itm_id=&conn_path=MT_GTITLE01, accessed on June 17, 2020.

Statistics Korea, Korean Statistical Information Service, Monthly Ozone Air Contamination Levels, https://kosis.kr/statisticsList/statisticsListIndex.do?menuId=M_01_01&vwcd=MT_ZTITLE&parmTabId=M_01_01&outLink=Y&parentId=T.1;T_7.2;#content-group, accessed on June 17, 2020.

e-Narajipyo, Scale of Local Transfer Finance of the Central Government, http://www.index.go.kr/potal/main/EachDtlPageDetail.do?idx_cd=1043, accessed on May 15, 2020.

Korea Appraisal Board Real Estate Statistical Information System, Official Land Prices (Land Price Fluctuation Rate), https://www.r-one.co.kr/rone/resis/statistics/statisticsViewer.do?menuId=LFR_11100, accessed on April 6, 2020.

Korea Appraisal Board Real Estate Statistical Information System, Official Land Prices (Land Price Index), https://www.r-one.co.kr/rone/resis/statistics/statisticsViewer.do?menuId=LFR_11100, accessed on April 6, 2020.

Korean Educational Development Institute Education Statistics Services, Number of Students by Metropolitan City and Province, https://kess.kedi.re.kr/kessTheme/timeStats?itemCode=03&menuId=m_02_03_02, accessed on April 6, 2020.

Korean Educational Development Institute Education Statistics Services, Number of Enrolled Students by Year, https://kess.kedi.re.kr/mobile/stats/school?menuCd=0102&cd=4195&survSeq=2019&itemCode=01&menuId=m_010205&uppCd1=010205&uppCd2=010205&flag=B, accessed on April 6, 2020.

Ministry of the Interior and Safety Local Finance Integrated Open System, Fiscal Independence, http://lofin.mois.go.kr/websquare/websquare.jsp?w2xPath=/ui/portal/theme/vslz/sd006_th037_01.xml, accessed on November 12, 2020.

Ministry of the Interior and Safety Local Finance Integrated Open System, Fiscal Statistics (Local Finance Yearbook), http://lofin.mois.go.kr/portal/bbs/bbsListPage.do?bbsCd=FSL1004&code=fsl&leftCd=1&subCd=FSL410, accessed on May 11, 2020.

Ministry of the Interior and Safety Local Finance Integrated Open System, Fiscal Statistics Search [Statistical Data (Integrated Fiscal Overview, Local Finance Yearbook, Local Tax Statistics Yearbook), searched: local tax/general account tax revenue/total local tax revenue/total local expenditure/local shared tax/local tax/local excise tax/national subsidy/capital expenditure, etc.], https://lofin.mois.go.kr/websquare/websquare.jsp?w2xPath=/ui/portal/search/sd001_cs001.xml, accessed on October 10, 2020.

Ministry of the Interior and Safety Local Finance Integrated Open System, Expenditure Settlement by Local Government and Function, http://lofin.mois.go.kr/portal/service/openInfPage.do?infId=CKJQQ8RW0FL1E1UJ1IRX839865&srvCd=, accessed on November 11, 2020.

Ministry of the Interior and Safety Local Finance Integrated Open System, Integrated Fiscal Overview /Fiscal Indicators / Budget Expenditure per Resident, http://lofin.mois.go.kr/portal/service/openInfPage.do?infId=E8CLIL7H1FHQ3F38ON5W225441&srvCd=, accessed on November 11, 2020.

OECD National Account, OECD Fiscal Decentralization Database, http://www.oecd.org/tax/federalism/fiscal-decentralisation-database/, accessed on April 21, 2020.

Current Issues in Medium- and Long-term Healthcare Financing

John M. Kim and Sung-Joo Yoon*

I. Introduction

Korea's healthcare expenditures have recorded substantial growth over the last three decades, at a rate that is currently the highest among various areas of government spending. One of the most pressing current issues for healthcare and fiscal authorities is to come up with a reliable assessment of both the level and rate of change of healthcare expenditures. There is still no clear consensus on whether the level and growth rate are indeed excessive or, rather, actually too low, as Korea still spends less money on its healthcare sector than other developed countries. To answer this question about the "adequacy" of healthcare expenditures, the authorities need to take an array of factors into consideration (e.g., income level, age structure, institutional factors, etc.) and also determine how each factor would influence the assessment. Without this evaluation of the "adequacy" of healthcare expenditures, it will be extremely difficult to determine the direction of future healthcare policies: whether the healthcare expenditures are truly at a problematic level and then to decide how relevant policies can be coordinated to rein in the growth rate.

Despite the importance of this issue, unfortunately, few studies have presented convincing evidence-based arguments. To date, Korea lacks a consensus on the country's

* John M. Kim, Senior Fellow, Korea Institute of Public Finance
Sung-Joo Yoon, Fellow, Korea Institute of Public Finance

healthcare expenditures. Some researchers have reported that Korea spends less on healthcare than other countries. Others argue that, given the speed of population aging and the expected implications for accelerating expenditure growthin the future, Korea is already spending too much. Few attempts have been made to bridge the gap between these two positions.

This lack of consensus on what would be the adequate level of healthcare expenditures obviously hampers policy decisions for healthcare finances. Indeed, it may be the most pressing question in this sector, ranking above any other frequently raised issue.

For a meaningful discussion ofrelevant policies and institutional responses required, we first need at least cursory answers to these questions, following which we may then determine how much of this estimated fiscal burden the country can sustainably bear. This report focuses on the adequacy of healthcare spending.

Before delving into these issues further, we will clarify what we mean by the term "adequacy." Quite obviously, the adequacy of spending does not refer to the "optimal" level of expenditure, for the simple reason that the subjective nature of consumers' and citizens' needs, *inter alia*, makes it rather difficult to discuss or define an "optimal" level. Instead, in this study, we use the term "adequacy" in connection with our intention to assess healthcare expenditures in Korea, judging from comparisons to other countries that incorporate adjustments for factors known to influence spending in health, as well as from Korea's experience in the past. In simpler terms, allowing for differences in such key factors as the level and growth rates of incomes or population age structure across different countries, should it be found that Korea's healthcare expenditures increase at a rate that remains with the range predicted by the "adjusted" international comparison, the growth rate can be understood as being "adequate." In other words, "adequacy" refers to a similarity to, or remaining within the range of, common experiences in other countries.

As a basic check on whether the methodology we use in this study is reliable, we also conduct a "postmortem" analysis of previously carried out long-run healthcare predictions. If such predictions prove to be reasonably accurate over an extended period of time since they had been produced, the methodology used in that previous study would merit a greater degree of confidence from us. Naturally, there are bound to be prediction errors, but if it can be shown that prediction errors in the "independent variables" (e.g., future income levels or population aging) can explain most or all of the observed error in the prediction for healthcare spending, then we may expect that the same methodology should have a good chance of producing reasonably accurate long-term predictions for the future as well. In this context, this study revisits the long-term estimates developed around two decades ago,. As far as we know, this study represents the first attempt at a follow-up assessment of a long-term

estimation in Korea. We thus hope that these findings will assist policymakers to determine the direction and pace of Korea's future healthcare policies.

II. Issues Pertinent to Healthcare Expenditure Estimation

To assess the adequacy of healthcare expenditure levels and growth rates, we need to first discuss specific issues pertaining to the assessment, which include issues related to methodology, time series data, and institutional changes. This chapter focuses on introducing and explaining these issues, and specific institutional and quantitative assessments will then be covered in Chapters III and IV.

1. Issues Pertaining to Long-Term Estimation

Most long-term estimation models estimate "dependent variables" using equations that consider future predictions of various "independent variables." Granted, predictions of dependent variables are bound to be different from the actual results achieved. However, if most of the differences can be explained by prediction errors that are also found with independent variables, the dependent variables can be used as bases for adequacy assessments, after adjusting them based on the actual results.

On the other hand, if prediction errors are not explained by errors found in independent variables, there may be other factors that were not considered at the time the regression equation was used, or there may have been fundamental changes in the healthcare institution, government policies, or social consensus in the sector. As such, this issue requires a careful review of both the institutional factors and the quantitative methods used. In this study, we focus on the possible effect of the Long-Term Care Insurance (LTC Insurance) adopted in the late 2000's on healthcare expenditures. The overlap between the National Health Insurance (NHI) and the LTC Insurance is discussed in Chapter 3.

A. Long-Term Estimation Using Income Levels

It is widely understood that there exists a stable and constant relationship between the overall income level of a society and its healthcare expenditures. This relationship has been found across numerous countries, and became one of the key bases of estimating health expenditure when Newhouse (1977) proposed the following estimation of health

expenditures using 1971 data from 13 member states of the Organisation for Economic Cooperation and Development (OECD).

$$HE_i = -60 + 0.079\,GDP_i, R^2 = 0.92 \quad (1)$$

Despite its simple form, the equation proved potent for explaining differences in healthcare expenditures among different countries (explanatory power: $R^2 = 92\%$). Based on these findings, Newhouse (1977) then made two arguments: 1) per capita income alone can explain most differences in healthcare expenditures, and healthcare service prices and institutional factors are not as important as per capita income (HE_i represents per capita healthcare expenditure in Country i. The t of 0.079, which is the coefficient of the estimated GDP_i, is 11.47); 2) the above equation and the findings of Kleiman (1974) and other studies suggest that the elasticity of health expenditure against per capita (average) income is higher than 1, and that healthcare services can be classified as luxury goods.

Subsequently, many researchers have published papers either refuting or verifying the findings of Newhouse (1977). Key findings are summarized below. First, most subsequent studies confirmed that the per capita income exerts a significant effect, and that the elasticity against per capita income is higher than 1. Some recent studies produced elasticity estimates close to 1; however, these estimates were derived by adjusting healthcare expenditures for price indexes. These estimates can be interpreted as representing the elasticity of healthcare services (treatments, etc.) rather than the elasticity of healthcare expenditures.[1] For this reason, even though the expenditures of healthcare services against the per capita income did not necessarily exceed 1, the elasticity of healthcare expenditures stands at around 1.2, in most studies.

Secondly, other than the per capita income, the demographic structure (aging), unemployment rate, and women's participation in the workforce were included as variables. However, these variables did not produce significant results. The institutional variables analyzed in this study also include the following, which were analyzed as dummy variables. Most were cited by Gerdham et al. (1992a; 1992b; 1998). The findings of these studies indicate

1 In economics, goods are classified as luxury goods or inferior goods depending on their income elasticity. However, it should be noted that the elasticity of healthcare expenditure against per capita income is different from the typical income elasticity. In other words, Newhouse classified healthcare services as luxury goods, but they do not fit the economic definition of luxury goods. Newhouse uses the growth rate of the total expenditure (PQ) rather than the growth rate of demand for the goods (Q). As for income, while economics assume cross-sectional changes in individuals' income, healthcare elasticity is measured based on inter-national difference or changes in the overall income among different time points.

that gatekeeper designation, refund of prepaid expenses, diagnosis-related group (DRG), and the percentage of public healthcare lower the overall health expenditures.

In reflection of the above, in this study, we mainly rely on the following methods.

$$In(Health\ \text{exp}enditure) - f(In(Income\ level) \mid Aging \cdot Population\ factor,\ State \cdot Institutional factors) \quad (2)$$

Unlike the component-based estimation, this method empirically confirms the elasticity between health expenditures and income levels. As such, it is the most suitable method for long-term estimations. Many previous studies estimating health expenditures rely on this form of component-based method. However, we did not consider that method in this study, as it requires very strong assumptions. The component-based model typically involves an assumption that the characteristics of income distribution, institutional framework, and household type remain constant, to some extent. These assumptions do not pose a serious issue when the period subject to analysis is less than ten years, as the characteristics at issue are not likely to significantly change in that relatively short period.

However, in the case of a long-term prediction, economic, cultural, and institutional characteristics may change significantly. In such cases, the underlying assumptions of the component-based method are likely to significantly affect the findings, which make the method unsuitable for long-term predictions. Furthermore, the assumptions in the component-based method are included in the model without either explicit discussion or verification, which makes it difficult to determine the direction or extent of the bias caused by the assumptions. Note that this is not to say that the component-based method holds little relevance to a detailed assessment of long-term trends related to healthcare expenditure. Nevertheless, we decided not to rely on the component-based method because it would be difficult to perform the analysis on top of the income level analysis featured in this study.

The component-based method presupposes that certain distributions and behavioral characteristics will remain constant, even when they are likely to change in the long term and play important roles in the estimation process. This use makes it difficult to determine the validity of estimates based on the component-based method. For example, the occurrence rate, prevalence rate, and mortality of key diseases may change over decades. In this case, future medical expenses cannot be reliably estimated based on the major diseases that we see today. Changes in pharmaceutical products and medical technologies also hold great importance in this regard. Advances in medical technologies have practically eradicated some diseases, including smallpox and tuberculosis. There have also been significant changes in the

occurrences, treatments, and expenses of cancer, as well. Furthermore, new diseases may emerge at any time, which have included AIDS and COVID-19 infections. When attempting a long-term estimation, a specific and detailed analysis of diseases, pharmaceutical technologies, and expenses is likely to undermine the original goal of obtaining an accurate prediction. As such, the component-based method is not an effective approach for considering these factors. Other factors that show slow yet significant changes over long periods of time include demographical factors, living conditions, and the healthcare system. The LTC Insurance represents another example of such factors. Only 20 years ago, no one thought that people would spend so much money on healthcare services.

In contrast to the component-based method, this study relies on income levels as the main variable. This estimation method is based on two ideas. First, health expenditures are bound to be physically limited by one's income and economic capabilities. Therefore, the relationship between income and health expenditure reflects the equilibrium between healthcare supply and demand, as well as the equilibrium between the healthcare sector and the other sectors. In other words, health expenditures are not a mere sum of estimates; it is a representation of society's economic capacity and social consensus. There are numerous other factors to be considered, such as medical technology, cultural and institutional differences, and demographic characteristics. However, the ultimately observed expenditures represent a point of equilibrium between supply and demand, and produce very simple and constant results that may seem mechanical. These results are highly consistent with economic insights. Overall, a highly stable regularity is empirically observed between income levels and health expenditures (stable income level elasticity). Such regularity is not only found at a national or social level, but also observed in international comparisons. Despite differences in income, culture, institution, and race, the determination of how much income to spend on health and lifespan is surprisingly similar across different societies and countries. Therefore, health expenditure estimations based on income levels represents a highly reliable prediction method, despite its perceived simplicity.

Second, the method used in this report understands the relationship between income levels and healthcare expenditures to be as follows. The method typically uses a linear function for the regression analysis. Therefore, the main variable (income level) determines the "gradient" of changes in healthcare expenditures. On the other hand, other variables mainly determine the "intercept" that affects the level of healthcare expenditures. The gradient can be used to determine the rate of growth because it represents the income level elasticity of the health expenditures.[2] The effects of the estimated intercepts represent the relative level

of expenditures unique to the relevant society or country. Granted, other factors can also be included in the regression equation. However, while income, age, and demographic factors show wider fluctuations, national and institutional factors mostly factor into the regression equation as dummy variables, and therefore manifest as "fixed effects" specific to each country. In other words, while institutional reforms may affect the level of expenditures (intercepts), they may not have a significant effect on the long-term growth rate (gradient), but merely represent a "one-time" adjustment.

B. Long-Term Prediction Errors

In order to assess the "adequacy" of healthcare expenditures by comparing previous long-term predictions with the actual results, we need to first examine how many of the errors in the dependent variables can be explained by the prediction errors of the key independent variables. If the resulting new "calibrated predictions" are similar to the actual results, they may be interpreted to imply that the current healthcare expenditures are consistent with the judgments underlying the prediction models and techniques used in the past. In particular, if the previous estimation model was based on common experiences shared by multiple countries, the current healthcare expenditures in Korea can be understood to be within the range that can be universally expected. On the other hand, if the actual expenditures today differ significantly from the calibrated prediction, it may mean that the level of expenditures are either too low or too high. Granted, even in the first case, it may not objectively prove that the previous long-term prediction model was "right." However, the results may add to the credibility of the model, and that subsequent changes in healthcare expenditures can then be assessed based on this statement of credibility.

Most previous long-term estimations predicted health expenditures by exogenously calculating changes in income levels (economic growth rate) and the demographic structure. However, over the last two decades, the population growth rate and the economic growth rate deviated from the original predictions by a great margin. Therefore, these factors have seriously disrupted the follow-up assessments of long-term estimations of health expenditures. However, few follow-up estimations have considered this aspect, and thus could

2 Both the per capita income levels and per capita healthcare expenditures are estimated by taking their natural logarithms. Therefore, the estimated coefficients of the independent variables are interpreted as representing elasticity. Therefore, if the value is larger than 1, it means that the growth rate of the dependent variable is larger than the growth rate of the independent variable.

not use prior long-term estimations in discussing the adequacy of today's health expenditures.

Income level is deemed the most important factor for use in calculating predictions. It is widely known that, in Korea, the actual growth rate has turned out to be much lower than the original long-term prediction. In Chapter IV, we will revisit the specific figures and compare them in order to determine how they affected healthcare expenditures. In terms of demographic factors, the mortality rate of the elderly decreased faster than for previous predictions, which is likely to result in an overall increase in the elderly population. However, the increase in the elderly population has relatively small impact on the percentage of the elderly population. It is not likely to have caused significant disparities between previous predictions and actual healthcare expenditure. The birth rate declined much faster than the original estimation, and is likely to significantly change the age structure of Korea within 20 to 30 years. Therefore, it is expected to have more significant effect on the long-term estimation of health expenditures than any estimation errors in the mortality rate.

It remains difficult to measure the effect of the demographic structure alone.[3]

Even when considering the effect of the demographic structure, more factors are reflected into the regression equation through changes in income levels than demographic factors, because of endogeneity and multicollinearity issues.[4] As in the case of the well-known demographic transition, an improvement in the income levels change the demographic and age structure by lowering both the mortality rate and the birth rate, and investments in human capital

---

3 Granted, depending on the regression equations and the analysis methods used, factors other than income level (aging, diseases, and institutional impact) may "explain" a larger portion of the healthcare expenditures. On the other hand, in long-term estimations at the social or national level, aging and income level are highly correlated. Therefore, it does not produce a significant difference in estimating the changes in the dependent variables, and no bias is caused in the estimation of the dependent variables. In other words, the issue holds less relevance for the purpose of this study, as we are more interested in the total healthcare expenditures itself, and the effects of individual factors are less significant. We already mentioned that, in recent studies, the estimated income elasticity of health expenditures tends to be low.

4 None of the long-term estimations on healthcare service or expenses so far have properly discussed methodological issues such as endogeneity and multicollinearity issues. It may be because it is difficult to discuss health, lifespan, healthcare, consumption, and long-term economic growth at a level of specificity sufficient to form a regression equation. However, the endogeneity issue does not pose a serios challenge in long-term prediction. Endogeneity is problematic in estimation because of the bias among parameter estimates of independent variables. An estimated coefficient represents who a change in a certain variable affects the dependent variables that form the policy objective. Bias undermines the accuracy of such measurement. However, even when there exists a bias in the coefficient of each independent variable, the prediction of dependent variables calculated by the regression equation is unbiased. A component-based long-term prediction is bound to be affected by biases caused by the underlying assumptions.

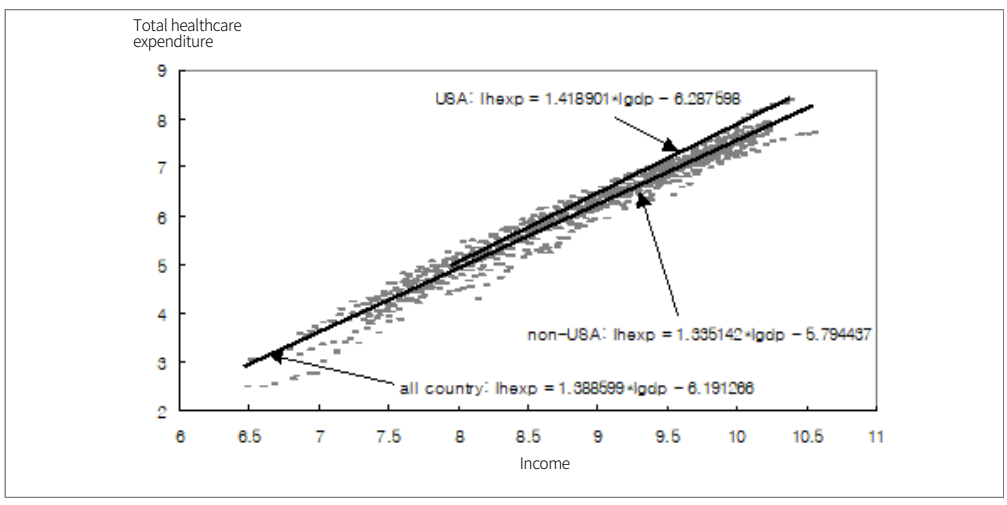
are made for longer periods of time, due to the increase in the average lifespan, which in turn improves the overall productivity. As such, the income level, demographic, and age structure hold a close endogenic relationship. In other words, even when including aging in the regression equation, its effect will be restricted to simply fine-tuning the intercept and the gradient.

Cultural, institutional, and other national-level factors are treated as dummy variables in the regression process, and thus the estimate of the "intercept" of each country. Institutional changes may result in a permanent shift in the healthcare expenditure level, which is the intercept over medium terms ranging from five to ten years. In the long-term, however, their effect on the growth rate may be overwhelmed by the effect of the graphic gradient. In this regard, we thus need to consider that changes in service fees, insurance premiums, and NHI coverage are included in the changes in healthcare expenditures caused by income changes. However, institutional factors seldom affect healthcare expenditures on their own.

A special case of these institutional changes is related to the issue of the interpretation of LTC expenditures. In the process of adopting the LTC Insurance, it is unlikely to have been reviewed for a potential service overlap with the NHI. Therefore, the LTC Insurance may have affected the healthcare expenditures in Korea in either the short or medium term. This issue will be discussed at the end of this section, in connection with Figure 4.

The following figures will help readers understand the discussion so far. In Equation (2) above, a linear relationship is established between HE_t and GDP_t when taking their natural

Figure 1_Income and Health Expenditure (log-scale)



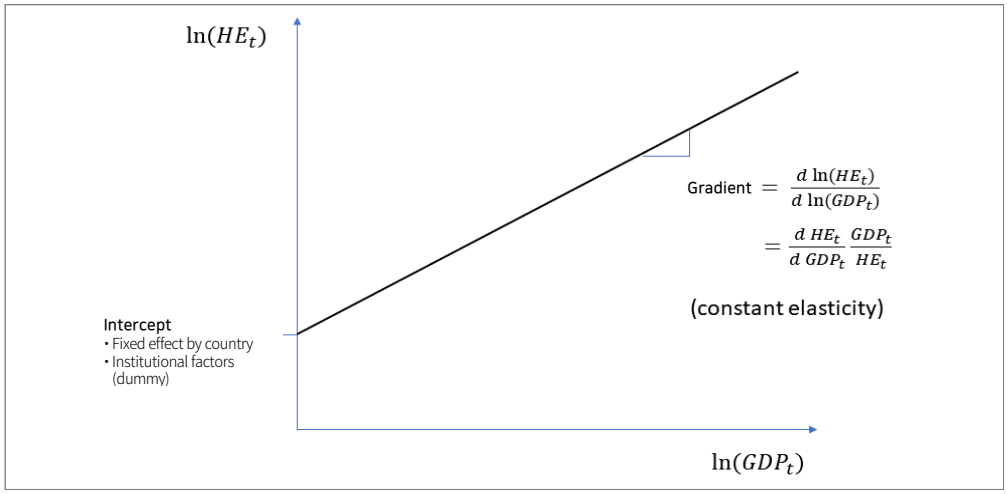
Source: Kim (2002)

logarithms. It indicates that the elasticity between the two is stable. Figure 1 visually confirms that it is consistent with actual observations. In fact, such a relationship between healthcare expenditures and income levels was previously identified by Newhouse (1971; 1977).

Figure 2 represents a simpler version of the relationship, which can be interpreted as follows. The gradient of the graph representing the income-health expenditure relationship represents the elasticity of health expenditures to per capita GDP. As disparities among different countries are minimal, the income level alone is seen to largely determine the level of health expenditures. However, if differences in healthcare expenditures are consistently observed at similar income levels on account of cultural, social, or institutional factors on the national level, such differences can be estimated using the fixed effects specific to the country, which will be represented in the figure as differences among the intercepts of different countries.

Some of the country-specific effects represented by the intercepts indicate the effect of continuous variables such as aging. Given the high correlation between income level and aging, the changes in the regression equation attributable to aging alone are minimal, such that most of the effect on health expenditures can be attributed to the income level variable.[5]

Figure 2_Relationship among Income Level, Healthcare Expenditure, and Other Variables

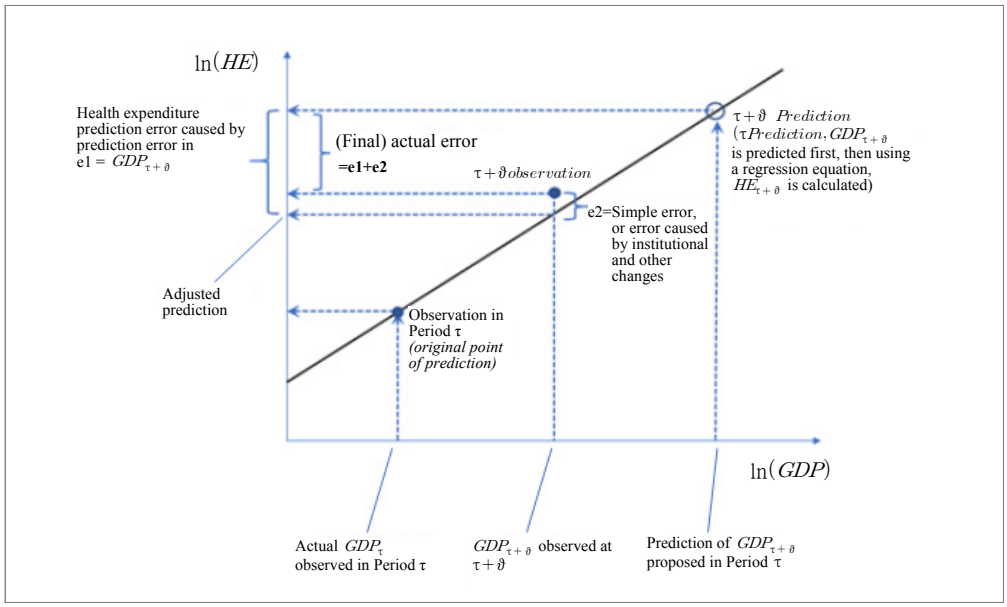


Source: Present study

5 As mentioned in the preceding footnote, the biases caused by endogeneity and correlation among independent variables do not have a significant impact on the prediction of the dependent variables that we are interested in.

Figure 3 explains the concept of the calibrated predictions attempted in this study. The purpose of this approach is to distinguish errors that can be explained through decomposition and then to account for forecast errors due to the other errors. The assessment of the fundamental errors in the original forecast depends on the size of the latter. In other words, when predicting the health expenditure of Period $\tau+\theta$ in Period τ, the health expenditure is predicted by first predicting the independent variables to be used to predict $GDP_{\tau+\theta}$, and to then use this prediction to calculate the health expenditure in Period $\tau+\theta$. However, the actual value of GDP observed in Period $\tau+\theta$ is bound to be different from the previous prediction. In such a case, the health expenditure re-calculated using the original regression equation would be the calibrated prediction. This prediction can be explained by the difference between the actual and predicted GDP. It represents the calibrated prediction that can be calculated and proposed, by first assuming that the regression equation used for the prediction is correct, and that e_1 can therefore be interpreted as an "explainable" error. On the other hand, the errors that remain after the adjustment can be interpreted as either simple errors (e_2 in the figure) or as behaviors deviating from the explicit and implicit assumptions.

Figure 3_Cause of Prediction Error Based on Adjusted Prediction



Source: Present study

In this study, we use the calibrated predictions as the primary criteria for determining whether healthcare expenditure is growing too fast or too slow in Korea. Although not logically immaculate, we concluded that relying on the predictions in Korea and other countries 20 years ago may be a useful approach, by considering the absence of criteria for assessing the growth rate of healthcare expenses.

A long-term prediction is bound to result in larger discrepancies between the estimation and the actual results. Without the analysis and description of errors shown in the figure above, the growth rate of healthcare expenditures cannot be accurately assessed. For example, if we only consider the healthcare expenditure in the figure above, some may argue that the healthcare expenditure is too small because the actual healthcare expenditure observed in Period $\tau + \theta$ is lower than the prediction in Period $\tau + \theta$. However, if we consider the income level, the same findings can be interpreted to mean that the healthcare expenditure is not small, and that it is actually excessive relative to the income level because it is located above the regression line. If the latter interpretation is correct, an increase in the income level or aging is likely to increase the financial burden in the future, resulting in some arguing that a further increase in healthcare expenditures needs to be avoided. In fact, many researchers have already raised concerns to that effect.

In addition to the issue of income level interpretation, we can consider the issue of intercepts. If we look at the intercepts in the figure above, which represent the fixed effect of each country, Korea belongs in the lowest-ranked group among the OECD countries. Therefore, it would be unreasonable to conclude that Korea's healthcare expenditure is excessive just because the expenditure is above the regression line. A further comparison with other countries would be needed.[6]

We would like to conclude this section by mentioning another issue that this study seeks to analyze. The long-term estimation method explained above encompasses healthcare expenditures across all diseases, treatments, and systems. Therefore, as shown on the left side of Figure 4, if we consider both the NHI and LTC Insurance, a simple interpretation aligned with the purpose of the LTC Insurance would be that the total expenditures increase at a manageable rate in accordance with the original predictions, with the new LTC Insurance playing the role previously assumed by the NHI in some areas.[7]

---

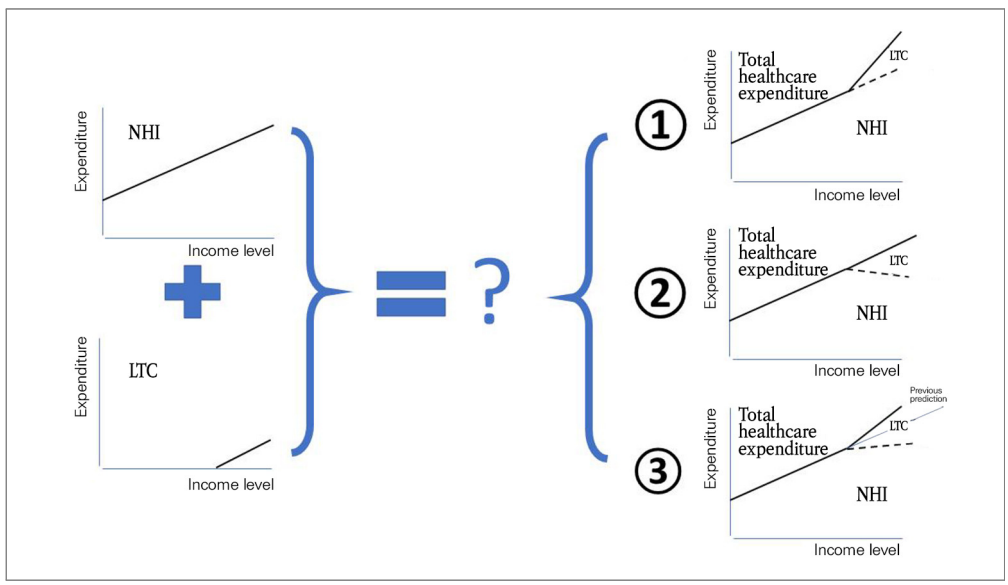
6 The effect of country-specific fixed effects reflected in the intercepts is discussed in detail in Chapter IV.

7 An anonymous respondent proposed that the LTC Insurance represents a combination of healthcare and social welfare. In particular, facility benefits are not regarded as healthcare benefits, and that caution is required

At the time of its adoption in 2018, LTC Insurance was designed to collect premiums as a part of the NHI premiums. Then, some may ask that the insurance be based on ① rather than ②. Obviously, in this case, the total healthcare expenditures are highly likely to be excessive.

We expect that, unlike the two cases mentioned above, the adoption of the LTC Insurance will partially mitigate the current pressure on the NHI, while causing a somewhat excessive increase in healthcare expenditures.

Figure 4_Possible Overlap between the NHI and the LTC Insurance Expenditures



Source: Present study

when interpreting these findings. We think that this opinion has its merits. However, there are some areas where the distinction between healthcare and social welfare becomes blurred, and that there may be different interpretations. It would not be problematic to include it in the healthcare expenditures, and we have no intention to argue that it should be excluded from social welfare expenditures.

Medical benefits may seem to invariably belong to the healthcare group. However, they may also be categorized as social welfare in that they benefit vulnerable groups. Facility benefits can be classified as healthcare benefits if the facility provides healthcare services.

In other words, even if we acknowledge the social welfare nature of the LTC Insurance, there is no clear answer to whether it should be considered as a healthcare benefit. Nevertheless, even if this report does not provide a definitive answer to this question, we seek to provide useful reference points through our analysis.

This interpretation is supported by the fact that the issue of service overlap between the NHI and the LTC Insurance was recognized from its onset, and that efforts have been made to address this issue. In addition, there was no reference data from overseas, because Korea adopted these care systems at around the time of the adoption of similar systems in other countries. However, it remains important to understand how healthcare expenditures increased in the long term under the respective schemes. Therefore, in this study, we seek to examine this issue further. In Chapter III, we analyze the ten years of the LTC Insurance from a mainly institutional perspective. In Chapter IV, we provide a more detailed discussion on the issue by applying a quantitative approach.

C. Overview of Previous Long-Term Estimations

Measuring the adequate level of healthcare expenditure growth requires certain baselines, which can be provided by predictions made sufficiently long ago that are based on objective truths. Early healthcare expenditure estimations in Korea that fit these requirements include Moon (2000) and Kim (2000; 2002). In this study, we assess the adequacy of healthcare expenditures in Korea based on the more recent long-term estimation conducted by Kim (2002). Overall, the studies cited above analyzed how Korea's healthcare expenditures had changed over a long period, and how they would potentially change in the future.

For example, Kim (2002) presented long-term estimations of the total healthcare expenditures, and used these findings to calculate long-term estimations of public health expenditures and total NHI expenditures.

First, Kim (2002) developed a time-series cross-sectional model for per capita healthcare expenditures using panel data obtained from OECD member states. Among the dummy variables used in their regression analysis, those variables applicable to Korea were set as omitted variables (e.g., with a value of 0). Therefore, they are not shown in the equation.

$$\begin{aligned} \log(HEXP_t) &= \alpha + \beta \log(GDP_t) + \gamma POP65_t + E[u_t \mid u_{2000}] \\ &= \alpha + \beta \log(GDP_t) + \gamma POP65_t + \rho^{t-2000} \cdot e_{2000} \end{aligned} \tag{3}$$

where $HEXP_t$ and GDP_t are the per capita healthcare expenditures and GDP (in USD), and $POP65_t$ is the percentage of the elderly (65 or older) population. In addition, ρ is Korea's autocorrelation coefficient estimated using the regression analysis, and e2000 is the last observed expected residual. By applying the estimated coefficients to the equation, we

compiled the following findings. Note that the per capita healthcare expenditure was calculated in USD, and then converted back to KRW using the latest purchasing power parity (PPP) value. We used the exchange rate based on the 2017 PPP (USD 1 = KRW 726).

$$\begin{aligned} HEXP_t &= GDP_t^{\beta} \cdot \exp\left\{\alpha + \gamma \cdot POP65_t + \rho^{t-2000} \cdot e_{2000}\right\} \\ &= GDP_t^{\beta} \cdot e^{\alpha} \cdot e^{\gamma \cdot POP65t} \cdot e^{P^{t-2000} \cdot e_{2000}} \\ &= GDP_t^{1.215856} \cdot \exp\left\{-5.207419 + 0.010005 POP65_t + 0.887364^{t-2000} e_{2000}\right. \end{aligned} \quad (4)$$

We used the above equation to calculate both the calibrated prediction and in the interpretation of the prediction errors, which is described in Chapter IV.

III. Correlation between NHI and LTC Expenditures

1. Discussions on the Relationship between Healthcare Finances and LTC

The effect of LTC on healthcare finances is not easy to determine. LTC can both raise and/or lower healthcare expenditures. Therefore, the effect of LTC will be determined based on the relative sizes of the positive and negative effects.

If the adoption of the LTC Insurance improves the elderly's access to healthcare services, the demand for these services is likely to increase. Given the fact that a large portion of healthcare expenditures is incurred immediately before a person's death, healthcare expenditures are likely to increase under the LTC Insurance scheme. In other words, LTC can significantly increase healthcare expenditures and undermine healthcare finances. On the other hand, in the early stages of the LTC Insurance, LTC services may replace in-house care services, which had no specific treatments provided under the NHI. In addition, the provision of accessible and affordable care services may improve the healthy aging of LTC beneficiaries, thereby reducing NHI benefits being claimed by the elderly. In such cases, the LTC Insurance exerts a positive effect on healthcare finances (Park and Jun, 2011).

The effect of LTC on healthcare expenditures and healthcare finances should be empirically determined. Previous studies have typically highlighted the positive effect of LTC on healthcare finances, though some studies have suggested that it exerts a negative effect. The following section presents changes in the NHI and LTC expenditures in Korea.

2. NHI and LTC Expenditures

A. NHI

The NHI was adopted in December 1963. The NHI Act was then enacted in February 1999, followed by the complete integration of the health insurance scheme in July 2000 (https://www.hira.or.kr). For this reason, the 2000 data only consist of data collected over six months, and is therefore excluded from this study.

In Table 1, the local revenue of the NHI increased from KRW 11.9 billion to KRW 62.7 billion between 2001 and 2018, at an average annual rate of 10.3%. The subscribers' premiums to the NHI finance increased from KRW 8.9 trillion to KRW 53.9 trillion, at an average annual rate of 11.2%.

The NHI expenditures increased from KRW 14.1 trillion to KRW 66.0 trillion between 2001 and 2018 (9.5% growth rate), and the insurance benefit expenses increased from KRW 13.2 trillion to KRW 63.2 trillion in the same period, at an average annual rate of 9.6%.

The total per capita benefit payments quadrupled from KRW 0.29 billion to KRW 1.24 billion between 2001 and 2018, and premiums increased from KRW 0.25 billion to KRW 1.20 billion in the same period.

Table 1_NHI Status

(unit: KRW 1,000, %)

By balance (1)	By balance (2)	2001	2009	2018
Revenue (KRW 1,000)	Total (A)	11,928,329,647	31,500,393,381	62,715,795,218
	Premium (C1)	8,856,157,614	26,166,081,793	53,896,460,440
	Government subsidies	2,624,979,558	4,682,831,080	7,070,427,632
	Others	447,192,475	651,480,508	1,748,907,146
Expenses (KRW 1,000)	Total (B)	14,105,818,569	31,189,152,469	65,978,340,945
	Insurance benefit expenses	13,195,615,994	30,040,870,810	63,168,331,869
	Administration expenses	628,806,905	659,722,664	763,555,340
	Others (total)	281,395,670	488,558,996	2,046,453,736
Total expenditure-revenue ratio (B/A) (%)	Subtotal	118.3	99.0	105.2
Premium-benefit payment ratio (D/(C1+C2+C3)) (%)	Subtotal	116.5	97.4	103.6
Current balance (A–B) (KRW 1,000)	Subtotal	-2,177,488,922	311,240,912	-3,262,545,727
Carryover (KRW 1,000)	Subtotal	257,945,169	4,586,651,937	664,572,167

Table 1_NHI Status(continued)

(unit: KRW 1,000, %)

By balance (1)	By balance (2)	2001	2009	2018
Accumulated reserves (E) (KRW 1,000)	Subtotal	0	2,227,783,531	20,773,357,170
Total per capital premiums (KRW 1,000)	Subtotal	245,659	637,156	1,195,417
Total per capita benefit payments (KRW 1,000)	Subtotal	286,294	620,467	1,238,582
Other comprehensive income (KRW 1,000)	Subtotal	-	-	-29,691,889

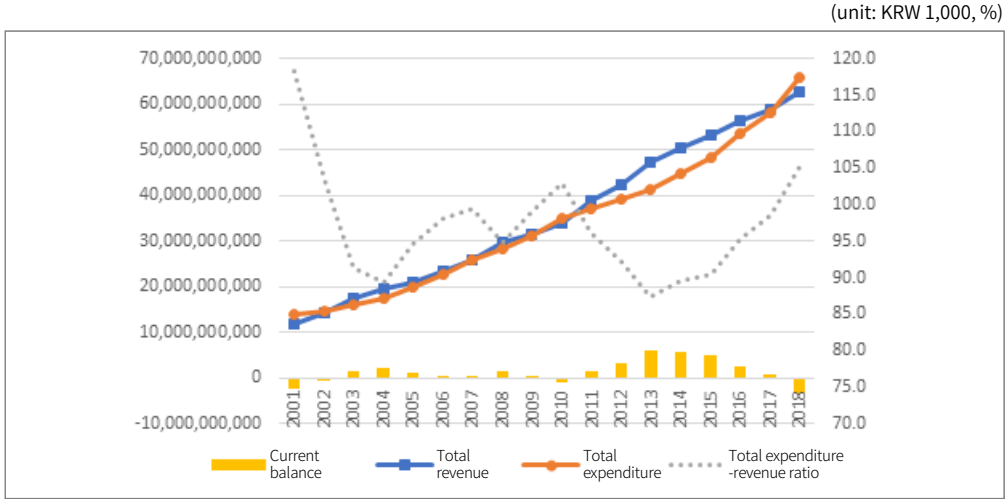
Source: http://kosis.kr/statHtml/statHtml.do?orgId=350&tblId=TX_35001_A023&conn_path=I3, accessed on April 9, 2020.

Table 1 provides an overview of the NHI finances between 2001 and 2018. Throughout this 17-year period, the NHI's total expenditures exceeded the total revenues in 2001, 2002, 2010, and 2018, whereas the opposite was true in the other years. The average total expenditure-revenue ratio was 97%.

According to the table, the growth rate of the expenditures increased in 2013 and onward, before gradually declining. As mentioned above, the average annual growth rate of the total expenditures between 2001 and 2018 were around 9.5%. Whereas the total expenditures increased only by 5.7% between 2010 and 2013, the growth rate between 2014 and 2018 was 10.2%.

Figure 5_NHI Finances

(unit: KRW 1,000, %)

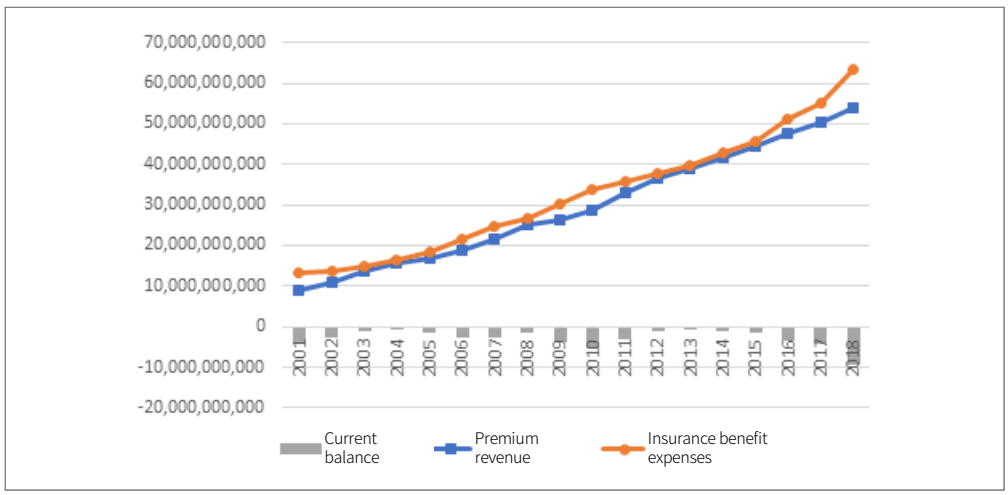


Source: http://kosis.kr/statHtml/statHtml.do?orgId=350&tblId=TX_35001_A023&conn_path=I3, accessed on April 9, 2020.

In addition, the table indicates that the NHI benefit payments exceeded the premium revenues throughout the 2001~2018 period, and that the gap grew wider from 2013 onwards. These findings suggest the high likelihood of a deficit in the NHI finances if there was no government support, which have included subsidies and the National Health Promotion Fund.

Figure 6_NHI Premium Revenues and Benefit Payments

(unit: KRW 1,000)



Source: http://kosis.kr/statHtml/statHtml.do?orgId=350&tblId=TX_35001_A023&conn_path=I3, accessed on April 9, 2020.

B. LTC

The LTC Insurance was adopted in July 2008 (https://www.hira.or.kr). For this reason, the 2008 data only consist of data collected over six months, and is therefore excluded from this study.

In Table 2, the local revenue of the NHI increased from KRW 2.1 billion to KRW 6.2 billion between 2001 and 2018, at an average annual rate of 12.8%. The subscribers' premiums to the LTC finance increased from KRW 1.2 trillion to KRW 3.9 trillion, at an average annual rate of 14.1%.

The LTC expenditures increased from KRW 1.9 trillion to KRW 6.8 trillion between 2001 and 2018 (15.2% growth rate), and the insurance benefit expenses increased from KRW 1.7 trillion to KRW 6.5 trillion in the same period, at an average annual rate of 15.7%.

Table 2_LTC Insurance Status

(unit: KRW 1,000, %)

Finance (1)	Finance (2)	2009	2013	2018
Revenue (A)	Subtotal	2,084,929,125	3,831,212,265	6,153,281,117
	Premium (A1)	1,199,551,493	2,542,097,685	3,924,506,029
	Subsidies (A2)	204,351,491	459,058,000	710,701,000
	Medical benefit contributions (A3)	660,082,482	743,938,636	1,434,747,523
	Central government contributions (A3-1)	41,596,688	35,068,334	35,943,196
	Local government contributions (A3-2)	618,485,794	708,870,302	1,398,804,327
	Others (A4)	20,943,659	86,117,944	83,326,565
Costs (B)	Subtotal	1,908,462,509	3,317,961,158	6,800,831,681
	Insurance benefit expenses (B1)	1,746,732,140	3,099,533,550	6,465,183,582
	At-home benefit expenses (B1-1)	985,020,419	1,493,254,561	3,513,447,032
	Facility benefit expenses (B1-2)	754,497,938	1,598,158,349	2,935,223,474
	Family care expenses (B1-3)	1,656,125	1,026,503	1,352,169
	Medical certificate issuance costs (B1-4)	5,358,103	6,904,112	14,740,142
	At-home care order issuance costs (B1-5)	199,555	190,025	420,765
	Administration expenses (B2)	135,720,376	178,158,578	250,186,945
	Others (B3)	26,009,993	40,269,030	85,461,154
Other comprehensive income	Subtotal	-	1,818,412	-18,756,716
Total expenditure/ revenue ratio (B/A)	Subtotal	92	87	111
Benefit-premium ratio (B1/(A1+A2+A3))	Subtotal	85	83	107
Current balance (A-B)	Subtotal	176,466,616	513,251,107	-647,550,564
Carryover	Subtotal	385,140,812	976,296,494	-426,807,260
Accumulated reserves (E)	Subtotal	105,400,000	1,125,800,000	1,768,500,000
Reserve ratio (E/B)	Subtotal	8	50	33

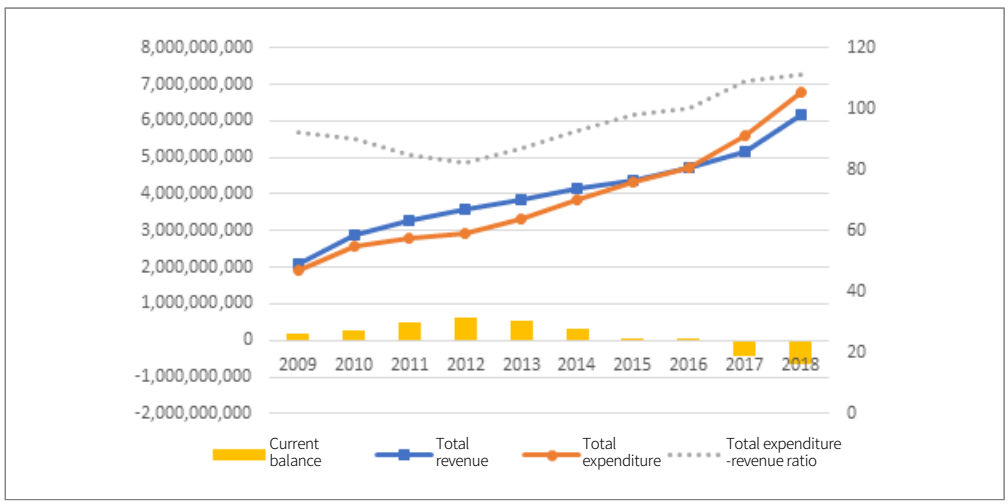
Source: https://kosis.kr/statisticsList/statisticsListIndex.do?publicationYN=Y&statId=2011038&outLink=Y&entrType=#content-group, accessed on April 9, 2020.

In the 2009~2016 period, the total revenues of the LTC Insurance exceeded its total expenditures. However, the LTC finances were in the red in 2017 and 2018. The average total profit/expense ratio between 2009 and 2018 was 95%, but the ratio increased to 100%, 109%, and 111% between 2016 and 2018.

According to the table, the current balance continuously declined after 2012. The difference between revenues and expenditures increased from KRW 176.5 billion to KRW 624.4 billion between 2009 and 2012. However, the expenditures exceeded the revenues in 2017, and the expenditures exceeded the revenues by KRW 647.6 billion in 2018.

Figure 7_LTC Finances

(unit: KRW 1,000, %)

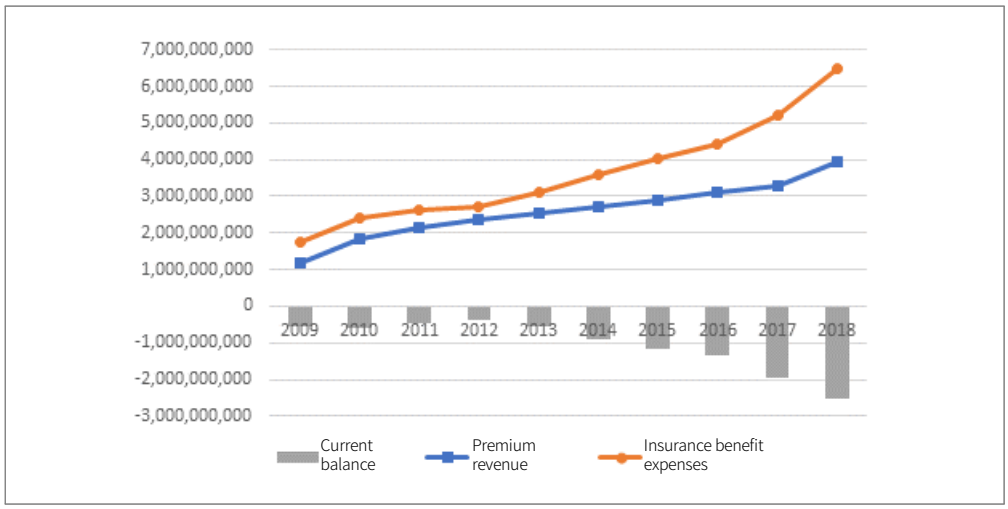


Source: https://kosis.kr/statisticsList/statisticsListIndex.do?publicationYN=Y&statId=2011038&outLink=Y&entrType=#content-group, accessed on April 9, 2020.

In addition, Table 2 indicates that the LTC Insurance benefit payments exceeded the premium revenues throughout the 2001~2018 period, and that the gap grew wider from 2012 onwards. The difference between the premium revenues and benefit payments was KRW 363.2 billion in 2012. The difference continued to increase, until reaching KRW 2.5 trillion in 2018. The findings suggest the high likelihood of a deficit in the LTC finances without continued government support, such as current subsidies and the National Health Promotion Fund.

Figure 8_LTC Insurance Premium Revenues and Benefit Payments

(unit: KRW 1,000)



Source: NHIS, https://www.nhis.or.kr, accessed on May 14, 2020.

3. Discussions on Relationship between LTC Insurance and NHI

A. Premium Rate

As mentioned above, the LTC Insurance in Korea is operated as a standalone insurance under the Long-Term Care Act. However, to ensure its efficient administration and operation, the National Health Insurance Service (NHIS) manages both schemes (http://m.nhis.or.kr/).

In addition, the LTC Insurance premium is determined by a prescribed rate based on the NHI premium (LTC Insurance premium = NHI premium × LTC Insurance premium rate). Therefore, when the NHI premium rate increases, the LTC Insurance subscribers should also pay higher premiums. Regarding this issue, the government has explained that the LTC Insurance premium rate decreases when the NHI premium rate increases, such that the LTC Insurance premium is not dependent on the NHI premium rate (Ministry of Health, Welfare and Family, 2008).

Table 3_NHI and LTC Premium Rates

(unit: %)

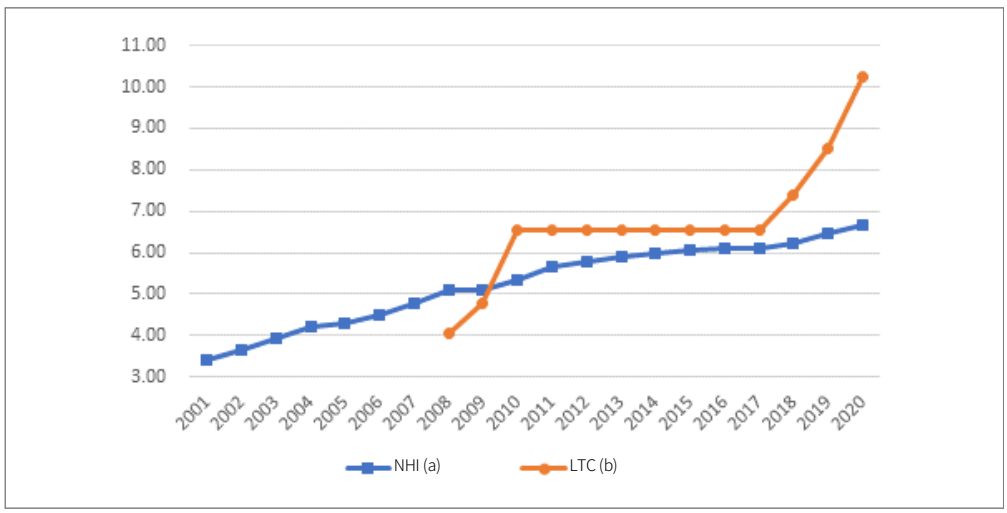
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NHI (a)	2.8	3.4	3.63	3.94	4.21	4.31	4.48	4.77	5.08	5.08	5.33
LTC (b)									4.05	4.78	6.55
NHI + LTC*	2.8	3.4	3.63	3.94	4.21	4.31	4.48	4.77	5.29	5.32	5.68
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
NHI (a)	5.64	5.8	5.89	5.99	6.07	6.12	6.12	6.24	6.46	6.67	
LTC (b)	6.55	6.55	6.55	6.55	6.55	6.55	6.55	7.38	8.51	10.25	
NHI + LTC*	6.01	6.18	6.28	6.38	6.47	6.52	6.52	6.70	7.01	7.35	

Note: NHI + LTC = a+(a/100*b/100*100).
Source: NHIS, https://www.nhis.or.kr, accessed on May 14, 2020.

The NHI premium rate increased year over year in all years between 2001 and 2018, except for 2009 and 2017. The rate in 2020 stands at 6.67%. The LTC premium rate was 4.05% in 2008, and remained at 6.55% between 2010 and 2017. The government raised the rate every year between 2018 and 2020, and the 2020 rate stands at 10.2%.

Figure 9_NHI and LTC Premium Rates

(unit: %)

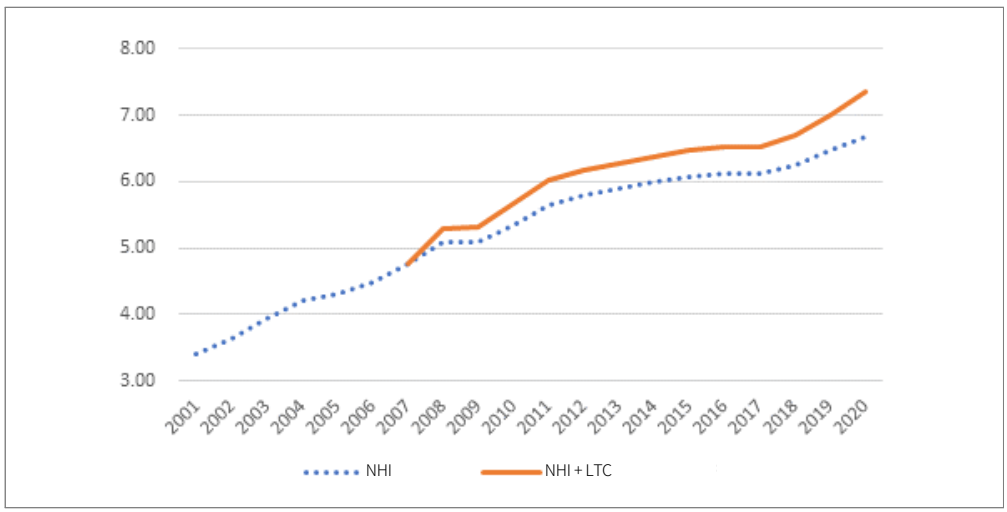


Source: NHIS, https://www.nhis.or.kr, accessed on May 14, 2020.

Figure 9 shows the combined premium rates for the NHI and the LTC Insurance. The NHI premium rate increased by an annual rate of 0.22%p between 2001 and 2006, and by 0.15%p between 2007 and 2020. However, the combined premium rate increased by around 0.20%p per year between 2007 and 2020. In other words, after the LTC Insurance was adopted, the premium rate increased at a somewhat slower pace.

Figure 10_NHI Premium Rate and LTC Premium Rates

(unit: %)



Source: NHIS, https://www.nhis.or.kr, accessed on May 14, 2020.

B. Expenses

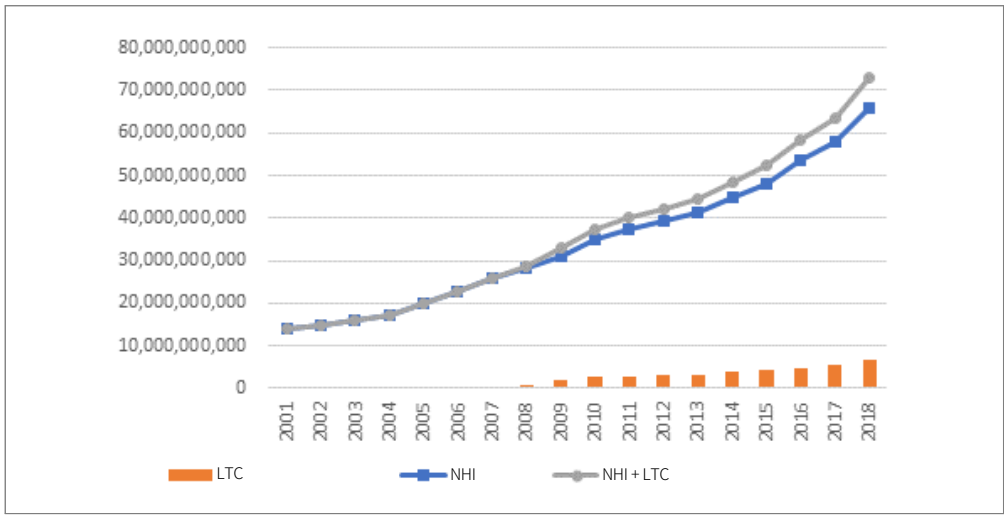
The NHI expenditures increased from KRW 14.1 trillion to KRW 66.0 trillion between 2001 and 2018 (9.8% growth rate), and the LTC expenditures increased from KRW 1.9 trillion to KRW 6.8 trillion between 2001 and 2018 (15.2% growth rate). The combined expenditures increased from KRW 14.1 trillion to KRW 72.8 trillion in the same period, by 10.1% per year (Figure 11).

Before adopting the LTC Insurance, the NHI expenditures increased by 10.7% per year between 2001 and 2007, and by 8.8% between 2008 and 2018. Given the annual growth rate of the NHI expenditures between 2001 and 2018 (9.5%), the annual NHI expenditure growth rate before the adoption was 1.2%p higher than the 2001~2018 average, and the annual expenditure growth rate after adoption was 0.7%p lower than the 2001~2018 average. The

data indicate that, while these trends do not provide evidence of causality, the growth of NHI expenditure somewhat slowed down after the adoption of the LTC Insurance.

Figure 11_NHI and LTC Expenditures

(unit: KRW 1,000)



Source: NHIS, https://www.nhis.or.kr, accessed on May 14, 2020.

IV. Comparison of Baseline Predictions and Actual Expenditures

1. Decomposition of Existing Long-Term Estimation Errors

To calculate the calibrated predictions mentioned in Chapter II, in this section, we compare the predictions for the independent variables used by Kim (2002) with the actual results observed, and then determine how healthcare expenditure predictions should be calibrated. In the next chapter, we will compare the calibrated predictions with the levels and growth rates of healthcare expenditures in recent years in order to assess the prediction adequacy.

In this study, we calculate the calibrated predictions in two phases, following the example of Kim (2002). We first re-estimate the total healthcare expenditures, and then apply additional assumptions to re-estimate the long-term predictions for the NHI.

A. Total Healthcare Expenditure Prediction Errors

1) Overview of the 2002 Long-Term Predictions

Kim (2002) proposed long-term predictions for the total healthcare expenditures as follows.

Table 4_Total Healthcare Expenditure Projections (2001~2050)

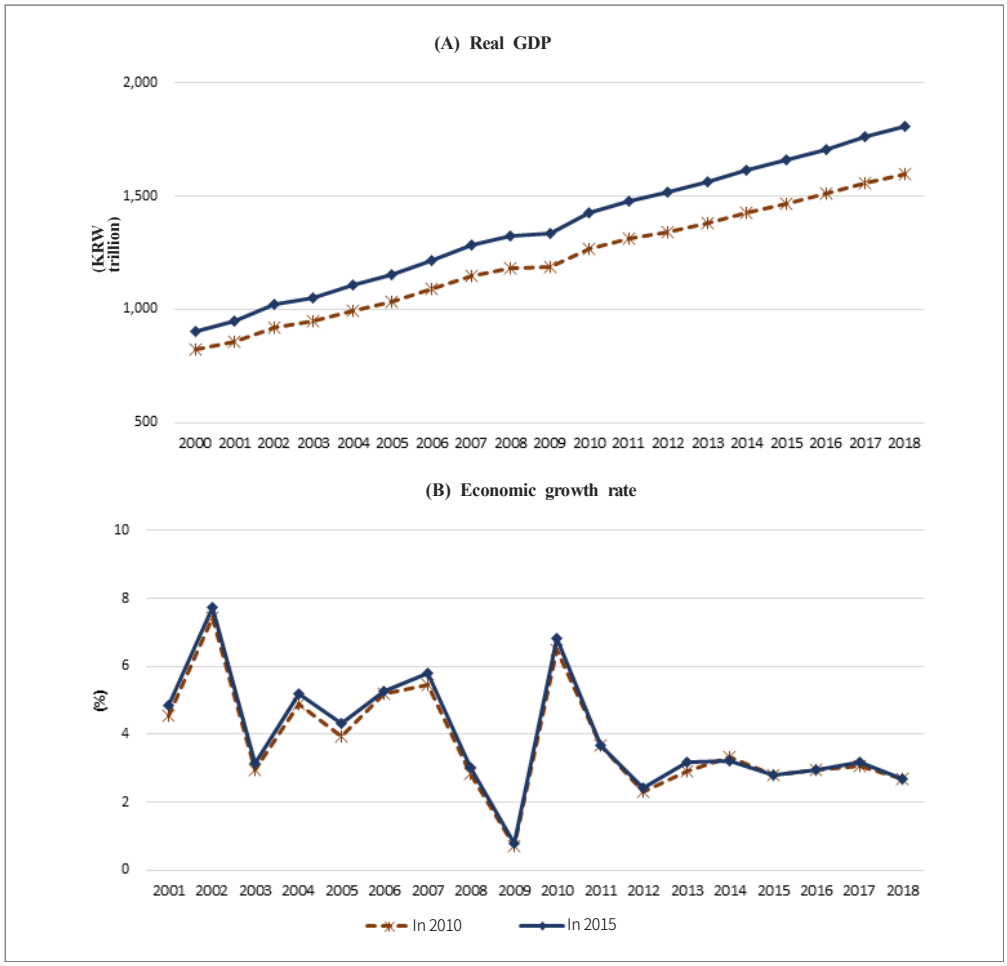
Year	Nominal annual growth rate (average %)	Per capita GDP (nominal USD)	65 or older percentage in total population (%)	Per capita health expenditure (nominal KRW)	Health expenditure /GDP ratio (%)
2001		15,857	7.56	676,052	5.87
2002	9.1	17,192	7.92	731,163	5.86
2003	9.7	18,747	8.28	798,434	5.87
2004	8.5	20,225	8.65	862,735	5.88
2005	8.0	21,726	9.01	929,202	5.89
2006	8.1	23,365	9.39	1,004,236	5.92
2010	8.1	31,337	10.69	1,391,722	6.12
2020	7.1	60,926	15.14	3,107,883	7.03
2030	5.5	104,803	23.07	6,411,559	8.43
2040	5.5	186,786	30.15	13,836,680	10.20
2050	5.0	330,795	34.44	28,903,530	12.03

Source: Kim (2002)

First, the growth rate is set to be higher than the actually observed growth rate, which resulted in a higher income level (per capita income in USD, based on PPP). For example, Kim predicted the per capita income to be around USD 60,000, which is much higher than the actual income (USD 38,000~39,000). As the per capita GDP and per capita health expenditures both involve strong assumptions regarding the exchange rate, these values need to be further analyzed when calculating the calibrated predictions.

Another key factor that undermines the long-term estimation is the fact that Korea updates and announces official GDP data every five years. Kim used the 2000 data, which are not consistent with the 2015 data. These time series differences cannot be easily resolved with simple measures such as adjusting the data at a certain ratio. Indeed, this issue lies outside the scope of this study. Here, we simply remind the readers of the existence of the issue (see the Figure 12, which compares the 2010 and 2015 data).

Figure 12_Changes in Real GDP and Economic Growth Rate Caused by New Baseline Year for the National Economy

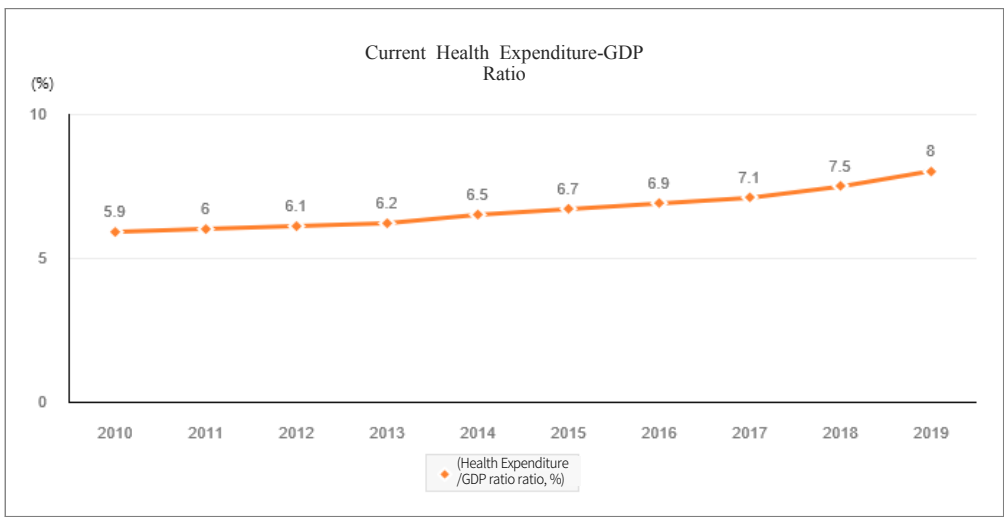


Notes: 1. Bank of Korea, Economic Statistics System, National Account (2010), http://ecos.bok.or.kr/, last accessed on: August 9, 2019.
2. Bank of Korea, Economic Statistics System, National Account (2015), http://ecos.bok.or.kr/, last accessed on: August 9, 2019.
Source: Jun et al. (2019), Figure IV-29, p. 100.

The percentage of the 65 or older population included in the long-term estimation regression equation did not exert a significant effect, as the errors between the predictions and the actual results were relatively small. For this reason, in this study, we do not analyze this factor further.

To return to Table 4, the growth rate and income level predictions until 2020 are higher than the actual observations, which means that the predictions for the health expenditure /GDP ratio may be higher than the actual results. However, the health expenditure/GDP ratio in 2018 was actually 8%, which is higher than the 2020 prediction (7.03%) in Table 4. On the other hand, the 2010 prediction (5.9%) is similar to the 2002 prediction.

Figure 13_Current Health Expenditure/GDP Ratio Based on 2015 GDP Data



Source: MOHW, 2017 *National Health Accounts*; OECD, Health Statistics, 2019.

Therefore, based on the Health Expenditure/GDP ratio, the total healthcare expenditure is seen to increase at a faster rate than the long-term predictions presented by Kim (2002), and faster than the average growth rate among OECD countries. However, it is too early to conclude that this finding is attributable to the "gradient" issue. The finding may have been affected by institutional changes and/or the readjustment of "intercepts," which had been very low among OECD countries. In the following section, however, we attempt to determine whether the adjustment was carried out within a reasonable scope. In particular, we need to examine the effect of the LTC Insurance as a part of the institutional changes.

To complete this task, we first need to determine how many of the prediction errors can be explained by considering the effect of the growth rates, exchange rates, and population changes, which is then followed by an assessment of the increase in healthcare expenditures, based on the calibrated predictions.

2) Effect of Independent Variable Predictions

First, we compare the assumptions on the growth rates used in the 2002 long-term prediction with the actual observed growth rates. We applied the following prediction criteria obtained from the Korea Public Finance Institute (KIPF) to the 2002 predictions.

Table 5_Medium- and Long-Term Macroscopic Predictions for the Korean Economy (KIPF)

Year	2002	2003	2004	2005	2006	2010	2011~2020	2021~2030	2031~2040	2041~2050
Real growth	6.2	6.3	5.6	5.2	5.1	5.1	5.1	3.5	3.5	3.0
Inflation	2.9	3.4	2.9	2.8	3.0	3.0	2.0	2.0	2.0	2.0
Nominal growth	9.1	9.7	8.5	8.0	8.1	8.1	7.1	5.5	5.5	5.0

Source: Kim (2002)

The following table compares the predictions with the actual economic growth rates achieved.

Table 6_Comparison of Growth Rate Predictions Used in the 2002 Predictions and the Actual Growth Rates

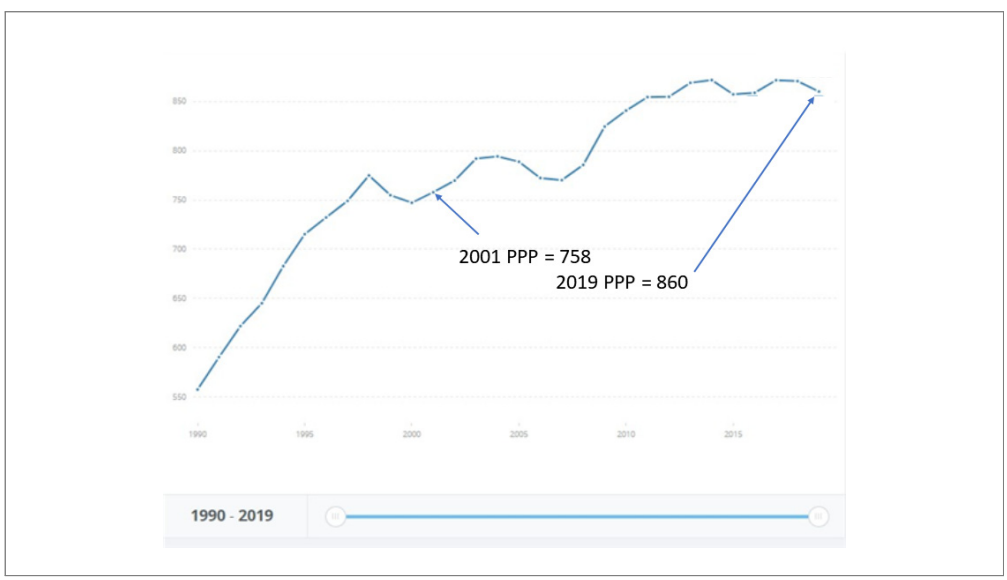
Assumptions for prediction		Year	Actual observation (2015 data)		Error ratio (A/B)
Cumulative growth (A) (2002=1)	Nominal growth rate (%)		Nominal growth rate (%)	Cumulative growth (B) (2002=1)	
1.00	9.1	2002	10.99	1.00	1.00
1.10	9.7	2003	6.71	1.07	0.97
1.19	8.5	2004	8.49	1.16	0.97
1.29	8.0	2005	5.39	1.22	0.95
1.39		2006	5.03	1.28	0.92
1.50		2007	8.36	1.39	0.92
1.62	8.1	2008	5.92	1.47	0.91
1.76		2009	4.43	1.54	0.88
1.90		2010	9.73	1.69	0.89
2.03		2011	5.01	1.77	0.87
2.18		2012	3.68	1.84	0.84
2.33		2013	4.22	1.91	0.82
2.50		2014	4.14	1.99	0.80
2.67	7.1	2015	6.08	2.11	0.79
2.86		2016	4.99	2.22	0.77
3.07		2017	5.45	2.34	0.76
3.28		2018	3.40	2.42	0.74
3.52		2019	1.10	2.45	0.70

Source: Present study, based on Kim (2002) and the Bank of Korea statistics

The calibrated predictions for the per capita GDP can be calculated by applying the error ratios in the table to the income level predictions shown in Table 4, based on the assumptions of the PPP exchange rate. The calibrated predictions are seen to be roughly consistent with the actual results. In other words, the per capita GDP in or around 2019 was calibrated to be USD 37,000 to 38,000, which is consistent with the per capita GDP announced by the World Bank and other international organizations. The findings confirm that the 2002 estimation method and equation can be used as a basis for error decomposition, once calibrated.

In the 2002 study, the PPP exchange rate was assumed to be non-changing at KRW 726 throughout the prediction period. However, the actual exchange rate changed, as shown in the World Bank data presented below. According to the World Bank data, the PPP exchange rate in 2001 was KRW 758, whereas the OECD exchange rate was KRW 726. The difference stems from the difference in the time-series data used, and the fact that the World Bank's time-series data was for the year 2010. In this study, we calibrated the predictions using the World Bank time-series data. For example, the predictions for the year 2019 were calibrated using the ratio between KRW 860 and KRW 758, which is the prediction for the year 2001.

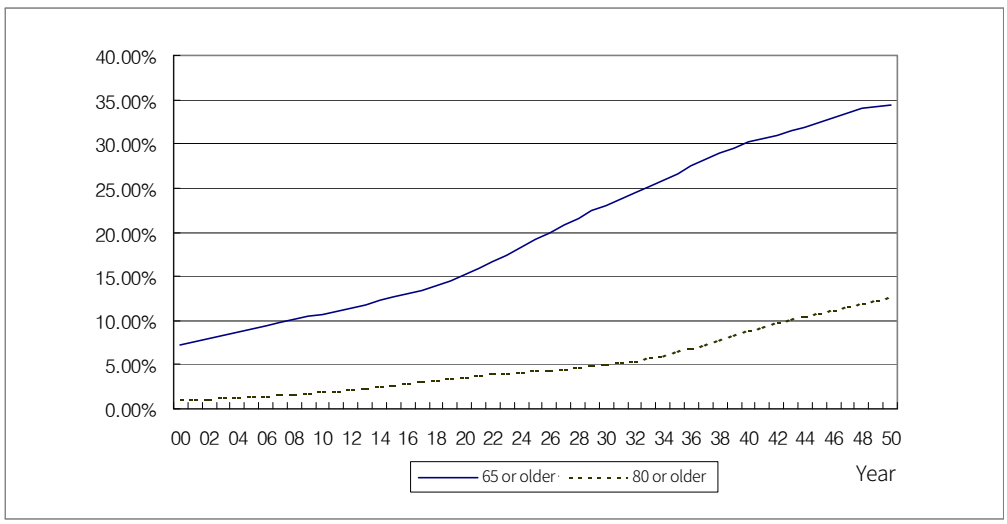
Figure 14_KRW Exchange Rate Based on Actual Purchasing Power
PPP conversion factor, GDP (LCU per international $)



Source: World Bank, https://data.worldbank.org/indicator/PA.NUS.PPP?end =2019&locations=KR&start=1990&view=chart, accessed on July 1, 2020.

We reviewed the population projections in order to determine the effect of other variables. Compared with the future population projection in 2002, the actual population seems to be 3% larger. This discrepancy, however, has only a minimal effect on the calculation of the per capita GDP, and thus we will not discuss it further. The percentage of the elderly population also had a minimal effect on the estimation of healthcare expenditures (the actual results are 1.5% higher than the predictions; see Table 7 for the estimates used in the 2002 predictions). These two factors had only a minimal effect on the healthcare expenditure predictions, albeit in opposite directions. Notably, even though the percentage of the elderly population somewhat lowered the re-predictions of healthcare expenses, the effect was cancelled out for the re-estimation of healthcare expenditures. Therefore, the factor is not discussed further in this report. For the sake of convenience, Figure 15 represents the population projections used by Kim (2002).

Figure 15_Estimated Percentages of Elderly Population (2000~2050)



Source: Kim (2002)

Table 7_Percentage of the 65 or Older Population in the Total Population

(unit: %)

Year	2002	2003	2004	2005	2006	2010	2020	2030	2040	2050
Percentage of the elderly	7.92	8.28	8.65	9.01	9.39	10.69	15.14	23.07	30.15	34.44

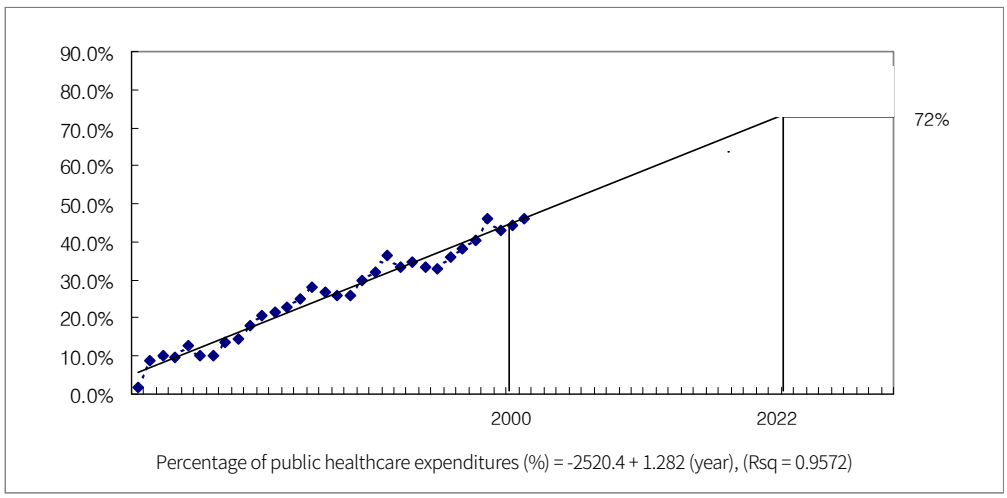
Source: Kim (2002)

Based on the above discussions, the calibrated predictions can be developed by re-estimating the total healthcare expenditures based on actual results, in lieu of using estimated independent variables. However, the actual calculations will be performed in the next section. In this section, we focus on describing the process of re-estimating the total healthcare expenditures and predicting the public health expenditures and NHI expenditures.

B. Analysis of the Growth of Public Health Expenditures and NHI Expenditures

To estimate the public health expenditures and NHI expenditures from the total healthcare expenditure estimations, the 2020 long-term predictions were based on the following assumptions.

Figure 16_Assumptions about the Percentage of Public Health Expenditures

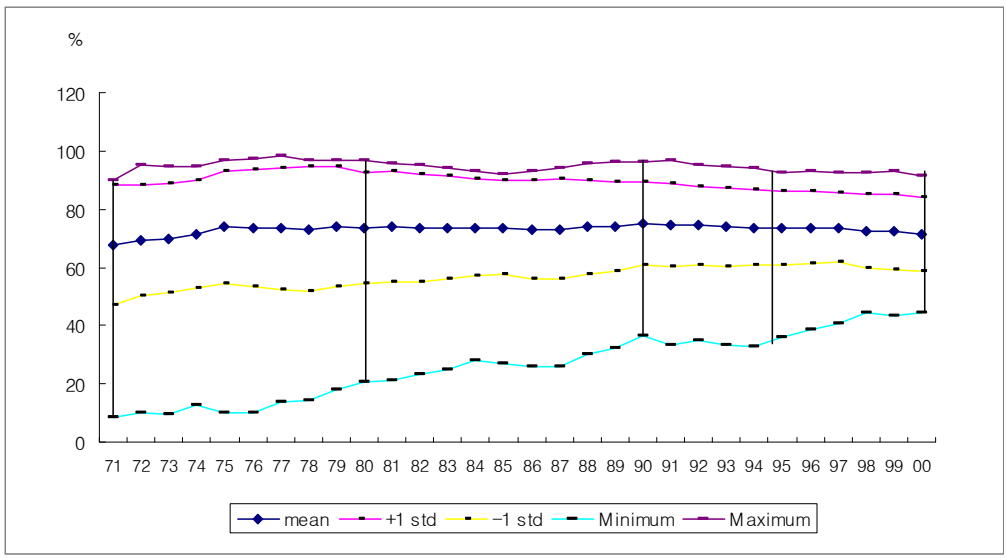


Source: Kim (2002)

The 2020 predictions expected that, based on the 30-year trends in Korea, the percentage of public health expenditures in the total healthcare expenditures will change in a linear fashion, and will reach 67% in 2018. The actual percentage observed in 2018 (National Health Accounts) was 60%, which is lower than the predicted percentage. However, when considering the non-mandatory subscribers,[8] the percentage increases to 67%, which is quite close to the prediction. The 2002 study assumed that the percentage of public health expenditures would increase linearly to 72% (close to the OECD average) before settling

there. The assumption is based on the expectation that the Korean average will stabilize over a long period, as did the OECD average for 30 years.

Figure 17_Percentage of Public Health Expenditures in Total Healthcare Expenditures among OECD Countries



Source: Kim (2002)

To estimate NHI expenditures from public health expenditures, the 2020 study adopted an additional assumption: the percentage of NHI expenditures in public health expenditures was assumed to be 83.2%, which was the average between 1997 and 2000. In this report, we also need to examine the effect of the LTC Insurance as a part of the institutional changes.

C. Prediction of NHI Premium Rate Increase

Kim (2002) estimated the NHI premium rate increase that could be expected in the future, on the condition that the revenue-expenditure balance is achieved.

---

8 "Non-mandatory subscription" refers to a program to protect unemployed persons, in which a non-mandatory subscriber continues to pay the non-mandatory insurance premium if it is lower than the non-employee NHI premium. A non-mandatory subscriber retains the status of an employee NHI subscriber for up to 36 months from the date following their termination of employment.

In the long-term, the NHI revenue growth rate can be explained by the following relationship. The NHI revenue can be determined by using a multiplicative formula that applies fixed premium rates to incomes. Then, an additive formula can be established between the growth rates of the respective factors.

NHI revenue growth rate = Premium rate growth rate + GDP growth rate

In this case, the (current) revenue-expenditure balance is maintained if the expenditure growth rate is equal to the revenue growth rate. Then, the following relationship can be identified.

NHI expenditure growth rate = Premium rate growth rate + GDP growth rate

In other words, the "Premium rate growth rate for balanced NHI finances = NHI expenditure growth rate – GDP growth rate." From the 2020 long-term estimations, we can estimate the level of NHI expenditures by calculating the growth rate. Therefore, using the estimation equations, we can also predict the NHI premium rates and its growth rate. These predictions are presented in Table 8.

Table 8_Premium Rate Growth Rate and Expected Premium Rate for Balanced NHI Finances

Year	Per capita NHI expenditure	Per capita NHI expenditure growth rate	Revenue-expenditure balance Growth rate of premium rate satisfying the conditions	Premium rate Growth rate (based on NHIS' tentative financial stabilization measures)	Premium rate
2001	256,217				
2002	284,883	11.19	2.77		3.63
2003	319,588	12.18	3.13	9.0	3.95
2004	354,505	10.93	3.05	9.0	4.31
2005	391,703	10.49	3.07	9.0	4.70
2006	434,018	10.80	3.25	9.0	5.12
2010	660,711	11.07	3.42		5.86
2020	1,806,107	10.58	3.55		8.30
2030	3,831,548	7.81	2.09		10.22
2040	8,268,800	8.00	1.85		12.28
2050	17,272,750	7.64	1.57		14.36

Source: Kim (2002)

As previously discussed, the 2002 health expenditure predictions set the growth rates to be somewhat higher than the actual rates. The NHI expenditure growth rate was pushed downward relative to the actual economic growth rates (the elasticity of health expenditures against per capita GDP was estimated to be higher than 1). The growth rate of the NHI rate in 2020 was 3.2%, which is relatively consistent with the prediction presented above (3.55% in 2020). However, if we include the LTC Insurance in the broadly defined NHI, it may change the interpretation of the premium rate increase.

D. Chapter Conclusion

A comparison of the long-term estimations of healthcare expenditures by Kim (2002) and the actual results of the overall indicators produced the following (tentative) findings.

Overall, the percentage of public health expenditures and the increase in the NHI premium rate are consistent with the 2002 predictions. Given these findings, it seems excessive to conclude that the rapid growth of healthcare expenditures is on an excessive level. The largest difference from the 2020 long-term predictions was found to be for the total healthcare expenditures. The predictions set the economic growth rates to be higher than the actual rates, which are expected to result in lower healthcare expenditure growth and Health Expenditure/GDP ratio. However, the expenditures and the ratios increased significantly faster than the indicated in the predictions. However, it is too early to conclude that the increase in healthcare expenditures is excessive, and as such this issue will be discussed further in the following sections. Korea's health expenditures are notably lower than the OECD average. Therefore, the actual expenditures that exceed the previous predictions may be interpreted as indicating an increase in supplementary expenditures, such as coverage expansion. This issue is discussed in the following sections in connection with country -specific "fixed effects", in the process of a regression analysis of the 2020 long-term predictions.

In addition, the LTC Insurance can be interpreted as being a part of broadly defined "health insurance", which will be also interpreted and assessed in the following sections.

2. Assessment of Increases in Healthcare Expenditures

A. Total Healthcare Expenditures

In Chapter III, we discussed changes in health expenditures in connection with the

adoption of the LTC Insurance and a possible overlap with the NHI. However, it is difficult to compare different schemes and regulations, and to then clearly identify overlaps or similarities. However, from a common sense standpoint, the LTC Insurance is aimed at improving and managing the health of its beneficiaries. The LTC Insurance forms a part of a healthcare program in a broad sense, which warrants the question regarding a possible overlap between the LTC Insurance and the NHI, as well as the role of the former in the accelerating the growth of healthcare expenditures after 2008. In this section, we attempt to identify implications for health expenditure growth by analyzing historical trends for the NHI and the LTC Insurance.

Before discussing the healthcare expense system and expenditures in the public sector, we must first analyze the overall level of healthcare expenditures. To this end, we think that it would be helpful to review past long-term estimations conducted before the adoption of the medical benefit system. As a baseline for assessing the total healthcare expenditures and the current health expenditures, we propose "baseline predictions." The use of baseline predictions will help us utilize long-term estimations of health expenditures created from an objective and neutral standpoint. However, these previous predictions are bound to be based on assumptions about independent variables such as economic growth rates and population aging. We will calibrate previous predictions by taking inot account these assumptions.

The use of these baseline predictions is consistent with the calibration of OECD data based on economic levels, future growth rates, and demographic characteristics. While the need for such calibrations is frequently mentioned, few studies have actually attempted them because it is difficult to compare different data based on economic levels and demographic characteristics. In this chapter, we attempt to re-assess the health expenditure growth in Korea over the last two decades by developing baseline predictions through a calibration of past data.

First, we examine the effect of income, economic level, or economic growth rate. As discussed in Chapter II, economic levels and standard of living represent highly important explanatory factors for healthcare expenditures. These factors are affected by supply and demand, as well as the underlying needs, technologies, knowledge, and institutions. Ultimately, however, these predictions rely on the basic economic insight that an equilibrium is achieved when the demand and supply are harmonized within the usable income.[9,10]

---

9 This insight forms the basis of the materialistic theories of Marx, and of Becker (1962), who also demonstrated that key economic principles can be explained based solely on income or purchasing power.

10 The original regression equation used in 2002 included the percentage of the elderly population, as discussed

Table 8 presents the difference between the nominal growth rates obtained by Kim (2000; 2002) and the actual nominal growth rates. The left side of the table lists the growth rates assumed by research reports and other government reports published around 2002. By cumulatively applying the growth rates, we can arrive at a prediction of how much the economy will grow from 2002. The prediction is an estimated 3.52-fold growth by 2019. The right side of the table lists the actual growth rates. As previously discussed, the actual growth rates around 2000 were much lower than the predictions. For this reason, the cumulative growth rate until 2019 was merely at 70% of the prediction produced in the early 2000's. Given the fact that the health expenditure-GDP elasticity is larger than 1, it seems that the growth of health expenditures was deterred more than the economic growth rate was lowered.

The regression equation in 2002 used USD based on the PPP exchange rate as the basis for an international comparison, and assumed that the latest exchange rate at the time (USD 1 = KRW 726) would not change. However, as shown in Chapter II and Table 4, the actual PPP exchange rate continued to fluctuate, and actually increased above the assumed rate, which lowered the health expenditure estimations even further.[11] As such, the health expenditure-GDP ratio should be calibrated using the coefficients on the right side of Table 4, which allows us to calculate the health expenditure-GDP ratio, which is calibrated based on the baseline predictions in the farthest right side of the table. Obviously, as seen in the table, the ratio is lower than the 2002 predictions.

In the table, the calibration coefficient (C) is similar to the 2002 predictions for the first five years. Then, the gap with the previous growth rate assumption continues to widen after 2009, which seems to be the result of the global financial crisis in 2008. The difference with the predicted economic growth rate gradually declines to below the predicted level. The health expenditure-GDP ratio in 2019 is 6.19%, which is lower than the prediction (6.87%). However, the actual growth rate in 2019 was 8.0%, which is higher than the 2002 prediction.

---

in Chapter II. However, the estimated coefficient was too small, and only provided a fine-tuning calibration. It did not have any meaningful effect on the analysis results. For this reason, the factor is not discussed further in this report. In other words, income level alone can explain most of the health expenditure levels.

11 The PPP exchange rate was KRW 726 per USD in 2002. However, due to the adjustment of the time-series data announced by the World Bank, the 2002 exchange rate was KRW 758. The exchange rate was calculated by lowering the exchange rate to under the new time-series data by using the ratio between the two exchange rates in 2001.

Table 9_Re-Estimation of Health Expenditure-GDP Ratio Using 2002 Estimations

Assumptions for prediction		Year	Actual observations (2015 time series data)		Cumulative growth Error ratio (A/B)	PPP Exchange rate	Calibration coefficient (C) (growth rate and exchange rate)	Health expenditure -GDP ratio (%)	
Cumulative growth (A) (2002=1)	Nominal growth rate (%)		Nominal growth rate (%)	Cumulative growth (B) (2002=1)				2002 estimation (D)	Baseline projection (C*D)
1	9.1	**2002**	10.99	1	1	769	0.996648	5.86	5.840
1.1	9.7	**2003**	6.71	1.07	0.97	792	0.984032	5.87	5.776
1.19	8.5	**2004**	8.49	1.16	0.97	794	0.983429	5.88	5.783
1.29	8	**2005**	5.39	1.22	0.95	788	0.980462	5.89	5.775
1.39	8.1	**2006**	5.03	1.28	0.92	772	0.978153	5.92	5.791
1.5		**2007**	8.36	1.39	0.92	770	0.978748	5.95	5.824
1.62		**2008**	5.92	1.47	0.91	785	0.972254	5.99	5.824
1.76		**2009**	4.43	1.54	0.88	824	0.955229	6.04	5.770
1.9		**2010**	9.73	1.69	0.89	840	0.953532	6.12	5.836
2.03	7.1	**2011**	5.01	1.77	0.87	854	0.945563	6.16	5.825
2.18		**2012**	3.68	1.84	0.84	854	0.938357	6.23	5.846
2.33		**2013**	4.22	1.91	0.82	869	0.930177	6.30	5.860
2.5		**2014**	4.14	1.99	0.8	871	0.924591	6.38	5.899
2.67		**2015**	6.08	2.11	0.79	857	0.92543	6.46	5.978
2.86		**2016**	4.99	2.22	0.77	858	0.919947	6.56	6.035
3.07		**2017**	5.45	2.34	0.76	871	0.914453	6.65	6.081
3.28		**2018**	3.4	2.42	0.74	870	0.909412	6.76	6.148
3.52		**2019**	1.1	2.45	0.7	860	0.900939	6.87	6.189
3.77		**2020**	-	-	-	-	-	7.03	

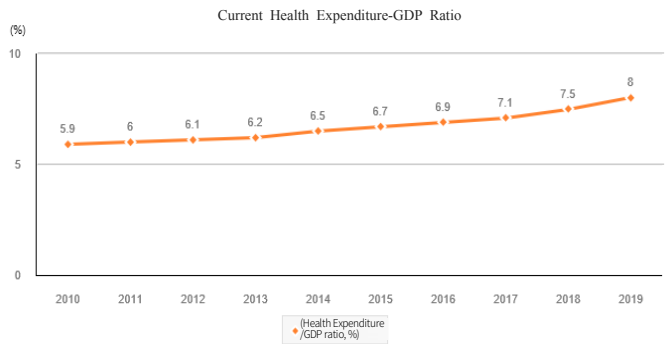
Source: Present study

The following presents the actual growth rate of the percentage of health expenditures.

Figure 18_Actual Health Expenditure–GDP Ratios

(unit: %)

Year	Health expenditure –GDP ratio	Growth rate
2010	5.90	1.72
2011	6.00	1.69
2012	6.10	1.66
2013	6.20	1.63
2014	6.50	4.83
2015	6.70	3.07
2016	6.90	2.98
2017	7.10	2.90
2018	7.50	5.63
2019	8.00	6.67



Source: MOHW, *2017 National Health Accounts*; OECD, Health Statistics, 2019.

The graph may appear somewhat flat, but the growth rate of the health expenditure–GDP ratio actually increased during the transition period between the previous two administrations and the current administration. The ratio increased by 1.6%p per year under the Lee Myung-bak administration, which is close to the baseline predictions after the calibration proposed in Table 4. However, under the Park Geun-hye administration, the ratio grew by 3%p per year, and 6%p per year under the Moon Jae-in administration. These growth rates are notably higher than the baseline predictions, and even higher than the 2020 prediction for the year 2019.

The findings of this study can thus be summarized as follows. The findings confirmed the recently accelerated growth of health expenditures. It is evident from both the increase in the health expenditure-GDP ratio, and even more so when considering the "baseline predictions" proposed in this report and the fact that the actual growth rates were lower than the predictions over the last 20 years. These findings also show that the standard of living explains more of the health expenditure growth than population aging. However, it remains difficult to capture the direct effect of aging in the estimation process.

We need to further discuss whether, as some worry, the acceleration of the health expenditure growth over the last seven years is excessive—even relative to the OECD average. If the prediction methods used in 2000 and 2002 are valid, the GDP (income variable) may seem to explain most aspects of health expenditures in the regression equation. However, significant interpretations can be derived from the "intercepts" as well.

Intercepts reflect dummy variables that are specific to each country. Korea's variables were processed as omitted dummies, and those of the other countries were assumed to be positive. In other words, even at a similar or equal level of health expenditure elasticity, Korea's level of expenditures was estimated to be lower than those of the other countries. As such, we may be able to conclude that, despite having a health expenditure growth rate exceeding the baseline predictions, the growth rate is still within a reasonable range relative to the OECD average.

Table 10 lists the fixed effects of the 20 or so countries used in the 2002 regression analysis. The simple arithmetic mean of the fixed effects is 0.38855, and the dependent variable was the natural logarithmic of the per capita health expenditures. Then, incorporating the effect of the mean fixed effect doubles the health expenditures. Therefore, even though the growth rate exceeded the 2002 prediction by around 50% (47.5% to be exact), it did not exceed the OECD average.

Table 10_Comprehensive Time-Series Regression Analysis of Total Healthcare Expenditures

Coefficient	Coefficient estimate	t value (Pr>|t|)
δ_i (fixed effects by country)		
Australia	0.353026	6.079909 (0.0026)
Austria	0.422898	5.853349 (0.0002)
Belgium	0.232609	5.831428 (0.0320)
Canada	0.588243	7.214677 (0.0001)
Finland	0.504906	5.873109 (0.0001)
France	0.412502	6.918494 (0.0004)
Germany	0.638349	7.211393 (0.0001)
Iceland	0.343487	5.509981 (0.0027)
Ireland	0.360167	6.377293 (0.0141)
Italy	0.338957	4.002812 (0.0042)
Japan	0.231114	5.921505 (0.0588)
New Zealand	0.260321	4.646880 (0.0571)
Norway	0.255137	4.648290 (0.0278)
Portugal	0.466071	7.426743 (0.0001)
Spain	0.393865	4.936266 (0.0005)
Sweden	0.619359	5.760099 (0.0001)
Switzerland	0.375645	5.172676 (0.0027)
Turkey	0.208586	5.115323 (0.0082)
UK	0.140777	5.839596 (0.2434)
US	0.630547	5.491088 (0.0001)
Korea	(omitted var)	–

Note: The dependent variable is the log of the per capita total healthcare expenditure (in USD) based on the PPP exchange rate.
Source: Kim (2002)

Thus, we can draw the following conclusions: Korea's level of healthcare expenditures was much lower than those of other countries in 2000, and the increased percentage of healthcare expenditures from 2013 onwards was motivated by the need to address this discrepancy.

According to Table 4, in 2002, the health expenditure-GDP ratio was expected to reach 6.87% by 2019. However, the actual economic growth rate was lower than the prediction. By using the same estimation equation to analyze the deviation the actual results incurred from the assumptions, the actual health expenditure-GDP percentage could be lowered by as much as the actual growth rate was lowered. We could then calculate the baseline prediction by reducing the original prediction (6.87%) by 10%, which comes to 6.2%. On the other hand, the actually observed health expenditure-GDP ratio in 2019 was 8.0%, which exceeded the baseline prediction (6.2%) by 29%. However, as previously mentioned, given the room for calibration variations that are based on country-specific fixed effects, the ratio remains within the average health expenditures of OECD countries, even if it exceeded the baseline prediction in 2002 by up to 47%. Therefore, even though the actual ratio exceeded the baseline prediction by 29%, it remains within a level acceptable by Korean society. However, if the ratio continues to grow at a similarly fast rate, we cannot deny the possibility that the resulting ratio may far exceed the OECD average. Currently, the gap between the actual ratio and the baseline prediction is only 60% of the gap with the OECD average (29%/47%). As such, room for policy measures and adjustments exists as a future task.

B. NHI and LTC Insurance

In the previous sections, we comprehensively analyzed changes in the health expenditures by focusing on the growth of total healthcare expenditures. In this section, we narrow the scope of our analysis to examine changes in the health expenditures in the public sector. Table 11 summarizes the NHI predictions from the 2002 study, which were covered in Chapter II. The NHI premium rate in 2020 is estimated to be 8.3%. However, when applying the same method applied to Table 8, the NHI premium rate in 2019 is re-estimated to be around 7.2%. The actual premium rate in 2019 was 6.46%, however, which is lower than both baseline predictions.

Table 11_Premium Growth Rate and Expected Premium Rate for Balanced NHI Finances

Year	Per capita NHI expenditure	Per capita NHI expenditure growth rate	Revenue-expenditure balance Growth rate of premium rate satisfying the conditions	Premium rate Growth rate(based on NHIS' tentative financial stabilization measures)	Premium rate
2001	256,217				
2002	284,883	11.19	2.77		3.63
2003	319,588	12.18	3.13	9.0	3.95
2004	354,505	10.93	3.05	9.0	4.31
2005	391,703	10.49	3.07	9.0	4.70
2006	434,018	10.80	3.25	9.0	5.12
2010	660,711	11.07	3.42		5.86
2020	1,806,107	10.58	3.55		8.30

Source: Kim (2002)

These findings can be first attributed to the factors that were not considered 20 years ago, such as the expanded scope of collection base, and funding from the National Health Promotion Fund. In 2002, the revenue ratio between the employee NHI and the revenue from the non-employee NHI was 5:5. The ratio currently stands at around 7:3, which has been achieved by expanding the premium collection base for the employee NHI. The change in the ratio is similar to the cumulative effect of raising the premium increase rate per year by around 3% for 20 years, without expanding the collection base. Therefore, lowering the premium rate increase by a mere 1% for ten years may explain why the premium rate is lower than the baseline prediction. In other words, while the premium collection base for the employee NHI was expanded, the growth of the premium rate was somewhat deterred during the process.

An alternative interpretation may also be proposed. Based on the baseline predictions (calibrated predictions), the NHI premium rate is 7.2%. As seen in the last figure of Chapter II, this rate is close to the sum of the actual NHI and LTC Insurance rates. Therefore, we can define the combination of the two schemes as a broader social healthcare system, and can then conclude that the findings are consistent with the income-based health expenditure estimation model. However, while this approach can bring the predicted premium rates closer to the actual rates, given the expansion of the premium collection base, the actual fiscal size of the NHI is bound to be starkly different from the baseline prediction. Therefore, we believe that the relationship between the NHI, the LTC Insurance, and the public health expenditures cannot be properly explained by focusing solely on the premium rates.

Furthermore, it is possible that medical protection was implicitly included in the NHI expenditures at the time of the 2002 prediction. As such, we need to perform a further comparison by explicitly taking account the medical protections. The medical protections account for around 9% of the total NHI expenditures. In 2019, if the medical protections were funded by NHI premiums, their actual percentage would be similar to the baseline prediction of 7.2%, rather than the actual premium rate of 6.46%.[12] Thus, it would be more reasonable to conclude that the sum of medical benefits expenditures and NHI expenditures is consistent with the 2002 prediction. Overall, the revenue growth originating from the LTC Insurance and the expanded collection base should be regarded as additional expenditures that exceed the estimates proposed by the baseline predictions. In other words, healthcare expenditures in the public sector increase faster than can be expected based on simple income growth. This interpretation is consistent with the position that total healthcare expenditures are growing faster than the health expenditures predicted based on either income or international comparisons.

V. Conclusion: Re-Assessment of Long-Term Trends of Healthcare Expenditures

This report comprehensively re-assessed the usefulness and availability of long-term estimations on healthcare expenditures obtained in the past. More specifically, this study is based on the insight that the percentage of healthcare expenditures in terms of the total expenditures can be determined by the overall income level, that is, the standard of living, which is similar to the argument proposed by Becker (1962). It represents an intuition that restrictions of the economic opportunity sets (usable income in this context) determine the results of economic actions, rather than either personal or social preferences. When considering income levels, however, population aging was found to have a minimal effect on its own.

Given the experiences of Korea and other OECD countries, these findings may provide a basis for producing long-term predictions of healthcare expenditures across a wide range

12 In 2002, medical protections (medical benefits) comprised a smaller percentage than the NHI, and the researchers only focused on NHI expenditures, and thus implicitly assumed that the NHI expenditures included both the NHI expenditures per se and medical benefit expenditures. Even though the assumption has turned out to be incorrect, they may be considered when assessing the accuracy of premium rate predictions and the expenditure levels estimated using the prediction model.

of income levels. By calculating common income elasticities (gradients) and estimating dummy variables at country-specific levels, we were able to predict the long-term trends in healthcare expenditures on a national level. In the past, Korea ranked the lowest in terms of healthcare expenditures among the OECD countries.[13]

In addition, even though the equation below uses seemingly simple variables for the estimation, in the context of a long-term estimation, we remind the reader that all factors that would usually be regarded as of interest to us (diseases, treatments, costs, and institutions) may change significantly at any time, rendering the long-term prediction much less or even wholly unreliable. In this regard, the findings of this study offer the benefit of proposing predictions solely based on income levels and simple variables, which are more likely to behave as significant predictors of healthcare expenditures even in the somewhat distant, and unpredictable, future.

$$\begin{aligned} HEXP_t &= GDP_t^{\beta} \cdot \exp\left\{\alpha + \gamma \cdot POP65_t + \rho^{t-2000} \cdot e_{2000}\right\} \\ &= GDP_t^{1.215856} \cdot \exp\left\{-5.207419 + 0.010005 POP65_t + 0.887364^{t-2000} \cdot e_{2000}\right\} \end{aligned} \quad (5)$$

In addition, given the relationship between income levels and healthcare expenditures, we suspected that the LTC Insurance may overlap with the NHI, or cause double accounting of expenditure items, because the LTC Insurance premium was collected as a surcharge to the NHI premium.

More broadly, this study reviewed the debate on whether the level and growth of healthcare expenditures is at an adequate level in the long-term. It has been repeatedly pointed out that Korea's health expenditures may be rising too fast, which may include the issue of overlap caused by the LTC Insurance. Others argue that health expenditures in Korea are much lower than the OECD average. However, it is not reasonable to directly compare only healthcare expenditures among different countries. As discussed above, international comparisons should be made based on figures calibrated based on the comprehensive consideration of various factors.

To set the baseline predictions for an objective assessment, we calibrated the health expenditure predictions obtained from 2000 and 2002. In particular, we re-estimated the

13 As for the estimated fixed effects of the respective countries, the OECD average is 0.39, which means that the average health expenditure is 47.5% higher than that of Korea, even when controlling for the other variables.

economic growth rates and income levels. While the previous predictions used certain assumptions, we calibrated the previous predictions by applying the actually observed results. These calibrated predictions can be interpreted as "criteria" that would have been the most neutral at the time of the predictions in 2000 and 2002. These baseline predictions allow us to interpret findings using criteria that exclude researchers' preferences and policy directions. We used these baselines to re-assess today's healthcare expenditures in Korea. We also compared the expenditures in Korea and other OECD countries by appropriately considering income levels and economic growth rates.

From the re-estimation of the economic growth rates, the actual growth rates were found to be notably lower than the 2002 predictions. As a cumulative result of the over-assumptions, the cumulative growth rate until 2020 was at a mere 70% of the 2002 prediction. As the health expenditure-GDP elasticity was larger than 1, an increase in either the health expenditures or health expenditure-GDP ratio was expected to result in even larger gaps between the predictions and the actual results. When the health expenditure-GDP ratios were subsequently re-estimated based on the PPP exchange rates, the health expenditures were found to decrease more than the GDP. For these reasons, the "baseline prediction" for the health expenditure-GDP ratio in 2019 was calculated to be 90% of the original estimation in 2020.[14]

We calculated calibrated predictions based on the 2002 study, and the resulting health expenditures were estimated to be lower than the original 2002 predictions, because of the

14 In this study, we did not strictly distinguish between the total healthcare expenditure and the current healthcare expenditure. An anonymous reviewer pointed this out and provided a detailed explanation, for which we express our gratitude. We cite the full text of the reviewer's explanation for readers.
"This study is based on Kim (2002). While Kim (2002) estimated the total healthcare expenditure, this study covers the current healthcare expenditure. If you used OECD data because the total healthcare expenditure data are no longer published, the data represent current healthcare expenditure. The current healthcare expenditure is the total healthcare expenditure less the amount corresponding to the capital formation and serves as a standard for international comparison. According to the 2013 National Health Account published in 2015 (the last report to use the total healthcare expenditure concept), the fixed capital formation accounts for around 4.5% of the total healthcare expenditure. If its amount can be predicted for a long term, the percentage will be between 7 to 8%, which may vary depending on the scope of dispersion. Such difference in source data (current healthcare expenditure and total healthcare expenditure) will affect the estimation results. If this report does not clearly define the concept of total healthcare expenditure and current healthcare expenditure, the mixed used of the two concepts may confuse readers. Although it may not be accurate, I suspect that the "90% difference" mentioned in Chpater 5 may come from the difference between the two parameters: the current healthcare expenditure and the total healthcare expenditure."

slower economic growth from 2009 onwards. The calibrated prediction for 2019 was 6.19%, which is lower than the original prediction (6.87%). However, the actual result was 8.0% in 2019, which is higher than both the calibrated prediction and the 2002 prediction based on a high economic growth rate.

Healthcare expenditures largely increased around the transitional periods between administrations.[15] Under the Lee Myung-bak administration, healthcare expenditures increased by 1.6%p per year, which is similar to the baseline prediction used in this study. The growth rate increased to 3%p under the Park Geun-hye administration and 6%p under the Moon Jae-in administration. Overall, we can conclude that the acceleration of healthcare expenditure growth has continued over the last decade, regardless of the political orientation of the administration or their changes in policy direction.

These findings confirmed the recently accelerated growth of health expenditures. The rate of growth is notably high, even when considering the income level differences with other countries. However, given the country-specific fixed effects used in the 2020 predictions, even at a similar or equal level of health expenditure elasticity, Korea's level of expenditures was estimated to be lower than that in other OECD countries.

We thus may be able to conclude that, despite having a health expenditure growth rate that exceeds the baseline predictions, the growth rate remains within a reasonable range relative to the OECD average. Importantly, even if we calibrated Korea's expenditure level by raising it above the 2002 prediction by around 50% (47.5% to be exact), it would not exceed the OECD average. The actually observed health expenditure-GDP ratio in 2019 was 8.0%, which exceeded the baseline prediction (6.2%) by 29%. Therefore, even though the actual ratio exceeded the baseline prediction by 29%, it is still within a level that is acceptable by Korean society, albeit with a note of caution.

The healthcare expenditures in the public sector can be assessed as follows. Under the baseline predictions (re-estimation based on actual growth rates and exchange rates), the NHI premium rate in 2019 was predicted to be around 7.2%. The actual premium rate in 2019 was 6.46%, which is lower than the baseline predictions. Given the current health expenditure levels, one would think that the health expenditures would be higher than for the previous prediction. However, it is actually lower than the previous prediction.

The findings can be explained as being due to factors that were not considered 20 years ago, such as the expanded scope of the collection base, and funding from the National Health

15 See the growth rates proposed in Figure 18 in Chapter IV.

Promotion Fund. In 2002, the revenue ratio between the employee NHI and revenue from the non-employee NHI was 5:5.[16] The ratio currently stands at around 7:3, which has been achieved by expanding the premium collection base for the employee NHI. In other words, Korea raised its premium rate at a slow pace, while expanding the premium collection base, which allowed the country to maintain its NHI premiums at a relatively low levels, despite the overall health expenditures exceeding the 2002 predictions.

Based on the baseline predictions (calibrated predictions), the NHI premium rate was 7.2%. In the last figure of Chapter II, the rate is seen to be close to the sum of the actual NHI and LTC Insurance rates. As such, the NHI and the LTC Insurance may be interpreted as forming a single social healthcare system. However, given the expansion of the premium collection base, the actual NHI revenue exceeds the baseline prediction by a large margin. Therefore, we believe that the relationship between the NHI, the LTC Insurance, and public health expenditures cannot be properly explained by focusing solely on the premium rates.

Furthermore, it is possible that medical protections were implicitly included in the NHI expenditures at the time of the 2002 prediction. We thus need to perform a further comparison by explicitly taking account the medical protections. These medical protections account for around 9% of the total NHI expenditures. In 2019, if medical protections were funded by the NHI,[17] the actual percentage would be similar to the baseline prediction of 7.2%, rather than the actual premium rate of 6.46%. The only difference is that medical benefits are paid for by the government's general budget, rather than by NHI financial resources.

However, we believe that the revenue growth originating from the LTC Insurance and the expanded collection base should be regarded as additional expenditures that exceed the estimates proposed by the baseline predictions. In other words, healthcare expenditures in the public sector are growing faster than expected, based solely on income levels. On top of the healthcare expenditure growth caused by changes in the "gradient" proposed in the 2002 study, the "intercepts" were also adjusted, which also resulted in the growth of healthcare expenditures.

---

16 Non-employee NHI revenue was assumed to include national subsidies and other funding sources.

17 As explained in the last footnote in Chapter IV, in 2002, medical protections (medical benefits) comprised a smaller percentage than the NHI, and as the researchers only focused on NHI expenditures, they implicitly assumed that the NHI expenditures included both the NHI expenditures per se as well as the medical benefit expenditures. As such, the estimated NHI expenditures in the 2002 study can be interpreted to include medical protection expenditures.

To summarize, we agree with the observation that total healthcare expenditures, NHI expenditures, LCT expenditures, medical benefit expenditures, and other public healthcare expenditures have been growing at faster rates over the last few years. However, Korea's expenditures remain below the average healthcare expenditures of other OECD countries, even though the gap is closing. Therefore, the level of healthcare expenditures in Korea seems not to be overly excessive.

References

Bae, Sung-il, Lee, Sun-mi, and Kim, Gyung0ha, *An Analysis of the Effect of the Long-Term Care Insurance on the National Health Insurance and the Medical Benefit Finance*, National Health Insurance Service Health Insurance Policy Research Center, 2009.

Jun et al., *Medium and Long-Term Tax Policy Operation Planning*, Ministry of Finance and Economy and Korea Institute of Public Finance, 2019. 12.

Kim, Jin-hyun, "An Analysis of the Reform Directions and Outlook of the National Health Insurance Premium Imposition System," Korean Association of Health Economics and Policy Autumn Academic Conference, 2015.

Kim, Jin-hyun, "National Health Insurance Premium Imposition System," *Health and Welfare Forum*, Korea Institute for Health and Social Affairs.6.

Kim, John M, *Long-Term Prediction of Healthcare Expenditure*, Korea Institute of Public Finance, 2000.

Kim, John M, *An Analysis of Potential Burden of the NHI on Long-Term Finance*, Korea Institute of Public Finance, 2000.

Ministry of Health, Welfare and Family, *An Easy to Understand Guide on the Long-Term Care Insurance*, 2008.3.

Oh, Se-yung, *Japan's Public Insurance As Deterrent to Medical Expenses for the Elderly*, 2005.

Park, No-wook and Jun, Byung-hil, *An Analysis of the Results of the Long-Term Care Insurance Scheme Operation*, Korea Institute of Public Finance, 2011.

Becker, Gary S., "Irrational Behavior and Economic Theory," *Journal of Political Economy*, 70(1), 1962, pp. 1~13.

Costa-Font, J., S. Jimenez-Martin, and C. Vilaplana, "Does long-term care subsidization reduce hospital admissions and utilization?," *Journal of health economics*, 58, 2018, pp. 43~66.

Feng, J., Z., Wang and Y. Yu, "Does Long-Term Care Insurance Reduce Hospital Utilization and Medical Expenditures? Evidence from China," *Social Science & Medicine*, 258(113081), 2020, pp. 1~8.

Hermiz, O., E. Comino, G. Marks, K. Daffurn, S. Wilson, and M. Harris, "Randomised controlled trial of home based care of patients with chronic obstructive pulmonary disease," *the Bmj*, 325, 2002, pp. 1~5.

Holland, S. K., S. R. Evered, and B. A. Center, "Long-term care benefits may reduce end-of-life medical care costs," *Population Health Management*, 17(6), 2014, pp. 332~339.

Shin, J., "Long-term care insurance and health care financing of the Korean national health insurance program," *Health and Social Welfare Review*, 34(4), 2014, pp. 68~92.

Stuck, A. E., H. U. Aronow, A. Steiner, C. A. Alessi, C. J. Büla, M. N. Gold, K. E. Yuhas, R. Nisenbaum, L. Z. Rubenstein and J. C. Beck, "A trial of annual in-home comprehensive geriatric assessments for elderly people living in the community," *New England Journal of Medicine*, 333(18), 1995, pp. 1184~1189.

Van Rossum, E., C. M. A. Frederiks, H. Philipsen, K. Portengen, J. Wiskerke, and P. Knipschild, "Effects of preventive home visits to elderly people," *British Medical Journal*, 307(6895), 1993, pp. 27~32.

Health Insurance Review and Assessment Service, https://www.hira.or.kr/

Korean Law Information Center, http://www.law.go.kr/

National Health Insurance Service, https://www.nhis.or.kr/

The Effect of Blind Recruitment on Diversity of Employee Composition and Fairness of Recruitment Process in Public Institutions

Kyoung Ryoul Min, HoSung Sohn, and Kangshin Lee*

I. Introduction

Three years have passed since the launch of the blind recruitment policy. However, few studies have examined how this change in recruitment practice policy has specifically affected public institutions. Some reports have simply highlighted the achievements of the blind recruitment policy, or have introduced best practice cases. However, in order to understand changes brought on by the blind recruitment policy, we need to first review the theoretical discussions pertaining to the overall recruitment policies implemented across public institutions, and then consider the implementation progress of the blind recruitment policy. Therefore, in this study, we review the current status of recruitment policies at Korean public institutions, and then try to analyze the changes brought on specifically by the blind recruitment policy. Specifically, we examine the changes in two aspects: ensuring fairness, and promoting diversity.

In the remainder of this paper, Chapter 2 reviews the theoretical discussions on the overall

* Kyoung Ryoul Min, Team Leader, Korea Institute of Public Finance
HoSung Sohn, Assistant Professor, Public Human Resource Department, Joongang University
Kangshin Lee, Senior Researcher, Korea Institute of Public Finance

recruitment practices at public institutions, and assesses the current recruitment policies being implemented at public institutions. Chapter 3 discusses the size of recruitments at public institutions and the implementation of the blind recruitment policy, and then summarizes the recruitment process by recruitment type. Chapter 4 analyzes the effect of the blind recruitment policy, focusing on the perception toward fairness in recruitment, and changes in the personal characteristics of new recruits before and after the implementation of the policy. To examine the perception on fairness, we conducted a survey with job seekers and public institution employees before and after the implementation of the blind recruitment policy, in order to gauge their perception about the fairness of recruitment policies at public institutions. Then, to analyze the changes in the characteristics of new recruits, we compared the genders, ages, and education histories of new recruits between 2013 and 2017

We also interviewed human resource managers at public institutions to obtain their opinions regarding the overall changes in recruitment policies. Chapter 5 summarizes the findings of this study, and proposes suggestions for the effective operation of the blind recruitment policy.

II. Theoretical Discussions and Previous Literature on Recruitment Policies

1. Recruitment Policies at Public Institutions

Recruitment refers to the process of selecting and employing the persons most suited to carry out tasks at an organization. Therefore, the purpose of recruitment policies is to secure human resources suitable for an organization's tasks through a reasonable and legitimate process, and then assign them to the appropriate positions. The specific criteria for selecting suitable applicants has somewhat changed over the years. Between the 1980's and 2014, recruitment typically focused on so-called "specs" that tended to be irrelevant to the actual tasks at the institution, including educational credentials, college grade point average (GPA), or personal appearances. Between 2015 and the first half of 2017, public institutions began to rely on actual skills rather than these irrelevant specs. The blind recruitment policy was subsequently adopted in the second half of 2017, which promoted a fair provision of recruitment opportunities and an evaluation based on the actual job skills and the type of persons that the institution was looking for. The blind recruitment policy prohibited public

institutions from requiring applicants to provide information on certain personal, educational, and professional backgrounds, which had previously been selected for their potential to cause discrimination or preconceptions based on gender, university, or age.

The recruitment policies implemented at public institutions are now based on the blind recruitment policy, which is supplemented by a wide range of social equity recruitment policies.

2. Blind Recruitment Policy

The United States was the first country that adopted a blind recruitment policy. The first recorded case of blind recruitment dates back to the 1970's, when the Toronto Symphony Orchestra recruited new members through a blind audition. Blind recruitment was then adopted to prevent institutions from discriminating against, and excluding people based on academic attainment and/or places of origin, despite their talent. Currently, the specific list of information blinded to prevent preconceptions slightly varies depending on the country and the industry.

To briefly discuss blind recruitment practices in countries other than Korea, the list of blinded information typically includes name, academic history, age, and gender. In cases where career information is required, such information may not include specific names of employers, addresses, or period of employment. For example, an applicant is only allowed to specify the business type of his/her former employer, but may not disclose the trade name of the company. Applicants' periods of employment are also blinded in some cases, because an applicant's age can be inferred from such information. In addition, names are often blinded because names can be used to guess applicants' races, and it is believed that applicants with names that are easier to pronounce are more likely to be hired.

Korean public institutions typically blind information regarding educational attainment, educational credentials, and personal appearances that are irrelevant to the specific tasks at the institutions. These items include gender, age, place of origin, family relationship, recent photographs, etc. The policy prohibits public institutions from requiring answers to these items on application forms, and interviewers are not allowed to ask questions regarding such information. Regarding these non-discrimination items, Article 11 of the Constitution of the Republic of Korea stipulates, "All citizens shall be equal before the law, and there shall be no discrimination in political, economic, social or cultural life on account of sex, religion, or social status." Article 7 of the Framework Act on Employment Policies prohibits business owners

from discriminating against applicants on grounds of gender, religion, age, physical conditions, social status, place of birth, level of education, educational background, marriage, pregnancy, medical history, etc., and requires business owners to guarantee equal employment opportunities. Article 7 of the Equal Employment Opportunity and Work-Family Balance Assistance Act, and Article 4-4 of the Act on Prohibition of Age Discrimination in Employment and Elderly Employment Promotion also prohibit discrimination.

Typical factors that cause preconceptions at different stages of recruitment are as follows. Some recruitment notices restrict the eligibility of applicants irrelevant to the actual tasks, such as gender or place of origin. In document screening procedures, some institutions often required information and documents stating gender, or required photographs and information pertaining to height and weight, even though these items are not relevant to the tasks to be performed. In addition, also considered discriminatory has been the practice of asking different questions to people of different genders, or asking questions that are not task-related, including places of origin and/or family relations.

In a blind recruitment policy, an institution is required to inform applicants of the required skills and the tasks to be performed at the institution, so that applicants know what they will be expected to do at that institution. An institution must design their recruitment process based on the size and characteristics of the organization, and specify the evaluation items for each process. In a blind recruitment policy, during the public notice stage, an institution is required to provide applicants with a job description that details the jobs to be performed and the requirements for the jobs, whereas, in the past, institutions only provided information pertaining to the application areas. In addition, items not related to actual jobs are to be excluded from the evaluation.

The Human Resources Development Service of Korea (HRD Korea) conducted a survey on 14 public institutions,[1] and their findings indicate that the blind recruitment policy promoted both efficiency and fairness as well as diversity. The results regarding diversity include the following. First, the percentage of local recruits increased. The percentage of local recruits in the overall recruits was 18.5% on average between 2015 and the first half of 2017. The average percentage went up to 21.99% between the second half of 2017 and the second half of 2018. This change seems to have been affected by the local recruit quota policy, as well as the implementation of the blind recruitment policy. Second, the percentage of women

1 HRD Korea (2018), "Final Report for the Survey and Performance Analysis on Preconception-Free Recruitment and Blind Recruitment," Industry-Academia Cooperation Group, Hanyang University.

increased in college graduate recruitments. Before the implementation of the blind recruitment policy, the percentage of women in college graduate recruitments was 39.8%, but reached 43.1% after the policy's implementation. Third, the educational credentials of recruits have been diversified. The percentage of recruits from Seoul National University, Korea University, and Yonsei University ('SKY' universities) dropped from 15.3% to 10.5%, whereas the percentage of recruits from universities outside the Seoul Capital Area (SCA) increased from 38.5% to 43.2%. The average number of universities new recruits have graduated from increased from 10.3 to 13.1. Lastly, the past work experiences and majors of successful applicants have been diversified.

The benefits of the blind recruitment policy include recruiting applicants with diverse backgrounds, as well as improving the fairness of recruitment processes and freeing job seekers from investing time and efforts into preparing for meaningless specs. To sum, the policy reduces investments for both job seekers and public institutions. Applicants can now focus on improving the competencies required to perform the jobs required of them, and institutions can spend less time and efforts on training new recruits—due to the improvement in screening for applicants' job-related competencies.

However, the blind recruitment policy also poses various limitations in eliminating discrimination. First, blinding certain information about applicants may result in recruiting applicants only having certain characteristics. Some public institutions may even recruit additional applicants in order to meet the social equity recruitment quota. Second, blind recruitment may be a serious weakness in the evaluation of ensuring fit between the organization and applicants. Career information about an applicant allows the organization to determine whether he/she is a good fit with the organization, and blinding such information may seriously undermine the organization's ability to make that decision. Third, the reputation of an applicant is an important consideration for recruitment. However, blind recruitment prevents an organization from identifying such information about the credibility or reputation of applicants.

As a way to address this issue, some companies use an employee value proposition (EVP) to recruit applicants that they want. The implementation of a blind recruitment policy should not be considered mandatory, but must be based on practical considerations and purposes. In the past, the government abolished educational credential requirements in the recruitment at public institutions, in order to improve employment practices and promote merit-based recruitment. However, despite its intention, the abolishment resulted in college graduates or post-college graduates applying for positions that were intended for high school graduates

(Park, 2012). The reality of recruiting appropriate candidates suggests that there remains a need to review the effect of new reforms and to then adjust them accordingly.

Therefore, in the following paragraphs, we examine the characteristics and current status of blind recruitment in Korea, analyze its effects, and identify potential improvements and implications of the policy.

3. Previous Literature

Previous literature on the effect of blind recruitment includes the following. Goldin and Rouse (2000) discussed whether blind auditions resulted in an increased diversity in orchestra members. In order to measure the level of diversity, they used the difference-in-differences method. One of the major threats to the internal validity of blind auditions is the possibility that an applicant's characteristics may change before and after a blind audition. As the same individual could be observed over multiple years, the authors were able to confirm the difference in recruitment probabilities of the same individual before and after the implementation of the blind auditions. They analyzed 254 auditions between the 1950's and 1995, and found that blind auditions increased the likelihood of women being employed.

Bertrand and Mullainathan (2004) reviewed recruitment advertisements in newspapers to determine whether discrimination exists between white and black applicants. They submitted around 5,000 fake curriculum vitae (CV) to 1,300 recruitment advertisements, changing only the applicant's name. In their study, CVs with white names were 50% more likely to be responded with interview requests than CVs with black names.

Edin and Lagerström (2006) analyzed the degree of discrimination based on gender and race in the employment market. They used a difference-in-differences estimation based on the selection of observable assumptions, using the fact that applicants can choose to either disclose or hide their gender or race when entering their information into a recruitment website. The study used the information from 8,043 applicants in Sweden's public sector applicant database, and the findings indicated that a woman was 5% more likely to receive interview requests when hiding her gender. However, in terms of race, no statistically significant discrimination was observed.

Krause, Rinne, and Zimmermann (2012) studied the effect of blind recruitment in the higher education employment market on gender discrimination. The authors conducted a document evaluation of two randomly divided groups of CVs from economics PhDs submitted to a research institute (treatment group: anonymous applicants; control group:

non-anonymous applicants). The study targeted 82 applicants with economics PhD degrees in the 2010/2011 employment market, and found that women were less likely to receive interview requests.

With regards to the recruitment of senior management positions, Hiscox et al. (2017) analyzed the effect of blind recruitment on the existence of explicit or implicit discrimination. Through a random controlled experiment, to determine whether blind recruitment improves the gender balance or diversity in the recruitment of high-level management positions, the authors randomly divided CVs into two groups and they blinded the CVs in one of the groups. The findings showed that, in the non-blind group, the likelihood of women being considered as candidates increased by 2.9%. For male applicants, in the non-blind group, the likelihood of being considered as candidates declined by 3.2%.

Lee et al. (2018) analyzed changes before and after blind recruitment at 260 public institutions. The blind recruitment policy was found to increase the percentage of women and non-SCA college graduates among new recruits with college degrees, and improved the fit between new recruits and the organizations and the jobs required. However, the policy did not make a meaningful difference in either early resignation or application rates.

Kim (2019) studied the status of blind recruitment at 1,044 private companies, of which only 26.8% (280 institutions) adopted a blind recruitment policy. The reason for not adopting a blind recruitment policy included the fact that the effectiveness of blind recruitment had not yet been verified. In addition, some respondents stressed that the information items typically blinded in a blind recruitment process, including age, major, and gender, are required in order to assess applicants. In addition, respondents stressed the need for a phased approach to spreading blind recruitment practices into the private sector, based on specific measures pertaining to the special nature of private companies.

Lastly, Rinne (2018) summarized the benefits and drawbacks of blind recruitment policies, and proposed directions for future improvements. The benefits of blind recruitment included: prevention of discrimination at the first stage of recruitment; improvement of the possibility of minorities being employed; the signal that applicants will be assessed solely based on their merits and qualifications; and the ease of comparisons between applicants. The drawbacks included: mitigation of discrimination by blind recruitment only when the degree of discrimination against applicants was severe; the possibility that the effect of blind recruitment may decline over time; the possibility that blind recruitment may undermine the effectiveness of affirmative action initiatives; and the possibility that the improper implementation of blind recruitment may increase the time and cost required for recruitment,

and may lead to errors in hiring.

A review of the previous literature ultimately shows that not all effects of blind recruitment are positive. In addition, the effect of blind recruitment on discrimination and diversity in the employment market is also affected by factors such as the state, occupation, culture, and employer characteristics. As such, the effect of blind recruitment should be ultimately determined based on empirical examinations at the national and organizational levels. By empirically verifying the changes brought on by blind recruitment policies which have been introduced to all the public institutions in 2017, it is suggested that the government needs to take further efforts to improve their efficacy and sustainability.

III. Current Status and Characteristics of Recruitment Practices at Public Institutions

1. Scale of Recruitment

Korean public institutions[2] recruited 34,256 employees in 2015 (including regular positions, contract positions, and interns). The number of new recruits increased by 21.4% per year in the following years, until reaching a total of 63,622 in 2019. The number steeply increased between 2017 and 2018 (60%), and slightly declined by 1.9% in 2019. By type of recruits, the number of recruits at regular positions steadily increased from 18,962 to 33,247 between 2015 and 2019. The number of recruits in contract positions slightly declined between 2015 and 2017, and rapidly increased again starting in 2018. The number of such recruits reached 8,810 in 2019, representing a 359.1% growth from 2015. The number of interns also steadily increased; the number went up from 13,375 to 21,565 between 2015 and 2019, marking a 61.2% increase.

2. Timing of Implementation

In June 2017, President Moon Jae-in ordered the implementation of blind recruitment policies in the public sector. In July 2017, the Ministry of Employment and Labor (MOEL) and the Ministry of Economy and Finance (MOEF) jointly published the Guidelines on Blind

2 Public Institution Management Information Disclosure System, Alio, (http://www.alio.go.kr/home.do).

Recruitment at Public Institutions, and adopted blind recruitment policies at 332 public institutions in the second half of 2017.[3]

However, the actual timing of the implementation has varied, depending on the public institution. Among the 182 public institutions surveyed in this study, the Korea District Heating Corporation (KDHC) was the first to adopt a blind recruitment policy (April 2013). The KDHC was followed by the Daegu National Science Museum (January 2014). In 2015, the blind recruitment policy was adopted by the Korea Expressway Corporation (EX, a quasi-market public enterprise), the Korea Land and Geospatial Informatix Corporation (LX), the Korea Communication Agency (KCA), the National IT Industry Promotion Agency (NIPA) (quasi-government institutions), the Korean Federation Of Credit Guarantee Foundations (KOREG), and the Korea Fair Trade Mediation Agency (KOFAIR), among other public institutions. Overall, 27 public institutions, including those cited above, adopted a blind recruitment policy before the government recommendation, which consisted of four public enterprises (market public enterprise: 1; quasi-market public enterprises: 3), twelve quasi-government institutions (delegated execution: 11; fund management: 1), and 11 other public institutions.

Among the public enterprises that adopted a blind recruitment policy early on, the EX was the largest institution in terms of the number of employees (8,677).[4] Among quasi-government institutions, the National Health Insurance Service (NHIS) was the largest institution (16,235). In particular, most of the "other" public institutions that adopted blind recruitment policies early on were small institutions hiring 100 or less employees. However, some were major public institutions such as the Korea Housing Management Co., Ltd. (KOHOM: 2,673) and the Korea Sports Industry Company (KSPO&CO: 1,460). As of 2019, the EX hired 984 new recruits,[5] the NHIS hired 2,336.75 recruits, and the KOHOM and KSPO&CO hired 237 and 283, respectively.

By year, among the respondents, the number of institutions that adopted blind recruitment policies was the highest in the second half of 2017; 26 additional institutions adopted the blind recruitment policy in the first half of 2018.

---

3 Relevant Ministries, Guidelines on Blind Recruitment at Public Institutions, July 2017.

4 As of the first half of 2020.

5 Includes all officers, regular employees, contract employees, and interns.

3. Recruitment Process by Recruitment Type

According to the MOEL,[6] blind recruitment has four characteristics, and all hold relevance to recruitment processes. First, in the public notification stage, blind recruitment policies require employees to disclose the knowledge, skills, and attitudes, etc. required for the jobs. Second, in the document screening stage, a public institution may not demand applicants to provide personal information, which has been replaced by requirements for job-related education, qualifications, and experiences. Third, in the written test stage, as a means to supplement the lack of personal information in the screening stage, applicants' job skills are evaluated through basic skill tests and job performance tests. Fourth, in the interview stage, applicants go through systemized interviews in order to prove the fit between them and the jobs required.

We surveyed the timing of the implementation of blind recruitment policies, as well as the elements used by public institutions in their recruitment processes. The elements were divided into five stages: application, document screening, written test, interview, and result announcement. A total of 177 institutions responded to the survey. We also considered six different types of recruitments, because the elements used in each stage may vary depending on the type: regular positions (no prior experience), regular positions (prior experience), contract positions, non-regular positions, intern (recruitment), and intern (experience). Most public institutions recruit regular positions (no prior experience). However, the recruitment of the other types varies from institution to institution.

Regardless of the type of recruitment, website applications are the most frequently used at the application stage. For this purpose, some institutions use their own website, whereas others may use recruitment service websites. According to the Fair Hiring Procedure Act, public institutions are also required to make efforts to receive application documents by email or websites.

In the next stage, document screening,[7] the most frequently used documents used for evaluation were cover letters and application forms, followed by career statements, experience statements, qualification statements, and education statements. These items were common across all types of recruitments, with slight variations. For example, for regular positions (prior experience), job performance plans were considered more often than educational statements.

---

6 MOEL and HDR Korea, 2018 Public Sector Blind Recruitment Best Practices, March 2019.

7 For regular positions (no prior experience).

For contract positions, job competency statements were evaluated more often than job performance plans. For interns, as can be expected, experience statements were more frequently used than career statements.

Next, the items frequently evaluated in the document screening stage included educational statements, qualification statements, job competency statements, and job performance plans. Education statements, qualification statements, and job competency statements were most frequently used by quasi-government institutions, which may be attributed to the fact that these institutions carry out tasks delegated by the government, and therefore need to recruit applicants with specific job competencies and skills from the onset of the process. In addition, regardless of the type of recruitment, public enterprises did not use job competency statements at all, nor did they use education statements for contract positions or non-regular positions. Job performance plans were most frequently used by "other" public institutions, regardless of the type of recruitment. These findings may be motivated by the need for these institutions, which tend to be smaller, to hire applicants with a better understanding of the jobs that they are being hired for.

The percentage of institutions requiring dissertations and research outputs is far higher among "other" public institutions than among quasi-government institutions. This requirement may be attributed to the fact that most research institutions under the Ministry of Science, Technology and ICT and the Economics, Humanities and Social Research Council (NRC) are listed as "other" public institutions.

As for the characteristics related to the written test stage, the test items used by institutions showed more variations than the elements used in the document screening stage. A basic job competency evaluation was most frequently used for regular positions (no prior experience), interns (recruitment), and contract positions. Personality tests were mostly used for non-regular positions and for interns (experience). Other than basic job competency evaluations and personality tests, the most frequently utilized items included job knowledge evaluations, job performance evaluations, and aptitude tests. For all recruitment types other than contract positions, job knowledge evaluations were most frequently utilized. Job performance evaluations were used more often for regular positions (no prior experience) and interns (recruitment), whereas aptitude tests were more frequently used for the other four types of recruitments. These evaluations were followed by essay tests, which were utilized more often than job performance evaluations only for regular positions (prior experience).

In the interview stage, across all recruitment types, job interviews were most frequently conducted. Other types of interviews included presentation interviews, experience

interviews, comprehensive interviews, debate interviews, management interviews, situational interviews, employee interviews, and personality interviews. By recruitment type, debate interviews were more frequently used for regular positions (no prior experience), and presentation interviews were frequently used for regular positions (no prior experience) and regular positions (prior experience). Employee interviews were more frequently used for non-regular positions than the other types of recruitment. For interns, situational interviews were used more often than the other types of interviews.

Other types of interviews at public institutions included simulation interviews, "in-basket" interviews, portfolio interviews, and observation interviews. The Korea Power Exchange (KPX) also employed a camp-type interview.

In the result announcement stage, in rank order, hired applicants were notified via a website, text message, email, or telephone. However, for non-regular positions and interns (experience), text messages were more frequently used than website notifications.

IV. Effect of Blind Recruitment Policies

1. Perception of Recruitment Fairness

A. Design

To assess the fairness of recruitment at public institutions, we used data from the Recruitment Fairness Perception Survey conducted by the Anti-Corruption and Civil Rights Commission (ACRC). The survey was conducted on 5,983 job seekers and public sector workers between April 1 and May 15 of 2020. Interview questionnaires were sent via web and email, and 1,182 completed questionnaires were returned.

The backgrounds of the respondents are as follows. First, 500 of the respondents were job seekers (42.3%), and 682 were public sector workers (57.7%). Second, the number of male respondents (616) was slightly higher than female respondents (566). Third, in terms of highest educational attainment, 805 respondents were college students or graduates, followed by graduate school (Master's) students/graduates (150), graduate school (PhD) students/graduates (88), high school graduates or lower (75), and junior college students/graduates (64). Lastly, the largest number of respondents were aged between 31 and 40 (496), followed by respondents aged between 21 and 30 (481), 41 and 50 (113), and 19 and 20 (91).

Table 1_Respondent's Educational and Professional Backgrounds

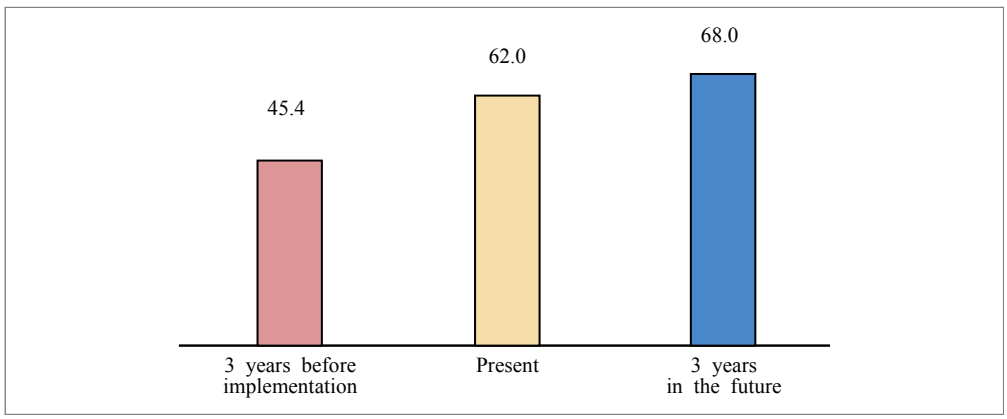
Category		Frequency (no. of persons)	Percentage (%)	Category		Frequency (no. of persons)	Percentage (%)
Work type	Job seeker	500	42.3	Gender	Woman	566	47.9
	Public sector worker	682	57.7		Man	616	52.1
Highest educational attainment	High school graduate or lower	75	6.3	Age	19~20	91	7.7
	Junior college student/graduate	64	5.4		21~30	481	40.7
	Junior college (ongoing/graduate)	805	68.1		31~40	496	42.0
	Graduate school (Master's) student/graduate	150	12.7		41~50	113	9.6
	Graduate school (PhD) student/graduate	88	7.4	Total		1,182	100.0

Source: Present Study

B. Findings

The questionnaire included a question to assess the level of fairness at public institutions: "How would you rate the level of fairness in recruitment at public institutions? (Please answer for three years before implementation, the present, and three years in the future)." The fairness rating three years before was very low at 45.4, but higher for the present (62.0) and three years in the future (68.0)

Figure 1_Awareness of Fairness in Recruitment



Source: Present Study

Second, the questionnaire asked the respondents, "Do you think that the recruitment at public institutions is more fair than recruitment in the private sector?" The fairness level at public institutions relative to the private sector was rated at 63.6, with men (66.1) giving more positive scores than women (60.8). By age group, the respondents aged between 31 and 40 gave the highest rating, followed by respondents aged between 41 and 50 (63.6), 21 and 30 (62.8), and 19 and 20 (53.7).

The third question asked about the respondents' opinion on the most effective policies in improving fairness in recruitment. The choices included: stricter punishment of people involved in corrupt recruitment practices; efforts to identify corruption cases (Recruitment Corruption Eradication Group, etc.); improvement of recruitment policies (blind recruitment, etc.); and raising social awareness pertaining to corruption in recruitment. These findings confirm that the respondents were more positive toward the blind recruitment policy than in implementing stricter punishments or cracking down on corruption.

Lastly, pertaining to the question asking the most required government efforts to improve fairness, 24.7% of the respondents chose stricter punishment of corrupt recruitment practices, followed by identification of recruitment corruption cases (17.6%), and improvement of recruitment practices (16.5%). The first choice of the largest percentage of respondents was stricter punishment (34.2%), followed by the improvement of recruitment practices (18.5%), and identification of corruption cases (12.9%).

As for the second choice, the largest percentage of respondents chose identification of corruption in recruitment (22.3%), followed by stricter punishment of corrupt recruitment practices (15.4%), and institutional improvements (14.4%). Other proposals for improving fairness in recruitment included the improvement of awareness on the manager level, and the reinforcement of protections for whistleblowers.

2. Effect of Blind Recruitment Policies

A. Design

To estimate the effect of the blind recruitment policies, we need to compare institutions that adopted a policy and those who did not. It would be unreasonable to conclude that the blind recruitment policies had a certain effect only because some differences in output variables were identified before and after the blind recruitment policies were implemented at a single institution, because various confounding factors exist that can change over time, in

addition to ongoing changes in economic circumstances and applicants' backgrounds before and after the implementation. In addition, differences after the implementation of blind recruitment policies between the variables between the institutions that adopted the policies and those that did not may not be attributed to the blind recruitment process.

Such variables may reflect observable or unobservable characteristic differences between the two groups of institutions. For example, an institution that adopted a policy may be more interested in improving diversity or eradicating discrimination, which may have more influence on the improved diversity at the institution than the implementation of a specific recruitment policy.

For this reason, in this study, we examine the effect of the blind recruitment policies using difference-in-differences estimators. Two groups of samples were used for the analysis. The treatment group consists of public institutions that adopted blind recruitment policies in 2017, and the control group consists of institutions that did not implement blind recruitment policies between 2013 and 2017.

This study used the data pertaining to the backgrounds of new recruits from 180 public institutions, including public enterprises, "other" public institutions, and quasi-government institutions. However, a closer review of the data indicated that the data from many public institutions were not suitable for a further statistical analysis. Specifically, the following data from public institutions were excluded from the samples:

- The data do not have information pertaining to the variable of interest.
- The institution provided only average data, not the data on specific individuals.
- The institution did not provide data before or after the implementation of the policy, which is required for a difference-in-differences estimation.
- The institution did not provide information before the implementation of the policy, which is required in order to utilize extraneous variables.
- The institution did not provide data for all relevant years.
- The institution did not properly provide outcome variables (e.g., unrecognizable university names, and school locations indicated only as "SCA").

Other than the excluded data, we used data provided by the following public institutions.

- Sample Group 1: 24 public institutions adopted the blind recruitment policy in 2017 (treatment group), and 3 institutions did not adopt blind recruitment until 2017 (control group). The number of samples in the treatment group was 17,000, and there were around 600 in the control group (the number of samples varies depending on the variable). Using Sample Group 1, we can only examine the effect of blind recruitment on recruitment characteristics in the first year of implementation. In Sample Group 1, public institutions with 15 or less recruits were excluded from the analysis. The purpose of the exclusion was to prevent the percentage values from being excessively affected by a one or two recruits, which may increase the fluctuations of the trend and make it impossible to make meaningful comparison.
- Sample Group 2: 4 public institutions adopted the blind recruitment policy in 2016 (treatment group), and 12 institutions did not adopt blind recruitment until 2018 (control group). The number of samples in the treatment group was 750, with around 900 in the control group (the number of samples varies depending on the variable). Using Sample Group 2, we could examine the effect of blind recruitment on recruitment characteristics in the first and second years of implementation. Public institutions with low numbers of recruits were not excluded from Sample Group 2, as most public institutions in this group hired 15 or less recruits.

B. Findings

Table 2 highlights the descriptive statistics of the samples used in the analysis. First, the number of institutions included in the analysis sample is 27. Second, in the treatment group, female recruits accounted for 35.2% of all recruits. In the control group, the percentage of women was 18.2%. Third, the mean age of recruits was slightly lower in the treatment group (28.4 years old).The mean age of recruits in the control group was 31.2. Fourth, the percentage of recruits aged 35 or older was 12.6% in the treatment group, and 29.0% in the control group. Fifth, the percentage of recruits who graduated from Seoul National University, Korea University, or Yonsei University ('SKY' universities) was 33.7% in the treatment group, and 9.8% in the control group. Sixth, the percentage of recruits who did not complete their military service was 28.4% in the treatment group, and 5.8% in the control group. Seventh, the percentage of recruits who left the institutions within a year was estimated to be 14.0%

for the treatment group, but the percentage was only 0.7% for the control group. Lastly, the number of samples in the treatment group was around 17,000 (recruits who did not complete military service: 6,296; recruits who left the institutions within a year: 13,272), and the number of samples in the control group was around 590 (recruits who did not complete military service: 360). Table 2 lists the mean value of variables in the treatment group and the control group, which show great disparities between the two groups. Therefore, the two groups do not allow for simple comparison.

Table 2_Descriptive Statistics

Variable	Mean	Standard deviation	Min	Max	No. of samples
Panel A: Treatment group (adopted blind recruitment)					
Percentage of female recruits	0.352	0.477	0	1	17,593
Mean age of recruits	28.431	6.730	17	71	17,486
Percentage of recruits aged 35 or older	0.126	0.332	0	1	17,486
Percentage of 'SKY' graduates	0.337	0.180	0	1	17,318
Percentage of non-completion of military service	0.284	0.180	0	1	6,296
Percentage of resignation within a year	0.144	0.351	0	1	13,272
No. of public institutions	24				
Panel B: Control group (did not adopt blind recruitment)					
Percentage of female recruits	0.182	0.386	0	1	594
Mean age of recruits	31.244	6.549	17	53	594
Percentage of recruits aged 35 or older	0.290	0.454	0	1	594
Percentage of 'SKY' graduates	0.098	0.297	0	1	594
Percentage of non-completion of military service	0.058	0.235	0	1	360
Percentage of resignation within a year	0.007	0.082	0	1	594
No. of public institutions	3				

Source: Present Study

Tables 3 and 4 represent the findings on the effect of blind recruitment policies on the backgrounds of recruits in public institutions that adopted blind recruitment. Among the values listed in the tables, the coefficients for "interaction variables" represent the difference-in-differences estimations, that is, the effect of the blind recruitment policies. The coefficients for "dummy variables for 2017" represent the mean difference between the treatment group and the control group before the implementation of blind recruitment

policies. For example, the coefficient estimated for the percentage of female recruits is 0.055, which means there exists a 5.5% difference between the percentage of female recruits in the treatment group and the control group. On the other hand, the coefficients for the "treatment group dummy variable" refers to the mean difference in outcome variables before and after the blind recruitment policies in the control group. For example, the coefficient of the variable for the mean age of recruits is -2.863, which means there exists 2.86 years difference in the mean age of recruits in the institutions that did not adopt blind recruitment policies before and after the implementation of the blind recruitment policies. As can be seen at the bottom of the table, the number of samples used for analyzing the effect of blind recruitment was around 18,000.

Table 3 presents the estimated effect on three outcome variables (percentage of female recruits, mean age of recruits, and percentage of recruits aged 35 or older). The numbers in parentheses represent cluster-robust standard errors clustered for each year. The standard errors were clustered because we decided that recruits' backgrounds could show a high correlation within a year. It should be noted that similar results were found using normal standard errors and robust standard errors. The numbers in brackets represent the *p* values.

As for the effect of blind recruitment policies on the percentage of female recruits, the policies did not have a statistically significant effect. The estimated coefficient value is –0.058, which indicates a 5.8%p decline in the percentage of female recruits in the year when the blind recruitment policies were adopted. As the public institutions that adopted blind recruitment policies reported there being around 40% of female recruits, the estimated coefficient value is not substantively significant, either. Therefore, the blind recruitment policies did not have a significant effect on the percentage of female recruits.

As for the mean age of recruits, the estimated coefficient was –1.631. This coefficient implies that the blind recruitment policies lowered the mean age of recruits by around 1.6 years. However, the estimate was not statistically significant. The coefficient estimate is also not substantively significant, because among institutions that adopted blind recruitment policies, the mean age of recruits before the implementation was around 31. As for the percentage of recruits aged 35 or older, before the implementation of blind recruitment policies, the percentage of recruits aged 35 or older was around 20%, and the difference-in-differences estimate was –0.039, which is neither statistically nor substantively significant. Therefore, the blind recruitment policies did not have a significant effect on the age of recruits.

Table 3_Difference-in-Differences Estimates 1

Explanatory variables	Result variables		
	Percentage of female recruits	Mean age of recruits	Percentage of recruits aged 35 or older
Interaction variables	-0.058 (0.030) [0.124]	-1.631 (0.868) [0.133]	-0.039 (0.036) [0.338]
Dummy variables for 2017	0.055** (0.018) [0.039]	0.619 (0.676) [0.411]	0.002 (0.030) [0.942]
Treatment group dummy variables	0.252*** (0.030) [0.001]	-2.863* (1.057) [0.054]	-0.169** (0.043) [0.017]
Other public institution dummy variables	0.208*** (0.023) [0.001]	-0.485 (0.690) [0.521]	0.011** (0.023) [0.661]
Quasi-government institution dummy variable	0.240*** (0.018) [0.000]	-1.128 (0.802) [0.232]	-0.034 (0.028) [0.285]
Constant	-0.055 (0.027) [0.115]	32.001*** (1.029) [0.000]	0.305*** (0.039) [0.002]
No. of samples	18,187	18,080	18,080

Note: The numbers in parentheses ( ) represent cluster-robust standard errors. The numbers in brackets [ ] represent *p* values.
Source: Present Study

Table 4 shows the estimated effect on the other three outcome variables. The first outcome variable is the percentage of SKY graduates. The estimated coefficient value is –0.005, which is minimal. In other words, in the year of implementation, blind recruitment policies did not cause any change in the percentage of SKY graduates. The coefficient value is not substantively significant either, as the percentage of SKY graduates was around 10% before the implementation of the blind recruitment policies.

As for the percentage of non-completion of military service, the difference-in-differences estimate was –0.035, which means that the blind recruitment policies decreased the percentage of non-completion of military service by 3.5%p. However, the estimated *p* value was 0.367, which was not statistically significant. In addition, before the implementation of the blind recruitment policies, the percentage of non-completion of military service among male recruits in the institutions that adopted blind recruitment was around 20%, which means that the coefficient value was not substantively significant, either.

Lastly, as for the percentage of resignations within a year, the estimate for the effect of

blind recruitment policies was 0.040, which was statistically significant at around 1%. In other words, blind recruitment policies are estimated to have significantly increased the percentage of recruits who left the institutions within a year. To further analyze the substantive significance of the estimates, we examined the percentage of resignations within a year at public institutions that adopted blind recruitment policies in the period before the implementation, which was around 10%. Here, a 4%p increase is highly significant in terms of substantive significance as well.

As mentioned earlier, the blind recruitment policies restrict the information available to determine the quality of the recruits, which may reduce the compatibility between the institution and the employees being recruited. The findings of this study, however, do not provide strong evidence that blind recruitment policies reduce compatibility between employers and employees, because the increase in the percentage of resignations within a year may have increased the re-applications to other institutions by those recruits. For recruits, the blind recruitment process means that the institutions do not know whether they submitted applications to other institutions. Therefore, recruits may also apply for another public institution in order to find a better job. In this case, the percentage of resignations within a year will increase. However, further data on applicants are required in order to analyze these findings, which do not provide strong evidence in this regard. Overall, as a core finding of this study, the implementation of blind recruitment policies was seen to increase the percentage of recruits who left the institutions within a year.

Table 4_Difference-in-Differences Estimates 2

Explanatory variables	Result variables		
	Percentage of SKY graduates	Percentage of non-completion of military service	Percentage of resignation within a year
Interaction variables	-0.005 (0.012) [0.695]	-0.035 (0.034) [0.367]	0.040*** (0.007) [0.005]
Dummy variables for 2017	0.002 (0.013) [0.911]	-0.053 (0.035) [0.206]	-0.017** (0.004) [0.016]
Treatment group dummy variables	-0.065*** (0.011) [0.004]	0.168** (0.040) [0.013]	0.095*** (0.006) [0.000]
Other public institution dummy variables	-0.025** (0.008) [0.041]	0.390*** (0.036) [0.000]	0.052** (0.018) [0.048]

Table 4_Difference-in-Differences Estimates 2(continued)

Explanatory variables	Result variables		
	Percentage of SKY graduates	Percentage of non-completion of military service	Percentage of resignation within a year
Quasi-government institution dummy variable	-0.010 (0.006) [0.212]	-0.032 (0.026) [0.292]	-0.075** (0.022) [0.026]
Constant	0.113*** (0.014) [0.001]	0.012 (0.051) [0.820]	0.032 (0.023) [0.242]
No. of samples	17,912	6,656	13,866

Note: The numbers in parentheses ( ) represent cluster-robust standard errors. The numbers in brackets [ ] represent p values.
Source: Present Study

In this section, we analyzed the effect of blind recruitment policies at public institutions based on characteristics of their recruits using difference-in-differences estimators. These findings do not indicate that there was a significant effect on the characteristics of recruits, except for the percentage of resignations within a year, of which the policies increased the number by around 4%. Overall, however, the findings of this study do not provide significant evidence as to the mechanism of how the percentage of resignations increases.

3. Interviews with Human Resource Managers

A. Changes After the Implementation of Blind Recruitment Policies

The recruitment managers interviewed in this study commonly pointed out the increased mean age of recruits. While interviewing applicants, interviewers may estimate the age of applicants. For this reason, only one recruitment manager answered that the change in applicants' age is not significant. Most of the other recruitment managers answered that blind recruitment policies provided more opportunities for older job seekers to pass the document screening stage and to take the written tests, or answered that the range of recruits' ages was broadened after the implementation of blind recruitment policies.

Despite the increased diversity in age, many recruitment managers stated that diversity declined in terms of places of origin. In particular, recruitment managers at quasi-government institutions that manage public funds or carry out tasks delegated by the government reported increased percentages of recruits from universities in the SCA, which may be attributed to the

fact that the importance of written tests increased in evaluating the skills of applicants. Recruitment managers attributed the increased percentage of recruits from the SCA to the fact that applicants from the SCA have better access to recruitment information, and more opportunities to form study groups with other applicants. As for the interview stage, most recruitment managers complained that blind recruitment policies restrict the information available to identify the characteristics of applicants, and that interviews now mostly consist of simple questions. According to some respondents, to provide fair opportunities in a broader sense, more support should be provided to university students outside the SCA, which would then promote the purpose intended by the blind recruitment policies.

Some public institutions with increased percentages of recruits originating from the SCA have established separate recruitment processes for applicants from non-SCA areas and local recruits from innovative cities. However, many of these processes were replaced by the provision of additional points or have been abolished altogether under the recognition that such special processes may cause conflicts by treating them and the other applicants differently.

Public institutions that relocated outside the SCA reported that they met or exceeded the target percentage of non-SCA recruits or local recruits from innovative cities. According to recruitment managers, the effect comes from the increased percentage of local applications, rather than the effect of blind recruitment policies. This tendency was more pronounced in public institutions with no local branches.

Other changes reported by the managers included the increased recruitment of foreigners and sexual minorities, which were rare before the implementation of the blind recruitment policies. The managers also reported that the foreigners and sexual minorities have successfully adapted to life at these institutions.

B. Issues Caused by the Implementation of Blind Recruitment Policies

The interviewed recruitment managers reported a number of problems that were caused by the implementation of blind recruitment policies. First, after implementation, public institutions tended to recruit applicants with quick thinking and good verbal skills, rather than applicants from diverse backgrounds who were skilled and more suited to the institutions. In the interview stage, the time available for each applicant is bound to be very limited. Despite the existence of written tests and interviews, applicants who can logically express their opinions in a short amount of time tended to receive better scores. Verbal skills and quick thinking do not necessarily translate to superior job skills or adaptation skills. Recruiting

managers feel that these biases need to be addressed.

The second most cited issue with the blind recruitment process is the higher percentage of written tests in the overall score, which means that applicants who do better at written tests are more likely to be hired. This issue has resulted in two subsequent issues. First, a significant number of recruits are those either coming back from a long hiatus or those who had previously worked at other public institutions, and these recruits tend to be less engaged in their work. The majority of applicants with no previous experience who received high scores on written tests are those who had prepared for state exams, accountant exams, tax account exams, etc. According to the recruitment managers, they tend to focus on improving their personal qualifications (e.g., preparing for license tests) rather than committing themselves to achieving good outcomes for the organization. In a quasi-government institution in Seoul where we interviewed recruitment managers, many of the applicants were former employees of public institutions outside the SCA who now want to work at a public institution in Seoul. Due to their previous experience, a high percentage of those applicants were hired. According to the interviewed managers, however, these recruits with previous experience tend to lack the proactive attitude required of new recruits.

Another issue caused by the higher success rate of applicants with high written test scores is the sacrifice of substantive fairness for the sake of procedural fairness. Applicants only with high school diplomas enjoy equal opportunities as applicants who graduated from colleges or graduate schools. However, as a result of this new policy, most of the recruits are applicants who are college graduates or higher, and applicants who did not graduate from colleges have less chance of being hired. Even at public institutions with separate recruitment processes for high school graduates, most of the applicants who passed written tests with top scores were college students. One of the recruitment managers interviewed in this study suggested that a truly fair recruitment policy would be to provide separate recruitment processes to high school graduates, junior college graduates, and four-year college graduates.

The third most cited issue with the blind recruitment process stems from the second issue discussed above. As previously mentioned, the increased importance of written tests has resulted in an increase in recruits who have graduated from college. Recruits with college degrees are now tasked with jobs that were previously performed by high school graduates, which results in a low level of job satisfaction and increases the percentage of recruits leaving the organization within a year. It takes four to five years to train a recruit into a fully functioning member of an organization. However, on account of the high turnover rate, the percentage of new recruits in the overall workforce continues to increase, along with the cost of training

these new recruits.

The fourth issue shares a similar context to the third issue. Applicants are not allowed to specify their college majors on the application forms, and applicants who majored in humanities or social sciences tend to do better at written tests than engineering or science majors. As a result, the success rate of applicants who majored in engineering or science has significantly declined. The recruitment manager who mentioned this issue added that, if the current trend continues, the organization plans to take measures to increase the success of recruits with science or engineering diplomas; for example, by giving them additional points in the evaluation process.

The fifth issue that was commonly reported by the interviewed public institutions pertains to the laws regarding blind recruitment policies. These laws are highly complicated, and the personnel in charge of recruitment tend to be subject to relatively severe disciplinary actions for making minor mistakes in the course of recruiting new hires. As a result, employees have begun to avoid being assigned to recruitment-related tasks, which has resulted in employees with less experience being assigned to recruitment-related tasks.

The sixth issue is that some applicants are disadvantaged by the current practice of confirming the information provided by applicants in the last stage of the recruitment process. For example, during the recruitment process, the places of origin of applicants were confirmed at the last stage of the process, resulting in one of the finalists being deemed non-eligible while reviewing their supporting documents. Granted, the institution can hire the runner-up recruit. However, at least one other applicant did not pass the written test because of the success of that particular finalist, and thus did not even get an interview opportunity.

The last issue is that, due to the "blinding" of information, many applicants with no diplomas or knowledge related to the required tasks are now being hired. For this reason, some recruitment managers responded that blind recruitment policies can actually undermine the institutions' ability to recruit personnel suitable for the organizations originating from diverse backgrounds. They also suggested that public institutions should be allowed to choose whether to implement these blind recruitment policies.

The interviews with recruitment managers have shed some light on the changes that existed before and after the implementation of blind recruitment policies, which were not previously apparent in quantitative analyses based on applicant information. As shown in the quantitative analyses, the implementation of blind recruitment policies did not make a significant difference in the characteristics of successful applicants. This seems to stem from the fact that applicants in the SCA have better access to recruitment information, as well as

better environments to prepare for recruitment tests. In addition, public institutions hiring large number of recruits receive applications from across Korea, regardless of whether they implement a blind recruitment policy.

Given the findings from these interviews, however, different findings may be obtained if another quantitative analysis is conducted, using only applicant information from institutions that are related to areas outside the SCA hiring less than 100 recruits per year.

V. Summary and Conclusions

Blind recruitment policies have required public institutions to exclude factors that may discriminate against applicants based on personal backgrounds, which seems to be consistent with the purpose of the policy to evaluate applicants based solely on their merits. For this reason, this study examined the changes brought on by the implementation of these policies, rather than what effects the blind recruitment policies have had, or how the effects have affected the policy goals. Specifically, we examined the changes at public institutions under two key terms: fairness and diversity. In order to assess the changes in fairness, we conducted a questionnaire survey on the perceptions toward fairness in recruitment at public institutions before and after the implementation of these policies. As for diversity, we used the difference-in-differences method to identify changes in the personal and educational backgrounds of public institution recruits between 2013 and 2018 (i.e., gender, age, places of origin, and educational history). Lastly, in order to identify changes not visible from the questionnaire survey or the statistical analysis, we interviewed recruitment managers at public institutions. The following paragraphs summarize the findings of this study.

First, the level of perceived fairness in recruitment improved across all public institutions. The respondents replied that fairness improved, and will further improve, between the three years before the implementation of the blind recruitment policies, the present, and three years into the future. The answers from the interviewed recruitment managers were consistent with the survey findings. However, the findings also indicated that there were an increased workload and costs caused by the application of the blind recruitment policies. The respondents stressed the need for addressing these issues, though all agreed with the original purpose of blind recruitment policies.

The respondents stated that a stricter punishment for corruption in recruitment and the identification of corruption cases should be implemented on a continuous basis, in addition to the need for improving the recruitment practices. These suggestions must be considered

for future improvements on these policies.

Second, the blind recruitment policies did not cause significant changes in many of the personal, educational, and professional backgrounds of new recruits. Among gender, age, highest educational attainment, and resignation within a year, only the last factor recorded a significant change after the implementation of the blind recruitment policy. The high turnover rate seems to be attributable to various factors. First, the greater importance of written tests and interviews resulted in higher levels of educational attainment among the successful recruits. Many of these highly educated recruits were then assigned to simple, repetitive tasks, which led to them leaving the institutions early. In some institutions, the turnover rate among new recruits was as high as 26%. In addition, with the standardization of the recruitment process at public institutions, a large number of new recruits simply move to other public institutions, ones with better wages and/or conditions.

Third, the recruitment managers at public institutions interviewed in this study reported various issues with current blind recruitment policies. Most of the respondents agreed with the purpose and direction of the blind recruitment policies, although many complained about the increase in workload and pressure after the implementation of the policies. It should be noted that many of these issues are also caused by procedural issues with the application of blind recruitment policies, and the side effects of reinforced audits regarding corruption during the recruitment processes. First, the increased importance of written tests in the recruitment process has raised the percentage of recruits who received high scores on written tests, many of whom have prepared for state exams or licensing tests in the past. Many respondents stated that these recruits tend to be less engaged in their assigned tasks. Instead, they tend to focus on personal pursuits, such as preparing for other state exams or licensing tests. These recruits also tend to leave the institutions early, which increases the institutions' burden of recruiting new employees to fill the void and then training newer recruits. The second issue stems from the stricter disciplinary action criteria regarding corruption during the recruitment process. This issue does not seem to be directly attributable to the blind recruitment policies. However, the blind recruitment policy has increased the number of items to be reviewed by human resource personnel, which has resulted in a higher overall workload. Subsequently, recruitment tasks have become unpopular at public institutions, resulting in frequent changes in the relevant personnel, and thus even more errors.

The implications of the findings of this study are as follows. First, the original purpose of the blind recruitment policies was to improve the assessment of applicants based on their merits, rather than irrelevant factors such as educational history, place of origin, family

relationship, gender, date of birth, and personal appearance. The policies were particularly aimed at addressing the harm caused by recruitment based on educational credentials. However, an important question remains as to whether educational attainment and major cause unjust biases when evaluating the competency of applicants. Blind recruitment policies have excluded personal backgrounds that applicants are born with, such as gender, appearance, and family relations. This is one of the positive achievements of the policy. However, without an alternative evaluation tool for systematically evaluating applicants' competencies, we need to reconsider excluding educational attainment and major from the evaluation items. Currently, institutions are only allowed to demand such information during the recruitment process for researcher positions or for professional positions, or in cases otherwise required by the nature of the job. However, many respondents have suggested the need to improve the list of excluded items for general positions as well. According to the HRD Korea, which monitors compliance with the blind recruitment policies, 323 of the 340 public institutions were in compliance, as of April 2020. However, further discussions are needed regarding these excluded items so that institutions can recruit people with talents more suited to the respective organizations.

Second, the blind recruitment policies have greatly increased the importance of written tests and interviews. Public institutions have adopted various measures to evaluate applicants' competencies. Written tests involve tests pertaining to basic skills and applicants' majors based on NCS, and interviews include oral presentations and simulation interviews for a more systemic evaluation. Interview tools tailored to each institution need to be developed, along with systemic training and education for both evaluators and interviewees. However, public institutions perform from five to tens of recruiting processes per year, which makes it difficult to develop new questions and appoint new interviewers to each round of recruiting. Although individual public institutions have adopted measures to address these issues, a common solution needs to be developed in the long term. As for the selection of interviewers, the Ministry of Personnel Management provides access to its human resource database to public institutions. However, this service has not yet been widely utilized as it was adopted in the second half of 2020. Nevertheless, it will greatly facilitate the interviewer selection process, though it will not resolve the issue of interview tool development. Diverse interview tools and supports need to be developed for public institutions.

Finally, the selection criteria need to be less strict. The current selection criteria are quite strict, as recruitment interviews now represent one of the most corrupt areas in the recruitment process. At least a half of interviewers at an interview should be external

interviewers, and a single interviewer is only allowed to participate in a single stage of the recruitment process. These strict restrictions have resulted in serious difficulties in securing interviewers, more so for institutions outside the SCA or those looking for interviewers in highly specialized fields. The government actually lowered the restrictions on interviewer selection by revising the Guidelines on the Management of Public Enterprises and Quasi-Government Institutions on December 27, 2019. Under the revised guidelines, for recruiting workers with contracts shorter than a year (two years for recruits substituting for workers on maternity leaves or military service), the required number of external interviewers has been lowered to 1. However, recruitment staff still experience various difficulties with securing qualified interviewers. As such, the criteria need to be less strict than they currently are. For example, it is questionable whether an interviewer who participated in a previous recruitment process should be prohibited from participating in the next recruitment process. Granted, measures should be taken from preventing a single interviewer from participating in multiple recruitment processes over a long period of time. However, for practical reasons, this restriction needs to be lowered. In addition, we need to consider whether filling a half of interviewer seats with external personnel helps the institutions recruit suitable personnel. Due to the raised concerns about fairness, some institutions have now gone so far as to fill all interviewer positions with external interviewers. We need a compromise between the two extremes in order to ensure fairness, and to then make reasonable recruitment decisions to hire personnel suitable for the institution and the specific position.

References

Bertrand, M. and Mullainathan, S., "Are Emily and Greg More Employable Than Lakisha and Jamal?: A Field Experiment on Labor Market Discrimination," *American Economic Review*, 94(4), 2004, pp. 991~1013.

Edin, P. A. and Lagerström, J., "Blind Dates: Quasi-Experimental Evidence on Discrimination," IFAU Working Paper No. 2006: 4, Uppsala: IFAU, 2006.

Goldin, C. and Rouse, C., "Orchestrating Impartiality: The Impact of "Blind" Auditions on Female Musicians," *American Economic Review*, 90(4), 2000, pp. 715~741.

Hiscox, M. J., Oliver, T., Ridgway, M., Arcos-Holzinger, L., Warren, A., and Willis, A., Going Blind to See More Clearly: Unconscious Bias in Australian Public Service Shortlisting Processes, 2017.

Kim, Se-um, *A Survey on the Current Status of Blind Recruitment at Private Businesses*, Korea Labor Institute Research Project Report, 2019.

Krause, A., Rinne, U., and Zimmermann, K. F., "Anonymous Job Applications of Fresh Ph.D. Economists," *Economics Letters*, 117(2), 2012, pp. 441~444.

Lee, Sang-min, Yu, Gu-chang, Shin, Yu-hyung, Kang, Min-chul, Oh, Jae-won, and Lee, A-young, *Recruitment Without Prejudice: the Current Status and Results of Blind Recruitment*, HRD Korea Research Project Report.

Park, Han-jun, *Open Recruitment at Public Institutions: Policy Directions for Increased Recruitment of High School Graduates*, 2012.

Rinne, U., "Anonymous Job Applications and Hiring Discrimination." IZA World of Labor, 2018.

Korean Law Information Centre, http://www.law.go.kr