

2012~2060 Long-term Economic Outlook and Fiscal Analysis

2012. 9



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Long-term Economic Outlook and Fiscal Analysis

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Foreword

The world economy, which seemed as though it was stepping outside the shadow of 2008 global financial crisis, is once again facing a difficult and unpredictable phase with the recent European Fiscal Crisis. And it has become challenging for Korea to achieve its economic goals. Although Korea's fiscal balance, which has suffered to a certain degree in managing risk factors, is recovering fast recently, it is bound to face various obstacles in the long run. Population structure transformation due to low birth rate and aging, deceleration of potential growth rate, reduced tax base and sharp increase in welfare expenditure are some of the expected risk factors.

To soundly manage the nation's finance, long-term outlooks that make projections beyond 30 years are essential. National Finance Act mandates the administration to include mid and long-term outlook in the National Fiscal Management Plan, which the administration submits to the National Assembly each year. IMF and OECD also recommend production of long-term fiscal projections, and the United States(CBO), European Union, and United Kingdom already published their own long-term fiscal projections.

As such, NABO has published its own "2012-2060 Long-term Economic Outlook and Fiscal Analysis" for the first time. This report is based on the population projections up to 2060 from Statistics Korea, and projected macro economy based on long-term population structure transformation, total revenue, total expenditure, fiscal balance, and national debt. Also, the report includes analyses on fiscal sustainability and generational burden based on the projection results, and makes recommendations for policy measures to secure fiscal sustainability and to resolve generational inequity.

I sincerely hope that this report will contribute to discussions of the nation's future and fiscal soundness in the National Assembly.

Sept, 2012

Chief of the National Assembly Budget Office

Joo, Young-Jin

Table of Contents

I. Introduction

II. Population Projections

1. Population trend for the past 50 years
and comparison of the projections on the trend of
various nations for the next 50 years..... 14
2. Summary of population projections
from Statistics Korea..... 15
3. Long-term macro-economics
and the implications from the fiscal baseline21

III. Macro-economics Outlook

1. Total Supply..... 23
2. Total Demand..... 24
3. Variables for price 25
4. Implications from the outlook of the long-term economics 25

IV. Projections on Fiscal Baseline

1. Projections on 2012-2060 Total revenue 27
 - A. Total revenue.....27
 - B. Tax revenue.....28
 - C. Social security contribution revenue.....31
 - D. Non-tax revenue and revenue from capital32
 - E. Implications from the projections of 2012-2060
total revenue baseline33
 - F. Effect of aging population on tax revenue34

2. Projections on the 2012-2060 Total Expenditure	36
A. Total Expenditure	37
B. Implications from the projections of long-term total expenditure baseline	38
3. Projections on the 2012-2060 Fiscal Balance and National Debt	41
A. Projections on 2012-2060 Consolidated Fiscal Balance Baseline	41
B. Projections on 2012-2060 Fiscal Balance of Social Securities	41
C. Projections on 2012-2060 Managed Budget Balance Baseline	44
D. Projections on 2012-2060 National Debt Baseline	45
4. Analysis on long-term fiscal sustainability	46
A. Implications from the fiscal crisis of southern European nations	46
B. Review of projections on long-term fiscal baseline	49
5. Analysis of net tax burden per generation based on generational accounting	53
6. Implications from the projections of long-term fiscal baseline	54

V. Fiscal Policies for Sustainability

1. Scenario with Rising Interest Rates	56
2. Improving fundamental fiscal balanced required for sustainability: Sustainable scenario	59
3. Suggestions on fiscal structure in preparation for population aging: Preparation for aging population scenario	62
A. Raising rates for the national pension and adjusting the threshold age for receiving benefits	63
B. Suggestions for revising tax policies in preparation for aging population	64
C. Tax Revenue effects of the revised tax policies in response to aging population	67

4. Fiscal Soundness of the Preparation for aging population scenario and mitigation of generational burden.....	70
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VI. Long-term projections for National Pension and National Health Insurance, and Policy Suggestions

1. 2012-2070 Projections on National pension and Policy Suggestions.....	74
A. Projections on policy holders and beneficiaries	75
B. Projections on the Pension Finance.....	76
C. Remaining Policy concerns for securing fiscal sustainability for the national pension	79
D. Simulation result in search of policy suggestions.....	81
2. Long-term outlook on National Health Insurance and Policy Suggestions.....	84
A. Assumptions for the fiscal projections on the national health insurance and method for projections	84
B. Projection Results	86
C. Policy Suggestions	89

VII. Conclusion

Appendix

A - I . Table of Projection results	94
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I. Introduction

Population-aging in Korea is progressing at an unprecedented rate. Currently, population over 65 makes up 11.1% of the entire population, and this proportion, according to Statistics Korea, is expected to reach 14% in 2018, over 20% by 2026, and over 40.1% by 2060. Society with more than 14% of its population over the age of 65 is generally considered an ‘aged society’ while that with more than 20% is considered a ‘post-aged society’.

If these predictions turned out to be true, UN commented, Korea would be second most aged nation in the world after Japan. In other words, when today’s elementary school students retire from their jobs in the future, they would be living in a world where half of the population is over 65, which would be economically and culturally contrasted from the current society.

Since people experience more and more difficulties at their jobs as they age, nations with aging population lose vitality in its economy, and the growth rate starts to slow down. At the same time, domestic prices, naturally, stabilize, and the growth of Nominal GDP slows down even more than the real GDP growth rate does. The over all lethargy in the economy also affects the tax revenue because the proportion of the age bracket that pays the most tax reduces while that of the population who spends most of the tax money increases. Because the government’s fiscal aid to the older generation increases with time, national debt also increases.

Because Korea’s finance is still sound, the burden of aged population does not seem as imminent. However,

population-aging is bound to put a greater burden on fiscal conditions with time. Besides the reunification of two Koreas, low birth rate and population-aging are the biggest long-term fiscal burden for Korea, and academia, experts, and citizens seem to agree with this notion. Nevertheless, practical preparation for the aging population keeps being put off. Ironically, policies for expanding welfare budget for the aged population, which puts more burdens on long-term finance, are currently moving forward.

There are two reasons for the lack of fiscal readiness for population-aging. First of all, there is no concrete information or analysis on the magnitude of burden of population-aging. As such, the general public does not realize the seriousness of the problem. Secondly, the starting point at which population-aging affects fiscal soundness is far into the future for the public to feel the need to start getting ready for it.

This research discusses the future of Korea’s economy and finance up to the year 2060 and aims to provide information on the magnitude of fiscal burden due to population-aging and distribution of that burden among generations. Additionally, this report provides detailed suggestions on responses to aging population.

The second chapter introduces Statistics Korea’s Population Projections,¹⁾ which is used as a basis for this report’s population outlook. Population Projections entails how and how fast Korea’s population structure changes, and how those changes compare to those of other nations. Chapter III makes projections on the

¹ This research directly takes data from Population Projections from Statistics Korea. The end-year for long-term projections is 2060 is because Population Projections make projections up to 2060. Additionally, this research is the first fiscal projections research that utilizes the new Population Projections by Statistics Korea from December, 2011.

macro economy of Korea up to the year 2060. Chapter IV predicts the long-term baseline²⁾ utilizing population and macro-economic projections. The same chapter discusses long-term fiscal balance and national debt, fiscal sustainability of Korea, required adjustments in finance for maintaining that sustainability, and the equity between generations in the future.

The most important message from the predictions on the fiscal baseline is that the current policies for tax revenue and expenditure cannot handle the potential financial burden that population aging imposes on fiscal policies. Research on population aging reveals that even if Korea does not adopt any of the welfare policies that are currently being discussed, Korea's finance will lose³⁾ sustainability from 2034. The same research indicates that after managed fiscal balance improves until 2013, financial deficit continues to worsen each year. Such phenomenon has a close relationship with the trend in population aging. Upon entering the aged-population stage(14% of the population over the age 65) in 2018, managed fiscal balance deficit is only 1.9% of the GDP. However, once the proportion hits 20% (postaged population stage), the deficit surpasses 3% and hits 5% two years prior to reaching 30% in 2035, at which point the national debt is at 70% of the GDP. Starting from this point, fiscal soundness slips out of control, and the managed fiscal balance deficit reaches 13.1% of the GDP while national debt approaches 218% of the GDP in 2060 (40% of the population over the age 65).

Such aggravation of fiscal soundness implies unfair distribution of burden amongst generations. Net tax burden, which is calculated with the generational accounting method (converting the difference between tax paid over the lifetime and fiscal benefits received into the present value), predicts that those born before 1956 receives net benefit while those born after 1957 suffers net burden. Those born in 1956 receives 0.8% of their lifetime income as benefit while those born in

1952 receives 18.2% of their lifetime income as benefit. Additionally, those born in 1957 suffers a net burden of 1.6% of lifetime income while those born in 1992 takes on a burden of 20.6% of lifetime income. As such, net benefit and net burden varies according to the age.

Abovementioned distribution of benefit and burden could be considered an optimistic one under the simple assumption that there is no domestic or international impact on the economy until 2060. To remedy this problem, Chapter V makes projections under the assumption that interest rates respond sensitively to the level of national debt starting from 2034, when Korea's finance is expected to lose sustainability. Under the new assumption, a rise in the interest rates and the interest expense go on a chain reaction to exponentially accumulate national debt, resulting in managed fiscal balance reaching 27.3% of the GDP in 2060 and national debt reaching 299.8% of the GDP. In this case, Korea's economy, not to mention its finance, will be at a great risk. Differently put, these projections work as a sort of 'warning from the future'.

In addition Chapter V calculates what managed fiscal balance and national debt should look like to maintain fiscal sustainability. This calculation assumes that the Korean government does not take a significant action until 2034 to prevent receiving a serious impact from population-aging. Based on this assumption, generational fiscal burden becomes even more unfair.

Fiscal deterioration and unfair distribution of the financial burden due to population-aging is not as far-fetched as it may seem. Chapter V discusses systematic ways to fairly distribute financial burden among generations and maintain fiscal sustainability until 2060 on two aspects: tax revenue and expenditure. Tax revenue aspect discusses expansion of the tax base and gradual increase of the insurance rate of the national pension while tax expenditure aspect recommends

2 Baseline projections refer to the projection method that assumes no change from the current policy. In other words, long-term projections on tax revenue, expenditure, fiscal balance, and national debt level are made under the assumption that tax legislations regarding tax revenue and mandatory expenditure do not change until 2060.

3 This research does not offer long-term projections state-owned enterprise. Fiscal soundness of Korea's public finance is likely to yield much worsened result should potential debt such as debt from state-owned enterprises are also considered in evaluating fiscal sustainability.

practice solutions such as gradual lift of the threshold age for receiving benefits from the national pension. Furthermore, chapter V concludes that necessary measures must be prepared before 2018, at which point Korea becomes an aged society.

Chapter VI is devoted to long-term projections and necessary policy measures for the national pension and national health care, which are two fields that take direct hits from population-aging. This chapter could have been discussed in Chapter IV and V with other finance items, but they are discussed in a separate chapter in consideration of their importance in the context of population-aging.

Chapter VI explains why the national pension is expected to be in the red in 2041, which is three years sooner than expected, and why the pension fund is expected to be depleted in 2053 instead of 2060. Both of them are attributed to the fact that this research utilizes Population Projections from Statistics Korea, which is more recent than what had originally been used as a basis for projections (2008 National Pension Estimation Committee's projections), and the fact

that, as a consequence of changes in the population projections, macro-economic outlook has been updated. Additionally, Chapter VI provides an analyses and recommendations for maintaining sustainability of the national pension until 2070 and on the appropriate threshold age for receiving pension without unfairly distributing the burden to younger generations.

Furthermore, Chapter VI discusses how much fiscal burden of the national health care places on Korea's finance. In other words, it discusses how much national health care cost will increase until 2060 and how that affects the public's burden, what happens to managed fiscal balance and national debt if the deficit in the national health care cost is covered by national treasury. Chapter VI also explores what must be done in order to improve transparency and efficiency of the national health care.

Chapter VII ends with conclusions and provides alternative measures for the worst case scenario, in which Korea's finance, despite its effort to complete systematic preparations in response to population-aging, does not maintain sustainability.

Box 1 National Assembly's Task Force Team against Low Birth Rate

1. Summary

Korea's fast population-aging is accelerated by one of the lowest birth rates in the world, which makes overcoming low birth rate as an urgent task. As an attempt to tackle this problem, National Assembly of Korea has conducted a research on the issue.

First of all, NABO published a series of reports on low birthrate and aged society in 2009.⁴⁾ At the same time, National Assembly's Task Force Team against Low birth Rate has been established with the National Assembly Secretariat's Deputy Secretary-General for Legislative Affairs as a team leader to publish a comprehensive report. Health Welfare Committee experts, Chief of the Legislative Counseling Office,

⁴ NABO has published eight reports in response to low birthrate*population aging in 2009: 1. "Analysis of the public pension and tax reforms in consideration of population aging." 2. "Effects and implications of low birthrate and population aging on economics." 3. "Major trends and implications of promoting fertility and preparing for population aging." 4. "Fiscal analysis of countermeasures for low birth rate*aged society." 5. Policy implications and trends of generational employment rate of the aged society." 6. "Current status of governmental support for economic activities of women and suggestions for improvement." 7. Formulating financial foundation for securing post-retirement income." 8. "Policy direction for tax policies in aged society." And "Effect of low birthrate and population aging, and suggestions."

Senior Secretary to the Speaker for Policy, Chief for Economic Analysis Office, and Chief of the Society and Culture Research Office of National Assembly Research Service joined the task force. And this task force team has published a report called, “Countermeasures for Low Birth Rate and Policy Direction,” which includes ways to improve the law and societal measures to overcome low birth rate, from its three-month long activities from February, 2010 to April, 2010.

2. Major Recommendations from the report

“The Countermeasures for Low Birth Rate and Policy Direction” points out that burden of raising children, change in the perception of marriage and children, instability in employment conditions, and difficulties in maintaining both work and home were major reasons for low birth rate. Although the administration has established the 1st Low Birth Rate · Population-aging Plan (2006-2010), the effect of the plan has been evaluated to be insufficient. The report criticized that the quality of service for childcare was low and that the government’s support was limited to low-income families. The report also pointed out that childcare leaves were rarely used and therefore was impractical and that the government should support families for the cost of raising children.

The report made the following recommendations. First, Legislation of special law to overcome low birth rate. Once the special law is passed, any legislation related to low birth rate can be done in an efficient way and can be arranged in a more systematic way. Second, Establishment of special accounting for low birth rate. Establishment of such accounting can prevent overlapping costs from different ministries on the same measures and could improve the budget transparency. Third, Adoption of childcare benefits, establishment of public postpartum care center, adoption of infertility leaves, enforcement of male childcare leave quota, obligating all industrial complexes to provide public childcare facilities and requiring all day-care providers to register. In addition, the report suggested strengthening some of the already in place policy measures such as after school classes, childcare leaves, and pregnancy labor supports.

II. Population Projections

This chapter, before delving into the discussion of long-term baseline outlook of macro economy, tax revenue and tax expenditure, explores changes in population structure in Korea to assist readers in their understanding of the research results. Generally, economic variables in economics and fiscal projections consist of exogenous variables, which are the foundation for projections, and endogenous variables which are dependent on the exogenous variables. Unlike in short and mid-term projections, population projections are the most important exogenous variable in long-term economic and fiscal projections. Admittedly, acquiring accurate long-term population projections is a difficult task, population projections are still the most reliable exogenous indicator, more so than any other economic variables.

Population aging in its essence refers to a phenomenon where the proportion of younger generation diminishes, which lowers input of labor force and lowers potential and real growth rate of the economy. At the same time,

population aging lowers the growth rate by reducing consumption of the population. Consumption by the public reduces because, in addition to the fact that size of the population diminishes, older population has a lower consumption per working age population. As a result, even if the size of the population does not change, consumption by population naturally declines as the proportion of older people draws an upward curve. Additionally, expansion of older population lowers the saving ratio because older generations spend more than they save. And the lowered saving ratio, in turn, depresses potential growth rate by lowering investment ratio. Declining consumption and investment stabilize the domestic price, and, consequently nominal growth rate slows down at a greater rate than the real growth rate does, which eventually result in reduction in tax revenue. As expected, expenditure due to population aging expands with time, which puts fiscal balance deeper in the red and brings in more debt.

Figure II-1 _ The Comparison of Total Birth Rate

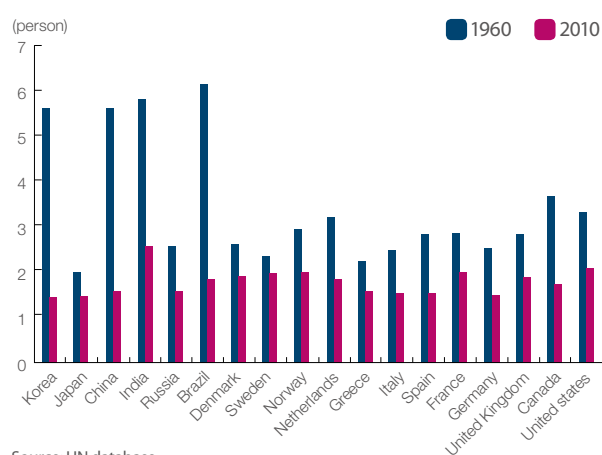
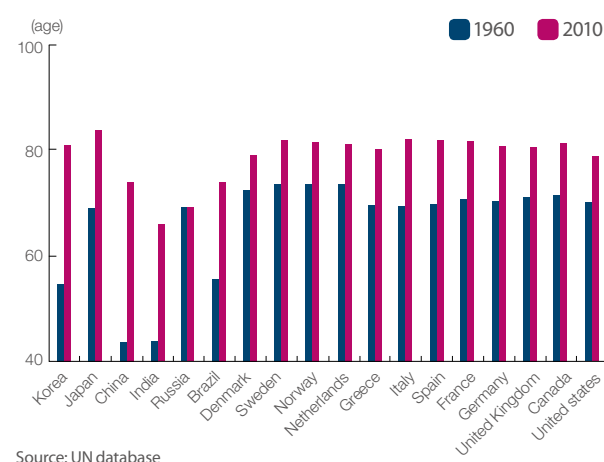


Figure II-2 _ The Comparison of Life Expectancy



1. Population trend for the past 50 years and Comparison of the projections on the trend of various nations for the next 50 years.

This section makes comparisons on the changes between population structures, their projections,⁵⁾ and the rate of population aging.

First of all, declining birth rates for the past 50 years (1960-2010) simultaneously occurred in various nations including Japan, United States, Europe, and BRICs. The decline was particularly noticeable in nations where 1960's Total Fertility Rate⁶⁾ was over five, such as Korea, China, India, and Brazil.

Higher life expectancy is another common phenomenon across the globe, especially in Korea, China, India, and Brazil where life expectancy was lower in the 1960's.

Decline in birth rate and incline in life expectancy are bound to cause significant changes in the population structure for the next fifty years. East Asian nations,

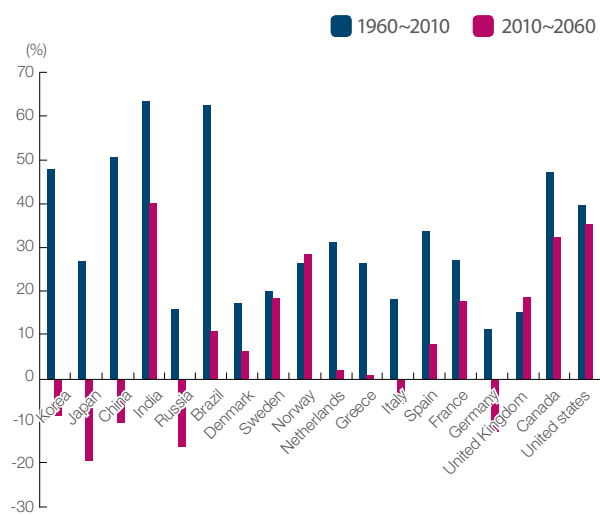
such as Korea, Japan, and China recorded remarkable rates of population increase from 1960 to 2010, but will experience population decrease for the next fifty years.

In 2060, population in the following nations will experience respective drops from 2010: Japan, -18.4%; Russia, -15.5%; Germany, -12.1%; China, -9.7%; Italy, -5.3%. On the other hand, United States, Canada, Norway, United Kingdom, France, and Sweden will manage to maintain relatively high birth rates.

In 2060, population aging is expected to be a serious matter globally. Japan is expected to suffer from the worst population aging, followed by Korea, Spain, and Italy in the order mentioned (See [Feature II-4]). China is also expected to experience serious population aging while India and the United States keep population aging under control. India is expected to have the lowest level of population aging, and the United States will maintain the lowest level of population aging among developed nations.

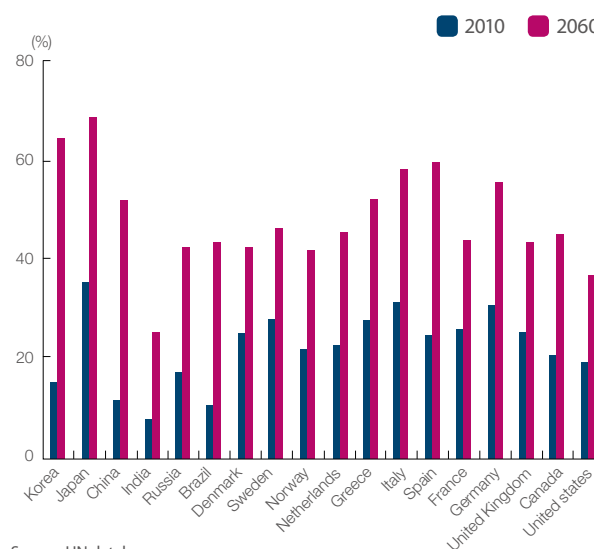
Old-age Dependency Ratio,⁷⁾ which refers to population over 65 divided by population from 20 to 64,

Figure II-3 _ The Comparison of Population Growth Rate



Source: UN database

Figure II-4 _ Old-age Dependency Ratio Projections



Source: UN database

⁵ It must be noted that population projections up to 2060 used by this research may differ from the value utilized by the UN, which is obtained differently from the value in Population Projections by Statistics Korea.

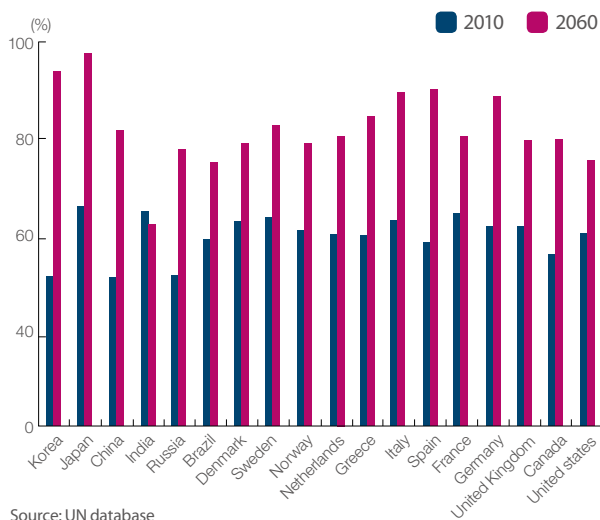
⁶ Total Fertility Rate is defined as the average number of children given by one woman in her fertile period(15~49).

⁷ As noted above, statistics by the UN differ from the values obtained by Statistics Korea. For example, Old-age Dependency Ratio and Total dependency ratio are defined by the ratio between the population from 15-64 and that above 65 while the UN uses the value of population above 65 divided by the population from 20-64.

will record the highest values in Korea and Japan (64.3%, 68.6%, see [Feature II-4]) while that of the United States stays low at 36.8%.

Total Dependency Ratio, which refers to population over 65 and under 19 divided by population from 20-64, will be the highest in Korea and Japan as well (91.2% and 95.7% respectively) while that of European nations will be around 70-80%.

Figure II-5 _ Total Dependency Ratio Projections



Source: UN database

2. Summary of population projections from Statistics Korea.

This research is based on “2011 Population Projections” reported by from Statistics Korea, which was published in December, 2011. “2011 Population Projections” is produced with data from Population and Housing Census, which Statistics Korea performs every 5 years, and makes projections with the most recent data from January, 2010 up to 2060 to reflect trends in different population aspects such as births, deaths, and immigration⁸⁾ (See [Box 1]). “2011 Population Projections” does not merely provide one set of projections. Instead, it provides three different projections under different hypotheses of birth rate, mortality, and immigration (See [Box 2]).

The hypothesis of this report utilizes the median population projection. The following total fertility rate: 1.23 in 2010; 1.35 in 2020; 1.41 in 2030; 1.42 after 2040. Life expectancy is expected to be 77.2 age for male and 84.1 age for female in 2010, which are projected to rise to 86.6 age and 90.3 age in 2060, respectively. Immigration into Korea is expected to decrease down to 0.53 per thousand people in 2060 from 1.67 in 2010.

Table II-1 _ The Outline of Estimated Future Population

Year	Total Population (thousand persons)	Growth Rate (%)	Gender Ratio (%)	The number of Births (thousand persons)	Youth Dependency Ratio (per hundred persons)	Old-age Dependency Ratio (per hundred persons)	Median age (age)	Average age (age)
2010	49,410	0.50	100.4	470	22.2	15.2	37.9	37.9
2020	51,435	0.30	99.4	451	18.6	22.1	43.4	42.4
2030	52,160	0.00	98.6	409	20.0	38.6	48.5	46.2
2040	51,091	-0.40	97.8	325	19.8	57.2	52.6	49.7
2050	48,121	-0.80	97.3	307	18.9	71.0	55.9	52.4
2060	43,959	-1.00	98.1	285	20.5	80.6	57.9	53.5

Note: Youth Dependency Ratio = Youth population(0~14) ÷ Productive population (15~64) X 100
 Old-age Dependency Ratio = Old-age population(over 65) ÷ Productive population (15~64) X 100
 Source: Statistics, “Estimated Future population”, 2011. 12

⁸ Please refer to “Future population projections”, Statistics Korea, 2011. 12

Box 1 Comparison between the old and new projections from Statistics Korea.

New projections expect higher birth rates, life expectancy, and immigration into Korea than those from the 2006 projections. Consequently, the gap in the total population projections between the old and new projections widens with time. For example, as a result of higher birth rate projections after 2005, new projections foresee total fertility rate in 2040 to be 0.14 higher than that from the old projections. As for life expectancy, the rate of incline in life expectancy was higher than that in 2006 projections. Recently, life expectancy for men continues to improve and is expected to be 2.2 higher in 2050 than the value from the old projections (0.4 higher for women). The old projections predicted that 16,000 people would emigrate out of Korea in 2050, but the new projections expect 31,000 people to immigrate into Korea in total. Population in 2010 increased by 540,000, and the apex for population curve was pushed back to 2030 from 2018, but working age population apex remains the same at 2016.

Table _ The Major Assumption & Outcome Comparison Between the new and Old Projections

(unit: person, age, thousand persons, %, productive population per hundred persons)

Indicator		Estimation(2006)		Estimation(2011)	
Total Birth Rate	2010	1.15		1.23	
	2045	1.28		1.42	
Life Expectancy (male/female)	2010	76.15/82.88		77.20/84.07	
	2050	82.87/88.92		85.09/89.28	
	2060			86.59/90.30	
Net Immigration	2010	-36		82	
	2050	-16		31	
	2060			23	
Total population (Growth Rate)	2010	48,875	(0.26%)	49,410	(0.46%)
	2050	42,343	(-1.07%)	48,121	(-0.76%)
	2060			43,959	(-1.00%)
	The top of population (year)	49,340	(2018)	52,160	(2030)
15-64 population (Composition Ratio)	2010	35,611	(72.9%)	35,983	(72.8%)
	2050	22,424	(53.0%)	25,347	(52.7%)
	2060			21,865	(49.7%)
	The top of population (year)	36,190	(2016)	37,039	(2016)
Over 65 population (Composition Ratio)	2010	5,357	(11.0%)	5,452	(11.0%)
	2050	16,156	(38.2%)	17,991	(37.4%)
	2060			17,622	(40.1%)
0-14 population (Composition Ratio)	2010	7,907	(16.2%)	7,975	(16.1%)
	2050	3,763	(8.9%)	4,783	(9.9%)
	2060			4,473	(10.2%)
Total Dependency (old-age)	2010	37.2	(15.0)	37.3	(15.2)
	2050	88.8	(72.0)	89.8	(71.0)
	2060			101.0	(80.6)

Note: 1) The new projections(2011 at present), The old projections(2006 at present)

2) The Fertility, Median Scenario

3) Population Growth, Median Scenario

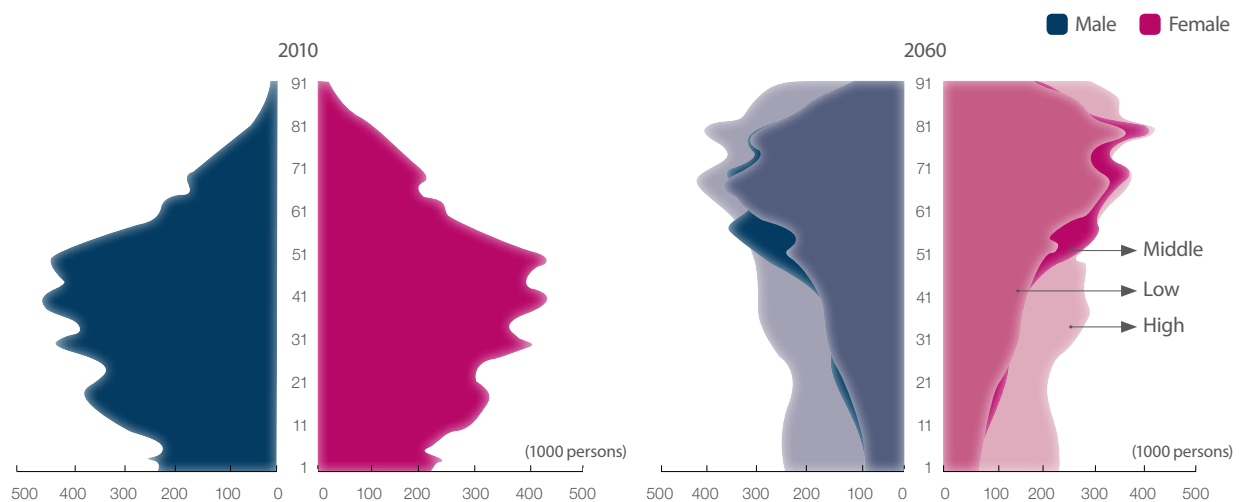
According to [Box 1], the median age for Korea's population jumps to 57.9 in 2060 from 37.9 in 2010, which indicates that nearly half of the population (40%) will be over 65 dependency ratio, which refers to population over 65 per 100 working age (15-64) is expected to increase from 15.2 in 2010 to 80.6 in 2060. Due to declining birth rates, infant population keeps decreasing and consequently decreases population. Population under the age of 5 decreases from 3,260 in 2000 to 1,464 in 2060 (44.9% decline).

Due to low birth rates and population aging, Korea's population structure will change from the bell shaped structure in 2010 to an inverted triangle shape in 2060. The inverted triangle shape shown on the right side of

[Feature II-6] indicates a serious case of low birth rates and population aging. It also looks like a coffin, which is why demographers refer to the shape as "population structure that leads to death." Low birth rates, which is the main reason why Korea's population structure changes into an inverted triangle, is also the reason that population up to five does not increase until 2060 (see [Feature II-7]).

Despite low birth rates, total population maintains an upward curve until 2030 to reach 52,160,000 as a result of higher life expectancies. Afterwards, starting from 2031, total population of Korea starts to dwindle. The rate of decline accelerates each year and the population will drop by 12.1% of population in 2060.

Figure II-6 _ The population Pyramid Changes(Gender, Age in Korea)



Box 2 Three Scenarios for Population Projections from Statistics Korea

The gap between the old and new projections for total population widens with time since the new projections reflect higher birth rates, life expectancy, and immigration into Korea. For example, due to higher birth rates after 2005, new projections expect total fertility rate in 2040 to be 0.14 higher. As for life expectancy, the rate of incline in life expectancy was higher than that in 2006 projections. Recently, life

expectancy for men continues to improve and is expected to be 2.2 higher in 2050 than the value from the old projections (0.4 higher for women). The old projections predicted that 16,000 people would emigrate out of Korea in 2050, but the new projections expect 31,000 people to immigrate into Korea in total. Population in 2010 increased by 540,000 and the apex for population curve was pushed back to 2030 from 2018, but working age population apex remains the same at 2016.

Figure _ Population Forecasts Scenario

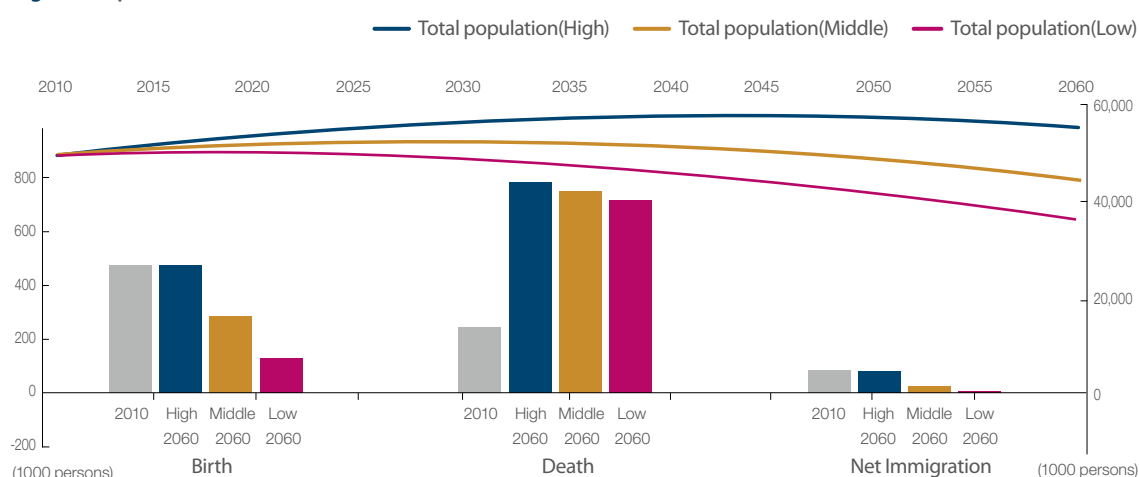


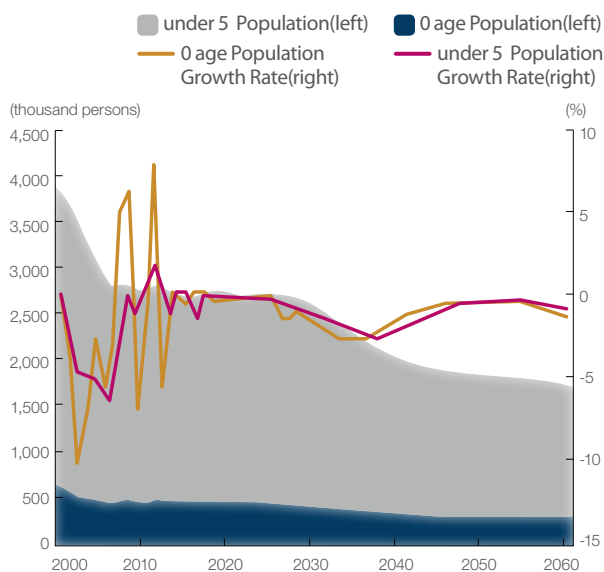
Table _ The Comparison of Population projections

(unit: person, age)

		2010	High	2060 Middle	Low
Total Birth Rate(person)		1.23	1.79	1.42	1.01
Life Expectancy (age)	Male	77.20	89.09	86.59	83.64
	Female	84.07	92.53	90.30	87.81
Ratio of Net Immigration (per thousand persons)		1.67	1.50	0.53	-0.07

Low, middle, and high population projections from Statistics Korea are shown in the graph. Middle projection for 2060 is 43.9 million while high and low projections are 54.8 million and 34.5 million, respectively. When the change in population for 2060 is broken down into major factors, namely births, deaths, and international immigration, births display the biggest discrepancies between the scenarios. The discrepancies are attributed to the differences in assumptions for the scenarios. Middle projections are based on statistical model while high and low projections are extrapolated from the average value of past birth rates and trends.

Figure II-7 _ The change of Population Age Structure

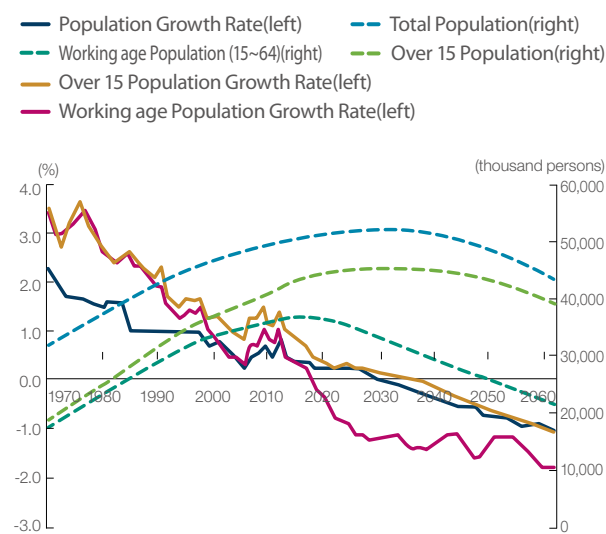


Population over the age of 15 peaks at 45.7 million in 2033 but starts to decline down to 39.4 million in 2060, which is a 7.0% drop from 2012. Population over the age 15 declines at a much slower rate than working age population because population over 65 increases at an explosive rate.

Working age population between 15 and 64 peaks at 37.0 million in 2016 and declines at speed to reach 2.19 million in 2060, which is similar to the current level. This is a 40.2% drop from working age population in 2012.

Population from 35 to 54, which makes up 33.4% of the population in 2012, had already begun declining in 2011 and is expected to drop down to 8.91 million people in 2060, which is a 47% drop from the number in 2012. Population from 35 to 54 is a generation central to production of the nation, produce more labor

Figure II-8 _ The projections of Total population and Working age population(1970~2060)



income than other age brackets, and contributes more income tax per capita than other age brackets.⁹⁾ This age bracket from 35 to 54 also is a major group in the real estate market, and decline of the group is most likely to negatively affect the future real estate market.

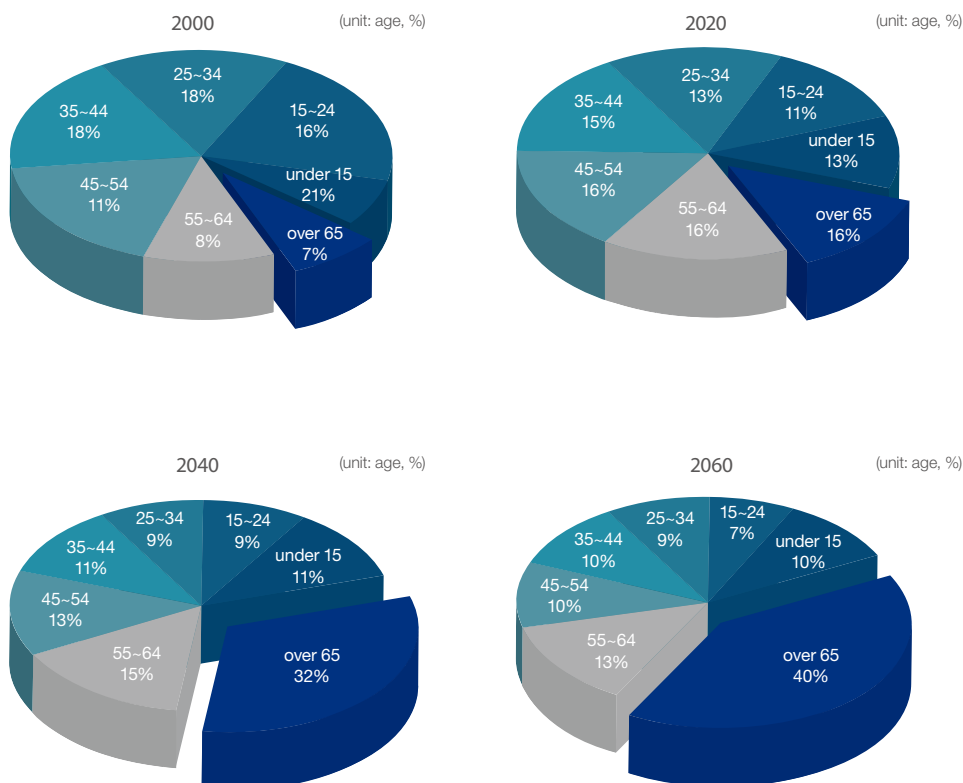
On the other hand, population over 65 makes up most of the population in 2060, and this type of surge in the older generation places fiscal strain on national pension, national health, and social insurance.¹⁰⁾

Population over 65 increases by a factor of 5 from 3.40 million in 2000 to 17.6 million in 2060. This age bracket makes up 11% of the total population in 2010, 14% in 2018 to enter the 'aged population' phase, and surpasses 20% in 2026 to enter 'post-aged population' phase. In 2036, this age bracket is predicted to make up over 30% of the total population and to reach 40.1% in 2060.

⁹ Please refer to Chapter IV for the effect of increase in Aging Population on tax revenue.

¹⁰ Please refer to Chapter IV for the effect of increase in Aging Population on the finance of social insurance.

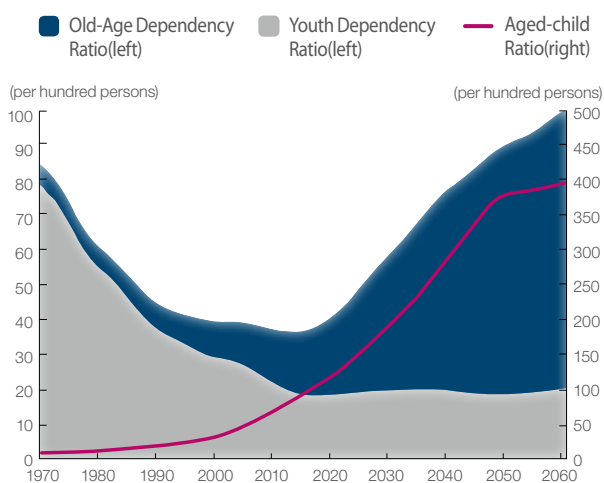
Figure II-9 _ Population Ratio's change and Projections of Total Population



In the 'over 65' age bracket, population between 65 and 69 increases marginally by a factor of 2.2 from 3.7% in 2010 to 8.0% in 2060. In contrast, population over the age 70 increases by a factor of 2.8 from 5.4% in 2010 to 15.0% in 2060 while the proportion of population over the age 80 increases by a factor of 9.1 from 1.9% in 2010 to 17.2% in 2060.

These significant changes in the next fifty years affect old age dependency ratio¹¹⁾ to jump from 15.2 in 2010 to 80.6 in 2060. On the other hand, youth dependency ratio¹²⁾ marginally decreases from 22.2 in 2010 to 20.5 in 2060. Aging index, which is youth population divided by aged population increases by a factor of 5.8 from 68.4 to 394, which means that there are 3.94 people over 65 per one youth under 14.

Figure II-10 _ Youth and Old-Age Dependency Ratio



Note: left is total
Source: Statistics Korea

11 The number of populations over 65 that 100 working population support

12 The number of youths under 14 that 100 working population support

Table II-2 _ The Aged's Current State and Projections

(unit: thousand persons, %)

	2000	2010	2020	2030	2040	2050	2060
over 65	3,395	5,452	8,084	12,691	16,501	17,991	17,622
(Composition Ratio)	(7.2)	(11.0)	(15.7)	(24.3)	(32.3)	(37.4)	(40.1)
over 80	483	961	1,904	2,786	4,815	6,894	7,548
(Composition Ratio)	(1.0)	(1.9)	(3.7)	(5.3)	(9.4)	(14.3)	(17.2)
70~79	1,530	2,645	3,522	5,820	7,568	7,403	6,572
(Composition Ratio)	(3.3)	(5.4)	(6.8)	(11.2)	(14.8)	(15.4)	(15.0)
65~69	1,381	1,847	2,658	4,086	4,118	3,694	3,502
(Composition Ratio)	(2.9)	(3.7)	(5.2)	(7.8)	(8.1)	(7.7)	(8.0)

Source: Statistics Korea

3. Long-term macro-economics and the implications from the fiscal baseline

For Korea's population, which did not cease to increase since the Korean War, decrease is an unimaginable phenomenon. The fact that population of Korea will decrease by 12.1% in 2060 is truly astonishing, and this astonishment is multiplied by the fact that population between 35 and 54, which makes up the most productive bracket in a nation, drops by 47% and also by the fact that working age population drops by 40.2%.

Projections by foreign agencies, including CBO of the United States, draw crucial factors for fiscal projections such as growth rate and tax burden ratio from constant values of indexes from a certain point in the future and onward.¹³⁾ As mentioned in the previous section, Korea's rate of aging is an unprecedented one, and hence assuming that economic growth rate will remain, constant is overly simple. Population aging will cause growth rate to lose steam, reduce tax revenue, and expand expenditure. It would be imprudent to assume that

economic indexes will maintain status quo after a certain point in the future in projecting economic growth rate, tax revenue, and expenditure, especially in the context of Korea's population aging.

Therefore, population projections lead us to the conclusion that Korea, with its fast population aging, cannot rely on the assumption that major economic and fiscal indexes remain constant for the purposes of macro-economic and long-term fiscal baseline projections.

In the following chapters, III and IV, long-term fiscal baseline projections for macro economy, tax revenue and expenditure from 2012 to 2060 are provided. Detailed methods of projections are provided in [A-I]. In those projections, the most important goal was to reflect the effect of population aging on macro-economic and fiscal indexes.

In the projections from 2012 to 2060, 2012-2016 period is based on the mid-term macro-economic, tax revenue and expenditure projections in 2012 Economic Outlook Update and Fiscal Analysis by NABO.¹⁴⁾ Projections from 2017 to 2060 are the results from a long-term projection model.

¹³ Please refer to "CBO's 2011 Long-Term Budget Outlook", Congressional Budget Office, 2011. 6. for the United States. "Sustainability Report 2009", European Economy 9, Economic and Financial Affairs, European Commission, 2009. for Europe. "Mid- to Long-term Trial Calculation for Economy and Finance", Japanese Ministry of Interior, 2011. 8. 12.

¹⁴ Of fiscal expenditure, discretionary expenditure is projected differently from that from NABO starting from 2014. Please refer to Chapter IV for detailed explanation on the discrepancy. As such, please note that size of the public finance, fiscal balance, and national debt projections differ from the mid-term fiscal projections for three years from 2014 to 2016.

III. Macro-economics Outlook

In this chapter, we discuss the long-term forecasts of major macro-economic indices from 2012 to 2060. Major indices are the nominal and real GDP, inflation rate, interest rates and wage, which are used for the baseline projection of the total revenue, total expenditure, fiscal balance and national debt. The forecasts during 2012-2016 are from the report¹⁵⁾ that NABO has already published as a mid-term projection, and we focus on the long-term projections after 2017.

Generally, short- and mid-term projections are more accurate than the long-term projections, since the momentum of projection variables is relatively stable in the mid-term. As projections reach further into the future, the accuracy naturally dwindle as uncertainties both diversify and amplify. We can think of an analogy to archery. When the targets are farther away, it is harder to hit no matter how easy it is to hit closer targets.

The long-term economic outlook for the 2012-2060 is essentially the same as projecting 2010 from the 1960's. Fifty years ago, it would have been impossible to imagine the Korean economy as it is today. That is just how difficult it is to predict what the Korean economy will look like fifty years from today. For this reason, it would be more appropriate to use the long-term outlook in this report for the purpose of understanding the Korean economy under the condition of its stable growth rather than as an accurate forecast of the future.

In this vein, we assume that the Korean economy

grows stably without extraordinary shocks and uncertainties until 2060, for the purpose of long-term forecasts. For the past 50 years, Korea's economy has undergone various crises such as the two oil shocks in the 1970's, the Foreign currency crisis in 1998, the credit card crisis in 2003, and the global financial crisis in 2008. There are still many hurdles to clear, which are the European fiscal crisis and potential global recession thereafter, management of domestic household debts, restructuring of global economy, depletion of fossil fuel, scarcity of raw materials and food, water scarcity due to climate change, and environmental problems. Furthermore, there is a possibility of reunification of two Koreas within next fifty years, and we need to account for the effect of all these events.

The main goal of this work is to analyze the economic and fiscal effects of the low birth rate and aging population. The low birth rate and aging population are a part of potential factors that will significantly affect the Korean economy. However, it is infeasible to discuss all of the factors in one research. Our work provides a starting point for the future.

To make the long-term projections,¹⁶⁾ a small-scale macro-econometric model has been designed by using the yearly data. The model is build up to reflect the effect of population structure on labor market, consumption, saving and growth rate, etc.

Factors to determine total supply, which is for the long-term growth path, have been endogenized, while

¹⁵ National Assembly Budget Office, 「2012 Economic Outlook and Fiscal Analysis(updated)」, 2012. 5

¹⁶ Please refer to Appendix A-I

some of the parameters that are determined to predict a scale of the long-term factors have been assumed to be exogenous. Specifically, total supply is determined by the constant return to scale Cobb-Douglas production function and the growth accounting. Once total supply has been determined, real GDP, along with GDP gap, is calculated, and GDP gap serves as a major explanatory variable that determines GDP deflator. The GDP deflator is used to identify between the real GDP and nominal GDP. Furthermore, it produces investment deflator and consumption deflator, which yield long-term projection values for nominal investment and nominal private consumption, which are necessary for projecting tax revenue.

Table III-1 _ Long term Forecasts of Economically Active Population
(unit: thousand people)

	'91~'00	'01~'10	'11~'20	'21~'30	'31~'40	'41~'50	'51~'60
Economically active population	20,791	23,539	25,597	27,038	27,168	26,630	24,884

1. Total Supply

In summary of our forecasts, the labor input peaks in 2037 and starts to gradually decline due to reduction in total population and working age population.¹⁷⁾

Total saving rate, due to the effect of aging population, gradually declines until 2060. And, as a result, the capital stock declines slowly until 2060. Total factor productivity is determined exogenously,¹⁸⁾ and it is

assumed to be a fixed rate of growth as 1.2% from 2017 to 2060.¹⁹⁾

[Table III-2] breaks down projections for real potential growth rate by input factors. As the table displays, Korea's potential growth rate maintains 3% until 2025, at which it drops down to 2%. In the 2040s, the value drops even further to 1% and below 1% after 2055. From mid 2020s, contribution to potential growth of labor input turns negative, and that of capital stock also gradually falls. Consequently, contribution to growth from labor and capital input turn negative from 2050s and the potential growth rate falls below the growth rate of the total factor productivity.

Before the currency crisis, increase in labor and capital input led the Korean economy to the high growth rate. Since the currency crisis, labor and capital input started to weaken. As [Table III-2] shows, the Korean economy cannot take the same step as it did before, because its growth of potential of labor and capital increase with a low rate. Following our forecasts, contribution to growth from labor input turns negative from the 2020s, because Korea turns into an aged society from those years. This implies that the Korean economy can grow only by capital and productivity increase. This will be a regime that Korea has never experienced before.

On the other hand, due to reduction in working hours and working population, labor productivity, which refers to real GDP per labor hour (=working population x working hours), continues to rise while average capital coefficient(=real net capital stock/real GDP) also maintains a relatively high rate of 3% in the long run.

¹⁷ As analyzed in the chapter II, working-age population (15~64 years old) starts to decline in 2016. But population (15 years old and over) declines in 2034. The conventional method to calculate the labor input is to use the working-age population (15~64). However, this method has a problem because the aged population (65 years old and over) is completely excluded from the labor market. Recently, the old age groups appear more and more in the labor market. We need to consider these aged workers in the aged economy, where the old population participates in the labor market actively. The latter method, which uses the population (15 years over) becomes more preferable than the former. In our forecasts, we use the latter, and the labor input declines from the year 2037, so this almost coincides with the year of population (15 years old and over) decline.

¹⁸ Please refer to Jin Hee Han (2007) and Survey research.

¹⁹ This methodology is similar to the CBO's and OECD's method that the total factor productivity is fixed at 1.1% and 1.3% and the economic growth is decomposed by the contribution of capital and labor input growth.

2. Total Demand

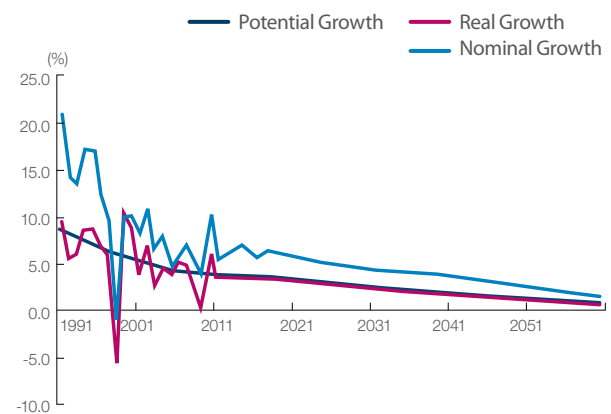
In this section, we discuss on the long-term projection for the expenditure by its components. Due to the declining disposable income and working hours, the growth rate of private consumption is also predicted to decline. In addition, as a result of continuing decline of the economic growth rate, the growth rate of total

investment is also expected to slow down. Imports and exports are determined with domestic and foreign economic growth rate, raw material price and the exchange rate. In the long run, the growth rate of nominal exports will be little higher than that of nominal imports. In this environment, the balance of payment will be a low deficit, close to zero.

Table III-2 _ Real Potential Growth Rate and Contribution of Factors
(unit: %)

Year	Real Potential Growth	TFP	Input	Contribution of Factors	
				Capital	Labor
2016~2020	3.4	1.5	1.92	1.38	0.54
2021~2025	3.0	1.2	1.76	1.31	0.45
2026~2030	2.5	1.2	1.25	1.26	-0.01
2031~2035	2.2	1.2	0.99	1.14	-0.15
2036~2040	2.1	1.2	0.86	1.04	-0.18
2041~2045	1.8	1.2	0.61	0.91	-0.30
2046~2050	1.5	1.2	0.33	0.79	-0.46
2051~2055	1.2	1.2	-0.01	0.68	-0.69
2056~2060	0.9	1.2	-0.29	0.58	-0.87

Figure III-1 _ Real and Nominal GDP Forecasts



Note: Potential GDP Growth before 2011 is estimated by HP(Hodrick prescott)filter
Real GDP Growth forecasts after 2012 is the same as the potential GDP Growth

Table III-3 _ Consumption and Investment(Average Annual Growth Rate & GDP Composition)

(unit: growth rate %, nominal GDP %)

Year	Nominal private consumption		Nominal fixed investment		Nominal export		Nominal import	
	growth rate	per nominal GDP	growth rate	per nominal GDP	growth rate	per nominal GDP	growth rate	per nominal GDP
2016~2020	4.9	51.1	5.3	26.3	8.8	68.2	9.2	66.1
2021~2025	4.5	48.4	4.5	25.2	5.6	70.4	6.1	69.7
2026~2030	4.2	46.8	4.1	22.7	4.5	70.1	4.8	70.5
2031~2035	3.8	45.8	3.7	23.7	4.0	69.5	4.1	70.5
2036~2040	3.6	45.1	3.2	23.2	3.7	68.8	3.8	70.3
2041~2045	3.1	44.6	2.7	22.4	3.0	68.0	3.1	69.7
2046~2050	2.7	44.3	2.4	21.9	2.2	66.5	2.1	68.3
2051~2055	2.2	44.3	2.0	21.6	1.0	63.1	0.8	64.6
2056~2060	1.9	44.6	1.7	21.5	0.1	58.6	-0.2	59.4

3. Variables for price

[Table III-4] shows the results of the long-term projection of the price, wage, and interest rates. The growth rate of consumer price shows a gradual decline until 2060. The growth rate of GDP deflator is predicted to decline at a higher pace than that of consumer price does. The real wage is determined by marginal productivity of labor. The growth rate of nominal wage, which is real wage combined with consumer price growth rate, is expected to slow down gradually. Corporate bonds yield(AA-) is expected to maintain 4% from 2011-2015, falls down to 2% by 2041, and falls further down to 1% in mid-2050s.

Table III-4 _ Interest Rates and CPI Inflation(average) (unit: %)

Year	'11~'15	'16~'20	'21~'30	'31~'40	'41~'50	'51~'60
Nominal corporate bonds yield	4.9	4.6	4.2	3.8	2.8	2.7
Nominal wage growth rate	3.7	4.7	4.7	4.0	3.7	3.3
CPI inflation	3.0	2.6	2.2	1.6	1.2	0.9

4. Implications from the outlook of the long-term economics

Long-term macro-economic projections give warning signals against retardation of the growth of the Korean economy. However, if we make an assumption that the value of Korean Won appreciates up to almost 50% and 700 KRW per USD in 2060, per capita GDP of Korea will reach 46,000 USD at the present value in 2011. This level of per capita GDP is slightly higher than that of Japan and slightly lower than that of the United States. Also, if we assume that the appreciation up to around 500 won, Korea's per capita nominal GDP(annual average) is projected to reach 62,000 dollars in the 2056-2060 period. Comparatively, this present value level of per capita GDP is 7th highest in the world in 2011. In other words, per capita GDP of Korea, with the exception of small city states with low population, will be one of the highest in the world.

Per capita GDP in USD is influenced largely by the exchange rate. The assumption of the appreciation of the value of the won to US dollar by 50%-100% does not seem to be impossible. Based on the assumption, per capita GDP of Korea will be at the same level with Japan and the United States in 2060. It seems plausible

Table III-5 _ Real and Nominal GDP Forecasts

(unit: trillion won, %, 10 thousand won, dollar)

Year	Real GDP		Nominal GDP		Deflator growth rate (%)	Nominal GDP per capita			
	growth rate		growth rate			10 thousand won	2011 present value (10 thousand won)	Dollar	2011 present value(\$)
2011~2015	1,166	3.7	1,404	6.1	2.3	2,871	2,548	26,192	23,206
2016~2020	1,390	3.4	1,883	5.9	2.4	3,681	2,633	35,837	25,556
2021~2025	1,626	3.0	2,477	5.4	2.3	4,783	2,761	54,122	31,177
2026~2030	1,857	2.5	3,162	4.7	2.2	6,067	2,854	75,763	35,593
2031~2035	2,081	2.2	3,920	4.2	2.0	7,534	2,902	100,068	38,517
2036~2040	2,310	2.1	4,761	3.8	1.7	9,256	2,942	124,863	39,682
2041~2045	2,542	1.8	5,665	3.3	1.5	11,253	3,005	152,179	40,644
2046~2050	2,757	1.5	6,568	2.8	1.3	13,459	3,100	182,475	42,028
2051~2055	2,944	1.2	7,413	2.2	1.0	15,799	3,225	214,738	43,827
2056~2060	3,096	0.9	8,143	1.7	0.8	18,170	3,376	247,576	46,001

Note: Present value of GDP per capita is estimated by using corporate bonds yield

Table III-6 _ Nominal GDP per capita(by country)

(unit: dollar)

Rank	Country	Dollar(\$)	Rank	Country	Dollar(\$)	Rank	Country	Dollar(\$)
1	Luxembourg	113,533	11	Austria	49,809	21	Iceland	43,088
2	Qatar	98,329	12	Finland	49,350	22	United Kingdom	38,592
3	Norway	97,255	13	Singapore	49,271	23	New Zealand	36,648
4	Switzerland	81,161	14	United States	48,387	24	Brunai	36,584
5	Arab Emirates	67,008	15	Kuwait	47,982	25	Italy	36,267
6	Australia	65,477	16	Ireland	47,513	26	Spain	32,360
7	Denmark	59,928	17	Belgium	46,878	27	Israel	31,986
8	Sweden	56,956	18	Japan	45,920	28	Cyprus	30,571
9	Canada	50,436	19	France	44,008	29	Greece	27,073
10	Netherlands	50,355	20	Germany	43,742	30	Slovenia	24,533

Source: IMF FIGURE(2010-2011)

as long as the Korean economy grows steadily for the next 50 years.

Depending on the domestic and foreign economic circumstances, the projection that the real growth rate of Korea will be around 2% after mid 2020s, 1% in the 2040s, and below 1% after 2055, becomes not as bleak

as it seems. The underlining premise to the projections is that the Korean economy steadily improves. In addition, it implies that the projection can only come true if various obstacles are successfully overcome. Therefore, the results of this projection should be taken cautiously, as it may be an overly optimistic one.

IV. Projections on Fiscal Baseline

This chapter discusses long-term projections of total revenue, total expenditure, fiscal balance and national debt from 2012 to 2060 in the same order listed. As mentioned in the previous chapter, fiscal variables for 2012-2016 have been taken from NABO mid-term projections. However, as it is noted in the second section of this chapter, discretionary expenditure from 2014 to 2016 is assumed to increase by a different method. As a result, fiscal balance and national debt are different from the mid-term projections during this period.

1. Projections on 2012-2060 Total revenue

Total revenue tends to receive direct impact from population aging as well as an indirect impact from the lower economic growth rate from population aging. This research acquires long-term projections on total revenue by first making projections of tax revenue, social security contribution, and non-tax revenue and then combining them.

A. Total revenue

Total revenue peaks at 26.1% of nominal GDP in 2011, gradually declines afterwards down to 24% in 2040, and falls at a greater rate down to 22.1% in 2060. Total revenue increases at an annual average of 5.0% from 2011 to 2035, but the rate slows down to 2.3% from 2036 to 2060. The sluggishness of the increase rate starting from the mid-2030s is due to the accelerating effect direct and indirect of population aging.

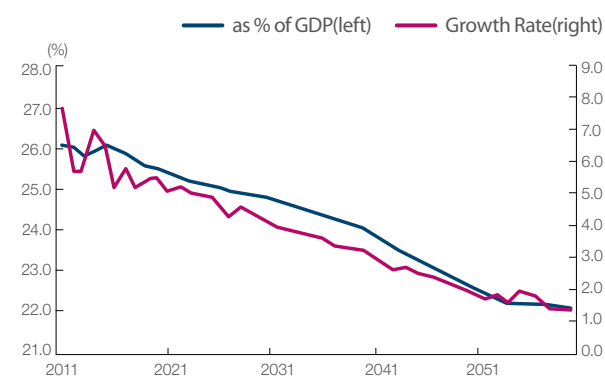
Specifically, the growth rates of tax revenue and

social security contribution fall at a faster rate than that of non-tax revenue. The annual growth rate of tax revenue falls from 5.3% in 2011-2035 to 2.7% in 2036-2060 while that of social security contribution revenue falls from 4.8% to 2.5% in the same time periods. At the time, in contrast, the annual growth rate of non-tax revenue falls from 4.3% in 2011-2035 to 1.1% in 2036-2060. Relatively large magnitude of drop in non-tax revenue is attributed to the reduction in interest income, resulting from depletion of national pension fund and declining interest rates.

Although the National tax revenue as a percentage of GDP does not seem to change significantly since the value is 15.6% in 2011 and 15.5% in 2060, it actually rises to 16.0% in 2017 and falls back down to the value in 2060. The proportion of social security contribution to GDP only falls from 3.1% to 2.6% in the 2011-2060 period while the proportion of non-tax revenue falls steeply down to 4.0% from 7.4%.

Total tax revenue²⁰⁾ (excl. social security contribution) as a percentage of GDP rises to 20.4% in 2017 from

Figure IV-1 _ Total revenue Long-term Projection



20 Rural tax was assumed to maintain its share in total tax while calculating total tax revenue.

Table IV-1 _ Total Revenue Long-term Projection

(unit: Tril.won, %)

	2011	2020	2030	2040	2050	2060	Average Annual Growth Rate		
							11-60	11-35	36-60
Total revenue	322.8	537.1	858.6	1230.1	1571.3	1858.9	3.7	5.0	2.3
(% of GDP)	(26.1)	(25.5)	(24.9)	(24.0)	(22.7)	(22.1)			
Nat'l tax	192.4	333.4	542.7	803.0	1080.9	1301.8	4.0	5.3	2.7
(% of GDP)	(15.6)	(15.8)	(15.7)	(15.7)	(15.6)	(15.5)			
SSC	38.9	67.5	102.6	140.2	183.7	222.6	3.6	4.8	2.5
(% of GDP)	(3.1)	(3.2)	(3.0)	(2.7)	(2.7)	(2.6)			
Non-tax etc.	91.5	136.2	213.3	287.0	306.7	334.5	2.7	4.3	1.1
(% of GDP)	(7.4)	(6.5)	(6.2)	(5.6)	(4.4)	(4.0)			
Total tax revenue as % of GDP(excl.ssc)	19.8	20.2	20.0	20.0	19.9	19.7			
Total revenue as % of GDP(incl.ssc)	26.2	27.2	27.5	27.9	28.0	27.8			

19.8% in 2011, but falls back down to 19.7% in 2060. Nonetheless, Total tax revenue (incl. ssc) as a percentage of GDP rises up to 28.0% from 26.2% in 2011 only to fall back down to 27.8% in 2060. In the projection period(2011-2060), Total tax revenue (excl. social security contribution) as a percentage of GDP does not change significantly (-0.1%p) but total tax revenue(incl. ssc) as a percentage of GDP rises by 1.6%p in the same period. This phenomenon is attributed to the fact that the proportion of national health fees in the GDP rises²¹⁾ (2.7% in 2011 → 5.1% in 2060) although those of national pension and government employees' pension decrease.

B. Tax revenue

National tax is projected by aggregating projections for each tax item:²²⁾ personal income tax, corporate income tax, V.A.T, liquor tax, property taxes, customs duties, special excise tax, transportation tax and etc. Projections from other institutions usually assume that the proportion of tax revenue in GDP remains constant for the projection period,²³⁾ but this research makes projections per tax item in order to analyze the effect of population structure on tax revenue.

To include the effect of population aging on labor income tax, which is directly affected by the change in population structure, tax burden by age bracket and the economically active population have been considered in the projection. On the other hand, corporate income tax and transportation tax have been projected through regression analysis since they are mainly determined by macro-economic factors and it is difficult to break down their tax payers by age.

Projection results show that the nominal growth rate of the three major tax items(personal income tax, V.A.T, corporate income tax) are expected to be slightly above the annual average of 4.0-4.5%. The growth rate of income tax falls at a higher rate in the second part of the projection period (2036-2060) due to the decrease in working age population and reduction in interest income tax from interest rate decline. Corporate income tax is expected to increase by 4.5% (from 44.9 trillion won in 2011 to 380.1 trillion won in 2060) as corporations are projected to steadily grow. Proportion of corporate income tax in GDP has increased after the 97's FX crisis as a result of restructuring of corporations, and this trend is expected to continue. V.A.T is predicted to increase by 4.0% on annual average from 51.9 trillion

²¹ National health fee is included when calculating total revenue (incl. ssc) although this does not consist consolidate fiscal revenue nor has form of any taxation.

²² Please refer to Appendix-I

²³ EU, CBO, Australian and UK government also employ such method.

Table IV-2 _ Nat'l Tax revenue- Long-term Projection

(unit: tril.won, %)

	2011	2020	2030	2040	2050	2060	Average Annual Growth Rate		
							11-60	11-35	36-60
Nat'l tax (% of GDP)	192.4 (15.6)	333.4 (15.8)	542.7 (15.7)	803.0 (15.7)	1,080.9 (15.6)	1,301.8 (15.5)	4.0	5.3	2.7
Personal Income Tax	42.3	79.4	134.9	201.9	268.7	317.2	4.2	5.9	2.6
Corporate Income Tax	44.9	77.1	129.3	203.4	294.8	380.1	4.5	5.5	3.4
V.A.T	51.9	92.1	150.3	222.6	297.0	349.9	4.0	5.4	2.6
Liquor Tax	2.5	4.0	6.8	9.9	13.5	16.6	3.9	5.1	2.8
Property Taxes	8.7	16.6	25.0	36.9	54.4	76.9	4.5	5.2	3.9
Customs Duties	11.0	17.4	24.5	30.1	31.1	24.1	1.6	3.9	-0.5
Special excise Tax & Transportation Tax	17.1	24.7	40.1	55.2	67.3	72.9	3.0	4.4	1.7
Other Taxes	14.0	22.2	31.9	42.9	54.1	64.1	3.2	4.2	2.2

won in 2011 to 349.9 trillion won in 2060. It is expected to grow more in the first part of the projection period (5.4%, 2011-2035) than the second part (2.6%) due to a lethargic atmosphere in the global economy and retardation of the consumption growth.

Other tax items such as property taxes and customs duties will also experience declining increase rates. property taxes, which is the sum of inheritance, gift tax, securities transaction tax and comprehensive real estate tax, are expected to increase by 4.5% on an annual average, slowing down the expected stock growth rate despite the fact that the prolonged decline of interest rate will increase the stock value. The growth rate of customs duties also falls in the second part of the projection period (2011-2035, 3.9% → -0.5%) due to expanding free trades, which is well exemplified with the ratification of Korea-EU FTA in July 2011 and Korea-U. S. FTA in March, 2012.

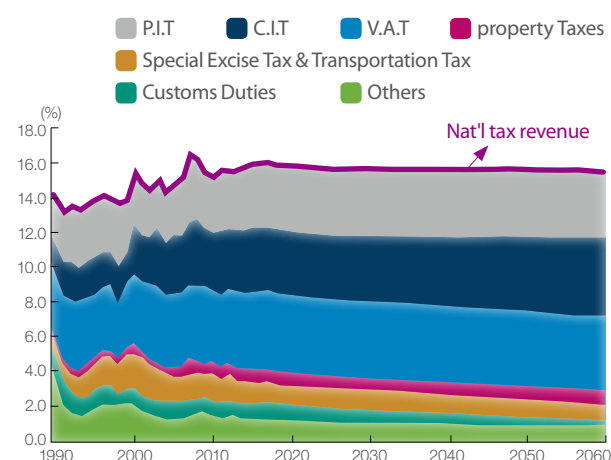
The growth rates of special excise tax and transportation tax, which make up the majority of oil-related tax, are also expected to fall from 4.4% in the first part of the projection to 1.7% in the second part. This accounts for the decline in the growth rates of the number of automobiles and consumption of energy resources due to population decrease.

The above baseline projections for tax revenue by item imply that Korea's tax revenue structure will undergo slight changes unless a major tax reform occurs. For

example, proportions of personal income tax(2011: 3.4% → 2060: 3.8%), corporate income tax(2011: 3.6% → 2060: 4.5%), and property taxes(2011: 0.7% → 2060: 0.9%) slightly increases, while V.A.T(2011: 4.2% → 2060: 4.1%), which is a consumption related tax, slightly falls.

In developed nations consumption and labor are considered as the most important sources of taxation. On the contrary, taxation on capital gains shows a declining trend. EU, Australia, Canada, Swiss and other nations are pursuing policies to increase the proportion of consumption tax and environmental tax. This type of tax encourages saving, bears no penalty effect on

Figure IV-2 _ Trend of each Tax Item, as of GDP



Note: Forecasted values from 2013 and there on.

wage and salary income, and adjusts externalities of the environment. For these reasons, this type of tax policy is found desirable. Nonetheless, in nations where an underground economy is sizeable, the proportion of consumption tax is low because only a small size of tax base is captured. Additionally, since individuals use more cash in transactions which makes it harder to accurately figure out their incomes, the proportion of corporate income tax appears to be relatively large.

Based on the above analysis, projection results (under the assumption that there is no major tax reform) that predict a decrease in the proportion of consumption tax and personal income tax due to population aging and increase in corporate income tax is concerning. To streamline the tax system, especially to secure additional finances in order to handle population aging, the main tax source needs to be shifted from income-related taxes to consumption tax.²⁴⁾

Figure IV-3 _ Size of Tax Item, as % of Total Tax revenue(2011 vs. 2060)

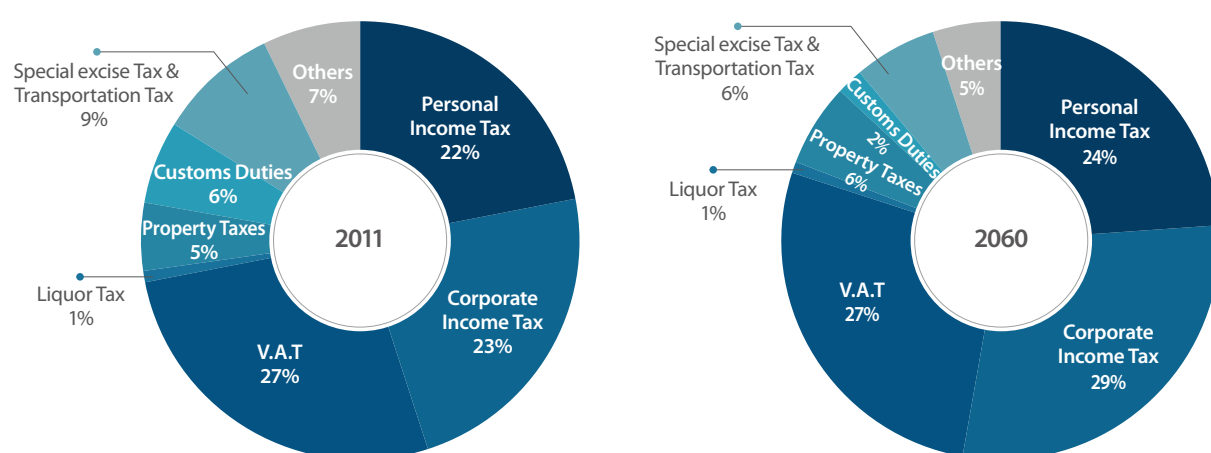
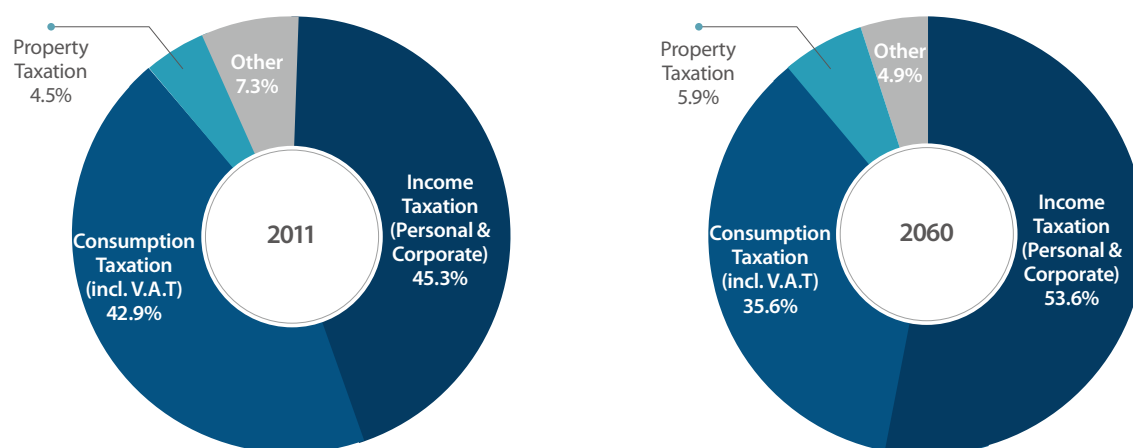


Figure IV-4 _ Size of Tax Item(OECD classification), as % of Total Tax revenue(2011 vs. 2060)



Note: Not comparable with other OECD countries statistic, because some of income-based special taxes(eg. special tax for rural development) are classified into others category.

²⁴ Chapter V of this report proposes to increase tax rate for V.A.T as a means of coping with population aging and estimates revenue effect of such measure.

C. Social security contribution revenue.

Social security contribution revenue, which entails national pension, teachers' pension, workers' compensation pension, and employment insurance, has been projected through models²⁵ dedicated to each part of the revenue that utilizes population and macro-economic variable as external variables and reflects details of the pension system.

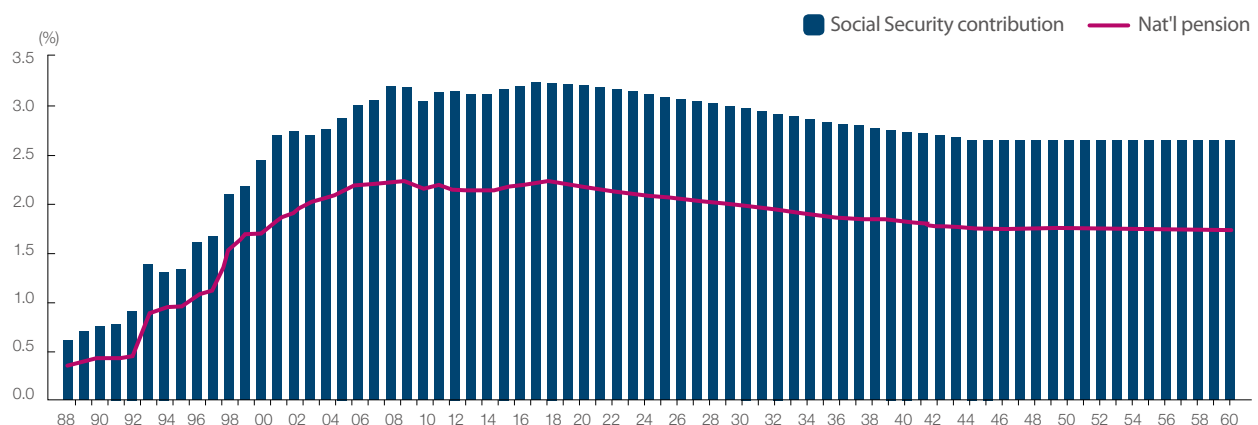
Social security contribution revenue is expected to increase by 3.6% on an annual average from 38.9 trillion won in 2011 to 222.6 trillion won in 2060 from 2011 to 2060. Annual average of growth rate for social security contribution revenue from 2011 to 2060(3.6%) is much lower than that of the past 20 years (17%). Social security contribution revenue decreases since policyholders decrease as a result of declining working population.

National pension increases by 4.6% on an annual average in the first part of projections, but increases only by 2.4% in the second part of the projections, yielding a 3.5% increase on an annual average from 2012 to 2060. Revenue from pension slows down in the second part of the projections because policyholders peak at 19.3 million in 2017 and fall down to 11.3 million in 2060 (-41%). Workers' compensation pension is determined by the working population and nominal

wage. It also slows down in the second part of the projection (5.1% → 2.6%). Retardation in the growth of workers' compensation pension is attributed to the fact that working population starts to decline rapidly after reaching the highest point in 2037. Since participation ratio of workers in 2011 is still relatively immature around 40%, the number of policy holders is expected to increase fast for some time. However, the growth rate is predicted to fall down to 2.3% in the second part of the projection from 5.7% in the first part. The number of policy holders for teachers' pension is assumed to follow the change in total population and the number of retirees is obtained from extrapolation from past three year's data (2008-2010). Results show that the number of policy holders steadily increase until 2033 but starts to decrease gradually to reach 0.274 million in 2060, which is about the same as the number in 2011 (0.273 million). During the first part of projection, where the number of policyholders slightly increases, the growth rate of policyholders is expected to be 5.1%, which is above the growth rate of wage (4.6%). Annual average of the growth rate in the second part, in contrast, is expected to be lower than the growth rate of wage (3.7%) at 3.4%.

Social security contribution revenue, which is a combined figure of national pension, workers'

Figure IV-5 _ Social Security Contribution Import(% of GDP)



25 For instance, National pension was projected by adjusted version of PROST(Pension Reform Option Simulation Toolkit by world Bank) that takes account of national pension system of Korea.

Table IV-3 _ Social Security Contribution-Long term Projection

(unit: Tril.won, %)

	2011	2020	2030	2040	2050	2060	Average Annual Growth Rate		
							11-60	11-35	36-60
Social Security Contribution	38.9	67.5	102.6	140.2	183.7	222.6	3.6	4.8	2.5
(% of GDP)	(3.1)	(3.2)	(3.0)	(2.7)	(2.7)	(2.6)			
Nat'l pension	27.4	45.8	68.6	93.1	121.9	146.5	3.5	4.6	2.4
Workers' Compensation pension	4.8	8.3	13.3	19.0	25.0	30.3	3.8	5.1	2.6
Employment Insurance	5.0	10.6	16.4	21.6	27.5	33.5	3.9	5.7	2.3
Teachers' pension	1.6	2.7	4.3	6.5	9.3	12.3	4.3	5.1	3.4

compensation pension, employment insurance, and teachers' pension, is projected to reach 3.2% of GDP in 2017. However, starting in 2018, when the number of national pension holders declines, the proportion gradually draws a downward curve down to 2.6% in 2060.

D. Non-tax revenue and revenue from capital

Non-tax revenue and capital gain have been projected

in two parts: interest income and others. Interest income is divided again into the following parts: return on public pension funds' financial investment, and interest revenue from loans from government funds. Public pension funds' investment return is projected through each public pension model and interest from loans is projected through net-lending forecasting model. Revenue from sources other than interest has been projected on a long-term scale by applying elasticity of each item to the growth rate of nominal GDP.

Results show that non-tax revenue and capital gain only increase by 2.7% on average per year from 91.5 trillion won in 2011 to 334.5 trillion won in 2060. This level of growth rate is much lower than the 17%, which is the annual average for the past 40 years. Reduction in interest income is the main reason of the significant decline in the growth rate for non-tax revenue and capital revenue.

Steady growth of public pensions and funds since the 1990's has been the main force for the increasing trend of interest income. Nonetheless, pension funds are expected to deplete from 2041 due to the change in population structure. Further, interest rates are expected

Figure IV-6 _ Trend in Nat'l pension Fund and Corporate Bond Yield

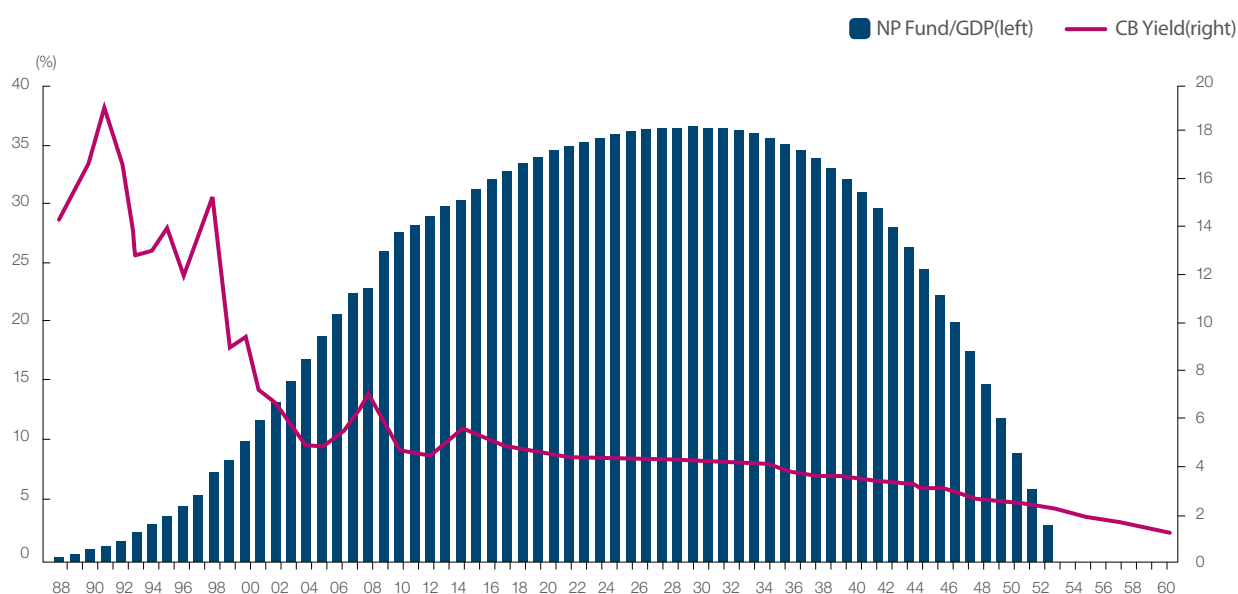


Table IV-4 _ Non-tax revenue and Capital revenues Long-term Projection
(unit: Tril.won, %)

	2011	2020	2030	2040	2050	2060	Average Annual Growth Rate		
							11-60	11-35	36-60
Non-tax etc. (% of GDP)	91.5 (7.4)	136.2 (6.5)	213.3 (6.2)	287.0 (5.6)	306.7 (4.4)	334.5 (4.0)	2.7	4.3	1.1
Non-tax Revenue	56.1	92.3	145.9	194.7	192.4	198.2	2.7	4.8	0.5
Interest	21.9	38.6	60.6	71.7	30.2	4.9	-2.9	5.0	-10.1
Capital Revenues	2.5	4.0	6.5	9.7	13.1	15.9	3.9	4.9	2.8
Repayment of Lending	26.8	29.7	44.1	57.8	67.6	79.6	2.3	2.7	1.8
Total Revenue of public Enterprises	6.1	10.2	16.7	24.8	33.6	40.8	3.8	5.2	2.8

of interest income to the negative direction. Especially As pension starts depleting, the rate of decline for interest income is expected to accelerate. Additionally, elasticity of other non-tax revenue to nominal GDP will stabilize downward and contribution revenue for government employees' pension will decrease due to decline in working population, both of which leads to

retardation of growth of other sources of revenue. As a result, the proportions of non-tax revenue and capital revenue in GDP are expected to continually decline from 7.4% in 2011 to 4.0% in 2060.

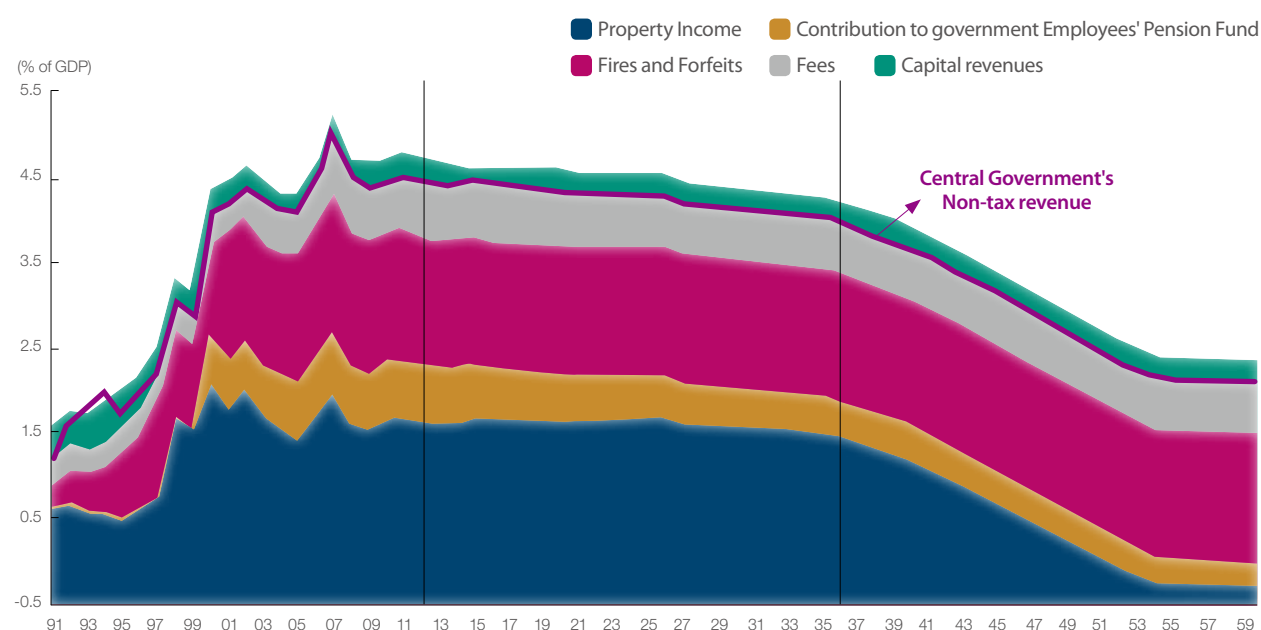
E. Implications from the projections of 2012-2060 total revenue baseline

Two aspects of the long-term projection on total revenue stand out. First of all, national tax revenue as a percentage of GDP, unlike the past, does not maintain the upward trend and displays a downward trend instead. National tax revenue as a percentage of GDP steadily rose from 13.2% in 1970 to 15.6% in 2011 but is projected to peak at 16.0% in 2017 only to drop down to 15.5% in 2060 as income and consumption dwindles due to population aging.

Secondly, the ratio of non-tax revenue/GDP nose-dives due to a reduction in interest income in the late 2030's. This phenomenon can be attributed to the lower number of national pension holders due to population aging and reduced interest income which is caused by a downward stabilization of the interest rate.

In other words, despite the fact that the long-term

Figure IV-7 _ Central Government's Non-tax and Capital revenue



projection on macro-economics is not particularly discouraging, the size of total revenue will decrease with respect to GDP. In the past, total revenue grew faster as the economy grew. In contrast, the economy is not growing as fast as before in the projection period and as the population ages, the growth rate of total revenue is short of that of GDP. Such claim has never been observed in previous researches. The bottom line of this projection is that fiscal deficit will soar if total expenditure is not cut down in accordance with the retarding GDP growth or if the tax base is not broadened sufficiently.

F. Effect of aging population on tax revenue

Low birth rates and population aging have direct and indirect effects on tax revenue.²⁶⁾ The direct effect of population aging can be observed through the change in size and composition of population. As population growth, especially that of the generation that pays majority of the tax, slows down or decreases the number of tax payers also naturally decreases and negatively affects tax revenue. In terms of population composition, population aging cuts down the number of people that

are enjoying the highest level of income in their lifetime and affects tax revenue.

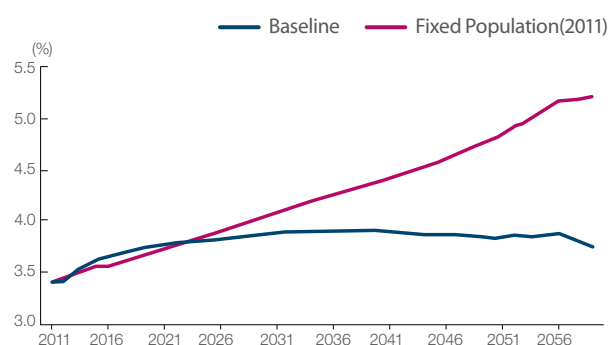
Population indirectly affects tax revenue since it slows down the economic growth and lowers the interest rate. In addition, population aging gives rise to a risk-averse atmosphere, which slows down asset-related tax revenues. Generally, young adults and middle-aged generation prefer assets with high risk and high return while the older generation prefers those with low risk and low return. As a result, preference for real assets wanes, demand for stocks and real estate assets decreases, and demand for bonds rises.

Due to retardation of growth by nominal GDP, wage, and the interest rate, income tax also experiences slow growth. V.A.T., which is directly affected by private consumption, also cannot grow as fast due to population aging. special excise tax and transportation tax mainly consist of oil-related tax revenue, and they are expected to undergo slow growth since population decline cuts down the number of cars sold and negatively affects the domestic market. Population aging will take away steam from the domestic market and consequently lower the demand for imported goods, lowering customs duties.

Box 1 Effect of Population Change on Tax revenue

Population change which Korea is facing decreases total population and reduces the proportion of the people at the high point of their lifetime income, negatively affecting personal income tax(PIT) revenue. In the baseline projection, labor income tax revenue (wage, global, business), which is expected to be heavily affected by population aging, has been projected by multiplying average tax amounts per

Figure _ PIT as % of GDP by Population Composition



26 Please refer to Box 1

taxpayer and number of tax payers by age bracket following each years' population hange. When this projection is compared with that made under the assumption of no change in population composition, the effect of population change on tax revenue can be observed.

The comparison shows that tax revenue is predicted to decline by 28.2%(124.4 trillion won) by 2060 because of the aging effect. Baseline projection for national tax was 3.4% of GDP in 2011 and gradually goes up to 3.9% in 2040, at which point starts to decline down to 3.8% in 2060. When population is fixed at the same level as that in 2011, and growth rate of GDP and wage projection for population aging is considered ratio of income tax to GDP reaches 5.3%, which is 1.4% above the baseline projection.

This analysis is attributed to the following findings: Population in the forties bear most of the tax burden, followed by those in their fifties. However, due to the structural change in population, population in their 30's and 50's decrease while those in their 60's increase in proportion.

Therefore, when the composition of population is fixed at the same level as that in 2011, tax revenue in 2060 is 124.4 trillion won higher(441.6 trillion won) than the baseline projection value.

Figure _ PIT on Average(by age, 2011)

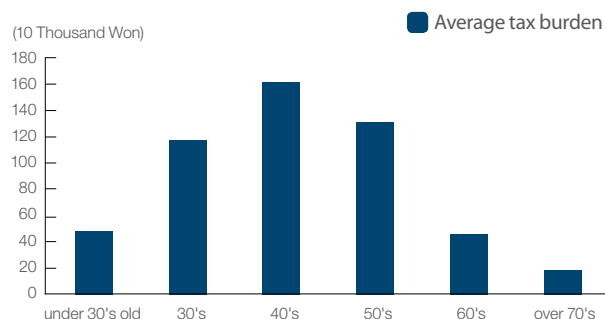


Figure _ PIT Payer's Population Composition

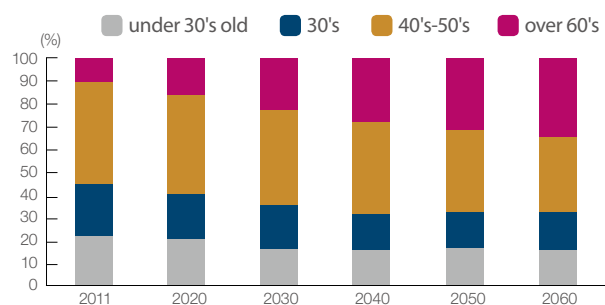
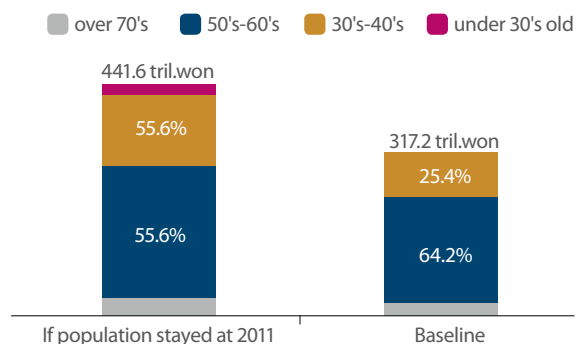


Figure _ PIT in 2060: by Population Composition



2. Projections on the 2012-2060 Total Expenditure

Total expenditure consists of mandatory expenditure and discretionary expenditure, which should be differently projected. This research, first, adjusts mandatory expenditure according to each item's respective legislation.²⁷⁾ The basic method of calculation is unit price multiplied by recipients. In determining the unit price, macro-economic variables such as wage and consumer price have been utilized while generational population and distribution have been used in determining the number of recipients. Fiscal transfers between central government and local governments and interests on loans also are parts of mandatory expenditure. For inter-governmental fiscal transfer, a portion of national tax has been set aside according to legislation while interest on loans has been determined in consideration of level of the national bond interest rate, amount of bond, and amounts at expiration periods.

As the word 'discretionary' suggests, the government has more control over discretionary expenditure, which includes national defense, R&D, SOC and payroll for public officials. The government plans for different periods is a major factor that affects fiscal management of discretionary expenditure. This discretionary nature of discretionary expenditure makes it extremely difficult to raise accuracy for long-term projections.

Because of the different nature between mandatory expenditure and discretionary expenditure, two principles of projection have been established for this research. First of all, discretionary expenditure maintains a certain level of the size of the economy in the long run. This has been accomplished by synchronizing the growth rate of discretionary expenditure with that of nominal GDP. Logic behind this method is that expenditure items such as R&D and SOC, which are directly linked to productivity, growth potential, national security, and quality of

administrative service, cannot be changed greatly at will. Since there have been some criticisms over inefficiency in R&D and SOC, more rigorous fiscal management of those are necessary. However, after efficiency in those divisions has been reached at a satisfactory level, expenditures in these divisions are expected to maintain a certain ratio to the size of the economy.²⁸⁾

The second principle is that discretionary expenditure grows at the same rate as the consumer price does up to 2013. In other words, this research projects that discretionary expenditure rises at the same level as consumer price does until 2013, at which point it starts to rise at the same rate as nominal GDP does until 2060.

Synchronizing the growth rates of discretionary expenditure and consumer price means that the real value of discretionary expenditure is being fixed. Fixing the real value of discretionary expenditure, in light of the past expenditure history of Korea, is a high level of fiscal austerity.²⁹⁾ Because the administration is resolute on recovering fiscal soundness, the high level of fiscal austerity assumed in the projection should be reasonable.

When the global financial crisis occurred in 2008, the administration aggressively expanded expenditure and provided large-scale tax cuts to cope with the crisis. As a result, national debt in 2009 rose to 3.7%p of GDP. Consequently fiscal soundness suffered and the administration changed its fiscal stance to a contractionary one. Furthermore, the administration has announced that it plans to achieve managed budget balance.

Admittedly, 2013 fiscal year will be managed by the next administration, but the budget for that year is set by this administration. Therefore, this administration's strong will to achieve managed budget balance should be reflected in this research, which is done by synchronizing the growth rates of discretionary expenditure and consumer price.³⁰⁾

²⁷ For details of classified discretionary expenditures, see 2012-2060 Long-term Fiscal Projection and Analysis (Korean edition).

²⁸ The real value of discretionary expenditure is being fixed in long-term projection of CBO and EU.

²⁹ If the growth rate keeps the balance in the black, real value of discretionary expenditure is being fixed and discretionary expenditure adjusted GDP will seem to decrease.

³⁰ However, although CPI instead of GDP growth rate in 2013 is used, it does not seem to achieve managed fiscal surplus in 2013. For details, see NABO(2012a).

A. Total Expenditure

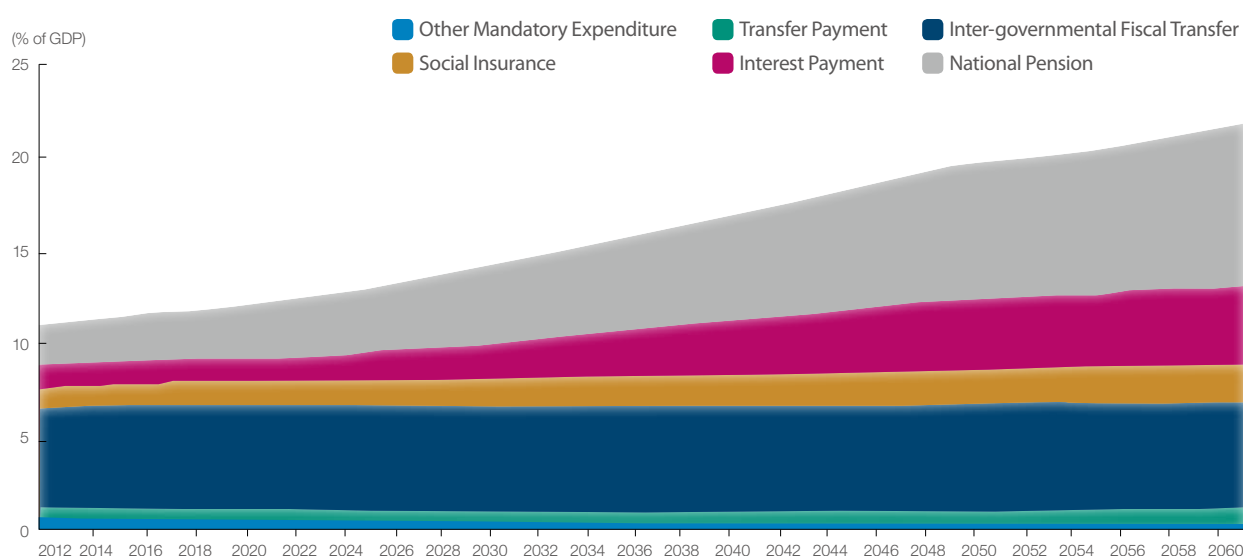
Above-mentioned method of projections yielded the following results on fiscal expenditure up to 2060. First of all, mandatory expenditure is projected to increase by from 11.3% of GDP in 2012 to 22.4% in 2060. Pension expenditure is the fastest growing item, which increases by 7.0% on annual average, followed by interest paid on loans (6.8%), social insurance (5.2%), transfer payment (4.8%), inter-governmental fiscal transfer (4.1%), others (2.5%) in that order. As for discretionary expenditure, the real value of discretionary expenditure was fixed at the 2013 level in consideration of the administration's resolution to rebuild financial soundness, but the increase rate of discretionary expenditure was assumed to maintain 13% ratio to GDP from 2014 to 2060.

As a result, total expenditure is predicted to increase by 4.7% on an annual average from 2012 to 2060, which yields 24.8% of nominal GDP in 2012 and 35.4% of nominal GDP in 2060 (10.6%p increase). Although ratio to GDP has been fixed for discretionary expenditure, mandatory expenditure grows at a faster rate than the

nominal GDP does and the ratio of total expenditure to GDP naturally also rises fast. Because total expenditure grows faster than the nominal GDP does, discretionary expenditure, which maintains a certain level of ratio to nominal GDP, decreases in its ratio to total expenditure from 54.3% in 2012 to 36.7% in 2060.

Proportion of mandatory expenditure in total expenditure rises from 45.7% in 2012 to 63.3% in 2060: elderly pension (8.7%), national pension (8.0%), interest paid on loans (6.8%), long-term care security for the elderly (6.3%), national health (5.9%), private school teachers pension (5.3%), industrial accident compensation insurance (4.9%), basic livelihood security (4.8%) by item. The increase rates indicated in parenthesis next to the mandatory expenditure items show growth rates higher than the annual average value of increase rate for total expenditure (4.7%). As shown in [Figure IV-8], due to population aging and the maturity of the system, recipients of national pension and elderly pension³¹⁾ soar, and expenditures take up the majority of mandatory expenditure.

Figure IV-8 _ Classified Mandatory Expenditure Projection Result



31 Rapid increase of expenditure for early pension is attributed to increase of people aged 65 and over and 'A' value, which is the average of monthly income of all pension holders for the three years prior to pension payment.

Table IV-5 _ Fiscal Payment on Baseline Projection Result

(unit: % of GDP, %p)

Category	Item	2012(B)	2020	2030	2040	2050	2060(A)	A-B
Public Assistance	National basic	0.53	0.53	0.57	0.62	0.71	0.80	0.27
Social Insurance	Health	0.41	0.56	0.82	0.96	1.03	1.03	0.61
	Employment	0.32	0.35	0.33	0.32	0.32	0.35	0.03
	Long term care	0.04	0.04	0.06	0.07	0.09	0.11	0.07
	Industrial Accident	0.30	0.29	0.29	0.32	0.36	0.45	0.15
	Sub Total	1.07	1.24	1.5	1.67	1.8	1.94	0.86
Pension	National	0.90	1.28	1.92	2.98	4.65	5.74	4.84
	Military	0.19	0.19	0.18	0.18	0.18	0.18	-0.01
	Teacher's	0.14	0.17	0.22	0.25	0.25	0.25	0.12
	Government employees	0.79	0.87	0.93	0.92	0.87	0.81	0.02
	Basic old-age	0.23	0.40	1.07	1.46	1.73	1.95	1.72
	Sub Total	2.25	2.91	4.32	5.79	7.68	8.93	6.69
Other Mandatory Expenditure	Patriots and Veterans	0.23	0.18	0.14	0.11	0.09	0.07	-0.16
	Child care	0.17	0.15	0.11	0.07	0.06	0.05	-0.13
	Interest payment	1.18	1.25	1.88	2.99	3.83	4.38	3.21
	Other	0.46	0.40	0.36	0.34	0.33	0.32	-0.13
	Sub Total	2.04	1.98	2.49	3.51	4.31	4.82	2.79
Transfer to Local government	Local Allocation	2.52	2.64	2.65	2.69	2.72	2.74	0.22
	Local Financial	2.93	3.05	3.07	3.11	3.15	3.17	0.23
	Sub Total	5.45	5.69	5.72	5.8	5.87	5.91	0.45
Mandatory		11.33	12.35	14.62	17.39	20.37	22.41	11.08
Discretionary		13.48	13.00	13.00	13.00	13.00	13.00	-0.48
Total Expenditure		24.81	25.35	27.62	30.39	33.37	35.41	10.60

Population aging induces expansion of the older age bracket that requires higher medical cost per capita. Consequently population aging leads to higher expenditure for national health³²⁾ and long-term care security for the elderly, which also grow fast in their proportions in mandatory expenditure. Long-term average growth rates for inter-governmental fiscal transfer, employment insurance, government employees pension, military pension, childcare subsidy grow less than 4.7% per year on average.

Based on the long-term projections for tax revenue and expenditure discussed in previous sections, the projections on fiscal balance and national debt baseline are obtained in the next section.

B. Implications from the Projections of long-term total expenditure baseline.

Total expenditure grows faster than the nominal GDP does because mandatory expenditure grows fast. As discussed in the next section, interests

³² Long-term baseline projection includes public expenditure for national health insurance as consolidated fiscal budget does. On the other hand, Chapter IV shows projection results of total revenue and expenditure for national health insurance and detailed methodology. In addition, assuming that national health insurance is managed as a fund in consolidated fiscal budget, it shows the degree of increase in national burden ratio.

paid on loans skyrockets due to aggravated fiscal soundness, contributing to the fast growth of mandatory expenditure. Naturally, as population ages, total expenditure rises fast, revenue falls, and fiscal soundness suffers.

[Box 2] below indirectly projects the effect of population aging on expenditure by comparing expenditure to the baseline projection under a simple assumption³³⁾ that the population structure of today does not change until 2060. According to the projection, by assuming that the number of recipients does not change after 2012, pension expenditure up to 2060 has been obtained. It shows that expenditure on pension is only

2.27% of GDP. In the baseline projection, expenditure on public pension was 8.92% of GDP, which means that population aging pushes up pension expenditure by 6.7% of GDP.

As for national health, when the number of older population is fixed at the 2012 level, only 2.98% of GDP is spent on medical expenses for older population, which is 3.2%p less than the 6.16% estimated in the baseline projection. This implies that, even if we do not account for the rising medical cost due to advancing medical technology, sheer volume of the older population increases the medical expense on older population increases by 3.2% of GDP.

Box 2 Effect of population change on pension expenditure

Fast population aging is the most concerning fiscal burden for Korea in the long-term. Public pension, which takes up 9.0% of total expenditure (29.5 trillion won, 2.24% of GDP) as of 2012, is expected to rise up to 23.3% of total expenditure (749.4 trillion won, 8.92% of GDP) in 2060.

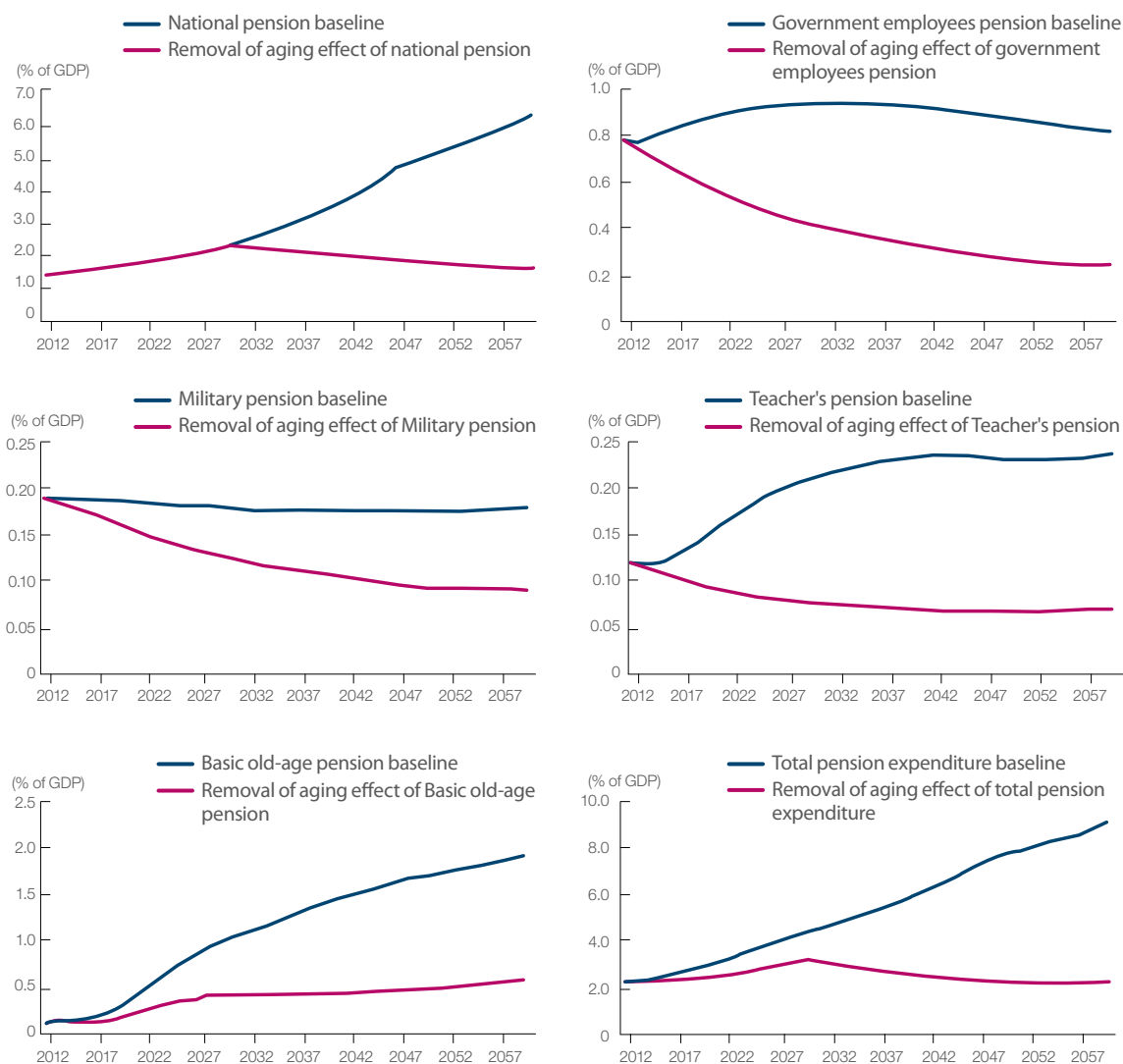
If the effect of population aging is removed with a simple assumption that the number of recipients for pension remains at the 2012 level, pension expenditure only takes up 2.27% of GDP in 2060.

Breaking the public pension fund down into each item, national pension drops by 1.2% from 5.79% of GDP in 2060, government employees pension from 0.81% to 0.24%, private school teachers pension from 0.23% to 0.07%, military pension from 0.18% to 0.09%, elderly pension from 1.95% to 0.65%. In other words, pension expenditure grows fast in the long-term mainly because of the soar in the number of recipients due to population aging.

Since national health is not included in the national finance, only the government subsidy for national health has been projected in this research, but it is reasonable to predict that population aging also places a significant burden of Korea's finance. As of 2012, 40.2% (167.1 trillion won, 3.16% of GDP) of the medical claims paid (415.1 trillion won) is paid to population over 60, which is expected to rise up to 517.9 trillion won (6.16% of GDP) in 2060.

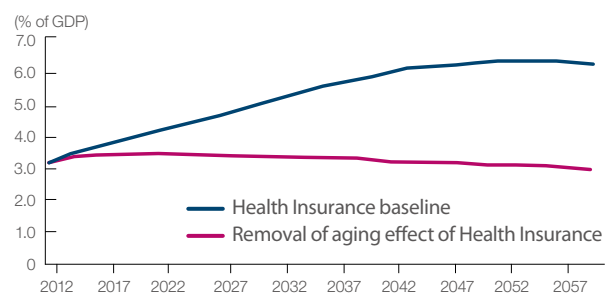
33 Projection of national pension is based on the number of pensioners in 2030.

Figure _ Change of Pension Expenditure According to Aging



When the number of older population is fixed at the 2012 level, medical expense paid to the older age bracket remains at 250.3 trillion won (2.98% of GDP) in 2060, leading to the conclusion that increase in the medical expense paid for the aging people is a major factor in the increase in national health expenditure.

Figure _ Change of Expenditure for National Health Insurance According to Aging



3. Projections on 2012-2060 Fiscal Balance and National Debt.

A. Projections on 2012-2060 Consolidated Fiscal Balance Baseline

As the growth rate for total expenditure surpasses that of total revenue, consolidated fiscal balance worsens with time from 2012 to 2060. Consolidated fiscal balance shows surplus (1.22% of GDP) in 2012 and the surplus expands to 1.4% of GDP in 2013. However, starting from 2014, the surplus starts to wane and turns red from 2021. Once the balance goes into deficit, it does not change direction to record -2.75% in 2030, -6.34% in 2040, -10.67% in 2050, and -13.30% in 2060.

B. Projections on 2012-2060 Fiscal Balance of Social Securities

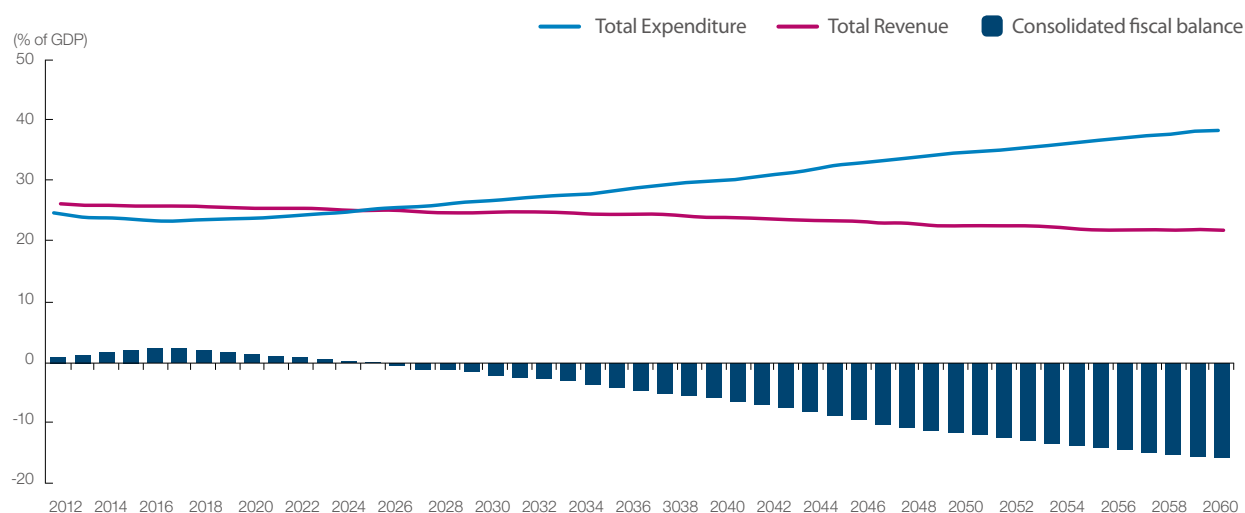
Surplus of social securities fund³⁴⁾ amounts to 2.46% of GDP in 2012, and the size of surplus continues to increase to reach 2.58% of GDP in 2017. However, the size of surplus starts to decrease from 2018 to record -0.16% of GDP deficit in 2040 and -4.36% of GDP in 2060.

National pension, which makes up 45.8% of public pension expenditure (as of 2012), is turning profit (2.5% of GDP) and the accumulated fund amounts to 29% of GDP. The accumulated fund goes up to 36.4% of GDP in 2028 but starts to decline from 2031. The rate of decline takes a quantum leap in 2041 when national pension goes into deficit. Although accumulated amount of the fund maintains 30.9% of GDP in 2040, the amount falls down to 20.2% of GDP in 2046, 3.2% of GDP in 2052, and depletion in 2053.

Management of the fund was the major source of profit for national pension. For example, management of the fund accounted for 55% of profit from insurance premiums and 35.3% of the total profit. Profit from fund management goes up with the size of the fund. For example, profit from fund management is going to peak at 75% of premium profit and 42.9% of total profit in 2028. Since the fund shows healthy growth until 2028, its depletion, which starts in 2040, is a dramatic phenomenon and is considered a classic adverse effect of population aging on finance.

Consequently, deficit of national pension reaches

Figure IV-9 _ Total Revenue and Expenditure, Consolidated Fiscal Balance Projection Result



³⁴ Social security fund consists of national pension fund, private school teachers pension fund, industrial accident compensation insurance fund, and unemployment insurance fund.

3.2% of GDP in 2057, at which point deficit of national pension is included in the managed budget balance³⁵). In 2070, the deficit reaches 4.8% of GDP.

Teachers pension is predicted to be depleted much sooner than national pension does. It is projected to turn deficit in 2019 and to be depleted in 2029. It may seem as though the government is responsible for replacing

depleted fund, but the government's obligation to preserve the fund is not mandatory under the law. Also, the managing entity for the fund is not a public entity but is Teachers Pension Corporation. Therefore, the government's obligation to preserve teachers pension is not clear. For that reason, depletion of teachers pension is thought to be resolved by Teachers Pension

Figure IV-10 _ Teacher's Pension on Fiscal Baseline Projections

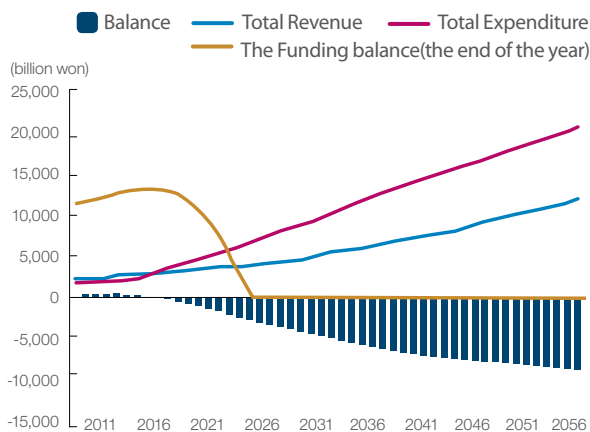


Figure IV-12 _ Employment Insurance on Fiscal Baseline Projections

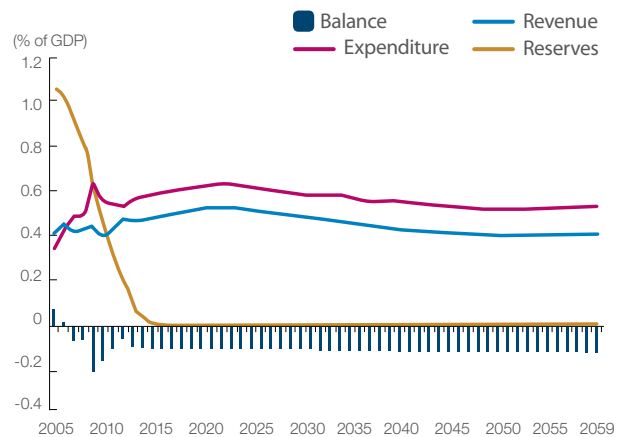


Figure IV-11 _ National Pension on Fiscal Baseline Projections

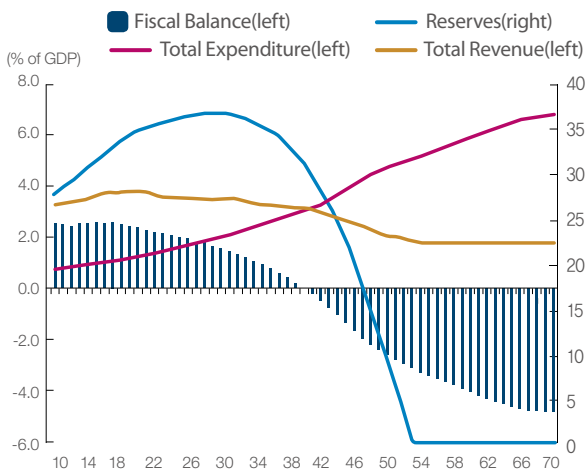
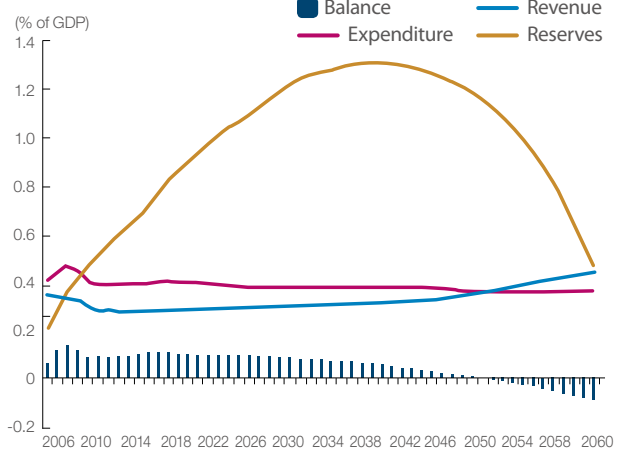


Figure IV-13 _ Industrial Accident Insurance on Fiscal Baseline Projections



³⁵ Managed fiscal balance is defined as surplus of social security funds, which is except for private school teachers pension fund, subtracted from consolidated fiscal balance. Using the term of managed fiscal balance along with the term of consolidated fiscal balance lets us correctly figure out a fiscal condition. First, it may reduce the possibility that fiscal condition seems to be good because of surplus of social security funds in the present. Secondly, it reflects the fact that if the funds get into the red, the government should cover the deficits of the funds and includes the deficits into managed fiscal balance. Of course, before the deficits are covered by national finance, reserves of the funds should be used to cover the deficits by priority.

Corporation, not by governmental aid for the purposes of this projection.

At the same time, employment insurance is projected

to be depleted by 2016 while industrial accident compensation insurance is projected to last until past 2060.

Box 3 Future Task for Four Major Public Pensions

National pension, teachers pension, government employees pension and military pension are often referred to as four major public pensions. Although government employees pension and military pension are not normally considered social securities, we will discuss policy concerns about these two funds to resolve fiscal uncertainties and make long-term fiscal projections.

First of all, national pension has already lowered income substitution rate by 30%p (70% → 40%) through two reforms (1998 and 2007). However, as life expectancy rises and mortality rate lowers, recipients of the pension increase fast and potential uncertainties for pension financing are not to be resolved yet. As for national pension's long-term projections and ways to secure sustainability, please refer to VI: Long-term projections for National Pension and National Health Insurance, and Policy.

In respective reform, government employees pension and teachers pension only managed to adjust premium rates and wage minimally and hence still possesses fiscal uncertainties to be resolved. According to the revised legislation, insurance rates have been raised from 5.525% of base income in 2008 (8.5% of monthly amount of remuneration) to 7% in 2012, but structural imbalance, which aggravates fiscal deficit, still remains because salary adjustment (pension benefit rate until 2008: 2.1% → 1.9% after 2009) is minimized.

Pension system, in addition to structural imbalance, has adopted system for link of entitlement durations between national pension and government employees pension from 2009. This means that a significant number of policyholders that used to receive one-time block payment go on scheduled payments and add to the fiscal uncertainties on the long-term. Therefore, pension benefit rate needs to be adjusted further in order to relieve long-term fiscal burden of government employees pension and teachers pension and to achieve equity with national pension.

Also, inter-generation equity between old policyholders and new policyholders need to be resolved.

Table _ Four Public Pension Long-term Projection

(unit: % of GDP)

Year	National pension			Teacher's Pension			Government Employees Pension			Military Pension		
	Total Revenue	Total Expenditure	Balance	Total Revenue	Total Expenditure	Balance	Total Revenue	Total Expenditure	Balance	Total Revenue	Total Expenditure	Balance
2012	3.37	0.95	2.42	0.17	0.14	0.03	0.64	0.79	-0.15	0.03	0.19	-0.16
2020	3.66	1.31	2.34	0.16	0.17	-0.01	0.59	0.88	-0.29	0.03	0.19	-0.16
2030	3.50	1.96	1.54	0.13	0.23	-0.10	0.55	0.95	-0.40	0.02	0.18	-0.16
2040	3.03	3.02	0.02	0.13	0.25	-0.12	0.54	0.95	-0.41	0.02	0.18	-0.16
2050	2.09	4.70	-2.61	0.13	0.25	-0.12	0.57	0.90	-0.34	0.02	0.18	-0.16
2060	1.74	5.79	-4.05	0.13	0.26	-0.11	0.64	0.85	-0.20	0.01	0.18	-0.17

This is so because revised legislation, which is applied to the new policyholders from 2010, reduces fiscal burden by differentiating payment structure by generations (Those who join after 2010 receive benefits when they turn 65 and the standard for benefits is changed from the average base income of the last three years of the working period to the average base income of the entire working period. This change is disadvantageous to the new members).

In 2010, Ministry of Defense has proposed reforms for military pension, but the legislation is not yet passed. Fiscal balance of military pension is -0.16% of GDP in 2012 and is expected to fall by 0.01% down to -0.17% of GDP in 2060. To revive fiscal stability for military pension, methods to improve government employees pension and teachers pension can be followed. Considering military's unique system (different retirement ages for different ranks, difficulty in finding a new job) reforms to military pension should be reviewed more carefully.

C. Projections on 2012-2060 Managed budget Balance Baseline

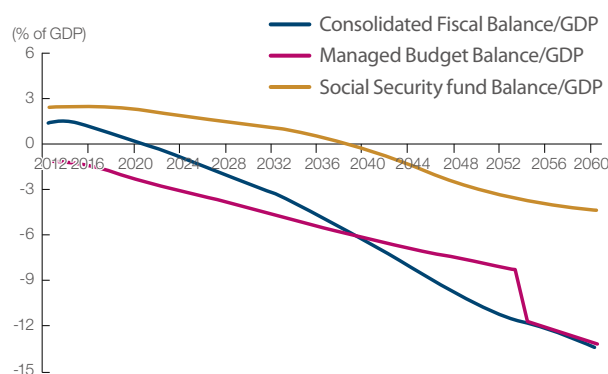
Results from projections on consolidated fiscal balance and social securities show that managed fiscal balance starts from -1.24% of GDP deficit in 2012, slightly recovers to -1.14% in 2013, and starts falling again from 2014 until 2060. In other words, managed fiscal balance does not turn profit until 2060.³⁶⁾

This type of deficit is closely related with the population aging. When the population enters “aging population” phase in 2018 (14% of population over age 65), deficit is 1.9% of GDP, but when the population enters “aged society” phase in 2024 (20% of population over 65), deficit is greater than 3% of GDP. When the proportion of population over 65 becomes greater than 30% in 2034, the deficit rises above 5% of GDP. Afterward, the magnitude of deficit continues to expand to reach 11% of GDP in 2054 and 13.1% of GDP in 2060.

The size of deficit from managed fiscal balance in [Figure IV-14] jumps up in 2054 because national

pension fund is depleted in 2053 and the deficit from the fund is reflected in managed fiscal balance.³⁷⁾ From that point, total revenue from national pension is only 36.9% of total expenditure and the big difference between revenue and expenditure requires aids from the government. As such, the size of managed fiscal balance expands by 32%p of GDP in 2054 to 11.6%. Managed fiscal balance shows 13.09% of GDP deficit in 2060, and 4.5%p of the deficit is needed for preserving the national pension fund.

Figure IV-14 _ Fiscal Balance Projection



³⁶ In NABO 2012 Revised Economic Outlook and Fiscal Analysis, consumer price index (CPI) is used at 2012-2016 projection of managed fiscal balance. On the other hand, in this long-term projection, GDP growth rate instead of CPI since 2014 is used. Using GDP growth rate grows up discretionary expenditure more quickly than using CPI does. As a result, managed fiscal balance is expected to be in 0.1% of GDP deficit.

³⁷ Because the reserves of employment insurance are expected to run low in 2017, the deficit is reflected at managed fiscal balance.

Table IV-6 _ The Projection of Consolidated Fiscal Balance, Social Security fund Balance and Managed Budget Balance (unit: trillion won, %)

Year	Consolidated Fiscal Balance			Social Security fund Balance			Managed Budget Balance
	Total Revenue	Total Expenditure	Consolidated Fiscal Balance	Revenue	Expenditure	Social Security Fund Balance	
2012	341.4 (26.03)	325.4 (24.81)	16.0 (1.22)	57.9 (4.41)	25.7 (1.96)	32.2 (2.46)	-16.2 (-1.24)
2020	537.1 (25.51)	533.7 (25.35)	3.4 (0.16)	100.0 (4.75)	50.7 (2.41)	49.2 (2.34)	-45.8 (-2.18)
2030	858.6 (24.87)	953.5 (27.62)	-94.9 (-2.75)	155.6 (4.51)	106.5 (3.08)	49.1 (1.42)	-144.1 (-4.17)
2040	1230.1 (24.05)	1554.7 (30.39)	-324.6 (-6.34)	203.5 (3.98)	211.9 (4.14)	-8.4 (-0.16)	-316.2 (-6.18)
2050	1571.3 (22.70)	2309.7 (33.37)	-738.4 (-10.67)	207.6 (2.99)	404.4 (5.84)	-196.9 (-2.84)	-541.5 (-7.82)
2060	1858.9 (22.11)	2975.0 (35.41)	-1117.9 (-13.30)	224.2 (2.67)	590.9 (7.03)	-366.7 (-4.36)	-1,100.7 (-13.09)

Note: () is % of GDP

D. Projections on 2012-2060 National Debt Baseline

National debt is divided into deficit covering debt and financial debt, depending on the capacity to repay. Deficit covering debt is the type that does not have assets for repayment of the debt and needs to be paid back through taxes, which place the burden of repayment on the tax payers. In this research, deficit covering debt is calculated by adding the deficit of fiscal balance to the deficit covering debt from the previous year. Financial debt includes secured assets for repayment such as foreign exchange loans. The size of financial debt is assumed to maintain a certain ratio to GDP for the purposes of this research.

Results show that national debt stays at a stable level until mid-2010, but starts to soar from 2020. National debt is 34% of GDP in 2012, but the proportion jumps to 40.0% in 2021 and over 50% in 2027. The rate of increase of national debt accelerates each year to exceed 60% in 2031, 103.5% in 2043, and 218.6% in 2060. It means that national debt doubles in just 17 years. This type of explosive increase is attributed to population

aging and interest paid on accumulated loans is another important reason. Since population aging is not a matter that can be resolved swiftly, national debt is predicted to continue its explosive expansion after 2060.

When the national debt is divided per capita, the value is around 9 million won in 2012 but shoots up to 420 million won in 2060. Present value for 420 million won in 2012 is around 70 million won. When this per capita debt is recalculated so that the national debt is divided by the number of tax payers, the value increases from 12 million won in 2012 to 840 million won in 2060, which the current value is equal to 140 million won in 2012.³⁸⁾ Since working population is on a decline, capacity to repay the debt is also weakening, leading to the conclusion that the explosive expansion of national debt is not sustainable.

Table IV-7 _ National Debt Projection (unit: trillion won, %)

	2012	2020	2030	2040	2050	2060
Scale	448	815	2,022	4,669	9,437	18,375
(% of GDP)	34.2	38.7	58.6	91.3	136.3	218.6

³⁸ As working age population (36.56 million in 2012 to 21.87 million in 2060) decreases faster than population does, national debt burden of working age population per capita is expected to increase faster than that of population per capita.

Figure IV-15 _ Trend of National Debt Ratio of GDP and Projection

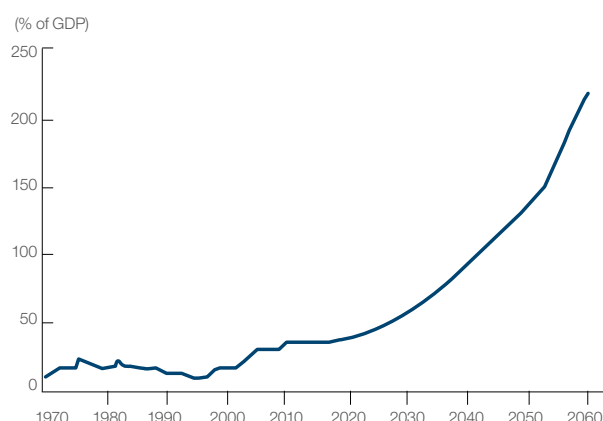
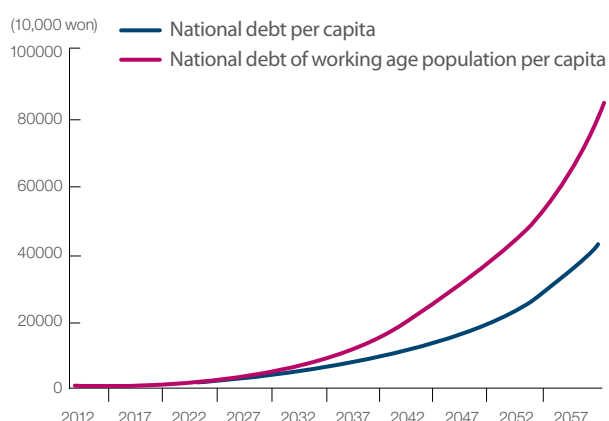


Figure IV-16 _ Total Population and Projection of National Debt of Working Age Population per capita



4. Analysis on long-term fiscal sustainability.

Fiscal crisis that broke out in Greece in 2010 spread to Spain, Portugal, and Italy. Fiscal crises in these European nations came as a big shock to the financial market; it pushed up the interest rate and credit rating of financial institutions plunged. Private loans suddenly vanished and these nations are experiencing the worst crises since the Second World War. The financial crises in southern European nations are the most recent example of financial crisis and have many implications for Korea since Korea may experience fiscal difficulties due to population aging.

A. Implications from the fiscal crisis of southern European nations

Fiscal crises in southern European nations expanded fiscal deficit in those nations and adversely affected the real economy through financial market. European banks that have invested in the national bonds of Greece,

Spain, Portugal, and Italy face uncertainties regarding recoverability of their investments, drop in their credit ratings and difficulties in financing, increasing the risk of bank run and possibility of bankruptcy. These nations need rigorous fiscal restructuring to prevent the worst scenario from turning into reality.

To recover fiscal soundness, these nations have cut down social welfare expenditure, reduced the number of public officials, cut back on expenditure, collected more tax, and raised V.A.T., all of which are thought to be politically infeasible (See [Box 4]).³⁹⁾ Additionally, they set a high goal of reducing fiscal deficit by 3-5%p of GDP each year. Southern European nations now face a difficult situation where they must cope with serious economic contraction with tight fiscal policy. As such, these nations are recording negative growth for three years. Some of them have unemployment rates higher than 20% and that of the young adults above 50%.

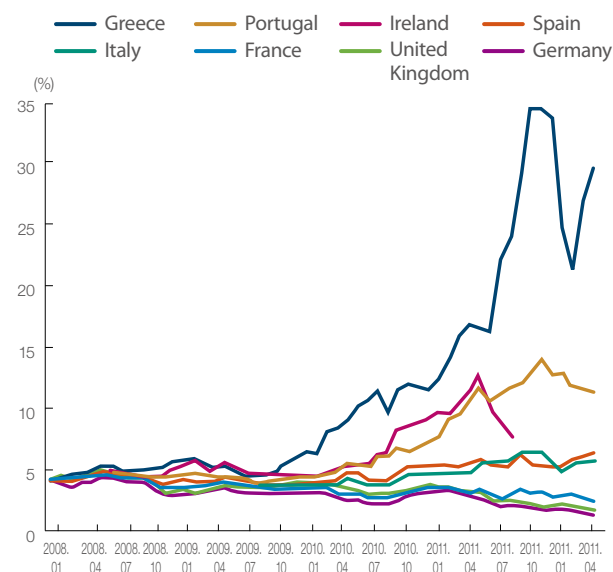
Public finance has various roles in economy. From macro-economic perspective, public finance can be expanded when the economy is contracting and

³⁹⁾ European nations implement fiscal soundness by reducing expenditure. However, some nations such as Greece, Portugal and Spain that have been in financial crisis have increased revenue as well as have reduced expenditure for their fiscal soundness.

contracted when the economy is growing so that the economy can find stability. If public finance is managed in the opposite direction (expanding when the economy is slowing down and vice versa), unemployment rate could skyrocket and other side effects could surface. Although it is the foremost task for the southern European nations to revive fiscal soundness through tight monetary policy, insisting on tight fiscal policy when the economy is down leave ample room for criticism from macro-economic perspective. In other words, public finance is holding back the economy that is already contracted instead of reviving it.

What Korea needs to pay special attention to in the fiscal crisis of Southern European nations is that, those nations did not have a high level of national debt compared to their GDPs. Spain was recording national debt at 67.1% of GDP in 2010, Portugal 103.6%, Italy 126.1%, and Greece 149.1%. Since the fiscal crisis in southern Europe broke out in early 2010, these values are most likely from 2009. In 2009, Greece recorded

Figure IV-17 _ Trend of Interest Rate for South European Nations



133.5% of GDP as national debt, Italy 127.1%, United Kingdom 72.4%, Spain 62.9%, Ireland 71.1%, and Portugal 93.3%.⁴⁰⁾

Box 4 European countermeasure for recovering fiscal soundness after the global financial crisis.

Some of the European nations experienced a considerable augmentation in deficit during the global financial crisis. National debt of Ireland increased by 63.0%p, Greece by 47.0%p, United Kingdom by 32.6%p, Portugal by 31.2%p, and Spain by 26.4%p. As a result, ratio of national debt to GDP in 2011 reached 165.1% for Greece, Italy 127.7%, Ireland 127.3%, Ireland 112.6%, and Portugal 111.9%.

Afterwards, European Union signed a new fiscal treaty led by Germany with approvals from 25 nations. Should a member nation's fiscal deficit exceed 3% of GDP and national debt exceeds 60% of GDP, European Union may impose a penalty on that nation. Also, to better cope with crises and risks, the new treaty consolidates ESM, which was established in 2012, and ETSF. European nations are strengthening the mid-term plan to recover fiscal soundness that has been established after the financial crisis.

⁴⁰ The results of the general election in Greece and France show antipathy for financial structure adjustment among the people. At this, national organizations such as IMF are changing their position that requirements of financial soundness to Southern Europe nations may be alleviated.

Table _ National Debt of the General Government of European Nations

(unit: % of GDP, %p)

	2007	2008(B)	2009	2010	2011(A)	A-B
Greece	115	118.1	133.5	149.1	165.1	47.0
Italy	112.1	114.7	127.1	126.1	127.7	13.0
Iceland	53.3	102.1	119.8	125	127.3	25.2
Ireland	28.7	49.6	71.1	98.5	112.6	63.0
Portugal	75.4	80.7	93.3	103.6	111.9	31.2
Belgium	88	93	100	100.2	100.3	7.3
France	73	79.3	90.8	95.2	98.6	19.3
United Kingdom	47.2	57.4	72.4	82.2	90	32.6
Hungary	73.4	77	86.7	86.9	89.8	12.8
Germany	65.6	69.7	77.4	87.1	86.9	17.2
Austria	63.4	68.4	74.4	78.2	79.9	11.5
Spain	42.3	47.7	62.9	67.1	74.1	26.4
Netherlands	51.5	64.8	67.4	70.6	72.5	7.7
Euro Zone 15 Countries Average	71.8	77	87.6	92.9	95.6	18.6

Source: OECD Statistics.

Table _ Mid-term Financial Soundness Plan of European Nations

	Mid-term Goal Setting	Revenue	Expenditure
Greece	Implementation of conditions for bailout program that set by EU and IMF	Increase of indirect tax on alcohol and cigarettes Privatization of public enterprises	Increase of pension age to 65 Reduction of payments in public sector Extension social security expenditure and health expenditure
Italy	Establishment of balanced budget in 2013 as a fiscal goal Include fiscal rule into constitution Establishment of independent audit organization	Imposition of solidarity contribution for high income earners Increase of capital gains tax	Reduction of pension expenditure through reformation of pension system Reduction of payments in public sector Extension of women' retiring age Reduction of financial assistance grants to local government through reorganization and merger
United Kingdom	Establishment of fiscal mandate	Increase of bank levy rate and zero-rating of VAT Abolition of applying consumer price index to some tax deduction	Increase of pension age to 67 Wage freeze in public sector Enactment of Welfare Reform Act Reduction of overseas development assistance Introduction of universal credit in FY2013/2014
Spain	Achievement 5.3% of GDP deficit in 2012 and 3.0% of GDP deficit in 2013 Include fiscal rule into constitution Establishment of a guideline of compilation of a balanced or surplus budget	Increase rates of corporate tax and income tax	Wage freeze in public sector Reduction of infrastructure investment and international cooperation expenditure Reduction of payment period of unemployment benefit Reduction of local government aid
France	Achievement a balanced finance Introduction of a zero nominal growth target and the general review of public policies(RGPP)	Renovation of net wealth tax Abolition of the highest limit of tax burden Establishment unrealized capital gains tax Increase rates of corporate tax and income tax	Increase of pension age from 65 to 67 Extension of legal retiring age From 60 to 62

What needs to be noted is that the interest rate rose and the credit rating of the country nosedived when the nation was thought to have lost sustainability, not when the nation was thought to have a high level of national debt. For example, the interest rate in Spain started to rise when the possibility of fiscal crisis was suggested. National debt of Spain was only 62.9% of GDP, meaning that fiscal crisis occurs when fiscal sustainability is questioned, not when the level of national debt exceeds a certain point.

B. Review of projections on long-term fiscal baseline

It has been projected in this research that Korea's national debt will reach 219% of GDP in 2060. Observing that southern European nations and the United Kingdom that are suffering from fiscal crises had national debts lower than 200% of GDP, possibility of fiscal crisis in Korea before 2060 cannot be negated.

Should Korea's public finance loses sustainability, the interest rate will rise, foreign investments will be withdrawn, and credit rating of Korea will fall just like they did in southern European nations. Also, unlike in southern European nations where the value of their currency cannot independently change, Korea's exchange rate will skyrocket, leading to bankruptcies of businesses that cannot handle the sudden change of the exchange rate and high rate of inflation. While European nations can rely on European Union members since they do not wish to see the collapse of the Union, Korea does not have similar institutions to rely on. Korea will face much more serious difficulties and higher possibility of bankruptcy, should fiscal crisis occur.

Therefore, major economic indexes such as the interest rate, exchange rate, growth rate, and unemployment rate will be completely different from the projection made in the third chapter once Korea's public finance loses sustainability. The real interest rate, exchange rate, inflation rate and unemployment rate will most likely soar and the growth rate of GDP will plunge, locking Korea's economy in negative growth for an extended period like the southern European nations.

Therefore, it is extremely important to test whether or not Korea's economy will be able to maintain fiscal sustainability until 2060, at which point national debt levels at 219% of GDP. If Korea's economy is bound to lose fiscal sustainability, it is still important to figure out when it will lose fiscal sustainability. In this research, two methods have been used to test fiscal sustainability: Bohn's Test and Blanchard et al. method.

1) Bohn's Test

According to Bohn's Test (See [Box 5]), Korea will hold onto its fiscal sustainability until 2033. In other words, ρ coefficient of Bohn's Test turns negative from 2034, meaning that fiscal sustainability is lost.⁴¹⁾ The fact that sustainability is lost despite the ratio of national debt to GDP is only around 70.2% in 2034 should be noted.

According to the macro-economic projections in the third chapter, the real GDP growth rate in 2034 is around 2.1%, and per capita GDP is similar to that of the United Kingdom around 39,000 USD at present value. In other words, if the current fiscal structure is maintained until 2034, Korea is projected to lose fiscal sustainability when the per capita GDP doubles from that in 2012.

⁴¹ Fiscal sustainability is expected to be maintained at the 10% significance level until 2030. In other words, since 2031, fiscal sustainability is expected to be lost at 5% significance level, and since 2038, it is expected to be lost at 1% significance level

Box 5 Bohn's Test

There are many methods to test fiscal sustainability. Among those, Bohn's Test methodology is used in this part. Bohn's test adjusts short-term fiscal expenditure that is discretionary or change in the economic atmosphere (in the context of the relationship between long-term fiscal balance and national debt) to test fiscal sustainability.

$$s_t = f(d_t) + \mu_t = \rho d_t + \alpha_0 + \alpha_G \text{GVAR}_t + \alpha_Y \text{YVAR}_t + \varepsilon_t$$

s : ratio of primary fiscal balance to nominal GDP

d : ratio of national debt to nominal GDP

$$\text{GVAR} = \frac{g - g^*}{y}, \quad \text{YVAR} = \left(1 - \frac{y}{y^*}\right) \frac{g^*}{y},$$

y : real GDP g : real governmental expenditure

$*$: projected value (obtained through HP filtering)

μ, ε : error

This function shows that when the national debt/ GDP variable, ρ , is positive, fiscal sustainability exists as policy measures to improve fiscal balance proves effect against increasing national debt. On the other hand, policy measures can be construed as ineffective or non-existent when the value of ρ is negative, meaning that fiscal sustainability is unattainable.

In terms of population structure, 2034 is the 9th year since Korea enters the phase “aged population,” with more than 20% of its population over the age 65 (27.6%). Aged dependency ratio, which refers to the population ratio of those who are over 65 to each person from 15-64, approaches 45.7% in 2034. At that point, national debt is around 70.2% of GDP with managed budget balance around 5.1% of GDP in deficit. The deficit and the ratio of national debt to GDP are on the rise at this point.

Should the news that Korea will not be able to hold on to its fiscal sustainability spread, Korea will have no

option but to adopt tight fiscal policy by increasing tax revenue and cutting down on expenditure just like the southern European nations did. And from this point on, major macro-economic indexes will be much worse than those projected in the third chapter. In that case, real economy will be contracted and fiscal conditions will be worse as the interest rate rises.

Chapter V discusses to which degree fiscal conditions exacerbated from 2034 when fiscal sustainability is lost and the interest rate responds sensitively to national debt.⁴²⁾

⁴² Long-term economic outlook in Chapter III is based on the premise that financial crisis will not occur.

Table IV-8 _ Estimation of Fiscal Sustainability Using Bohn's Test¹⁾

	Constant	α_G	α_Y	ρ	R2	S.E.	DW
2012	-0.018 (0.008)	-0.679 (0.001)	-0.753 (0.054)	0.115 (0.001)	0.428	0.015	0.467
2020	-0.017 (0.002)	-0.672 (0.000)	-0.738 (0.041)	0.110 (0.000)	0.484	0.014	0.456
2030	-0.001 (0.821)	-0.665 (0.001)	-0.574 (0.151)	0.026 (0.095)	0.235	0.015	0.291
2031	0.001 (0.882)	-0.665 (0.001)	-0.558 (0.167)	0.018 (0.219)	0.214	0.016	0.279
2032	0.002 (0.605)	-0.664 (0.001)	-0.543 (0.183)	0.011 (0.437)	0.197	0.016	0.268
2033	0.004 (0.378)	-0.664 (0.001)	-0.530 (0.198)	0.004 (0.755)	0.186	0.016	0.258
2034	0.005 (0.217)	-0.664 (0.002)	-0.517 (0.213)	-0.002 (0.871)	0.179	0.016	0.250
2035	0.006 (0.114)	-0.664 (0.002)	-0.505 (0.226)	-0.008 (0.519)	0.179	0.016	0.242
2036	0.008 (0.055)	-0.665 (0.002)	-0.494 (0.239)	-0.013 (0.257)	0.184	0.016	0.235
2037	0.009 (0.025)	-0.665 (0.002)	-0.484 (0.251)	-0.018 (0.103)	0.194	0.016	0.229
2038	0.010 (0.011)	-0.665 (0.002)	-0.475 (0.262)	-0.022 (0.033)	0.210	0.016	0.224
2039	0.011 (0.004)	-0.666 (0.002)	-0.466 (0.273)	-0.026 (0.008)	0.231	0.016	0.219
2040	0.012 (0.002)	-0.666 (0.002)	-0.457 (0.282)	-0.030 (0.002)	0.256	0.016	0.214
2050	0.019 (0.000)	-0.674 (0.002)	-0.398 (0.351)	-0.055 (0.000)	0.594	0.017	0.185
2060	0.019 (0.000)	-0.683 (0.001)	-0.359 (0.377)	-0.055 (0.000)	0.787	0.016	0.186

Note: 1) Numbers in the parenthesis are p-value. If pvalue is positive, it means that fiscal sustainability is maintained. Otherwise, it means that fiscal sustainability is lost.

Box 6 Formula of Blanchard et al.'s Short-term and Mid-term Differential

■ Short-term Differential

$$t^*_0 - t = g + h - t + (\gamma - \theta) b = d + (\gamma - \theta) b$$

t^*_0 : Revenue Ratio for Fiscal Sustainability γ : Real Interest Rate

t : Current Revenue Ratio θ : Real GDP Growth Rate

g : Real Government Expenditure of Real GDP b : National Debt of Real GDP

h : Real Government Transfer of Real GDP

■ Mid-term Differential

$$t^*_n - t = \left(\frac{\gamma - \theta}{1 + \gamma - \theta} \right) \left[1 - \left(\frac{1}{1 + \gamma - \theta} \right)^n \right]^{-1} \left[\sum_{s=1}^n \left(\frac{1}{1 + \gamma - \theta} \right)^{s-1} (g_s + h_s) \right] + b_0$$

t^*_n : Revenue Ratio for the nth Fiscal Sustainability t : Current Revenue Ratio

2) Blanchard et al. (1990) fiscal sustainability test

Although fiscal sustainability has been tested with Bohn's test in the previous part, fiscal sustainability is too important of an issue to reach a conclusion with one type of test. Therefore, Blanchard et al. method has been used to test fiscal sustainability once again to see how reliable the result from Bohn's test is.

Blanchard et al. (1990) proposed an indicator that is useful in determination of fiscal sustainability. That indicator is defined by the difference between tax revenue/GDP ratio that is sustainable for a certain period of time and the current ratio of tax revenue/GDP. Blanchard divides the test period into short-term gap (1 year), medium-term gap(5 years), and long-term gap(10 years). When the gap is negative, it means that fiscal sustainability is there while positive values mean that

fiscal sustainability is lost. Positive values also mean that more tax should be raised while expenditure is cut down at the same time. This research, to find out the time when fiscal sustainability starts to deteriorate, used short- and medium-term gaps.

Result shows that Korea will lose fiscal sustainability from 2029 while short-term gap indicated that Korea will lose fiscal sustainability from 2034.⁴³⁾ The medium-term gap result matches that from Bohn's test in the previous part of this research.⁴⁴⁾ Also, Bohn's test indicated that Korea's fiscal sustainability loses certainty from 2031, and this conclusion does not differ significantly from the result from Blanchard method. In conclusion, both methods that are widely used to test fiscal sustainability indicate that Korea's fiscal sustainability will lose certainty in the early 2030's.

⁴³ Short-term differential in 2029 is 0.15, which means that primary budget balance is improved as much as 0.15%p of GDP to maintain fiscal sustainability.

⁴⁴ Midterm differential in 2034 is 0.19, which means that primary budget balance is improved as much as 0.19%p of GDP to maintain fiscal sustainability for five years from 2034.

Table IV-9 _ Estimation of Fiscal Sustainability Using Blanchard et al. (1990)

	Estimation of short-term Differential	Estimation of mid-term Differential
2012	-4.54	-3.94
2013	-3.45	-3.90
2014	-3.23	-3.78
2015	-3.14	-3.75
2016	-3.01	-3.66
2017	-2.96	-3.36
2018	-2.66	-3.11
2019	-2.40	-2.87
2020	-2.15	-2.64
2021	-1.86	-2.38
2022	-1.62	-2.15
2023	-1.36	-1.93
2024	-1.10	-1.68
2025	-0.86	-1.47
2026	-0.61	-1.27
2027	-0.29	-0.97
2028	-0.03	-0.80
2029	0.15	-0.64
2030	0.42	-0.49
2031	0.60	-0.34
2032	0.89	-0.18
2033	1.04	0.00
2034	1.35	0.19
2035	1.57	0.37
2036	1.86	0.59
2037	2.13	0.82
2038	2.39	1.04
2039	2.66	1.31
2040	2.92	1.57
2041	3.24	1.88
2042	3.58	2.26
2043	3.93	2.63
2044	4.26	2.93
2045	4.62	3.33
2046	4.98	3.71
2047	5.33	4.05
2048	5.68	4.52
2049	5.93	4.80
2050	6.16	5.05
2051	6.38	5.38
2052	6.59	5.66
2053	6.77	5.80
2054	6.97	6.09
2055	7.07	6.27
2056	7.18	6.36
2057	7.31	6.52
2058	7.48	6.69
2059	7.65	6.86
2060	7.81	7.05

5. Analysis of net tax burden per generation based on generational accounting

In this section, we will discuss what long-term baseline projections mean to the people of Korea. It is a well-known fact that burden of fiscal difficulties are placed more on future generations rather than on the older generation. This section discusses how the burden, which has been projected with long-term baseline projections, will be distributed based on generational accounting method.

[Figure IV-18] shows how fiscal burden is distributed among the people of Korea. In this feature, each bar for respective generation represents net tax burden per capita at present value. In other words, each bar represents the difference between the amount of tax each person pays in lifetime and the amount supported by the government at present value in 2012. If the bar is in the positive, each person pays more tax than what he/she receives from the government and vice versa.

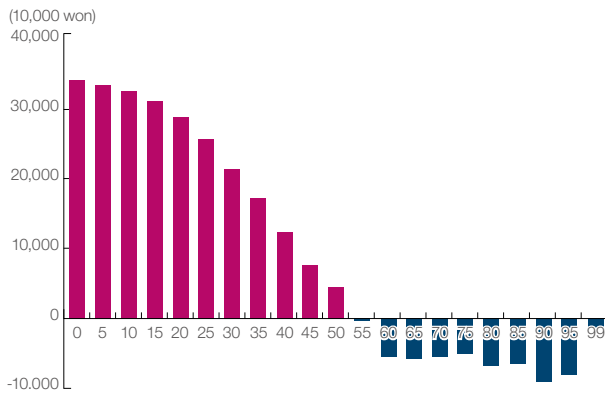
As the figure shows, should the long-term baseline projections are realized (the current fiscal structure is not changed until 2060), those who are born in or before 1956 enjoy more benefits than bear burden while those who are born after 1956 bear more burden than benefit.

Additionally, net generation burden decreases with age. For example, those who are 50 in 2012 bear 28.3 million won as net tax burden at present value while 40 year-olds bear 123.9 million, 30 year-olds 211.1 million won, 20 year-olds, 10 year-olds 296.4 million, and newly born babies bear 342.6 million in net burden. On the other hand, 60 year-olds enjoy 786.8 million won in benefit while 70 year-olds enjoy 80.3 million won and 80 year-olds enjoy 87.0 million won. This result shows that Korea's fiscal system is disadvantageous to the younger generation.

This result is plotted as a ratio to lifetime income in [Figure IV-19]. Babies born in 2012 bear tax burden that amounts to 22.2% of their lifetime income, which is sharply contrasted with 10.1% for those who are born in 1964. Further, those born in 1954 enjoy net benefit that amounts to 10.9% of their lifetime income. The ratio

goes up for older generations; those born in 1950 receive 27.1% of their lifetime income as net benefit while those born in 1944 receive 50.4%.

Figure IV-18 _ Present Values of Net Tax Burdens on Age Groups According to Baseline Projection



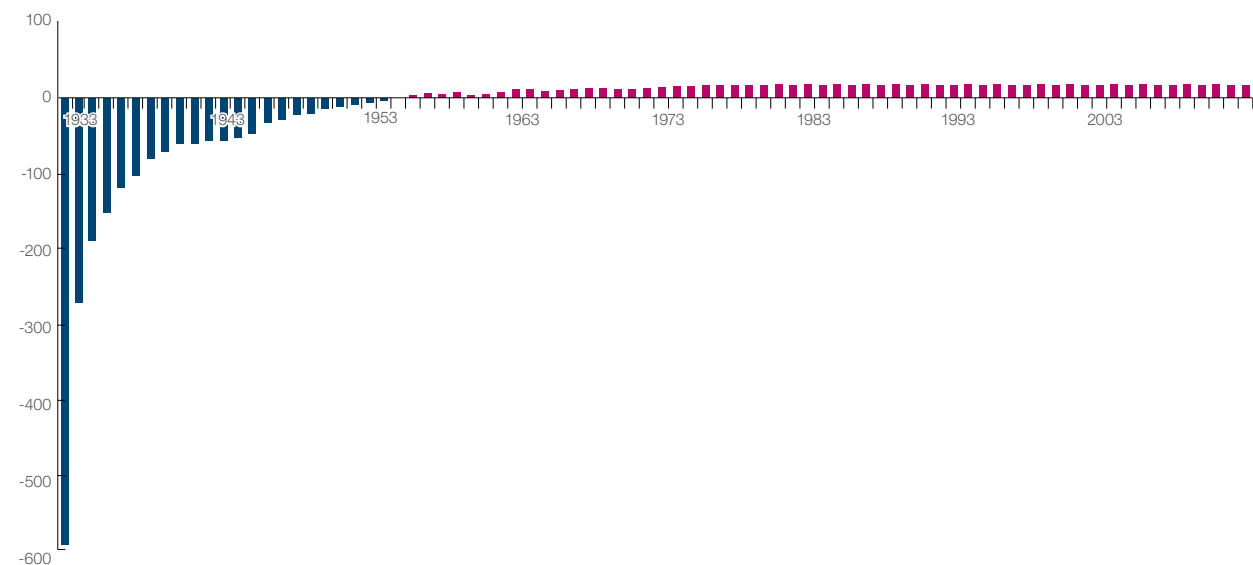
Note: Negative number is net benefits, and positive number is net burden.

6. Implications from the projections of long-term fiscal baseline

Long-term baseline projections, fiscal sustainability test, and analysis of generational tax burden have the following implications. First of all, Korea is projected to lose fiscal sustainability due to population aging. If the current legislation and systems regarding tax revenue and expenditure would not be changed, Korea's public finance will suffer greatly in the long-term. And what is more concerning is that fiscal difficulties will spread to the entire economic realm of Korea.

More importantly, danger of losing fiscal sustainability persists even under the assumption that there will be no additional social welfare expenditure. That means that Korea will still lose fiscal sustainability once it enters "post-aged society" phase even if it does not

Figure IV-19 _ Net Tax Burden of Lifetime Income on Age Groups According to Baseline Projection



Note: Negative number is net benefits, and positive number is net burden.

adopt additional social welfare programs. In this light, the current fiscal structure of Korea is not suitable for a nation with aging population and certainly is not ready for population aging.

Secondly, younger generations bear unfair amount of burden under the current system. In reforming the current system to preserve fiscal sustainability, equity

between generations must also be sought.

In the next chapter, we will discuss to what degree Korea's public finance will suffer if it loses fiscal sustainability. Also, we will discuss what must be done in order to maintain fiscal sustainability despite population aging and see if equity between generations can be improved through various simulations.⁴⁵⁾

⁴⁵ For details of analysis results and methodology, see Chun(2012). Chun, Young Jun, Analysis of Financial Burden among Generations using Generational Accounting, NABO Research Papers, 2012.

V. Fiscal Policies for Sustainability

Baseline projections of this research are carried out under the assumption that macro economy of Korea maintains steady growth until 2060. The interest rate of government bond is also assumed to be remains relatively low until 2060. However, assuming that the interest will remain low and stable seems simple since fiscal sustainability is projected to become unstable in the early 2030's and the ratio between government debt and GDP is expected to exceed 219%. Differently put baseline projections after 2034, at which point fiscal sustainability is predicted to be lost, could be optimistic.

In Japan, where the ratio of government debt/GDP is the highest in the world, the real interest rate is still kept near zero. Although Japan's government debt/GDP ratio is 211.7% as of 2011, which is much higher than the southern European nations, Japan is yet to experience fiscal difficulties like that we see in southern Europe. Japan's case gives Korea hope that Korea may not have to go through fiscal crises despite its high ratio of government debt to GDP of 219% in 2060.

As generally well-known, Japan is a unique case in that 92% of government bond is owned by domestic financial institutions and its people. It means that Japan will be able to avoid fiscal crises as long as the people who own the bonds do not give up on their bonds.⁴⁶⁾ On the other hand, Korea's bond market is different from Japan since 17.4% of the government bonds are already owned by foreigners as of July 2011. Due to different structures of government bond markets, it would be imprudent to hope that high ratio of government debt to

GDP will not affect the interest rate of Korea.

Also, we should watch carefully that Japan's public finance is weakening with time; it is merely avoiding major difficulties. Increasing ratio of government debt to GDP means that the soundness of Japanese financial institutions which own Japanese government bonds is seriously hurt. In fact, credit ratings of Japanese financial institutions are falling since 1998. Although Japan is not experiencing liquidity problems due to high rate of saving, it is not clear until when this situation will hold. Should financing from household savings face difficulties with a high ratio of government debt to GDP and falling credit ratings of financial institutions, Japan is bound to have financing problems both domestic and foreign. In that case, Japanese economy has a high probability of experiencing capital crunch, which will push Japan into a vicious cycle of fiscal crisis.

1. Scenario with Rising Interest Rates

It is unlikely that Korea will be able to prevent the rising interest from high rate of government debt accumulation. As such, this chapter attempts to find out how long-term fiscal projections deviate from the baseline projections when the interest rate of the government bond responds sensitively to the level of government debt. The projection is made from 2034, at which point Korea is expected to lose fiscal sustainability.

⁴⁶ Furthermore, Japan's surplus has amounted to 2~3 % of GDP for the current account which means Japan has no problem in the foreign currency market. This is a essential reason of not increasing interest rate even though there is a huge accumulation of government debt.

[Figure V-1] shows new trend of the interest rate from 2034. In the new scenario, the interest rate of government bond is set up so that it responds to the level of government debt. According to the new projections, the interest rate of the government bond in 2034 is 3.9%, which is 0.4% higher than what was expected in the baseline projection.

Afterwards, the interest rate rises with government debt and reaches 6.9% in 2060. This level of interest rate is more than twice that in June 2012 (3.27%). Nominal interest rate of 6.9% may not seem high considering the explosive growth of government debt. However, macro-economic indexes such as the real growth rate of GDP of 0.84%, growth rate of consumer price of 0.82%, nominal growth rate of GDP of 1.54% indicate that Korea is a low-growth nation in 2060. In this type of situation, a nominal interest of 6.9% (real interest rate of 5.7%) is an extremely high number and will place a heavy burden of the macro economy.

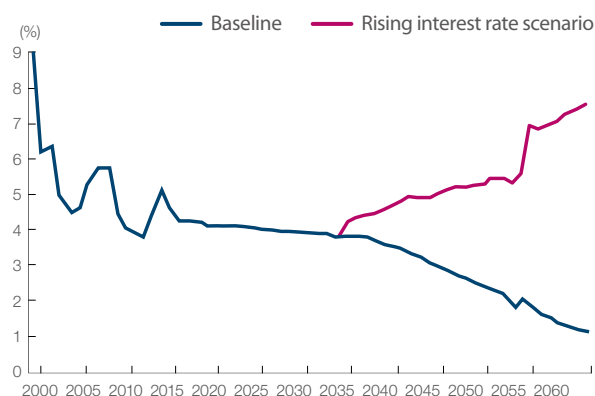
Furthermore, Korean Won/USD exchange rate is most likely to soar due to exodus of capital when fiscal sustainability is lost. When the exchange rate rises, consumer price for imports will also skyrocket, that in

turn will cause a high level of inflation. Then, there will be a plunge in the real value of investment, contraction of consumption, and rise of unemployment rate. Also, the financial market will become unstable, adversely affecting the real economy. When all of these effects are combined, the real growth rate of GDP will be much lower than what is projected in the third chapter of this research. Korea may not be able to maintain positive growth.

In the “Rising interest rate” scenario, long-term fiscal projections are made under the assumption that the interest rate of the government bond starts to sensitively respond to the level of government debt after fiscal sustainability collapses. However, the effect of capital exodus and the rise of the exchange rate on public finance are not considered in this projection. They are excluded in the projection because it was difficult to predict how foreign investors will behave when Korea’s fiscal sustainability is questioned. This type of assumption makes this scenario an optimistic one. But it still should be much closer to reality than the baseline projections.

When total revenue in the “rising interest rate” scenario is compared with that in the baseline fiscal projections, revenue from interest income tax increases by 47.5 trillion won in 2060 due to risen interest. On the other hand, due to the rise in the real interest, operating profit of corporations decreases, which lowers the corporation tax revenue by 51.1 trillion won from the baseline projection value in 2060. As stocks and real estate value fall, the property tax revenue also falls by 36.7 trillion won compared to the baseline projection value in 2060. When all of the deviations are combined together, tax revenue in the “rising interest rate” scenario is lower than the projected value in the baseline projection by 33.4 trillion won in 2060, 0.4%p of GDP (See [Figure V-2]).

Figure V-1 _ Government bond's interest rate Forecast:
Baseline vs Rising interest rate scenario



The difference between 'rising interest rate' scenario and the baseline projection of non-tax revenue and revenue from capital gain both can be explained by income from interest. The income from interest in the 'rising interest rate' scenario starts at 7.1 trillion won in 2034 and reaches 71.8 trillion won in 2054 (0.9% of GDP in 2054). However, in 2055, when the national pension fund is depleted, the difference in the income from interest between the two cases diminishes down to 20.9 trillion won in 2060, 0.25% of nominal GDP (See [Figure V-3]).

Total revenue, which combines tax revenue, non-tax revenue and revenue from capital gain all together, in the 'rising interest rate' scenario is 12.5 trillion won (0.15%p of GDP) lower than that in the baseline projection in 2060. Total revenue in the 'rising interest rate' scenario is higher than the baseline projection until 2040 without fast decrease in the growth rate, but retardation of the growth rate accelerates from the 2050's, and the value of total revenue in the 'rising interest rate' scenario falls below the baseline projection starting from 2057.

Figure V-2 _ Tax Revenue Forecast % per GDP

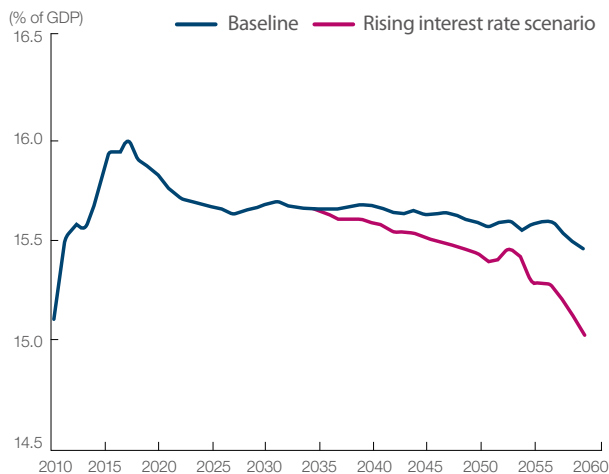


Figure V-4 _ Total Revenue Forecast of Baseline and Rising interest rate scenario

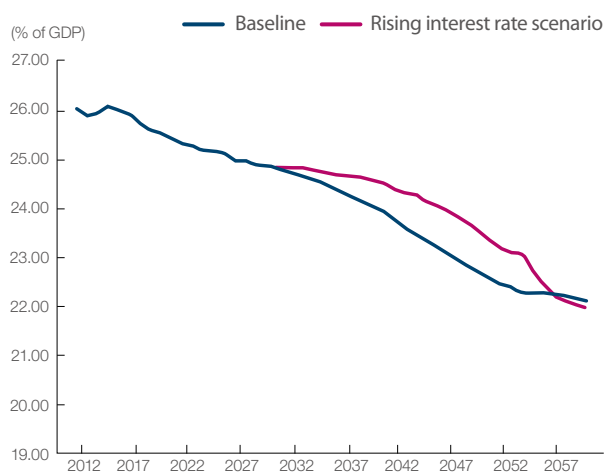


Figure V-3 _ Non-tax and Capital Revenue Forecast % per GDP

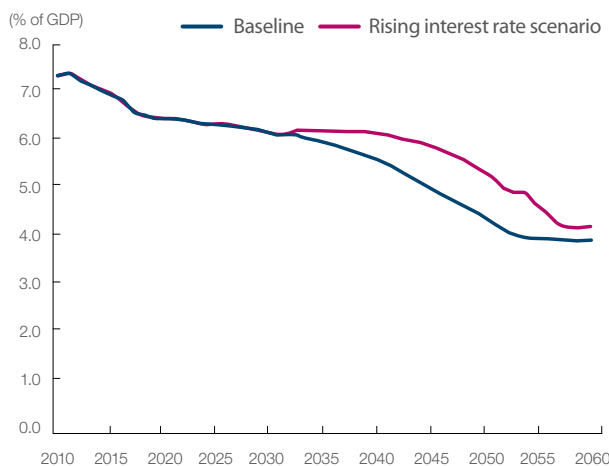
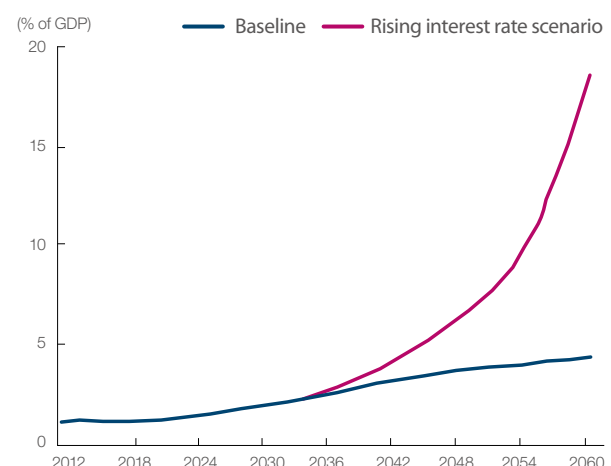


Figure V-5 _ Interest Payment Forecast of Baseline and Rising interest rate scenario



The rise in the interest rate mostly affects the account of interest payments among expenditure items. Although the account of interest payments is only around 4.4% of GDP (368.6 trillion won) in 2060, the value soars to 1,558.7 trillion won in 2060 in the ‘rising interest rate’ scenario, which is 18.5% of GDP (See [Figure V-5]). In other words, this item alone adds 14.4%p of GDP to the fiscal deficit in 2060. Such result also implies that responsiveness of government debt to the interest rate significantly affects the amount of fiscal burden.

Total expenditure in the ‘rising interest rate’ scenario is 4,155 trillion won in 2060, 49.4% of GDP in 2060. This value is higher than the baseline projection of 2,977 trillion won (35.4% of GDP) by 14.0%p of GDP due to higher interest rate.

As discussed that total revenue in the ‘rising interest rate’ scenario rises only slightly while the account of interest payments increases exponentially, there is seriously aggravating the deficit of managed fiscal balance. Deficit of the ‘rising interest rate’ scenario in 2060 is 27.3% of GDP, which is 14.2%p of GDP higher than the baseline projection. While the baseline managed fiscal balance suddenly falls in 2053, corresponding value in the ‘rising interest rate’ scenario falls four years later in 2057 because the higher interest rate delayed depletion of national pension fund by 4 years.

2. Improving fundamental fiscal balanced required for sustainability: Sustainable scenario

When the Bohn’s Test equation is rearranged, we can figure out how much the primary balance needs to be improved each year to maintain fiscal sustainability. Also, we can figure how government debt change as the primary balance improves.

[Figure V-9] shows the difference between the primary balance in the “rising interest rate” scenario and the necessary level of the primary balance to maintain fiscal sustainability. The difference shows by how much the primary balance needs to be improved to preserve fiscal sustainability. As the figure shows, the primary

Figure V-7 _ Managed Fiscal Balance Forecast of Baseline and Rising interest rate scenario

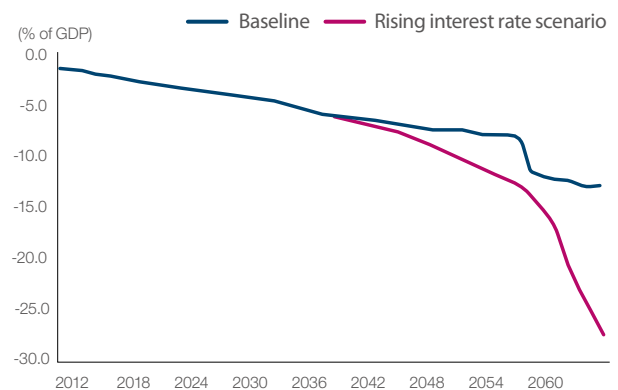


Figure V-6 _ Total Expenditure Forecast of Baseline and Rising interest rate scenario

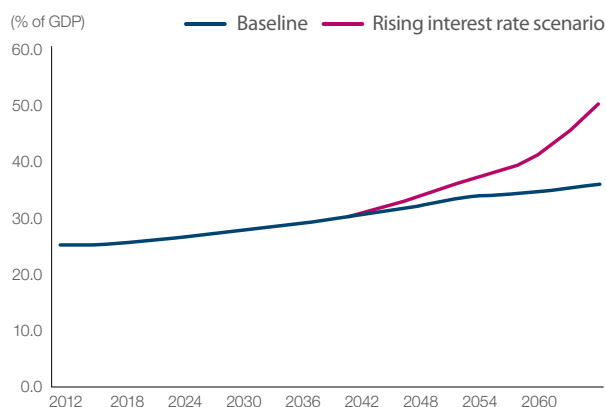
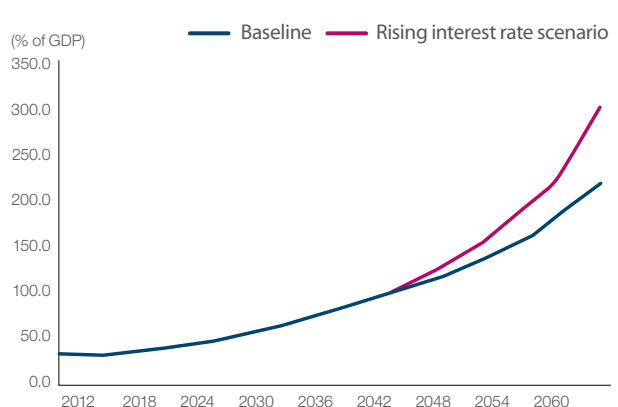


Figure V-8 _ Government Debt Forecast of Baseline and Rising interest rate scenario



balance needs to main 0.46% of GDP from 2035 in the sustainable scenario. The difference between the 'rising interest rate' scenario and sustainable scenario is 23.0 trillion won in 2034, which is 0.56% of GDP. The difference continually rises to 9.3% of GDP in 2060.

[Figure V-10] shows managed fiscal balance of sustainable scenario and the rising interest rate scenario. In order to preserve fiscal sustainability, managed fiscal balance needs to be downsized by 23.4%p of GDP in 2060 from 27.3% in the 'rising interest rate' scenario. The gap in managed fiscal balance is as wide as 23.4%p in 2060 because reduction in the interest cost accumulates in the managed fiscal balance after 2034. [Figure V-11] compares the amount the interest paid on loans in the 'rising interest rate scenario' and the sustainable scenario.

Figure V-9 _ Primary Balance of rising interest rate scenario and sustainable scenario

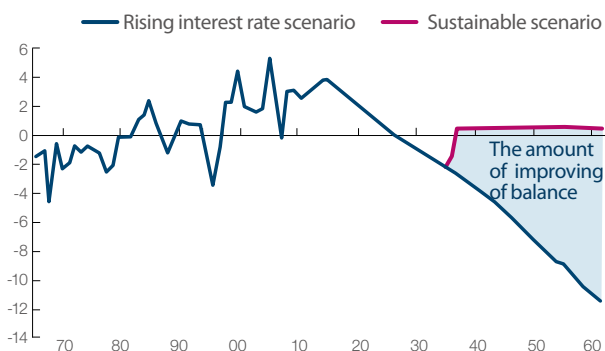
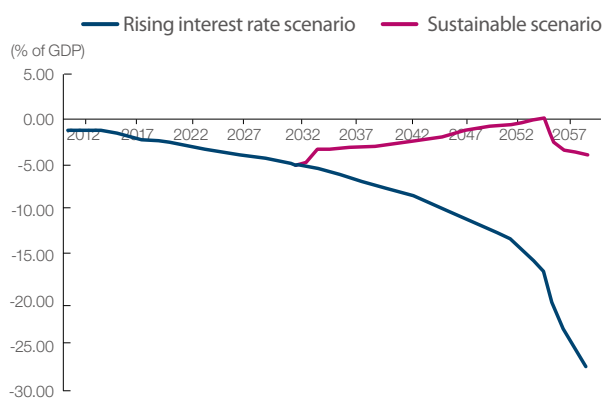


Figure V-10 _ Managed Fiscal Balance of rising interest rate scenario and sustainable scenario

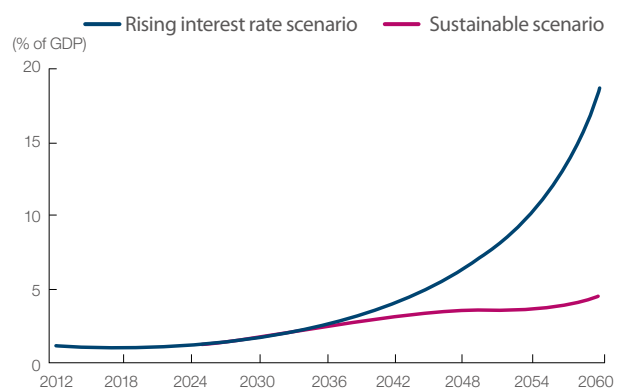


Managed fiscal balance improves from 210.1 trillion won deficit in 2034 to 9.3 trillion won surplus in 2056. However, the size of deficit expands from 278.6 trillion won in 2057 to 325.5 trillion won in 2060. This can be explained by depletion of national pension fund in 2057 in the 'rising interest rate' scenario; deficit in the national pension is reflected in managed fiscal balance starting in 2057. In other words, if the balance of national pension is not improved, improving the public finance would be meaningless since national pension financing places adverse stress on public finance from late 2050's.

Government debt in the sustainable scenario slightly rises from 70.1% of GDP in 2034 to around 70-80% in 2060 (See [Figure V-12]). Differently put, Korea needs to maintain its government debt ratio between 70-80% of GDP after 2034 to hold onto fiscal sustainability.

This section showed how much of government debt should be cut down in order for Korea to preserve its fiscal sustainability by rearranging the Bohn's Test equation. However, this type of calculation can only be applied from the point when Korea's fiscal sustainability is lost. Consequently, the required improvement of the primary balance increases fast with time, so tax revenue and/or expenditure in 2060 needs to be improved by 9.3%p of GDP. This magnitude of improvement is infeasible. In other words, public finance will need to be improved by unrealistic amount if fiscal restructuring and reforms begin after fiscal sustainability is lost.

Figure V-11 _ Interest Payment of rising interest rate scenario and sustainable scenario



If the improvements depicted in [Figure V-9] are achieved, Korea could maintain its fiscal sustainability even if it starts improving its public finance starting after 2034. However, in that case, the burden falls on the generation that pays more tax or experiences the effect of contracted expenditure after 2034.

As [Table II-1] in chapter II shows, Korea's old-age dependency ratio rises from 15.2 per 100 working age population to 80.6 in 2060. This means that there were 6.7 working age population per 1 old person in 2010, but the number of that falls down to 1.2 in 2060. This type change alone places burden on the future generation. If we add the burden of improving fiscal balance to the future generation, the consequence would be unfair to the future generation.

[Figure V-14] utilizes generational accounting used in Chapter IV Section 6 to see how much of burden falls on each generation when Korea attempts to improve its public finance to preserve fiscal sustainability. In the sustainability scenario, raising tax revenue or cutting down on expenditure did not matter as long as the primary balance reached its goal. However, it makes a difference when generational burden is calculated. In this research, both cases are calculated to see how generational net tax burden at present value deviates from the baseline scenario. This calculation raises or cuts down each item by the same ratio.

According to the analysis, as [Figure V-14] shows, the net tax burden of the younger generation significantly

rises while that of the older generation does not change significantly if Korea starts its mission to improve fiscal soundness after 2034. As for the method of improving fiscal soundness, cutting down on expenditure significantly placed fewer burdens on the young generation than increasing tax revenue did.

If the required improvement of the primary balance for maintaining fiscal sustainability is achieved through expenditure cut, burden of the age bracket 55 and above is less than 20 million won in 2012. However, the burden increases with age; 34.5 million won for 40-49, 40.3 million won for 30-39, 4.45 million won for 20-29, 46.45 million won for 10-19, and 46.53 million won for 0-9. When the improvement is accomplished through increasing tax revenue, the next tax burden of the people above 45 was 15.6 million won and the number also increases with age; 24.6 million won for 40-49, 47.8 for 30-39, 79.4 million for 20-29, 112.7 million for 10-19, and 138.2 million won for 0-9. The increase of burden with age was almost a linear function.

Improving fiscal soundness through expenditure cut distributes the burden slightly better than increasing the revenue does. This is true because when certain ratio of expenditure is cut, younger generation pays less for the mandatory expenditure for the older generation. However, when tax revenue is raised, younger generation still pays for the mandatory expenditure that goes to the older generation. This analysis implies that mandatory expenditure, especially social welfare

Figure V-12 _ Government Debt of rising interest rate scenario and sustainable scenario

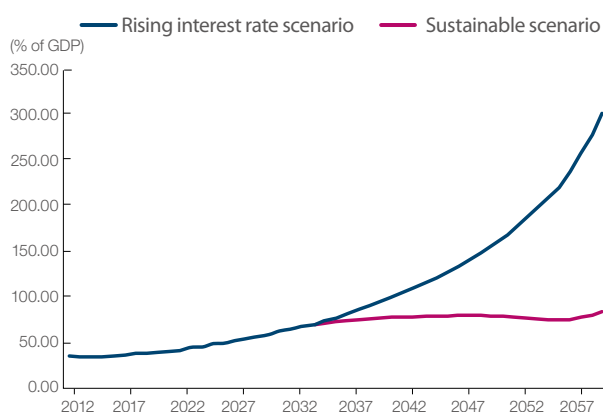
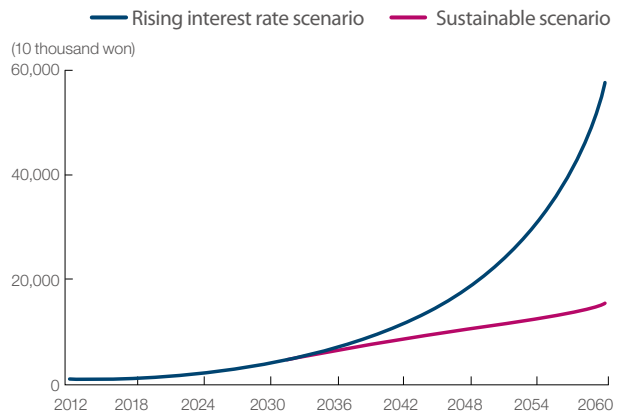


Figure V-13 _ Government Debt per person



expenditure, needs to be cut down in order to improve the primary balance by significant amount fairly each year if the improvement process begins after 2034. Even if a more equitable solution is found, as [Figure V-14] shows, younger generation below 30, compared to those who are above 50, stills needs to bear more burden for improving fiscal balance. In other words, younger generation bears additional burden for improving fiscal soundness in addition to the already unfairly distributed tax burden.

If the burden of population aging and that of improving fiscal balance are both placed on future generation, keeping the society together may be at risk. Therefore, improving fiscal balance should not be put off like it was assumed in the sustainability scenario. On the contrary, fiscal structure needs to be reformed as soon as possible to get ready for population aging, leading older generations to bear their portion of the burden to improve fiscal balance.⁴⁷⁾

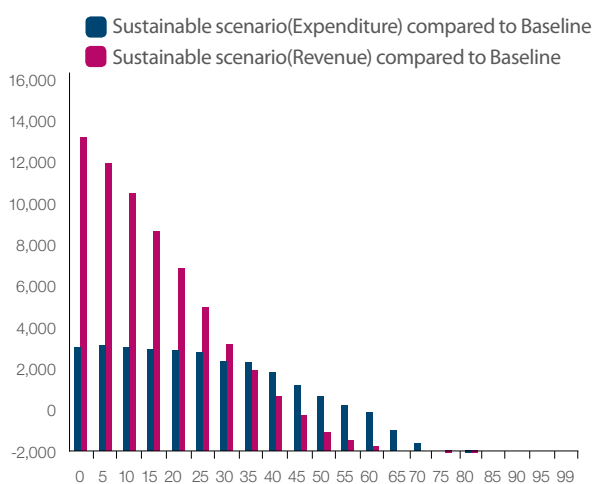
The answer to the question, “How soon should restructuring and reforms be completed?” would be, “Before Korea enters the ‘aging population’ phase.” The answer follows the same logic as preparing

for retirement before the retiring. This means that necessary preparations for preserving long-term fiscal sustainability-keeping government debt around 70-80% of GDP in 2060-should be done before 14% of the population gets older than 65, which is predicted to be 2018.

Korea’s public finance is not in a difficult position as of today. However, it will change fast once Korea enters the ‘aging population’ phase. However, that point is about a decade away, and the need for preparations seems elusive at best. Some may argue that expenditure may even be increased for some period of time. It may be politically unrealistic to asking people to endure when there the reason for enduring is not in sight. It may be prudent to gather public opinion about improving fiscal structure for now. The conflict between the need for an early start on fiscal reforms and difficulties getting the public to participate is the dilemma Korea faces today.

3. Suggestions on fiscal structure in preparation for population aging: Preparation for aging population scenario.

Figure V-14 _ Changes of Net Tax Burden by Age Bracket in Sustainable scenario Compared to Baseline



This section is the essence of this research; it suggests how and when Korea’s public finance should be reformed in preparation for population aging. In this section, we attempt to analyze how fiscal balance and national debt change, how generational net tax burden changes thereafter, and how much generational equity can be improved.

As for fiscal restructuring, the first goal is to prolong fiscal sustainability of Korea, which lasts until 2033, to 2060 by lowering the level of national debt below the baseline projections. Adjusting the unfairly concentrated fiscal burden of the future generation is a part of the goal.

⁴⁷ Newt Gingrich, a right-wing American politician, said "No civilization can survive if parents and grandparents cheat their children by leaving them crushed with debt. We have moral obligation to balance the budget now." Facing aged society, we had better rethink this word.

This research suggests the national pension would be reformed in addition to suggestions for the general public finance of Korea. Expenditure can be cut down by adjusting the threshold age at which pensioners begin receiving their benefits while tax reforms could broaden the tax base. Pension insurance can be raised as well. Admittedly, there could be many other policy measures to revitalize fiscal soundness and promote generational equity. This research is one of those many methods to improve the current situation and aims to set a starting place for exploring various solutions.

This section discusses tax reforms in detail and briefly touches upon reform suggestions for national pension. Reformation of the national pension is discussed in detail in Chapter VI.

A. Raising rates for the national pension and adjusting the threshold age for receiving benefits

This research suggests that the insurance rate of the pension be raised and the threshold age for receiving benefits be adjusted to the point that it does not seriously undermine generational equity. Magnitude of adjustment can be varied. Chapter VI explores various magnitudes of adjustment to see the effect of the adjustment. Raising the current 9% insurance rate of the pension to 12.9% by 2025 and raising the current threshold age for receiving benefits by one year every two years from 2013 67 to 2025 turned out to be the best combination measure in terms of both fiscal stability and generational equity.

The process of reaching the above conclusion is discussed in detail in Chapter VI. Below, we provide a brief overview of the process. To secure fiscal sustainability, which means for the pension fund to avert depletion until 2070, the insurance rate must be raised up to 17%. However, this level of increase seemed too much for the future generation to bear. If we rely solely on raising the insurance rate to 17% to improve fiscal soundness, ratio of benefit relative to insurance for those in the mid-20's to 30's drops and not suitable for promoting generational equity. Therefore, adjusting the retirement age for pension benefits was unavoidable. According to the simulation result, adjusting the

retirement age alone was not sufficient to secure fiscal sustainability either.

The best combination of raising the insurance rate and adjusting the retirement age for benefits, as mentioned above, was to raise the rate up to 12.9% by 2025 and to increase the retirement age up to 67. This combination pushed the depletion of the pension fund until 2070 and distributed the burden relatively equally among generations.

[Figure V-15] shows how national debt changes compared to the baseline projection after the inception of the adjustment.

The measure is effective in that it pushes the depletion point of the pension fund back to 2070 from 2053. However, [Figure V-15] shows that national debt starts to diminish after 2053. The reason for the late observance of the effect is that National Pension is accounted for separately from the general public finance.

In the baseline projection, National Pension started adversely affecting national debt when the fund was depleted and could not recover from deficit without outside aid. At that point, National Pension deficit was placed under the deficit of managed fiscal balance and the deficit was reflected in the deficit of the managed fiscal balance. Nevertheless, reformation of the National Pension prevents depletion of the fund and removes the need for the aid from the general public finance until

Figure V-15 _ National Debt in the Baseline Projection and National pension Reform Scenario

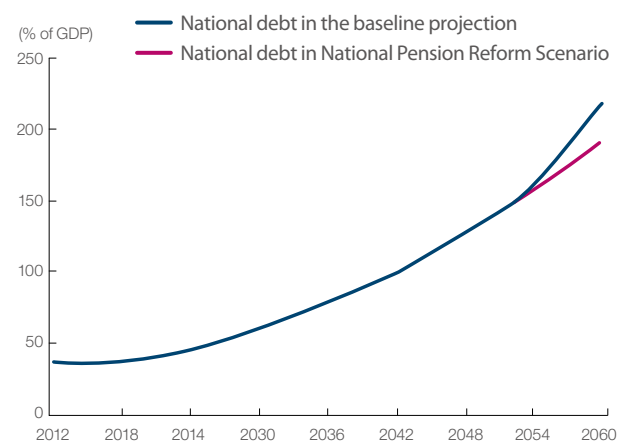


Table V-1 _ Tax structures in the Korea and OECD

(unit: %)

	1985		1995		2005		2009	
	Korea	OECD average	Korea	OECD average	Korea	OECD average	Korea	OECD average
Personal income Tax	15	30	18	26	13	24	14	25
Corporate income Tax	11	8	12	8	16	10	14	8
Social Security contributions	2	22	12	25	21	25	23	27
Payroll Taxes	1	1	0	1	0	1	0	1
Property Taxes	9	5	14	5	12	6	12	5
Consumption Taxes	59	32	41	32	34	31	32	31
- General Consumption Taxes ¹⁾	21	16	18	19	17	20	17	20
- Specific Consumption Taxes	38	16	23	13	17	11	15	11
Other Taxes	3	2	3	3	3	3	5	3
Total	100	100	100	100	100	100	100	100

Note: 1) It only indicates V.A.T in the Korea

Source: OECD, Revenue Statistics 1965-2010, 2011

2060. As such, national debt does not include the deficit of National Pension anymore and the rate of national debt to GDP falls from 218.6% to 192.6% in 2060.

B. Suggestions for revising tax policies in preparation for aging population

It has already been discussed in Chapter V, Section 2 that raising tax revenue from 2034 is unfavorable for generational equity. However, if tax revenue is raised sooner, older generations bear more tax burden and reduce the burden that falls on the future generation, improving generational equity.

This research considers broadening tax base as a major method to raise tax revenue. Expansion of tax base is discussed in detail because Korea, compared to other developed nations, has a high need for aggressively expanding tax sources. Since tax base still can be broadened, securing additional fund in preparation for population through tax reforms would be a wise direction in terms of fiscal policy.

The rate of tax burden in OECD nations averages at around 25% from 2006-2009. However, that of Korea is only around 20%, which is lower than that of other nations. Additionally, as population aging progresses

the rate of tax burden is going to be much lower. In light of this phenomenon, preparing for population aging without broadening tax base seems meaningless.

When we take a closer look at the tax system of Korea, personal income tax, V.A.T. , and social security contributions have room for expansion in the long-term. Personal income tax of Korea (14%) is much lower than the OECD average of 25% and academicians have persistently criticized the low rate. Reduction of tax exemption, lowering the taxable income threshold for global financial income tax, etc is some of the ways to broaden the tax base.

Additionally, proportions of general consumption tax-V.A.T.-in the total tax revenue fell from 21 % in 1985 to 17% in 2009, which is below the OECD average of 20%. V.A.T. is known as a highly effective tax and could provide a efficient way to make up for the increased expenditure due to population aging. Also, Korea's social security contributions take up 23% of the total tax revenue, but it is still short of the OECD average of 27%. National Pension, although benefit level fell after the reform in 2007, still offers an overly high rate of benefit and requires a higher rate of insurance.

[Table V-2] summarizes a brief summary of tax

Table V-2 _ Brief Summary of Tax Reforms

Downsizing tax breaks and tax preferences	-Lowering tax credits ratio from the current 14.4% to 9% by 2018: 13.5% in 2013, 12.6% in 2014, 11.7% in 2015→9% after 2018
Lowering the taxable income threshold for global financial income tax	-Lowering the Financial income in phases from the current 40 million won down to 30 million from 2013~2014 and down to 20 million after 2015
Finding additional financial bases for taxation	- Imposing V.A.T. for financial services that explicitly collect transaction fees - Imposing tax on capital gains to individual shareholders : 3% in 2013~2015, 6% in 2016~ 2017, 10% after 2018 - charging tax on financial derivatives transactions : 0.001% in 2013~2015, 0.01% after 2016
Raising the liquor tax rate	- Increasing the tax rate on distilled Liquor(SOJU, Whisky) from the current 72% to 90% after 2013
Increasing the rate of V.A.T.	- Raising the rate of V.A.T. from the current 10% to 12 % in 2018

reforms proposed by this research. Projections on the effects of raised tax revenue and reduced fiscal deficit were made under the assumption that tax reforms are completed before 2018.

1) Downsizing tax breaks and tax preferences

To broaden tax base in accordance with the principle, “wide tax base with low tax rates”, it is necessary to downsize unnecessary tax breaks and tax preferences. This research proposes lowering tax credits ratio from the current 14.4% to 9% by 2018. This measure is expected to increase the tax revenue by 3 trillion won in 2013 (0.2% of GDP) to 90 trillion won in 2060(1.1% of GDP).

Since a wide range of tax breaks and tax preferences are given to personal income tax, the effective tax rate of personal income tax is very low. Also, the average effective tax rate of Korea in 2010 for one-person family without children is 4.1% which is much lower than the OECD average (14.2%). It would be necessary to downsize or terminate tax breaks/tax preferences that reach the sunset period or when they have accomplished their purposes.

2) Lowering the taxable income threshold for global financial income tax

To promote generational equity and to broaden tax base, taxable income threshold for global financial

income tax needs to be lowered. In the past, taxable income threshold for global financial income tax was 40 million won for the combined financial income of the husband and wife. This basis, nonetheless, was ruled unconstitutional in 2002, and financial income is now taxed separately for the husband and wife up to 80 million won. This had an effect of doubling the financial income. Therefore lowering the taxable income threshold for global financial income tax would be one of the possible methods to broaden tax base.

It would be appropriate to lower the financial income in phases from 40 million won down to 30 million from 2013-2014 and down to 20 million after 2015. As a result the tax revenue will increase by 0.2 trillion won by 2013, 0.01% of GDP and 3 trillion won, 0.03% of GDP in 2060.

3) Finding additional financial bases for taxation

Imposing V.A.T. for financial services, imposing tax on capital gains to individual shareholders, and charging tax on financial derivatives transactions would be some of the places to find new tax bases.

One of the principles in imposing V.A.T. is to impose it where added value is created. Since financial services also create added value, V.A.T. must be imposed on them as well. There have been difficulties in imposing taxes on financial services due to administrative obstacles, but there is a growing consensus that V.A.T.

should be imposed on interest, transaction fees, etc.⁴⁸⁾ Some of the nations, such as New Zealand and Australia, are already imposing taxes on financial and insurance services. Therefore, it would not be against the principle to impose tax on financial services that explicitly collect transaction fees.⁴⁹⁾

Considering the maturity and size of the stock market, need to impose prevent distortion of distribution of wealth by setting fair tax rates, and generational equity, capital gains to individual shareholders need to be taxed as well.

For the past 20 years, scholars have pointed out financial gains from transfer of stocks need to be taxed,

but equally many disagreed by arguing that Korea's stock market is not mature yet. However, the opposing argument is now losing support as the Korea stock market is reaching the maturity of developed markets. This research, to minimize the shock to the market, makes projections under the assumption that tax on capital gains of stocks is imposed in phases (2013-2015: 3%, 2016-2017: 6%, 10% after 2018) Additionally, as the size of the financial derivative market grows fast, tax should be imposed on financial derivatives transactions as well.

Above-mentioned new tax bases on the financial market is projected to increase the tax revenue by 2 trillion won in 2013, 0.2% of GDP, and 60 trillion won in 2060, 0.7% of GDP. When broken down by item, V.A.T. on financial services is expected to bring in 0.6 trillion won in 2013 (0.05% of GDP), and 4 trillion won (0.05% of GDP) in 2060. Tax on capital gains to individual shareholders is expected to increase the tax revenue by 1 trillion won in 2013 (0.09% of GDP), and 43 trillion won in 2060 (0.51% of GDP). Taxation on financial derivatives transactions is predicted to bring in 0.1 trillion won, 0.01% of GDP, in 2013 and 13 trillion won in 2060 (0.15% of GDP).

Table V-3 _ Marginal Efficiency Cost of Tax Items

	Consumption	Imports	Labor	Capital
1970	0.0625	0.0444	0.0993	0.0589
1980	0.0359	0.0257	0.0504	0.0446
1990	0.0932	0.0657	0.1216	0.1468
2000	0.1267	0.0898	0.1658	0.2258
2004	0.1553	0.0963	0.2123	0.2990
1970-2004 Average	0.0822	0.0565	0.1119	0.1252

Source: Seung-Rae Kim and Woochul Kim(2007), "The Marginal Efficiency cost of Taxation in Korea", Korea Institute of Public Finance

Table V-4 _ GDP Elasticity of Tax Revenue

Income tax	Value added tax	Corporate income tax	Specific consumption tax	Liquor tax
0.9198	0.7161	0.5453	0.3057	0.6007

Source: Seoung Hwan Suh and Sung Tai Kim,(2006), "Public finance model of NABO in 2006"

4) Raising the liquor tax rate

Raising the liquor tax rate is intended to promote the public's health by suppressing alcohol consumption with

Table V-5 _ Recent Changes in V.A.T Rate

(unit: %)

Country	Year reformed	V.A.T rate(before reforms)		V.A.T rate(after reforms)	
		Standard tax rate	Reduced tax rate	Standard tax rate	Reduced tax rate
United Kingdom	Year reformed 2011~	17.5	5.0	20.0	5.0
Italy	September 2011~	20.0	4.0/10.0	21.0	4.0/10.0
Spain	July 2010~	16.0	4.0/7.0	18.0	4.0/8.0
Portugal	2011~	20.0	5.0/12.0	23.0	5.0/12.0
Greece	March 2010~	19.0	4.5/9.0	21.0	4.5/9.0
	July 2010~	21.0	4.5/9.0	23.0	4.5/9.0
Switzerland	2011~2017	7.6	2.4/3.6	8.0	2.4/3.6
Japan	Scheduled until April 2014	5.0	-	8.0	-
	Scheduled until April 2015	8.0	-	10.0	-

Source: OECD

⁴⁸ Auerbach and Gordon(2002), "Taxation of Financial Services under a VAT", The American Economic Review, Vol. 92, No. 2

⁴⁹ But Education tax on dividends and interest income tax will be repealed to avoid double tax

increased cost. The administration noticed in 2005 that tax rate on distilled liquor, especially that of SOJU, was relatively low, and moved to increase the rate to balance out the lowered rate on beer (from 150% to 72%). But the attempt did not bear fruit. Increased liquor tax rate is projected to increase the tax revenue by 0.7 trillion won (0.05% of GDP) in 2013, 4 trillion won (0.05% of GDP) in 2060.

5) Increasing the rate of V.A.T.

To adequately the adverse effects of population aging, the rate of V.A.T. should be raised from the current 10% to 12% in 2018 when the proportion of the population over 65 reaches 14%. If V.A.T. is raised by 2%p in 2018, 17 trillion won (0.9% of GDP) and 70 trillion won (0.8% of GDP) in 2060 in tax revenue can be additionally secured.

Academic theories confirm that raising the rate of V.A.T. is the most general, efficient, and stable way to broaden the tax base. Raising the rate of V.A.T. rather than that of other tax items would be especially appropriate when the growth potential is projected to fall as the saving rate dwindles due to population aging.

Since the efficiency cost of V.A.T. is lower than that of corporate income tax and personal income tax, Korea should shift the weight of taxation to V.A.T. In terms of efficiency cost, it is difficult to raise the rate of corporate income tax. Although the real tax rate of personal income tax should be raised for redistribution of wealth, it would be more appropriate to focus on V.A.T. because of its low efficiency cost. Southern European nations that are suffering from the recent fiscal crises are mostly focusing on raising the rate of V.A.T. to broaden the tax base.

C. Tax revenue effects of the revised tax policies in response to aging population.

As previously noted, it was assumed that fiscal reformations were to be completed by 2018. This assumption was made because: 1) Expenditure related to population aging is expected to exponential increase after 2018. 2) If the tax reform is completed before expenditure due to population aging starts to soar, overburdening the future generation can be avoided by distributing the tax burden to the older generation.

In short, there are five tax reforms that are deemed

Table V-6 _ Tax Revenue and Its GDP Ratio Caused by Preparation for Aging Population Scenario

(unit: billion won, %)

		2013	2015	2018	2020	2030	2040	2050	2060
Downsizing tax breaks and tax preferences	Tax revenue amount	2,644	9,010	20,733	23,115	37,623	55,666	74,932	90,246
	% of GDP	0.19	0.57	1.10	1.10	1.09	1.09	1.08	1.07
Lowering the taxable income threshold for global financial income tax	Tax revenue amount	204	572	680	784	1,455	2,232	2,647	2,858
	% of GDP	0.01	0.04	0.04	0.04	0.04	0.04	0.04	0.03
Imposing V.A.T. for financial services	Tax revenue amount	634	718	853	956	1,568	2,323	3,144	3,818
	% of GDP	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Imposing tax on capital gains to individual shareholders	Tax revenue amount	1,201	1,329	5,155	5,703	9,449	15,658	25,946	42,993
	% of GDP	0.09	0.08	0.27	0.27	0.27	0.31	0.37	0.51
Charging tax on financial derivatives transactions	Tax revenue amount	114	147	1,125	1,389	3,156	5,669	8,928	12,932
	% of GDP	0.01	0.01	0.06	0.07	0.09	0.11	0.13	0.15
Increasing the Liquor tax rate	Tax revenue amount	698	753	887	1,000	1,705	2,486	3,367	4,157
	% of GDP	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Raising the rate of V.A.T.	Tax revenue amount	0	0	16,588	18,415	30,051	44,518	59,393	69,971
	% of GDP	0.00	0.00	0.88	0.87	0.87	0.87	0.86	0.83
Total	Tax revenue amount	5,495	12,530	46,020	51,362	85,006	128,553	178,356	226,975
	% of GDP	0.39	0.79	2.45	2.44	2.46	2.51	2.58	2.70

Figure V-16 _ Tax Revenue Effect of Tax Reform Items

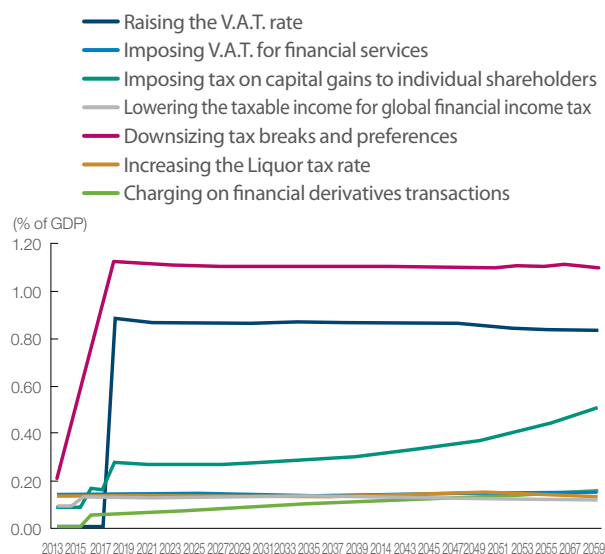
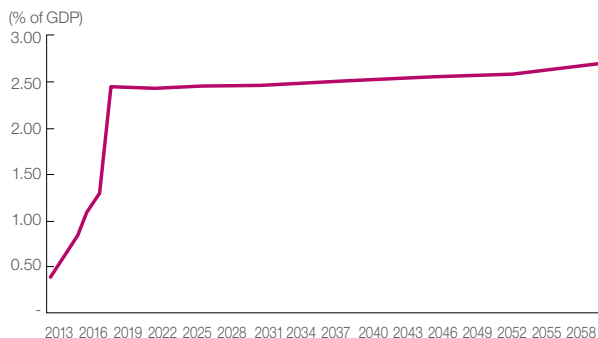


Figure V-17 _ Tax Revenue Effect of Preparation for Aging Population Scenario



necessary in this research. They are prioritized based on validity and appropriate time for inception. 1) Current tax breaks and preferences that make up 14.4% of the tax revenue should be cut down to 9% by 2018, 2)

Taxable income threshold for global financial income tax should be lowered until 2015 to broaden tax base, 3) To find new tax bases on the financial market, tax should be imposed on financial services, capital gains to individual shareholders, and financial derivatives transactions starting from 2013, 4) The liquor tax rate should be raised on alcohol since it causes external diseconomy, 5) The tax rate of V.A.T. should be raised before 2018, at which point expenditure due to population aging starts to soar.

Above mentioned measures up the tax revenue by the following increments: Downsizing tax breaks and preferences (90 trillion won, 1.07% of GDP in 2060), raising V.A.T. (70 trillion won, 0.83% of GDP in 2060), imposing tax on capital gains to individual shareholders (43 trillion won, 0.51% of GDP).

When the above mentioned measures are put in effect through legislation, tax revenue will increase by 227 trillion won in 2060 (2.7% of GDP). According to the baseline projection, tax revenue in 2060 was projected to be 15.49% of GDP. This number goes up to 18.19% in 2018.

Projections in this research showed that the tax to GDP ratio goes up to 2.5% in 2018 and 2.7% in 2060 (See [Figure V-17]). This projection matches the calculation result using the EU sustainability test equation. The value for S1, which is the sustainability indicator that EU uses, turns out to be 2.78 when the national debt is set to be 81.2% in 2060 (See [Box 1]). This means that tax revenue increase or expenditure cut in the magnitude of 2.78%p of GDP is necessary to keep national debt under 81.2% of GDP in 2060.

Box 1 Methods of EU sustainability indicators

EU sustainability indicators consist of two methods. The first method is S1, which is used to figure out the magnitude of tax revenue increase or expenditure cut. S2 is the second method that allows the users to figure out how to diminish national debt to zero in infinite length of time. S1 method is elaborated below.

First the government's intertemporal budget constraint is,

$$d_{t_0} - \sum_{t=t_0+1}^{\infty} \frac{Pb_t}{(1+r)^{t-t_0}} = 0$$

Here,

t_0 : initial date d_t : national debt/GDP ratio

Pb_t : primary balance per GDP $\Delta Pb = Pb_t - Pb_{t_0}$: primary balance compared to initial date

$1+r = (1+R)/(1+G)$; R : nominal interest rate, G : current GDP Growth rate

S_1 refers to the increment of tax revenue (or expenditure cut) required in order for national debt/GDP ratio reaches d_t while maintaining a constant tax revenue/GDP ratio from t_0 to T .

$$S_1 = rd_{t_0} - pb_{t_0} + \frac{r(d_{t_0} - d_T)}{(1+r)^{T-t_0}-1} - \frac{\sum_{t=t_0+1}^T \frac{\Delta pb_t}{(1+r)^{t-t_0}}}{\sum_{t=t_0+1}^T \frac{1}{(1+r)^{t-t_0}}}$$

In order to find S_1 under the assumption that the interest rate/growth rate ratio differential(r) is not constant, α needs to be substituted in.

$$\alpha_{i,j} = (1+r_i)(1+r_{i+1})...(1+r_j) \text{ if } i \leq j \text{ and } 1 \text{ otherwise}$$

Therefore, national debt becomes,

$$d_t = d_{t_0} \alpha_{t_0+1:t} - \sum_{i=t_0+1}^t pb_i \alpha_{i+1:t}$$

Government's intertemporal budget constraint (5) becomes,

$$d_{t_0} = \sum_{i=t_0+1}^{\infty} \frac{Pb_i}{\alpha_{t_0+1:i}}$$

When different values of r are substituted, S_1 can be written as:

$$S_1 = \frac{d_{t_0} (\alpha_{t_0+1:T} - 1)}{\sum_{i=t_0+1}^T \frac{1}{\alpha_{t_0+1:T}}} - Pb_{t_0} + \frac{d_{t_0} - d_T}{\sum_{i=t_0+1}^T \alpha_{i:T}} - \frac{\sum_{i=t_0+1}^T \Delta pb_i \alpha_{i+1:T}}{\sum_{i=t_0+1}^T \alpha_{i+1:T}}$$

S_1 under two different assumptions are summarized in the table below:

	Initial budgetary position(BP)		Target debt by T year(DR)		Long-term changes in the primary balance(LTC)
S_1 = (if r is constant)	$rd_{t_0} - pb_{t_0}$	+	$\frac{r(d_{t_0} - d_T)}{(1+r)^{T-t_0}-1}$	+	$-\frac{\sum_{i=t_0+1}^T \frac{\Delta pb_i}{(1+r)^{i-t_0}}}{\sum_{i=t_0+1}^T \frac{1}{(1+r)^{i-t_0}}}$
S_1 = (if r is different by year)	$\frac{d_{t_0} (\alpha_{t_0+1:T} - 1)}{\sum_{i=t_0+1}^T \frac{1}{\alpha_{t_0+1:T}}} - Pb_{t_0}$	+	$\frac{d_{t_0} - d_T}{\sum_{i=t_0+1}^T \alpha_{i:T}}$	+	$-\frac{\sum_{i=t_0+1}^T \Delta pb_i \alpha_{i+1:T}}{\sum_{i=t_0+1}^T \alpha_{i+1:T}}$

4. Fiscal Soundness of the Preparation for aging population scenario and mitigation of generational burden.

This chapter makes projections on how managed fiscal balance and government debt differ from the scenario with rising interest rates when the propositions made in the third chapter such as adjusting the insurance rate and the commencement age for the national pension, in addition to expanding tax base, are completed by 2018. Also, projections on how the net tax burden by generation changes up to 2060, under the assumption that fiscal structure is reformed in preparation of population aging by 2018, are also made in this chapter.

First of all, when the fiscal reform in preparation of population aging is conducted, the deficit of managed fiscal balance goes down by 13.1% from the baseline projection and by 27.3% from the scenario with the rising interest rate to reach 3.04% in 2060 (See [Figure V-19]). Consolidated fiscal balance improves to 4.44% from the 13.3% of the baseline projection and 27.5% of the scenario with the rising interest rate at the same time.

The government debt drops significantly to 64.7% from 219% of GDP in the baseline projection and 299.8% in the scenario with the rising interest rate. The sustainable scenario from the second section of

the Chapter 5 indicated that managed fiscal balance in 2060 should not exceed 3.9% while government debt is kept under 81.2% of GDP. Fiscal reform in preparation

Figure V-19 _ Managed Fiscal Balance

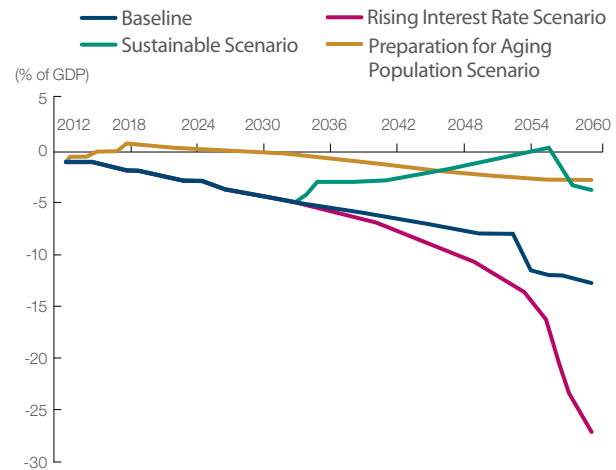


Figure V-20 _ Government Debt

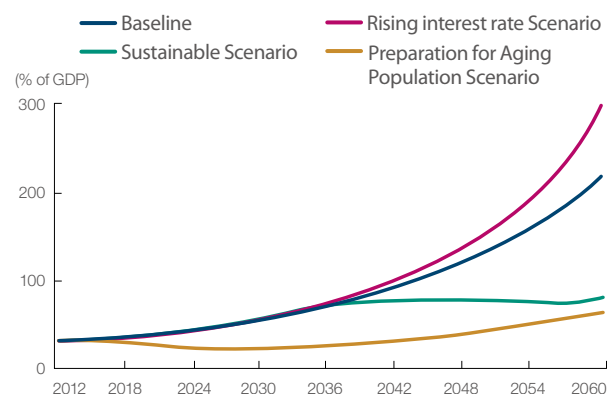


Figure V-18 _ Consolidated Fiscal Balance

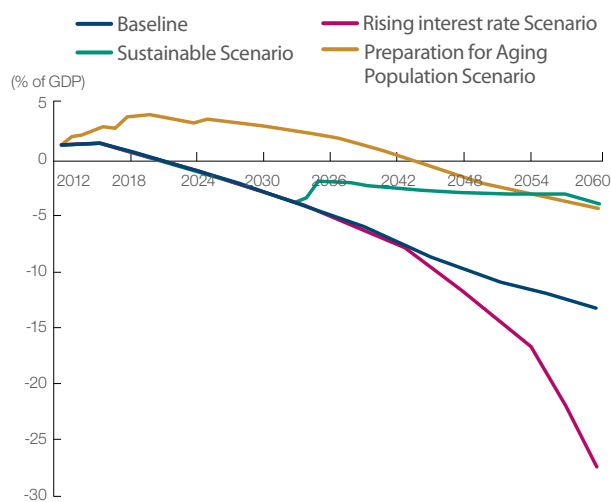
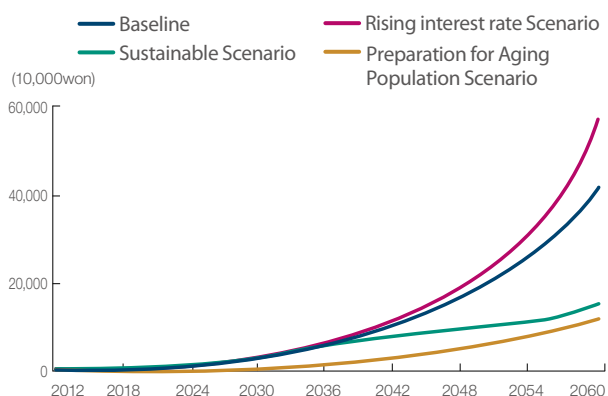


Figure V-21 _ Government Debt per capita



of population aging seems to improve the fiscal indices well enough to maintain fiscal sustainability.

Although the rate of national tax burden rose only by 2.5% after 2018 in the Preparation for aging population scenario, fiscal balance and government debt improve much better than that in the rising interest rate scenario because 1) financing for the national pension stabilizes, which puts less burden on the public finance, and 2) the public finance to maintain its fiscal sustainability, which prevents the cost of interest to accumulate on fiscal balance and government debt. In addition, preparation for aging population scenario shows improved fiscal balance and government debt from the sustainable scenario because fiscal balance improves much sooner and allows for government debt to fall much faster. As a result, the burden of raising the amount of improvement to be made each year no longer exists like it did in the sustainable scenario. If the older generation takes on the burden that they should bear due to population aging, rather than waiting until the public finance becomes unsustainable and pushes up the interest rate, thus placing the entire economy in difficulty, fiscal balance improves and government debt decreases.

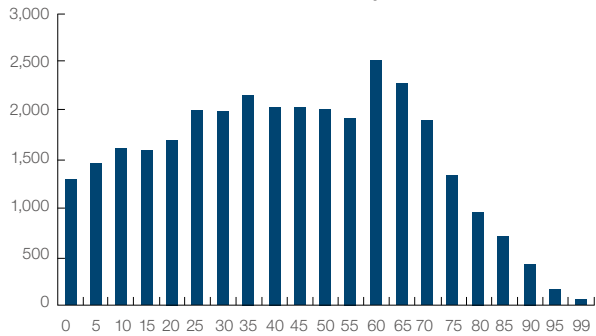
[Figure V-22] shows how generational net tax burden changes with respect to the baseline when the fiscal structure is reformed according to the preparation for population aging scenario. Preparation for population aging scenario reduces expenditure to the level less than the baseline and increases revenue, which raises net tax burden for all generations. Chapter V [Figure

V-14] has already shown that the net tax burden for all generations rise in the sustainable scenario. However, preparation for population scenario starts improving fiscal soundness 22 years sooner (in 2013) than the sustainable scenario. As such, it greatly improves generational equity. In other words, although the burden rises above the baseline for all generations in [Figure V-22], the burden is spread evenly across all generations, unlike it is in [Figure V-14].

For example, when fiscal soundness is improved only by cutting down expenditure after 2034, Chapter V, [Figure V-14] shows that the burden on fifty five year-olds is only half of that that falls on thirty year-olds. If fiscal soundness is improved only by increasing tax revenue after 2034, those who are older than 50 bear almost no burden while those who are born in 2012 bear the burden around 140 million won at present value. On the other hand, in the Preparation for population aging scenarios, which starts fiscal reform from 2013, burden on 55 year olds does not differ from that on 25-50, as shown in [Figure V-22].

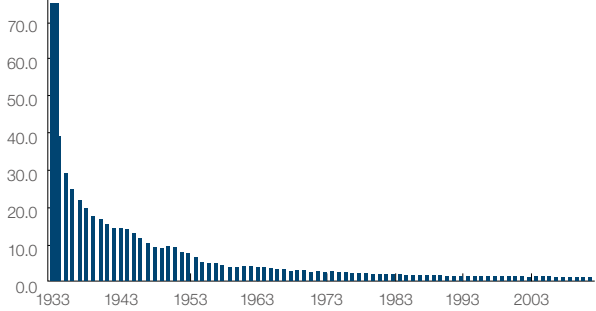
[Figure V-23] shows the comparison between the burden per life time income in Preparation for population aging scenario and baseline projections, respectively, under the assumption that preparation for population aging is completed by 2018, as suggested in the scenario. According to the figure, those born in 2012 experience 0.85% rise in their net tax burden per lifetime income from the baseline projection while those born in 2002 experience 0.96%, those born in

Figure V-22 _ Preparation for Aging Population Scenario Changes of Net Tax Burden with Respect to the Baseline



Note: Negative number means net benefit, Positive number means net burden

Figure V-23 _ Preparation for Aging Population Scenario Changes of Net Tax Burden per Life time Income with Respect to the Baseline



Note: Negative number means net benefit, Positive number means net burden

1992 experience 1.17%, those born in 1982 1.69% and those born in 1972 experience 2.41%. On the contrary, those born in 1962 bear 3.82% burden while those born in 1952 bear 7.59%, and those born in 1942 experience 14.17%. Conclusively, all generations bear additional net tax burden, but the public finance becomes sustainable while fiscal deterioration is prevented. In addition, older generations bear similar burden at present value while bearing higher burden per life time income.

On the other hand, [Figure V-24] shows the result of deducting [Figure V-14] from [Figure V-22]. Two scenarios share the same result in that they both maintain sustainability and prevents fiscal crisis from affecting the entire economy, but differ in the starting point for fiscal improvement by 22 years.

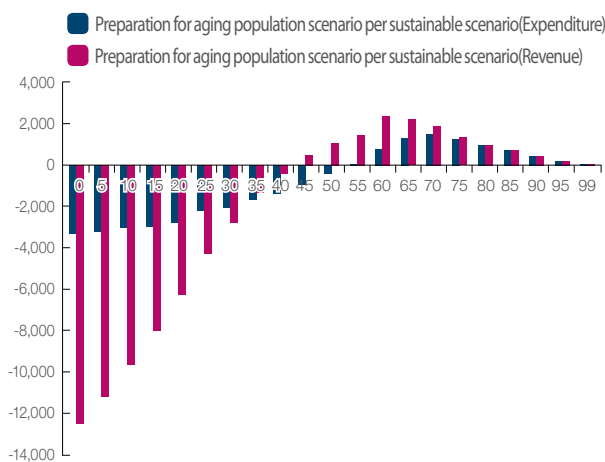
The result succinctly shows the difference between the two scenarios; one in which fiscal improvement is pushed off until 2034 and the other one in which preparation for population aging immediately begins with legislation prepared in 2012. In the preparation for population aging scenario, fiscal burden of the older generations increase while the burden on the younger generations fall. For example, the preparation for population aging scenario, in comparison to the scenario that starts fiscal improvement after 2034, expands the net tax burden on the fifty year-olds by 11.0 million,

23.3 million on the 606 year-olds, and 19.0 million won on the 70 year-olds while placing 0.424 million won benefit on the 40 year-olds, 28.0 million won on 30 year-olds, 6.24 m illion won on 20 year-olds, 9 6.6 m illion won on 10 year-olds, and 125.2 million won on the new born babies. (See Red bars in [Figure V-24]).

In the Preparation for population aging scenario, in comparison to the scenario that improves fiscal soundness only by cutting down on expenditure, expands the net tax burden on the 60 year-olds by 7.52 million won and 15.3 million won on the 70 year-olds while placing 4.37 benefit on the 60 year-olds, 14.1 million won on 40 year-olds, 20.5 million won on 30 year-olds, 27.5 million won on 20 year-olds, 30.4 million won on 10 year olds and 33.5 million won on the new born babies. (See [Figure V-24] Blue Bars).

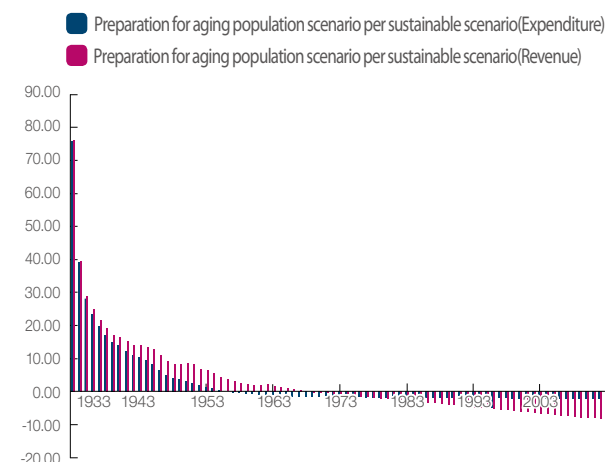
When the above results are converted to lifetime income basis, those born before 1968 bear more burden in the preparation for population aging scenario than they do in the scenario that starts improving fiscal soundness after 2034 while those born after 1969 enjoy benefit; those born in 2012 receive 8.3% of lifetime income as benefit while those born in 2002 receive 6.4%, those born in 1992 receive 4.5%, those born 1982 and 1972 receive 2.6% and 0.7% respectively. On the contrary, those born in 1962 bear 1.96% of the lifetime

Figure V-24 _ Difference of Net Tax Burden between Preparation for Aging Population Scenario and Sustainable Scenario



Note: Negative number means net benefit, Positive number means net burden

Figure V-25 _ Net Tax Burden/life time Income: Preparation vs Sustainable Scenario



Note: Negative number means net benefit, Positive number means net burden

income as burden while those born in 1952 bear 6.84%, those born in 1942 bear 14.03% as additional burden (See Figure [V-25]).

In the Preparation for population aging scenario, in comparison to the scenario that depends solely on expenditure cuts after 2034, those born before 1956 bear more burden while those born after 1957 receive benefit; those born in 2012 receive 2.18% of their lifetime income as benefit, those born in 2002 receive 2.05%, those born in 1992 receive 1.89%, those born in 1982, 1972 and 1962 receive 1.75%, 1.71%, and 0.96% in benefit. On the contrary those born in 1952 bear 1.91% of lifetime income as burden while those born in 1942% bear 10.813% as additional burden. ([Figure V-25] Blue Bars)

Under the above analysis, if preparation for population aging is completed by 2018 as suggested in the scenario, Korea's public finance is expected to maintain fiscal

sustainability until 2060 and avoid fiscal crisis like the one occurred in Southern European nations. Also, Korea will be able to distribute the fiscal burden among generations. In addition, it should be noted that the suggestions made in this report has been recommended by academia for a long time but has been pushed off for different reasons.

Before concluding this report, long-term projections on national pension along with explanations on the policy suggestions made in the previous sections are provided in the next chapter. Raising the insurance rate, timing, and adjustment of the commence age, which have been mentioned briefly in previous sections will be discussed in greater detail in Chapter VI. Also, in Chapter VI, long-term projections on financing for national health and related policy suggestions are introduced.

VI. Long-term projections for National Pension and National Health Insurance, and Policy Suggestions

National pension and national health insurance take the direct hit from low birth rates and population aging. This chapter discusses what needs to be done in order to maintain fiscal sustainability in addition to the long-term projections of national pension and national health insurance. Measures for stabilizing the public finance have been used in the “preparation for aging population” scenario and have been briefly introduced. In light of the gravity of national pension and national health insurance in public finance, especially when population

is aging, baseline projections and policy suggestions for national pension and national health insurance have been discussed in this detail below.

1. 2012-2070 Projections on National Pension and Policy Suggestions

In this research Pension Reform Option Simulation Toolkit(PROST), developed by the World Bank is used.

Box 1 Method of making projections on national pension

PROST is not a model for a specific pension system. It is a generic model that can be modified to fit various public pensions. As such, it had to be modified before it could be used to model Korea’s national pension. The basic method of PROST is similar to the projection model used by the National Pension Service. In this research, variables and assumptions that National Pension Projection Committee(2008) used were applied to PROST to test its appropriacy. PROST model yielded similar projections that the National Pension Projection Committee did and allowed for the projection results in the third chapter. 2011 Population Projections(middle) from Statistics Korea were used and the value in 2060 was assumed to remain constant after 2060. Other variables were taken from the 2008 projections.

Table _ Population Projection

(unit: person, age)

	2010	2020	2030	2040	2050	2060	2070
Total Fertility rate	1.23	1.35	1.41	1.42	1.42	1.42	1.42
Life Expectancy change							
Male	77.20	79.31	81.44	83.42	85.09	86.59	86.59
Female	84.07	85.67	86.98	88.21	89.28	90.30	90.30

Note: The value in 2060 was assumed to remain constant after 2060

Source: Statistics Korea

Table _ Macro-economic Projection

(unit: %)

	2011 ~2020	2021 ~2030	2031 ~2040	2041 ~2050	2051 ~2060	2061~ 2070
Real GDP Growth rate	3.7	2.8	2.1	1.7	1.0	0.8
Real wage Growth rate	2.3	2.5	2.5	2.4	2.5	2.4
Inflation rate	2.8	2.2	1.7	1.3	1.0	0.8
Real Interest rate	1.9	2.0	2.3	1.8	1.0	0.7

A. Projections on policy holders and Beneficiaries

The number of contributors is expected to rise from 19 million in 2012 to 19.3 million in 2017. Afterwards, as working population wanes, the number of contributors also decreases down to 10.2 million in 2070. The number of beneficiaries shows a similar pattern. It shoots up from 3.46 million in 2012 to 15.9 million in 2050. However, the number comes back down to 14.1 million in 2070 as those who were born when birth rates were low reach retirement age.

Nominal system dependency rate refers to the ratio of the number of total contributors to the number of total beneficiaries. This ratio rises at an accelerative pace from 18.2% in 2012 to 141.7% in 2065, at which

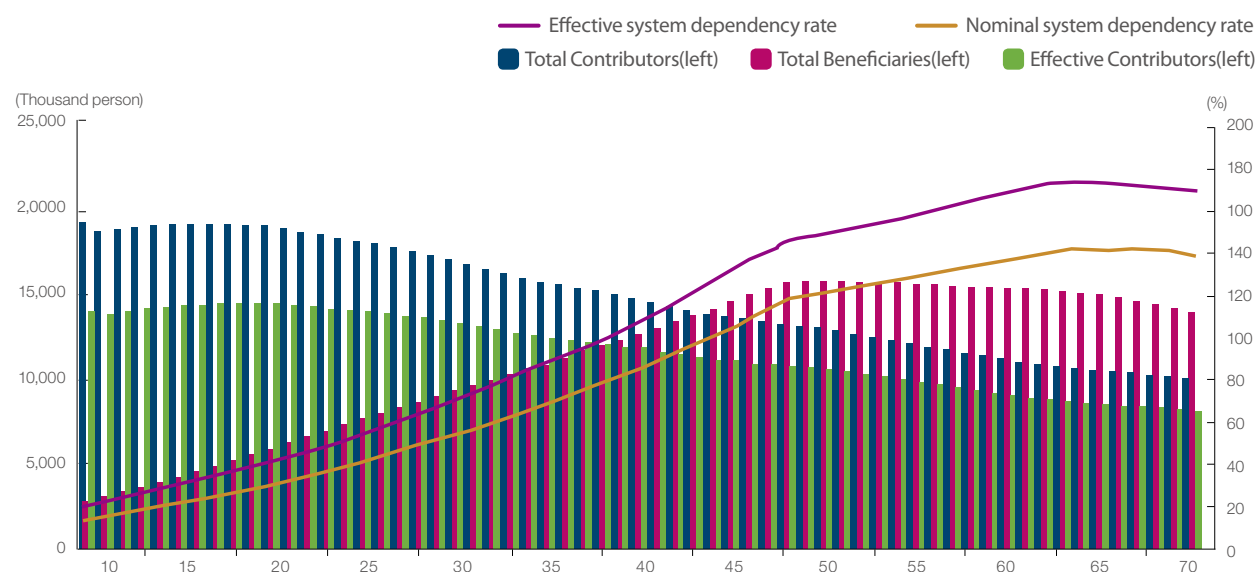
points the ratio begins to fall back down. Also, Effective system dependency rate(II), which refers to the ratio of the number of effective contributors(The number of

Table VI-1 _ Projections on Contributors and Beneficiaries

(unit: 1000 persons, %)

	Projections on contributors and beneficiaries			System dependency ratio	
	Total Contributors (A)	Effective Contributors (B)	Total Beneficiaries (C)	I (C/A)	II (C/B)
2012	19,001	14,118	3,457	18.2	24.5
2020	19,147	14,584	6,001	31.3	41.1
2030	17,180	13,424	9,458	55.1	70.5
2040	14,884	11,900	12,804	86.0	107.6
2050	13,118	10,690	15,944	121.5	149.1
2060	11,301	9,176	15,511	137.3	169.0
2070	10,169	8,258	14,048	138.1	170.1

Figure VI-1 _ Projections on Contributors and Beneficiaries



total contributors-the number of contributors excepted from contribution payment) to the number of total beneficiaries, rises from 24.5% in 2012 to 174.7% in 2065(See [Table VI-1]). Rise of system dependency rate can be seen as the result of population aging and maturity of the pension system.

B. Projections on the Pension Finance

Revenue from contributions is expected to increase by 3.2% on an annual average from 28.5 trillion won in 2012 to 180.7 trillion won in 2070. Profit from the fund management peaks at 62.1 trillion won in 2040 as the fund accumulates. However, accumulation stops and the amount of fund diminishes from 2041 and is predicted to be depleted in 2053. Because of the sudden depletion of the fund reserve, total revenue, which is the sum of revenue from contributions and profit from management of the fund, only increases by 2.5% on an annual average from 2012 to 2070. Total expenditures(pension payment + administrative costs) shows a sharp increase from 12.4 trillion won in 2012 to 652.9 trillion won in 2070 (7.1% increase on an annual average).

As the fiscal balance of the national pension worsens with time, the amount of pension payments will be

higher than the revenue from contributions. In 2041, total expenditure exceeds total revenue, resulting in deficit. The magnitude of the deficit continues to grow to reach -472.2 trillion won (-4.8% of GDP) in 2070.

Accumulated fund peaks at 15.7 trillion won (ratio of the fund to GDP peaks at 36.5% in 2029) at 29.6% of GDP in 2040. Starting from 2041, depletion of the fund reserve accelerates until it is completely depleted in 2053. If the national pension is maintained as it is today, total revenue will only be around 36.9% of total expenditure, necessitating a large jump in the contributions rate or governmental aid.

Figure VI-2 _ Projections on the Pension Finance

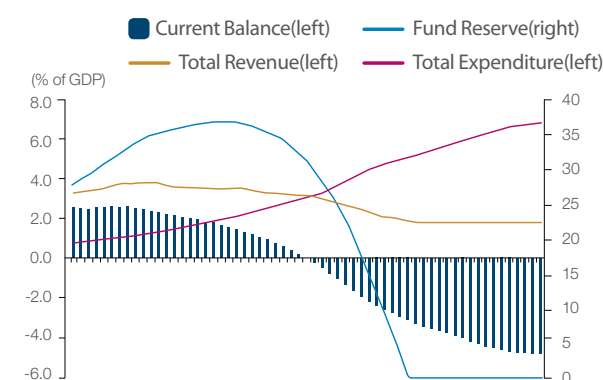


Table VI-2 _ Projection on the Pension Finance

(unit: trillion won)

	Revenue			Expenditure		Balance	Fund Reserve
	Total Revenue	Contributions	Investment returns	Total Expenditure	Pension payment		
2012	44.2	28.5	15.7	12.4	11.8	31.8	380.6
2020	77.0	45.8	31.2	27.7	26.8	49.3	725.4
2030	120.7	68.6	52.1	67.7	66.4	53.0	1,258.1
2040	155.2	93.1	62.1	154.4	152.5	0.8	1,582.1
2041	156.1	95.5	60.6	168.3	166.3	-12.2	1,569.9
2042	155.8	97.9	57.9	183.0	180.9	-27.2	1,542.7
2043	154.2	100.3	53.9	198.8	196.6	-44.6	1,498.1
2044	154.1	102.9	51.2	215.9	213.7	-61.8	1,436.3
2045	153.4	105.8	47.6	234.6	232.3	-81.2	1,355.1
2050	144.5	121.9	22.5	325.1	322.2	-180.6	637.9
2051	141.5	124.6	16.9	338.8	335.8	-197.3	440.7
2052	137.6	127.3	10.3	352.8	349.8	-215.2	225.5
2053	135.3	129.7	5.5	367.0	363.9	-231.7	0.0
2054	132.0	132.0	0.0	381.7	378.5	-249.7	0.0
2055	134.4	134.4	0.0	397.2	393.9	-262.8	0.0
2060	146.5	146.5	0.0	486.6	482.6	-340.1	0.0
2070	180.7	180.7	0.0	652.9	647.5	-472.2	0.0

Box 2 Comparison with the 2008 National Pension Fiscal Calculation

1. Comparison between Projections from NABO and National Pension Fiscal Calculation('08)

NABO's projection predicts that deficit and depletion of the Fund reserve occurs three and seven years sooner, respectively, than 2008 National Pension Fiscal Calculation does. These differences are attributed to the gaps between population projection and macro-economic projections. Each difference is discussed below.

Table _ Comparison between Projections from NABO and National Pension Fiscal Calculation('08)

	NABO(2012. 6)	National pension Projection committee(2008. 11)
The first year with a negative current balance or The first year with a negative fund reserve	2041 2053	2044 2060

2. Cause of the differences Change in macro-economic conditions

Majority of the differences between the two institutions arise due to their differences in macro-economic projections. Change in population structure affects macro-economic variables such as economic growth, wage, interest rate, consumer price, etc, and these macro-economic variables, along with change in population structure, affect the national pension. Nations that adopt modified funding system, especially, respond sensitively to changes in macro-economic variables due to their massive sizes.

As shown in the table below, NABO's macro-economic projections differ from that from the National Pension Projection Committee. Among the differences, NABO projects that the real interest rate is going to be 1-1.7% lower than the value projected by the National Pension Projection Committee. When the macro-economic variables are adjusted in NABO's projection to match those used by the Committee, depletion point of the national pension was pushed back by five years from 2053 to 2058. In other words, differences between the two institution's macro-economic variables caused NABO to predict that depletion of National Pension will occur five years sooner than what the Committee has predicted.

Change in Population Structure Another reason behind the differences between the two institutions is population projection. 2008 National Pension Fiscal Calculation used 2006 Population Projections (referred to as Old Projections) published by Statistics Korea. However, NABO used 2011 Population Projections (referred to as New Projections) from Statistics Korea.

According to the New Projections, New Projections predict that total fertility rate in 2045 is going to be 0.14 higher than what had originally been projected. Also, New Projections predict that life expectancy will incline by 2.2 for male and 0.4 for female in 2050. Such rise in birth rates and extended life expectancy affect pension finance in the opposite direction. Rising birth rates expand working population and broaden revenue base while extended life expectancy adversely affects pension finance since more benefits need to be paid.

If the effects of the two factors (rising birth rate and extended life expectancy) are similar in magnitude, life expectancy is more likely to affect pension finance. That is because the effect of the rising birth rate shows after the newly born reach working age (20-25 years later). However, extension of life expectancy has an immediate effect of expanding pension payments. Differences in population projections caused NABO's projection of the depletion point to be 1-2 years sooner than the value projected by 2008 National Pension Fiscal Calculation.

In conclusion, of the seven year difference on depletion point between the projections by 2008 National Pension Fiscal Calculation and NABO, five years can be attributed to differences in macro-economic variables while two can be attributed to differences in population projections, models, and other factors.

Table _ Comparison between Macro-economic Projection from NABO and NPPC

		2011~2020	2021~2030	2031~2040	2041~2050	2051~2060
NABO	Real GDP Growth rate	3.7%	2.8%	2.1%	1.7%	1.0%
	Real wage Growth rate	2.3%	2.5%	2.5%	2.4%	2.5%
	Inflation rate	2.8%	2.2%	1.7%	1.3%	1.0%
	Real Interest rate	1.9%	2.0%	2.3%	1.8%	1.0%
NPP Committee	Real GDP Growth rate	4.1%	2.8%	1.7%	1.2%	0.9%
	Real wage Growth rate	3.6%	3.3%	2.9%	2.6%	2.5%
	Inflation rate	2.6%	2.0%	2.0%	2.0%	2.0%
	Real Interest rate	3.6%	2.9%	2.4%	2.2%	2.0%

Table _ Changes in the Demographic Structure

(unit: person, age, 1000 persons, %, productive population per hundred)

Indicator		Estimation(2006)	Estimation(2011)
Total Fertility rate	2010	1.15	1.23
	2045	1.28	1.42
Life expectancy change (Male/Female)	2010	76.15/82.88	77.20/84.07
	2050	82.87/88.92	85.09/89.28
Dependency rate ¹⁾	2010	15.0	15.2
	2030	37.7	38.6
	2050	72.0	71.0

Note: 1) (Age 65+)/((Age 15~64)×100

Source: Statistics Korea

Such fiscal projections show differences that cannot be overlooked from calculations conducted by the 2008 National Pension Projection Committee. The committee projected that national pension will be in deficit starting from 2044, but this research predicts that it will be three years sooner. As for the depletion point of Fund reserve, NABO's projection was seven years sooner than that from the Committee at 2053. Such differences are

attributed to the fact that the macro-economic variables used by the Committee were more optimistic and to the fact that the two institutions used different population projections. More specifically, out of the -7 years of difference between the two institutions, -5 years occur due to differences in macro-economic variables while -2 years occur due to differences in population projections and models (See [Box 2]).

C. Remaining Policy Concerns for Securing Fiscal Sustainability for the National Pension

National Pension Act, which has been revised in July, 2007, had an effect of improving long-term fiscal soundness of national pension. Although, the contributions rates were not raised as planned, deficit was pushed off from 2036 to 2044 and the depletion point was pushed off from 2047 to 2060 by lowering the replacement rates from 60% to 40%.

Despite these efforts for improvement, it has been criticized that fiscal uncertainties due to population aging are still lingering. This projection concurs in that, under the current system, national pension will run out of fund starting from 2053, which is 7 years faster than the projection by the Committee.

If, as predicted, national pension fund is depleted, the only source of income for national pension is contributions. Generally, people easily are mistaken that any deficit in national pension will be covered by the government. On the contrary, there is not a single provision of law that says so. Scholars are divided on the issue: one side believes that the government should step in and cover the deficient amount while the other side argue that national pension should be turned into pay-go system when the fund reserve is depleted.

In the baseline projection by this research, 2041, at which national pension is in deficit, is the 8th year since fiscal sustainability is lost. Especially in 2053, when national pension fund is depleted and is in dire need of outside help, managed budget balance will turn out 11% of GDP deficit with national debt of 16.1% of GDP. In this type of situation, Korea's public finance is already coping with various difficulties, and it is not clear whether or not the government will be able to step in to cover the deficit.

It would be imprudent to expect that depleted national pension fund will receive aid from the government under the difficult fiscal state of Korea. Such idea is overly simple and irresponsible for the young generation that receives pension benefits from 2053. It would

be much more reasonable to give up the thought of receiving governmental help and finding ways to recover sustainability of national pension. In other words, national pension should find its own ways to maintain fiscal sustainability whether or not public finance is in good standing.

Otherwise, those who were born after the 1990's will receive much less benefits than what they had paid. Those who were born in the 1990's cannot be sure of their benefits after 2053.

Differently put, national pension, which is the most important social security system, becomes a beneficial system to those in their 50's because they receive more than they had paid but becomes a disadvantageous system to those under 30, especially those under 20, at the same time. This type of generational inequity is attributed to the low birth rate and population aging in Korea.

1) Establishing policy countermeasures

It would be necessary to raise the contributions rate or to lower the replacement rates. Of the two, raising the rate is the first task that needs to be taken care of. Further reductions in replacement rates would lower the credibility of national pension and therefore is excluded as an option in this research.

2) Increasing contributions

Contributions rate should be determined in consideration of fiscal sustainability and the critical point of the final contributions rate. The critical value refers to the value of the contributions rate that policy holders can accept. If the contributions rate goes above the critical value, national pension will lose its place in the public pension system.

Regarding the critical value of the contributions rate, Bert Rurup⁵⁰⁾(2005) argued that the system will be regarded as unfair when the expected benefit is less than premiums paid. Along the same logic, Kim(2007) argues that the psychological critical value in light of

50 Rurup, Bert, "Pension Reform and Demographic Ageing," Social Security, Toward Newfound Confidence, ISSA, Geneva, 2005, p.188.

equity would be the point where the present value of the benefit equals the present value of the premiums.

Based on this reasoning, this research has set the critical value of the contributions rate at the level where the present value of the issued benefits equal that of the contribution of the insurance premiums.

Levelled contributions rate is taken from the result in Kim(2008). Kim(2008) has analyzed levelled contributions rate of those born in 1970-2010. Based on the average value of single income male and males married to a working wife, Kim(2008) suggested

17.1%~18.1% as levelled contributions rate. To eliminate the possibility of one generation viewing the system as unfair, the most unfair levelled contributions rate of the generation-the lowest value of levelled contributions rate-has been set as the critical value. As a result, this research has set 17% as the critical value of the final contributions rate and analyzed the following two scenarios:

- 1) contributions rate gradually raised every five years from 2015
- 2) contributions rate raised fast every three years.

Box 3 Establishing the basis for evaluating the finance of national pension.

Although the revision of legislation in July 2007 had positive effects on the finance of national pension, fiscal uncertainties surrounding fiscal sustainability still pervade. It is projected that national pension fund will be depleted around 2053, at which point annually revenue from contributions will only be 36.9% of expenditure.

As such, additional adjustments are necessary. However, National Pension Act does not show a direction as to how the long-term fiscal imbalance should be resolved. The current legislation on the finance of national pension are National Pension Act Article 4 and its implementing ordinances Article 11, Paragraph 2. In the same article, it states that fiscal calculation on national pension should be done every five years to establish plans for adjustment. But it does not make specific comments on how to evaluate the finance of national pension for adjustment.

Also, long-term direction for fiscal management after depletion of the fund in 2060 was not clearly proposed in the 2008 national pension fiscal calculation. The Committee of National Pension(2008) commented as follows: 1) to shift the focus from adjustment to maturity 2) making long-term projections would not be appropriate since Korea is changing fast. As such, 2008 national pension fiscal calculation does not set a fiscal goal but sets four bases (The funding ratio is maintained by 2 times by 2078, 5 times by 2078, no deficit until 2078, funding ratio is maintained constantly) for proposing required rate of insurance. On this, Kim(2007) commented that although fiscal state of national pension improved after the 2007 revision of the legislation, there are inherent uncertainties since the fiscal calculation of national pension does not show how the contributions and benefit rate and the fund will be managed in the future. How national pension deals with population aging and the maturity of the fund will decide the future of national pension as a credible social security system. Clear direction of policy to achieve fiscal goals are necessary as population aging poses a serious potential risk to the finance of national pension.

3) Raising statutory retirement age

This research, as a way to lower the burden of pension fund expenditure, has analyzed the scenarios where retirement age is raised from 65 to 67. In other words, raising retirement age has been considered in light of rising life expectancy.

According to the current law, the retirement age is set to be raised by 1 year from 60 every five years from 2013 to reach 65 in 2033. Under the Scenario a of raising retirement age, the retirement age is raised to 67 from 65 and raises the age according to the schedule laid out in the current law; adjustment made every five years from 2013 until 2043 up to 67. Under the Scenario b, the retirement age is raised to 67, but the schedule is rushed; adjustment made every three years from 2013 to reach 67 in 2031. In Scenario c, adjustment schedule is even more contracted; adjustment every 2 years so that the retirement age may reach 67 by 2025.

Above mentioned scenarios of raising the contributions rate and adjusting the retirement age have been combined and analyzed. Of the combinations, Scenario A, the contributions rate is raised up to 12.9% by 2025 and the retirement age is raised every 2 years to reach 67 by 2025. In Scenario B, which is a more rigorous reform, the contributions rate is raised to 17% by 2035 while the retirement age is raised every two years to reach 67 by 2025.

D. Simulation result in search of policy suggestions

1) Fiscal sustainability

In order for the public pension system to last, fiscal sustainability is most important, and solvency must be secured to maintain fiscal sustainability. A system is fiscally sustainability when necessary expenditure can be made at any time without problems. From this point of view, public pension's fiscal sustainability can be tested by determining whether the fund possesses sufficient assets to make necessary expenditure on a long-term basis.

According to the simulation results, Scenario 1, which has been suggested by the administration in 2003 (contributions rate raised to 12.9% by 2025) is not enough to maintain long-term balance since the fund

Table VI-3 _ Summary of Scenarios for Pension Reform

		Raising contribution rates		
		2025 12.9% (Scenario1)	2021 17% (Scenario2)	2035 17% (Scenario3)
Raising retirement age	2043 67 age (Scenario a)	2025, 12.9% + 2043 67 age	2021, 17% + 2043 67 age	2035, 17% + 2043 67 age
	2031 67 age (Scenario b)	2025, 12.9% + 2031 67 age	2021, 17% + 2031 67 age	2035, 17% + 2031 67 age
	2025 67 age (Scenario c)	2025, 12.9% + 2025 67 age (ScenarioA)	2021, 17% + 2025 year 67 age	2035, 17% + 2025 67 age (ScenarioB)

reserve is projected to run out before 2070. In order to prevent the fund reserve from running out before 2070, the contributions rate needs to be raised up to 17% (Scenario 2 and 3). When different policy measures are combined, as they are in Scenario A (contributions rate 12.9% and retirement age 67 by 2025) and B (contributions rate 17% by 2035 and retirement age 67 by 2025), public pension system is projected to maintain the funding ratio around 4 times and 11 times respectively by 2070.

2) Generational Equity

National pension should be managed so that every generation can enjoy the benefit, and at the same time, the benefit should not be focused on one particular generation. Nevertheless, Korea's National pension system started as a low burden-high cost for fast expansion, and as a result future generation bears asymmetrical burden as the system matures. As such, fiscal stabilization, when deemed necessary, should be adopted as soon as possible to minimize future generation's burden.

For example, according to [Figure VI-3] of the scenarios where the contributions rate is raised up to 17%, Scenario 2, which raises the rate by 2012, places more burden on the older generation than Scenario 3, which raises the rate by 2035, does. Nonetheless, however the insurance is raised, raising

Table VI-4 _ Funding Ratio by Scenarios

	Baseline	(Scenario 1) 2025 12.9%	(Scenario 2) 2021 17%	(Scenario 3) 2035 17%	(Scenario a) 2043 67 age	(Scenario b) 2031 67 age	(Scenario c) 2025 67 age	(Scenario A) 2025 12.9% 67 age	(Scenario B) 2035 17% 2025 67 age
2012	28.0	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4
2020	24.4	25.0	26.9	25.2	24.1	25.2	26.7	27.7	27.9
2030	17.8	21.8	27.8	22.6	17.7	20.3	24.2	29.2	30.3
2040	10.2	15.6	22.4	18.4	10.5	14.3	16.6	23.5	27.0
2050	2.5	7.7	13.9	11.2	3.7	6.4	7.8	14.4	18.9
2053	0.6	6.0	12.4	9.9	2.0	4.7	6.0	13.0	18.0
2054	0.0	5.5	11.9	9.4	1.4	4.2	5.4	12.5	17.6
2055	0.0	4.9	11.4	8.9	0.8	3.6	4.8	12.0	17.3
2056	0.0	4.3	10.8	8.4	0.3	3.0	4.2	11.5	16.8
2057	0.0	3.7	10.2	7.8	0.0	2.4	3.6	10.9	16.3
2058	0.0	3.1	9.6	7.3	0.0	1.8	3.0	10.3	15.8
2059	0.0	2.5	9.0	6.7	0.0	1.2	2.3	9.7	15.3
2060	0.0	1.9	8.4	6.2	0.0	0.6	1.7	9.2	14.8
2061	0.0	1.3	7.8	5.6	0.0	0.0	1.1	8.6	14.3
2062	0.0	0.7	7.2	5.1	0.0	0.0	0.5	8.0	13.8
2063	0.0	0.2	6.6	4.6	0.0	0.0	0.0	7.4	13.3
2064	0.0	0.0	6.1	4.0	0.0	0.0	0.0	6.9	12.8
2065	0.0	0.0	5.5	3.5	0.0	0.0	0.0	6.3	12.4
2066	0.0	0.0	5.0	3.0	0.0	0.0	0.0	5.8	11.9
2067	0.0	0.0	4.5	2.5	0.0	0.0	0.0	5.3	11.6
2068	0.0	0.0	4.0	2.0	0.0	0.0	0.0	4.8	11.2
2069	0.0	0.0	3.5	1.6	0.0	0.0	0.0	4.4	10.9
2070	0.0	0.0	3.0	1.1	0.0	0.0	0.0	3.9	10.6

Note: Funding ratio-(t) = Fund Reserve-(t-1)/Total Expenditure(t)

the contributions rate alone is not enough to acquire generational equity. As the figure shows, no matter how soon the contributions rate is raised, people in their 20's and 30's bear more burden than the older generation does.

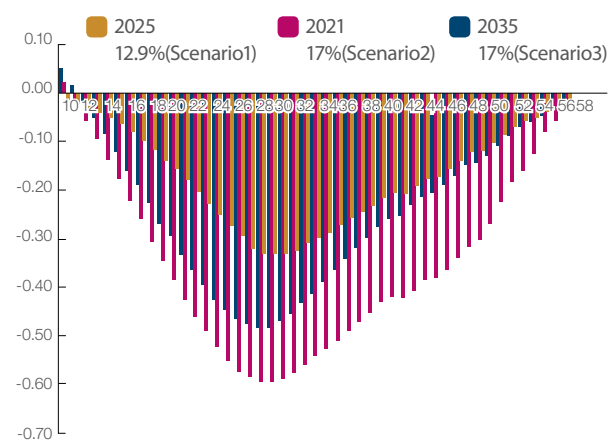
[Figure VI-4] calculates generational burden when the retirement age is raised. The figure shows that the burden on future generations decreases sooner extension of retirement age. If the increment is made fast enough, according to the figure, those in their 20's may receive more benefits than what is projected in the baseline. However, raising retirement age alone cannot secure the fiscal sustainability of the national pension. Accordingly, raising the contributions rate should be considered along with raising retirement age to spread the burden over a wide range of generations.

This research has run simulations for various combinations. The result shows that raising the rate up to 12.9% by 2025 and raising retirement age up to 67 (Scenario A) is the optimal solution for stabilizing the system and sharing the burden among different generations. In this scenario, generational burden of those under 25 decreases compared to that of other

generations. What is more, the magnitude of the burden diminishes for younger generations, and the result shows that those under 15 may even enjoy benefit (See [Figure VI-5, blue bars]).

Scenario B raising retirement age to 67, just like it does in Scenario A, but raises the contributions rate higher to 17% by 2035. This scenario is advantageous in that it secures stability of the national pension fund(See

Figure VI-3 _ Benefit Payment Ratio of Increasing Contributions Scenarios



Note: Benefit Ratio Difference by age = Benefit Ratio in scenario - Baseline Benefit Ratio

[Table VI-4]) and distributes the burden of adjustment over all generations, but the ratio the NPV of benefit to the NPV of premiums for all age groups excessively decreases and the burden of those in mid-20's to mid-30's get higher than that of other age groups (See [Figure VI-5], red bars).

Accordingly, it has been concluded that Scenario A would be the best combination for modifying the national pension, and the same scenario has been used in the analysis performed in chapter V, section 3 of this research.

3) Appropriateness of Benefits

One of the factors that need to be considered in preparing national pension policies is appropriateness of the benefits. National pension system is the most important institution for preparing the public's late years, and therefore appropriate level of pension payments need to be provided.

Raising the contributions rate alone does not affect the level of pension payments, but raising retirement age or combination scenarios indirectly contracts the benefits issued. In those scenarios, the sooner the reform is adopted, the lower the benefit per person falls. Monthly benefit per person may differ depending on average income and the duration of the policy, and hence it is difficult to project the level of benefit for each scenario. Nonetheless, on average, all scenarios guaranteed from 360,000 won to 490,000 won.

Should the fund insufficient, it will be supplemented by Basic Old-Age Pension, which is around 280,000 won in 2060, and appropriate level of benefit will be still be made to the contributors. As of 2012, the average monthly income is about 2.16 million won. Should a male with this level of income, on average, contributes a 35 years, the policy scenario suggests the lowest replacement rate of 32%. Since Basic Old-age Pension, based on the baseline projection, guarantees at least 10% of replacement rate, public pension fund is expected to guarantee around 42% of replacement rate. In general, OECD, World Bank, etc recommends public pension fund to provide 20-30% of replacement rate. Therefore, it seems that appropriate level of pension payments will be provided to the public.

Figure VI-4 _ Benefit Payment Ratio of Raising Retirement Age Scenarios

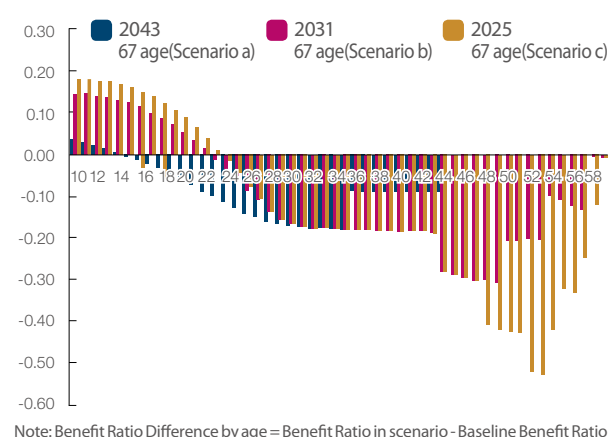


Figure VI-5 _ Benefit Payment Ratio of Combination Scenarios

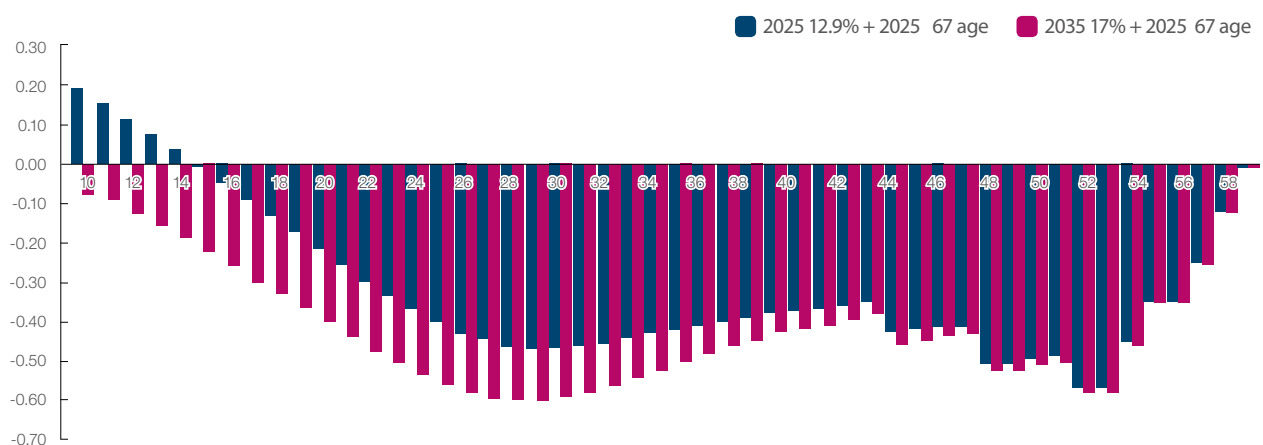


Table VI-5 _ Trend of Monthly Payments per person in Scenarios

(unit: won)

Year	Baseline	2025 12.9%	2035 17%	2021 17%	2043 67 age	2031 67 age	2025 67 age	2025 12.9%+ 2025 67 age	2035 17%+ 2025 67 age	Basic old-age pension
2012	285,447		274,339		274,339	274,339		274,339		79,607
2020	255,456		255,456		255,456	244,902		231,602		114,019
2025	255,395		255,395		255,395	235,804		211,195		181,054
2030	265,183		265,183		265,183	238,404		208,324		209,403
2035	281,731		281,731		281,731	239,149		217,816		215,891
2040	305,910		305,910		298,064	250,159		235,679		222,293
2045	344,051		344,051		315,990	276,857		267,839		230,452
2050	383,774		383,774		330,709	301,924		296,870		241,802
2051	390,850		390,850		333,100	305,793		301,341		244,386
2052	399,299		399,299		336,716	310,834		306,948		247,654
2053	407,381		407,381		339,986	315,595		312,248		250,524
2054	416,051		416,051		343,681	320,798		317,955		253,611
2055	425,948		425,948		348,283	326,910		324,535		257,242
2056	436,629		436,629		353,371	333,535		331,573		260,988
2057	448,064		448,064		358,957	340,661		339,094		264,985
2058	460,182		460,182		365,062	348,305		347,078		269,104
2059	472,905		472,905		371,681	356,465		355,533		273,484
2060	486,128		486,128		378,751	365,032		364,363		277,994

Note: Monthly payment is discounted by corporate bond yield rate

2. Long-term outlook on National Health Insurance and Policy Suggestions

Along with national pension, national health insurance is one of the most important social security programs. Due to population aging, extremely large amount of expenditure is expected for national health insurance. Expansion of aged population, increase of average medical fees due to advancing medical technology, increase of demand for medical service due to rising level of income etc will adversely affect the fiscal health of national health insurance. Unstable fiscal health of national health insurance will be a considerable burden to public finance.

In this section, long-term projections for national health insurance are provided and policy suggestions are made. This section focuses on how much population aging affects the fiscal health of national health insurance and how much of burden it will place on individuals and the nation. In other words, despite the fact that only a portion of fiscal burden of the national health insurance is designed to be supplemented by the government, this research attempts to analyze how much of the burden will increase should all of the burden fall on the government. With this type of background on

mind, this section attempts to project how much fiscal burden of the national health insurance will:

- 1) increase the contribution rate and contribution perperson if the burden falls on the policyholders
- 2) come from the government, if the burden is taken up by the government.

A. Assumptions for the fiscal projections on the national health insurance and method for projections

Below is the project ion on the size of the governmental aid for the national health insurance in two different scenarios. The first scenarios reflects the situation in which deficit of the national health insurance is covered by raising the contributions while the second scenario reflects the situation where the deficit is covered with the government subsidies.

Table VI-6 _ Scenario for the Long-term Outlook on National Health Insurance Finance

Scenario	Expenditure	Revenue
Raising contribution rate	Reflection of Population ageing	contribution rate is increased and government subsidy is kept as 20% of contribution revenue
Expanding government subsidy	Reflection of Population ageing	contribution rate is not increased and government subsidy is expanded

Box 4 Chronicles of Korean National Health Insurance

National health insurance is a social security program that aims to promote public health by providing insurance for inoculation, diagnose, treatment, recovery, birth, death and promoting health. The first system began as a health insurance union for large-scale businesses with 500 or more employees in 1977. The program was expanded to include fishermen and farmers in 1988 and to include self-employed workers in the city in 1989. Afterwards, in July, 2000, National Health Insurance Corporation was established to manage insurance policies for the public, and all health insurances were merged in July, 2003.

1) Scenario for raising the contribution rate

In this scenario, expanding expenditure of national health insurance due to population ageing is covered by raising the contribution rate, and projections are made with the following method. First, Health care benefits for the 2012-2060 period have been calculated with population aging considered. Data from the past have been used to calculate the benefits paid for each generation and types of the benefits. And each benefit has been divided by the number of policyholders in that age bracket to find the benefit per person. Then, future benefit per person has been calculated with multivariable regression analysis that utilizes nominal GDP long-term projections and ARMA error term.⁵¹⁾ As for national health insurance

revenue projection, national health insurance was assumed to balance the expenditure calculated above. And the government subsidies for national health insurance was assumed to be a certain percentage of the national health insurance revenue (20%).⁵²⁾

2) Scenario for expanding the governmental subsidy

The revenue for national health insurance was divided into the contribution of employee insured, contribution of self-employed insured and other revenue (additional charges, other collectables, income from interest, etc). The following equations have been used for projection of the contribution of employee insured and self-employed insured.

Table VI-7 _ Result of Scenario Projection for Raising Contribution Rate

(unit: trillion won, %)

	2012	2020	2030	2040	2050	2060
Benefits	41.5	83.5	169.7	295.4	428.4	517.9
(GDP ratio)	(3.17)	(3.97)	(4.92)	(5.77)	(6.19)	(6.16)
Contributions	34.6	69.6	141.5	246.2	357.0	431.6
(GDP ratio)	(2.64)	(3.30)	(4.10)	(4.81)	(5.16)	(5.13)
Government subsidies	5.4	11.8	28.3	49.2	71.4	86.3
(GDP ratio)	(0.41)	(0.56)	(0.82)	(0.96)	(1.03)	(1.03)

51 Total benefits= Beneficiaries of Health Insurance × Benefit per person

52 It is an obligation under the decree on Government Subsidy

Contributions of employee insured = Number of insured employees × monthly wage × contribution rate × rate of collection

Contributions of self-employed insured = Number of insured self-employed × contribution rate × Monthly income × rate of collection

In the above equation, the increase rate of both the insured have been assumed to be the increase rate of the employed,⁵³⁾ which was projected in Chapter 3. The numbers increase from 44% and 56% in 2012 respectively to 54% and 46% in 2030. Additionally, the insured's monthly wage(income) have been projected using a multivariable regression analysis that utilizes ARMA error term. In this regression method, insured employee's monthly wage is projected with projected values for the average monthly wage of the entire industry and seasonal dummy as independent variable. As for insured self-employed's monthly income, nominal GDP projections have been used. And the government subsidies for national health insurance

was assumed to be a certain percentage of the national health insurance's revenue (20%).

B. Projection Results

1) Scenario for raising the contribution rate

First of all, benefits paid by national health insurance increases from 3.2% of GDP in 2012 to 6.2% of GDP in 2060. This is due to a rapid expansion of the population above 60, who have much higher claims than other generations.

Population above 60 increases from 14.6% of the entire population in 2012 (7.22 million) to 42.4% of the entire population in 2060 (18.5 million). However, pays per person for the population between 60-69 are 4 times higher than those between 30-39. Population between

Table VI-8 _ Projection Result for Age Specific Medical Benefit per person
(unit: 10,000 won)

Age	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-75	over 75
2011	62	25	31	41	59	107	180	266	321
2020	116	43	51	69	94	174	289	462	621
2030	209	74	83	116	153	283	467	787	1,114
2040	324	113	122	173	226	419	686	1,187	1,722
2050	450	155	167	237	307	570	933	1,635	2,404
2060	556	192	209	293	382	712	1,170	2,049	3,044

Table VI-9 _ Average annual Increase in Age-group-specific covered person
(unit: %)

Age	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-75	over 75
2012 ~ 2060	-0.76	-1.37	-1.16	-1.12	-1.18	-0.77	1.09	1.42	3.36

Figure VI-6 _ Result of Scenario Projection for Raising Contribution Rate

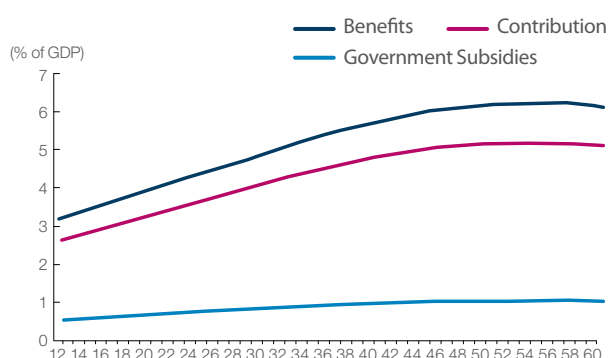
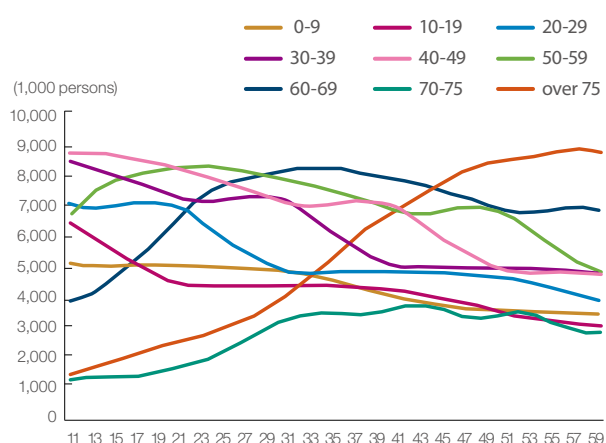


Figure VI-7 _ Projection Result of Age-group-specific covered person



53 It is on the assumption that the self-employed insured is continuously transferred to the employed insured

70-75 claim 7 times more while population above 75 claims 10.4 times more than those between 30-39.

In terms of generational population increase rate, population between 0 to 59 shows a negative growth from 2012 to 2060 while population above 60 shows a positive growth on average.

Insurance revenue is around 2.6% of GDP in 2012 but the value increases to 5.1% in 2060. As such, government subsidies increases from 0.5% of GDP in 2012 to 1% in 2060. The fast growth of the insurance revenue and government subsidies are attributed to the assumption that insurance revenue balances the expenditure for each year.

What stands out in the [Figure VI-6] is that the ratio of the health care benefits to GDP peaks at 6.21% in 2057 and starts to wake after 2058 (2058: 6.2, 2059: 6.18, 2060: 6.16). This is attributed to the population decrease

in all age brackets except those above 75. This can be verified in [Figure VI-7].

2) Scenario for expanding the governmental aid

In the Scenario for expanding the government subsidies, where the contribution rate has been kept at the 2012 level, the insurance revenue decreases from 2.6% of GDP in 2012 to 2.3% in 2060. This phenomenon is attributed to the fact that the number of the insured decreases. On the other hand, the government subsidies jump up from 0.5% of GDP in 2012 to 3.9% in 2060, which is due to the fact that all deficit are covered by the government subsidies.

3) Comparison of the two scenarios

In the scenario for raising the contribution rate, managed budget balance and national debt do not

Table VI-10 _ Result of Scenario Projection for Expanding Government Subsidies(contributions)

(unit : thousand persons, %, points, trillion won)

Year	Contributions of employed insured				Contributions of self-employed insured				Sum of contributions
	Persons	Monthly wage (thousand won)	Contribution rate	Contribution	Persons	Points	Contribution rate	Contributions	
2012	13,435	3.43	5.80	26.6	16,762	2,700	170	7.6	34.2
2020	15,874	4.44	5.80	40.7	16,862	4,170	170	11.8	52.4
2030	17,894	6.40	5.80	66.0	15,559	6,682	170	17.4	83.4
2040	17,812	9.09	5.80	93.3	15,488	9,787	170	25.4	118.7
2050	17,114	12.64	5.80	124.8	14,881	13,159	170	32.8	157.6
2060	15,682	17.26	5.80	156.0	13,635	15,930	170	36.4	192.4

Table VI-11 _ Result of Scenario Projection for Expanding Government Subsidies

(unit: trillion won, %)

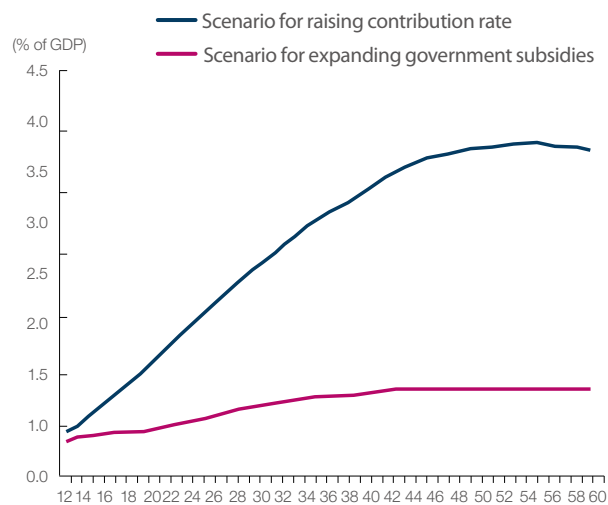
	2012	2020	2030	2040	2050	2060
Benefits	41.5	83.5	169.7	295.4	428.4	517.9
(GDP ratio)	(3.17)	(3.97)	(4.92)	(5.77)	(6.19)	(6.16)
Contributions	34.2	52.4	83.4	118.7	157.6	192.4
(GDP ratio)	(2.64)	(2.49)	(2.42)	(2.32)	(2.28)	(2.29)
Government subsidies	6.8	28.9	86.3	176.7	270.9	325.5
(GDP ratio)	(0.53)	(1.37)	(2.50)	(3.45)	(3.91)	(3.87)

Table VI-12 _ Projection Results for Government Subsidies

(unit: trillion won, %)

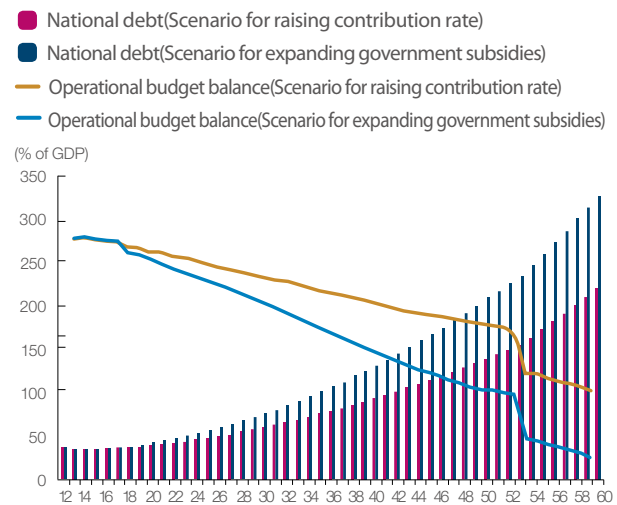
		2012	2020	2030	2040	2050	2060
Increase in contribution rate	Government subsidies	5.4	11.8	28.3	49.2	71.4	86.3
	(GDP ratio)	(0.41)	(0.56)	(0.82)	(0.96)	(1.03)	(1.03)
	Consolidated Public Sector Balance	16.0	3.4	-94.8	-324.2	-737.4	-1,116.1
	(GDP ratio)	(1.22)	(0.16)	(-2.75)	(-6.34)	(-10.65)	(-13.28)
	Operational Budget Balance	-16.2	-47.8	-147.4	-321.6	-549.1	-1,00.7
	(GDP ratio)	(-1.24)	(-2.27)	(-4.27)	(-6.29)	(-7.93)	(-13.09)
	National debt	448.1	815.1	2,021.9	4,668.7	9,437.1	18,374.6
	(GDP ratio)	(34.17)	(38.72)	(58.56)	(91.26)	(136.33)	(218.57)
Expansion of government subsidies	Government subsidies	6.8	28.9	86.3	176.7	270.9	325.5
	(GDP ratio)	(0.52)	(1.37)	(2.50)	(3.45)	(3.91)	(3.87)
	Consolidated Public Sector Balance	16.0	-15.4	-173.0	-524.6	-1,085.2	-1,551.8
	(GDP ratio)	(1.22)	(9.22)	(19.22)	(29.22)	(39.22)	(49.22)
	Operational Budget Balance	-16.2	-66.6	-225.6	-522.0	-896.9	-1,536.4
	(GDP ratio)	(-1.24)	(-3.16)	(-6.54)	(-10.20)	(-12.96)	(-18.28)
	National debt	448.1	870.8	2,551.9	6,606.9	14,205.9	27,177.5
	(GDP ratio)	(34.17)	(41.37)	(73.91)	(129.14)	(205.22)	(323.28)

Figure VI-8 _ Projection Results for Government Subsidies



change, but the contribution rate rises, which increase the rate of national burden in the scenario for raising the government subsidies, fiscal balance worsens and national debt rises, but the rate of national burden does not rise.

Figure VI-9 _ Projection Results for Operational Budget Balance and National Debt



① Comparison of the fiscal balance and national debt

Size of the government subsidies, fiscal balance and national debt of there for the two scenarios has been compared below. First of all, raising the contribution rate and the increase in insurance revenue of there

are irrelevant to the fiscal balance. Therefore, in the scenario for raising the contribution rate, fiscal balance and national debt equal to the baseline projections in Chapter IV.

However, when the deficit is covered by the government subsidies, managed budget balance is -18.28% of GDP in 2060, which is 5.19%p worse than the value in the scenario for raising the contribution rate. National debt rises by 104.7%p. In other words, when the contribution rate is kept at the current level, future fiscal burden exponentially increases and adversely affects the fiscal soundness.

② Comparison of the rate of national burden

In the scenario for raising the contribution rate, total revenue increases as the contribution rate rises, but in the scenario for expanding the government subsidies, revenue stays still since the contribution rate is assumed to remain constant. As such, in the scenario for raising the contribution rate causes the rate of national burden to go up while the value does not change in the other scenario.⁵⁴⁾ In the scenario for raising the contribution rate, to secure the revenue that is required to remedy population aging, the contribution rate rises in the following manner. First of all, the contribution rate of insured employees rises fast from 5.8% in 2012 to 13% in 2060. The contribution rate of insured self-employed also rises fast from 177 points in 2012 to 381 points in 2060. Considering that Germany and Japan, which manages health insurance as social insurance like Korea does, have insurance rates of 7.9% and 4.67%, the 13% contribution rate in 2060 is considerably high.

The contribution calculated per person for both the insured are shown in [Table VI-13]. The value for insured employees is around 2.06 million won in 2012 and 22.31 million won in 2060, which is around 9.79 million won at present value. On the other hand, the contribution per person for insured self-employed rises from 0.47 million won in 2012 to 5.99 million won in

2060, which is 2.63 million won at present value.

As the contributions soar, the rate of national burden rises by 1.4%p from 26.4% in 2012 to 27.8% in 2060. In the scenario for expanding the government subsidies, the rate of national burden remains the same as that in the baseline projection, which decreases somewhat from 26.4% in 2012 to 25% in 2060.

C. Policy Suggestions

“Who bears the fiscal burden of national health insurance?” was the question we tried to answer in this section. And there were two entities that could bear the burden; the insured and the government. According to the projections, when the government bore the burden to cover the deficit caused by population aging, national fiscal soundness was significantly hindered. Currently, Korea’s health insurance is run as a social insurance program, raising the insurance rate seems more appropriate to promote long-term fiscal stability.

Korea’s social insurance contributions takes up about 23% of national revenue as of 2009, but this is below the OECD average of 27% (2009), and there is room for collecting more. Also, because national health insurance of Korea is already collecting a considerable amount of aid from the government, and it would be difficult to significantly raise too high (13% in 2060). Therefore, the following efforts are required to expand insurance revenue and to keep expenditure in check.

First, fiscal management in mid- and long-term perspective is necessary. So far, fiscal management of national health insurance has not been run in mid- and long-term perspective. In the past, when fiscal surplus was large, the surplus was used to expand insurance coverage, and fiscal soundness was adversely affected. In the future, expanding the insurance coverage should be adjusted in mid- and long-term fiscal management.

Secondly, expenditure of national health insurance should be cut down with revisions for payment system and reduction of drug cost. So far, expenditure expansion was

54 It assumes for the scenario for expanding government subsidies that government subsidies is not financed through tax revenue but by national bonds

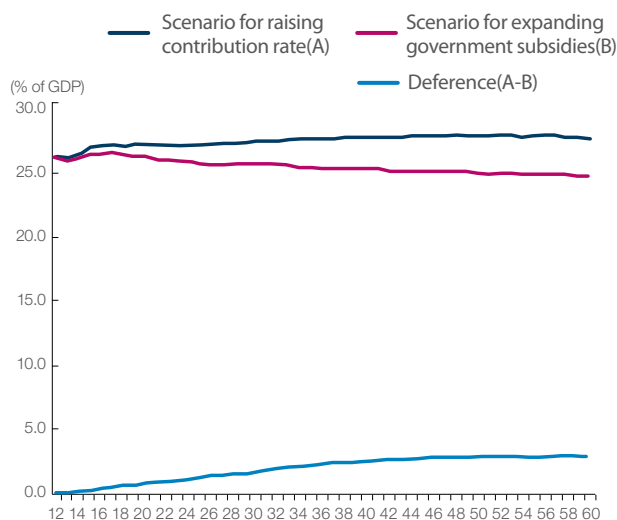
Table VI-13 _ Projection result of contribution rate per covered person(Scenario for raising contribution rate)
(unit: %, point)

	2012	2020	2030	2040	2050	2060
Employed Insured	6.04	7.69	9.83	12.02	13.14	13.01
Self-employed Insured	177	226	288	352	385	381

Table VI-14 _ Projection Result of Contribution per covered person(Scenario for Raising Contribution Rate)
(unit: 10,000 won)

		2012	2020	2030	2040	2050	2060
Employed Insured	contribution per covered person	206	340	625	1,086	1,652	2,231
	(current value)	(206)	(281)	(413)	(598)	(793)	(979)
Self-employed Insured	contribution per covered person	47	93	190	340	500	599
	(current value)	(47)	(77)	(125)	(187)	(240)	(263)

Figure VI-10 _ Projection Result for the Rate of National Burden



not appropriately controlled due to factors on the supply side. So far, control policy of the insurance cost was not effective and could not suppress the expenditure on medical costs. This type of failure will be an obstacle in securing fiscal soundness of the national health insurance in the future.

Controlling the insurance cost cannot practically suppress the insurance's expenditure. Even if the increase rate for insurance costs are kept below the inflation rate, medical service providers could increase the frequency of service provided to expand medical expenditure under the current free-for-service payment system. As shown in [Table VI-15], the increase rate of insurance costs was around 2.29% on average after 2005, but treatment fees, which are affected by change in insurance costs, showed large rates of increase of more than 10%. This type of phenomenon suggests that the free-for-service payment system should be abandoned in support of diagnosis related group payment system(DRG). However, DRG cannot resolve all of the problems associated with free-for-service payment system, and ways to minimize the side effects should be sought. Also, reasons for expanding medical costs should found in a systematic method.

Costs for drug and materials, which are not affected by the insurance costs, showed an even higher increase. Medicine cost rose by 12.37% on average while costs of materials rose by 16.45%. Considering that drug costs take up about 30% of the national health insurance, cutting down the drug cost is very important. To cut down on drug cost, incentives should be provided to both sellers and buyers of drug, and drug with lower costs should be recommended. Drug with comparatively higher cost could be paid with deductibles from patients.

Third, insurance revenue should be expanded by improvement scheme of contribution system). From July, 2011, dependents with those with property tax base above 0.9 billion won (17,533 people) are taxed, but the property tax base should be gradually lowered.

Fourth, to promote transparency and responsibility of the national health insurance finance, the national health insurance should be turned in to a fund. National health insurance, unlike national pension fund, industrial worker's accident compensation insurance and prevention fund, employment insurance fund, is nota fund, and is not accounted for in the consolidated fiscal balance of the government. National health insurance, unlike other social insurances, is not reviewed by the National Assembly, which makes it not as transparent. Also, because it is not reviewed by the National Assembly, granting governmental aids are

Table VI-15 _ The Medical Insurance Fee and Four Major Medical Treatment Fees

(unit: a growth rate(%))

	Medical insurance fee	Basic medical exams	Treatment activities	Drugs	Materials
2005	3.58	8.91	11.36	13.78	1.55
2006	2.3	13.29	13.06	16.26	45.81
2007	1.94	12.55	13.36	13.19	10.82
2008	2.22	6.25	10.33	8.32	12.83
2009	2.05	13.65	11.37	13.11	10.95
2010	1.64	8.21	13.01	9.57	16.72
Average	2.29	10.48	12.08	12.37	16.45

Source: National Health Insurance Corporation

more difficult. Therefore, national health insurance should be reviewed by the National Assembly as a part of national budget management. The National Health Insurance Act and National Health Promotion Act, which are the basis for providing governmental aids to national health insurance have been extended in December, 2011. Therefore national health insurance fund should be established under the National Health Insurance Act, and the National Health Insurance Act should be included in the National Finance Act Appendix 2, basis for establishing fund.

VII. Conclusion

This research is the first long-term fiscal research that utilizes the 2011 Population Projections by Statistics Korea, published in December, 2011. Through macro-economic and fiscal outlook up to 2060, it attempts to predict what kind of effect population aging will have on Korea's public finance. We dedicated lengthy hours on this research to analyze a wide range of issues thoroughly and to make detailed suggestions. Nonetheless, long-term macro-economic and fiscal outlook and policy measures in preparation for population aging both have parts that still remain insufficient. On these parts, we wait for reader's comments to make this research more complete.

Admittedly, this research is not the first one to analyze the effect of population aging on public finance. Past research on population aging, however, focused on emphasizing the importance of maintaining fiscal soundness by how poor fiscal balance gets due to low birth rates and population aging, and how high national debt gets. However, these projections are mostly with simplified assumptions on tax revenue and expenditure, which are directly influenced by low birth rates and population aging. As such they do not reflect the effect of change in population structure on public finance sufficiently.

This research, to remedy the aforementioned shortcomings, focused on reflecting the effect of low birth rates and population aging as accurately and in detail as possible. Of many aspects of tax revenue and expenditure, those that are influenced by changes in population structure were analyzed in depth to see how heavy the influence would be. Also, this research attempted to provide specific information on fiscal sustainability of Korea's public finance. At the same

time, this research, through generational accounting, pushed the old method of research a step forward to find out how much burden will fall on different generations. In addition, we attempted to show what type of preparation is necessary for population aging.

Fiscal baseline projections are provided in this research. Baseline projections refer to the projections made under the assumption that the current system maintains status quo, and the baseline projections in this research also assumes that there is no major change regarding tax revenue and expenditure until 2060. Projections made under this type of assumption allow us to see whether or not the current system is appropriate for future events such as population aging.

The main message from the analysis is that the current fiscal structure is absolutely unacceptable in preparation for population aging. That is to say, without significant reforms to the current system, Korea's public finance, although it may not face major obstacles for some time, will suddenly hit serious bumps once it enters the phase of aged population, loses sustainability from 2034, and gets out of control since then.

What we need to pay attention to in this phenomenon is that these projections are made without considering possible policies such as tax cuts that further aggravates fiscal soundness. In other words, even if Korea abstains from adopting new welfare policies, its public finance will get out of control from 2030, when 30% or more of the population is considered 'aged', unless major reforms are performed on the current fiscal system.

Such conclusion emphasizes that aggravation of fiscal soundness is not the type of problem that naturally resolves itself. In order for Korea's public finance to maintain sustainability despite population

aging, policies to expand tax revenue and cut down on expenditure need to be adopted as soon as possible. The sooner these policies are adopted, the sooner fiscal sustainability can be achieved.

Another reason to accelerate fiscal soundness is generational equity. Fiscal burden due to population aging naturally falls on younger generations. And if fiscal restructuring is delayed, the burden that younger generations bear will be bigger. Larger burden on the younger generation also means smaller one on the older generation.

This research, in preparation of population aging, recommends that the proportion of tax breaks and preferences in national tax to be lowered from the current 14.4% to 9% by 2018 to expand tax base. Secondly, taxable income for consolidated financial income tax should be lowered from 2013 to 2015 to expand tax base. Third, new sources of tax should be secured by taxing V.A.T. on financial services, transfer gains on stocks by minority shareholders, and transactionson exchange of financial derivatives. Fourth, liquid tax should be raised to strengthen tax on goods that cause external diseconomy. Fifth, V.A.T. tax rate should be raised before expenditure related to population aging gets serious (before 2018). Along with these measures, the insurance rate of national pension should be raised to 12.9% by 2025 and the commencement age for issuing benefits should be adjusted every two years from 2013 to 67 by 2025 so that the fund will not run out until 2070. When this scenario in preparation of population aging is executed, Korea's public finance will be able to maintain relatively sound fiscal conditions until 2060 and will be able to distribute the burden of fiscal restructuring among all generations fairly, as shown through generational accounting.

No one knows for sure which path Korea's economy and public finance will take to arrive at the year 2060. Even if Korea adopts the scenario in preparation of

population aging suggested by this research, it may be difficult to maintain fiscal sustainability as the proportion of aged population goes up.

In the future, Korea's public finance may raise the tax rate of V.A.T. by 2%p. Even if the tax rate of V.A.T. reaches 12%, it is still lower than that in advanced nations. Also, the suggested tax rate of 10% on transfer gains on stocks by minority shareholders could be raised more by 10%p. In the future, as the stock market of Korea matures and develops, tax on transfer gains will have less and less shock on the market. In addition, ways to broaden the tax base to find sources of tax without putting too much burden on the entire economy could be sought. If policy measures suggested in the scenario in preparation of population aging turn out to be insufficient, such additional tax raise package could be adopted before 2026, at which Korea enters the phase of 'post aged-population'.

Lastly, the underground economy should continue to be brought out of the dark in order for Korea's economy to be more transparent and to secure more assets in preparation for population aging.⁵⁵⁾ Bringing the underground economy out into the public realm is a major task for improving the tax system of Korea. It entails prevention of offshore tax evasion, active application of income/expenditure analysis system, expansion of the use of tax invoice and more. When the underground economy is brought into the public realm, it will have a significant effect on Korea's public finance, but it is not included in the projection of this research because it is difficult to project the magnitude of the effect.

Population aging is the biggest challenge imposed upon Korea's public finance. Due to population aging, Korea's public finance bears a huge burden, but it can be resolved with sufficient and early preparation. At this point, the older generation must look farther into the future and make a resolute decision not to leave fiscal burden on future generations.

55 According to estimations by Schneider(2011), Korea's underground economy levels around 25% of GDP, which is much higher than the average value presented by developed nations at 18%.

A- I . Table of Projections results

1. Baseline Projections

A. Macro-economy

	GDP				Price		Wage	Interest rate	Exchange rate	Labor
	Nominal GDP Growth (%)	Real GDP Growth (%)	Nominal GDP (tril.won)	Real GDP (tril.won)	Deflator (%)	CPI (%)	Nominal Wage Growth (%)	Corporate bond yield (%)	(Won/Dollar)	Empolymment Growth (%)
2012	6.00	3.50	1311.4	1119.4	2.36	2.69	4.20	4.3	1151.0	1.34
2013	6.50	3.90	1396.6	1163.1	2.56	2.72	4.50	4.9	1109.0	1.42
2014	6.80	4.20	1491.6	1212.0	2.50	2.83	4.80	5.5	1060.0	1.50
2015	5.98	3.50	1580.9	1254.4	2.36	2.66	4.20	5.2	1077.0	1.22
2016	5.57	3.30	1669.0	1295.8	2.22	2.50	3.70	4.9	1111.0	0.98
2017	6.15	3.60	1771.6	1342.4	2.46	2.70	5.20	4.7	1068.8	0.90
2018	6.03	3.50	1878.3	1389.4	2.44	2.70	5.00	4.6	1030.3	0.80
2019	5.92	3.40	1989.6	1436.6	2.44	2.60	4.90	4.5	995.3	0.70
2020	5.80	3.30	2105.0	1484.1	2.42	2.60	4.79	4.4	963.4	0.60
2021	5.64	3.20	2223.6	1531.5	2.36	2.50	4.85	4.4	934.5	0.50
2022	5.53	3.10	2346.6	1579.0	2.36	2.50	4.90	4.3	908.4	0.40
2023	5.40	3.00	2473.4	1626.4	2.33	2.40	4.77	4.3	884.7	0.30
2024	5.28	2.90	2604.0	1673.6	2.31	2.40	4.80	4.3	863.5	0.14
2025	5.15	2.80	2738.2	1720.4	2.29	2.30	4.72	4.2	844.5	0.15
2026	5.03	2.70	2875.9	1766.9	2.27	2.20	4.75	4.2	827.6	0.20
2027	4.90	2.60	3016.9	1812.8	2.24	2.10	4.68	4.2	812.7	0.09
2028	4.71	2.50	3159.1	1858.1	2.16	2.09	4.68	4.1	799.7	0.17
2029	4.65	2.40	3306.0	1902.7	2.20	2.03	4.62	4.1	791.4	0.10
2030	4.43	2.33	3452.6	1947.0	2.06	1.97	4.53	4.1	779.5	0.13
2031	4.41	2.30	3604.8	1991.7	2.06	1.91	4.51	4.1	770.2	0.00
2032	4.25	2.20	3757.9	2035.6	2.00	1.85	4.48	4.1	760.9	-0.11
2033	4.23	2.23	3916.9	2080.9	1.96	1.78	4.32	4.0	751.8	0.06
2034	4.09	2.14	4077.0	2125.4	1.91	1.72	4.30	4.0	742.8	-0.07
2035	4.09	2.18	4243.6	2171.8	1.86	1.66	4.17	4.0	742.4	0.03
2036	3.99	2.13	4412.7	2218.0	1.82	1.60	4.11	4.0	742.0	-0.02
2037	3.88	2.07	4584.0	2264.1	1.77	1.60	4.11	3.9	741.7	-0.08
2038	3.79	2.03	4757.8	2310.1	1.72	1.60	4.11	3.8	741.3	-0.11
2039	3.70	1.99	4933.9	2356.1	1.68	1.50	3.99	3.7	740.9	-0.14
2040	3.69	2.03	5116.0	2403.9	1.63	1.50	3.91	3.7	740.6	-0.02
2041	3.60	1.99	5300.3	2451.7	1.58	1.50	3.89	3.6	740.2	-0.05
2042	3.47	1.90	5483.9	2498.2	1.54	1.40	3.86	3.5	739.8	-0.27
2043	3.29	1.77	5664.2	2542.5	1.49	1.40	3.84	3.3	739.5	-0.31
2044	3.21	1.75	5846.2	2586.9	1.44	1.36	3.79	3.2	739.1	-0.32
2045	3.12	1.70	6028.4	2630.8	1.40	1.33	3.75	3.1	738.7	-0.37
2046	3.02	1.65	6210.3	2674.1	1.35	1.29	3.82	3.0	738.3	-0.42
2047	2.91	1.59	6391.2	2716.6	1.30	1.26	3.68	2.9	738.0	-0.47
2048	2.80	1.53	6570.4	2758.2	1.25	1.23	3.65	2.8	737.6	-0.54
2049	2.70	1.47	6747.7	2798.9	1.21	1.19	3.61	2.7	737.2	-0.59
2050	2.59	1.41	6922.4	2838.3	1.16	1.16	3.67	2.6	736.9	-0.65
2051	2.48	1.35	7094.3	2876.8	1.11	1.12	3.54	2.5	736.5	-0.70
2052	2.19	1.11	7249.8	2908.8	1.07	1.09	3.63	2.2	736.1	-0.75
2053	2.28	1.25	7415.4	2945.2	1.02	1.06	3.46	2.3	735.8	-0.80
2054	2.19	1.20	7577.7	2980.6	0.97	1.02	3.42	2.2	735.4	-0.84
2055	1.95	1.02	7725.8	3010.9	0.93	0.99	3.48	2.0	735.0	-0.87
2056	1.87	0.98	7870.2	3040.4	0.88	0.95	3.44	1.9	734.7	-0.90
2057	1.78	0.94	8010.6	3069.1	0.83	0.92	3.40	1.8	734.3	-0.93
2058	1.70	0.91	8146.9	3097.0	0.79	0.89	3.35	1.7	733.9	-0.95
2059	1.62	0.87	8278.9	3124.0	0.74	0.85	3.31	1.6	733.6	-0.97
2060	1.54	0.84	8406.7	3150.4	0.69	0.82	3.20	1.5	733.2	-0.99

B. Total Revenue

(unit: trillion won)

	National Tax Revenues								
	Income tax	Corporate tax	V.A.T.	Liquor tax	Property tax	Custom duties	Individual tax + Traffic	Others	Sub Total
2012	45.0	44.9	56.1	2.9	9.3	11.0	19.1	16.4	204.8
2013	49.1	49.2	60.3	2.8	10.4	11.1	18.6	16.1	217.5
2014	53.4	53.3	65.3	2.9	11.1	12.2	19.0	17.1	234.3
2015	57.5	57.6	70.5	3.0	12.2	13.9	19.2	18.2	252.2
2016	61.4	61.1	74.4	2.9	13.3	15.8	18.3	19.2	266.4
2017	65.7	64.7	78.6	3.6	14.1	16.0	21.7	19.7	284.0
2018	70.1	68.8	82.9	3.5	14.8	16.5	22.0	20.5	299.1
2019	74.7	72.8	87.5	3.8	15.6	16.9	23.3	21.3	316.0
2020	79.4	77.1	92.1	4.0	16.6	17.4	24.7	22.2	333.4
2021	84.3	81.4	96.9	4.2	17.2	17.8	26.1	23.0	350.9
2022	89.3	85.8	102.0	4.5	17.8	18.6	27.6	23.9	369.5
2023	94.3	90.4	107.4	4.8	18.5	19.5	29.0	24.8	388.8
2024	99.6	95.1	113.0	5.1	19.5	20.3	30.6	25.7	408.8
2025	105.0	100.1	118.8	5.3	20.6	21.0	32.1	26.7	429.7
2026	110.6	105.4	124.8	5.6	21.1	21.8	33.7	27.6	450.7
2027	116.6	110.7	130.8	6.0	21.8	22.5	35.3	28.6	472.2
2028	122.6	116.8	137.1	6.2	22.7	23.2	36.9	29.5	495.0
2029	128.7	122.9	143.5	6.5	23.8	23.9	38.5	30.7	518.6
2030	134.9	129.3	150.3	6.8	25.0	24.5	40.1	31.9	542.7
2031	141.2	135.7	156.7	7.1	25.5	25.2	41.7	33.2	566.3
2032	147.6	142.4	163.2	7.4	26.0	26.0	43.2	34.3	590.1
2033	154.0	149.2	170.1	7.7	26.9	26.4	44.8	35.3	614.5
2034	160.6	156.3	177.0	8.0	28.0	27.0	46.3	36.3	639.5
2035	167.4	163.4	184.2	8.3	29.4	27.5	47.9	37.4	665.4
2036	174.1	170.9	191.5	8.6	30.7	28.0	49.4	38.5	691.8
2037	180.9	178.5	199.1	8.9	32.2	28.6	50.9	39.6	718.7
2038	187.8	186.6	206.8	9.3	33.8	29.2	52.3	40.7	746.5
2039	194.9	194.9	214.6	9.6	35.4	29.8	53.8	41.8	774.7
2040	201.9	203.4	222.6	9.9	36.9	30.1	55.2	42.9	803.0
2041	208.7	211.7	230.7	10.3	38.2	30.6	56.7	44.0	830.9
2042	215.1	220.7	238.5	10.6	39.7	30.9	58.1	45.2	858.7
2043	221.7	229.9	246.3	11.0	41.3	31.1	59.4	46.3	887.0
2044	228.4	239.4	254.5	11.3	42.8	31.4	60.7	47.4	915.9
2045	235.1	248.4	262.1	11.7	44.5	31.6	61.9	48.5	943.8
2046	241.9	257.5	269.9	12.0	46.3	31.7	63.1	49.7	972.2
2047	248.6	266.8	277.8	12.4	48.2	31.7	64.3	50.8	1,000.6
2048	255.3	276.2	284.3	12.8	50.2	31.7	65.3	51.9	1,027.7
2049	261.9	285.5	290.8	13.1	52.3	31.5	66.4	53.0	1,054.5
2050	268.7	294.8	297.0	13.5	54.4	31.1	67.3	54.1	1,080.9
2051	274.4	304.2	303.1	13.8	56.5	30.8	68.2	55.2	1,106.1
2052	281.2	313.4	308.7	14.1	59.3	30.2	68.9	56.2	1,132.0
2053	288.3	323.4	314.5	14.4	60.9	29.7	69.7	57.3	1,158.2
2054	293.8	330.8	320.5	14.8	63.3	29.1	70.4	58.3	1,180.9
2055	299.9	339.6	326.0	15.1	65.9	28.3	70.9	59.3	1,205.0
2056	306.4	349.1	330.7	15.4	68.1	27.6	71.4	60.3	1,229.0
2057	312.8	357.1	335.5	15.7	70.4	26.8	71.9	61.3	1,251.3
2058	314.0	364.9	340.3	16.0	72.6	25.9	72.3	62.3	1,268.2
2059	315.4	372.6	345.1	16.3	74.8	25.0	72.6	63.2	1,284.9
2060	317.2	380.1	349.9	16.6	76.9	24.1	72.9	64.1	1,301.8

(unit: trillion won)

	Social Security Contribution					Non-Tax Revenue					Total Revenue
	National Pension	Worker's Compensation Insurance	Employment Insurance	Teacher's Pension	Sub Total	Non-Tax Revenue	Capital Revenue	Repayment of lending	Revenue of public Enterprise	Sub Total	
2012	28.5	5.1	6.0	1.8	41.4	58.7	4.2	26.0	6.4	95.3	341.4
2013	30.1	5.4	6.2	1.9	43.6	62.3	4.1	26.7	6.8	99.8	361.0
2014	32.1	5.8	6.8	2.0	46.6	66.5	3.8	27.9	7.2	105.4	386.3
2015	34.5	6.2	7.3	2.1	50.1	71.1	3.7	27.1	7.7	109.5	411.9
2016	36.8	6.6	7.8	2.2	53.5	74.6	3.5	27.4	8.1	113.6	433.5
2017	39.5	7.0	8.5	2.4	57.4	78.8	3.3	26.6	8.6	117.4	458.8
2018	41.6	7.4	9.2	2.5	60.8	83.0	3.5	27.3	9.1	123.0	482.9
2019	43.7	7.8	9.9	2.6	64.1	87.5	3.8	28.1	9.6	129.0	509.1
2020	45.8	8.3	10.6	2.7	67.5	92.3	4.0	29.7	10.2	136.2	537.1
2021	47.9	8.7	11.4	2.9	70.9	97.0	4.2	31.2	10.8	143.1	564.9
2022	50.0	9.1	12.2	3.0	74.4	102.0	4.4	32.6	11.4	150.4	594.3
2023	52.1	9.6	12.9	3.2	77.8	107.5	4.7	33.8	12.0	157.9	624.5
2024	54.4	10.1	13.4	3.3	81.1	113.1	4.9	35.2	12.6	165.9	655.8
2025	56.6	10.6	13.9	3.5	84.5	118.9	5.2	36.7	13.3	174.1	688.3
2026	59.0	11.1	14.4	3.6	88.1	124.9	5.4	38.2	13.9	182.5	721.3
2027	61.4	11.6	14.8	3.8	91.6	128.8	5.7	39.7	14.6	188.8	752.7
2028	63.8	12.2	15.4	4.0	95.3	134.5	6.0	41.2	15.3	196.9	787.2
2029	66.3	12.7	15.9	4.1	99.0	140.2	6.2	42.6	16.0	205.1	822.7
2030	68.6	13.3	16.4	4.3	102.6	145.9	6.5	44.1	16.7	213.3	858.6
2031	70.9	13.8	16.9	4.5	106.1	151.7	6.8	45.6	17.5	221.6	894.1
2032	73.2	14.3	17.4	4.7	109.7	157.5	7.1	47.0	18.2	229.8	929.6
2033	75.5	14.9	18.0	4.9	113.3	163.2	7.4	48.4	19.0	238.1	965.8
2034	77.8	15.5	18.5	5.1	116.9	168.9	7.7	49.8	19.8	246.2	1,002.6
2035	80.1	16.0	19.0	5.4	120.5	174.4	8.0	51.2	20.6	254.3	1,040.2
2036	82.6	16.6	19.5	5.6	124.3	179.9	8.3	52.6	21.4	262.2	1,078.3
2037	85.2	17.2	20.0	5.8	128.2	183.5	8.7	53.9	22.2	268.3	1,115.2
2038	87.9	17.8	20.5	6.0	132.2	187.0	9.0	55.3	23.1	274.3	1,153.1
2039	90.6	18.4	21.1	6.3	136.2	190.3	9.3	56.5	23.9	280.1	1,191.0
2040	93.1	19.0	21.6	6.5	140.2	194.7	9.7	57.8	24.8	287.0	1,230.1
2041	95.5	19.6	22.2	6.8	144.1	197.2	10.0	59.0	25.7	292.0	1,266.9
2042	97.9	20.2	22.8	7.0	147.9	198.4	10.4	60.2	26.6	295.6	1,302.2
2043	100.3	20.8	23.4	7.3	151.8	198.0	10.7	61.4	27.5	297.6	1,336.4
2044	102.9	21.4	23.9	7.6	155.8	199.2	11.0	62.5	28.3	301.1	1,372.8
2045	105.8	22.0	24.5	7.8	160.1	199.4	11.4	63.6	29.2	303.6	1,407.5
2046	109.0	22.6	25.1	8.1	164.8	199.0	11.7	64.5	30.1	305.4	1,442.4
2047	112.1	23.2	25.6	8.4	169.4	198.0	12.1	65.4	31.0	306.5	1,476.5
2048	115.3	23.8	26.2	8.7	174.0	196.5	12.4	66.2	31.9	307.0	1,508.8
2049	118.6	24.4	26.8	9.0	178.8	194.6	12.7	67.0	32.7	307.1	1,540.4
2050	121.9	25.0	27.5	9.3	183.7	192.4	13.1	67.6	33.6	306.7	1,571.3
2051	124.6	25.6	28.1	9.6	187.9	190.2	13.4	68.2	34.4	306.2	1,600.2
2052	127.3	26.2	28.8	9.9	192.2	186.1	13.7	68.8	35.2	303.8	1,628.0
2053	129.7	26.7	29.5	10.2	196.1	185.2	14.0	69.6	36.0	304.8	1,659.1
2054	132.0	27.2	30.1	10.5	199.9	182.9	14.3	70.7	36.7	304.6	1,685.4
2055	134.4	27.8	30.8	10.8	203.8	185.3	14.6	72.1	37.5	309.5	1,718.3
2056	136.8	28.3	31.4	11.1	207.6	188.1	14.9	73.6	38.2	314.8	1,751.4
2057	139.2	28.8	31.9	11.4	211.4	190.8	15.1	75.2	38.8	320.0	1,782.6
2058	141.6	29.4	32.5	11.7	215.1	193.4	15.4	76.7	39.5	325.0	1,808.3
2059	144.1	29.9	33.0	12.0	218.9	195.9	15.6	78.2	40.1	329.8	1,833.7
2060	146.5	30.3	33.5	12.3	222.6	198.2	15.9	79.6	40.8	334.5	1,858.9

(unit: % of GDP)

	National Tax Revenues								Sub Total
	Income tax	Corporate tax	V.A.T.	Liquor tax	Property tax	Custom duties	Individual tax + Traffic	Others	
2012	3.43	3.43	4.28	0.22	0.71	0.84	1.46	1.25	15.61
2013	3.51	3.52	4.32	0.20	0.74	0.80	1.33	1.16	15.58
2014	3.58	3.57	4.37	0.19	0.75	0.82	1.27	1.15	15.71
2015	3.64	3.65	4.46	0.19	0.77	0.88	1.22	1.15	15.96
2016	3.68	3.66	4.46	0.17	0.80	0.95	1.10	1.15	15.96
2017	3.71	3.65	4.44	0.20	0.79	0.90	1.23	1.11	16.03
2018	3.73	3.66	4.42	0.19	0.79	0.88	1.17	1.09	15.92
2019	3.76	3.66	4.40	0.19	0.79	0.85	1.17	1.07	15.88
2020	3.77	3.66	4.37	0.19	0.79	0.83	1.17	1.05	15.84
2021	3.79	3.66	4.36	0.19	0.77	0.80	1.17	1.04	15.78
2022	3.80	3.66	4.35	0.19	0.76	0.79	1.17	1.02	15.74
2023	3.81	3.65	4.34	0.19	0.75	0.79	1.17	1.00	15.72
2024	3.82	3.65	4.34	0.19	0.75	0.78	1.17	0.99	15.70
2025	3.83	3.66	4.34	0.20	0.75	0.77	1.17	0.97	15.69
2026	3.85	3.66	4.34	0.20	0.73	0.76	1.17	0.96	15.67
2027	3.86	3.67	4.34	0.20	0.72	0.75	1.17	0.95	15.65
2028	3.88	3.70	4.34	0.20	0.72	0.73	1.17	0.93	15.67
2029	3.89	3.72	4.34	0.20	0.72	0.72	1.16	0.93	15.69
2030	3.91	3.75	4.35	0.20	0.72	0.71	1.16	0.92	15.72
2031	3.92	3.77	4.35	0.20	0.71	0.70	1.16	0.92	15.71
2032	3.93	3.79	4.34	0.20	0.69	0.69	1.15	0.91	15.70
2033	3.93	3.81	4.34	0.20	0.69	0.67	1.14	0.90	15.69
2034	3.94	3.83	4.34	0.20	0.69	0.66	1.14	0.89	15.69
2035	3.94	3.85	4.34	0.20	0.69	0.65	1.13	0.88	15.68
2036	3.95	3.87	4.34	0.19	0.70	0.64	1.12	0.87	15.68
2037	3.95	3.89	4.34	0.19	0.70	0.62	1.11	0.86	15.68
2038	3.95	3.92	4.35	0.19	0.71	0.61	1.10	0.85	15.69
2039	3.95	3.95	4.35	0.19	0.72	0.60	1.09	0.85	15.70
2040	3.95	3.97	4.35	0.19	0.72	0.59	1.08	0.84	15.70
2041	3.94	3.99	4.35	0.19	0.72	0.58	1.07	0.83	15.68
2042	3.92	4.02	4.35	0.19	0.72	0.56	1.06	0.82	15.66
2043	3.91	4.06	4.35	0.19	0.73	0.55	1.05	0.82	15.66
2044	3.91	4.09	4.35	0.19	0.73	0.54	1.04	0.81	15.67
2045	3.90	4.12	4.35	0.19	0.74	0.52	1.03	0.81	15.66
2046	3.90	4.15	4.35	0.19	0.75	0.51	1.02	0.80	15.65
2047	3.89	4.17	4.35	0.19	0.75	0.50	1.01	0.79	15.66
2048	3.89	4.20	4.33	0.19	0.76	0.48	0.99	0.79	15.64
2049	3.88	4.23	4.31	0.19	0.78	0.47	0.98	0.79	15.63
2050	3.88	4.26	4.29	0.19	0.79	0.45	0.97	0.78	15.61
2051	3.87	4.29	4.27	0.19	0.80	0.43	0.96	0.78	15.59
2052	3.88	4.32	4.26	0.19	0.82	0.42	0.95	0.78	15.61
2053	3.89	4.36	4.24	0.19	0.82	0.40	0.94	0.77	15.62
2054	3.88	4.36	4.23	0.19	0.84	0.38	0.93	0.77	15.58
2055	3.88	4.40	4.22	0.20	0.85	0.37	0.92	0.77	15.60
2056	3.89	4.44	4.20	0.20	0.87	0.35	0.91	0.77	15.62
2057	3.90	4.46	4.19	0.20	0.88	0.33	0.90	0.77	15.62
2058	3.85	4.48	4.18	0.20	0.89	0.32	0.89	0.76	15.57
2059	3.81	4.50	4.17	0.20	0.90	0.30	0.88	0.76	15.52
2060	3.77	4.52	4.16	0.20	0.92	0.29	0.87	0.76	15.49

(unit: % of GDP)

	Social Security Contribution					Non-Tax Revenue					Total Revenue
	National Pension	Worker's Compensation Insurance	Employment Insurance	Teacher's Pension	Sub Total	Non-Tax Revenue	Capital Revenue	Repayment of lending	Revenue of public Enterprise	Sub Total	
2012	2.17	0.39	0.46	0.14	3.15	4.48	0.32	1.98	0.48	7.26	26.03
2013	2.16	0.39	0.45	0.14	3.12	4.46	0.29	1.91	0.48	7.15	25.85
2014	2.15	0.39	0.45	0.14	3.13	4.46	0.25	1.87	0.48	7.07	25.90
2015	2.18	0.39	0.46	0.13	3.17	4.49	0.23	1.71	0.48	6.93	26.05
2016	2.20	0.40	0.47	0.13	3.20	4.47	0.21	1.64	0.48	6.81	25.98
2017	2.23	0.40	0.48	0.13	3.24	4.45	0.19	1.50	0.48	6.62	25.90
2018	2.22	0.40	0.49	0.13	3.23	4.42	0.19	1.45	0.48	6.55	25.71
2019	2.20	0.39	0.50	0.13	3.22	4.40	0.19	1.41	0.48	6.49	25.59
2020	2.18	0.39	0.51	0.13	3.20	4.38	0.19	1.41	0.48	6.47	25.51
2021	2.15	0.39	0.51	0.13	3.19	4.36	0.19	1.40	0.48	6.44	25.40
2022	2.13	0.39	0.52	0.13	3.17	4.35	0.19	1.39	0.48	6.41	25.32
2023	2.11	0.39	0.52	0.13	3.14	4.34	0.19	1.37	0.48	6.39	25.25
2024	2.09	0.39	0.51	0.13	3.12	4.34	0.19	1.35	0.48	6.37	25.18
2025	2.07	0.39	0.51	0.13	3.09	4.34	0.19	1.34	0.48	6.36	25.14
2026	2.05	0.39	0.50	0.13	3.06	4.34	0.19	1.33	0.48	6.34	25.08
2027	2.03	0.38	0.49	0.13	3.04	4.27	0.19	1.31	0.48	6.26	24.95
2028	2.02	0.39	0.49	0.13	3.02	4.26	0.19	1.30	0.48	6.23	24.92
2029	2.00	0.38	0.48	0.13	2.99	4.24	0.19	1.29	0.48	6.20	24.88
2030	1.99	0.38	0.47	0.13	2.97	4.23	0.19	1.28	0.48	6.18	24.87
2031	1.97	0.38	0.47	0.13	2.94	4.21	0.19	1.26	0.48	6.15	24.80
2032	1.95	0.38	0.46	0.13	2.92	4.19	0.19	1.25	0.48	6.12	24.74
2033	1.93	0.38	0.46	0.13	2.89	4.17	0.19	1.24	0.48	6.08	24.66
2034	1.91	0.38	0.45	0.13	2.87	4.14	0.19	1.22	0.48	6.04	24.59
2035	1.89	0.38	0.45	0.13	2.84	4.11	0.19	1.21	0.48	5.99	24.51
2036	1.87	0.38	0.44	0.13	2.82	4.08	0.19	1.19	0.48	5.94	24.44
2037	1.86	0.37	0.44	0.13	2.80	4.00	0.19	1.18	0.48	5.85	24.33
2038	1.85	0.37	0.43	0.13	2.78	3.93	0.19	1.16	0.48	5.76	24.23
2039	1.84	0.37	0.43	0.13	2.76	3.86	0.19	1.15	0.48	5.68	24.14
2040	1.82	0.37	0.42	0.13	2.74	3.81	0.19	1.13	0.48	5.61	24.05
2041	1.80	0.37	0.42	0.13	2.72	3.72	0.19	1.11	0.48	5.51	23.90
2042	1.78	0.37	0.42	0.13	2.70	3.62	0.19	1.10	0.48	5.39	23.75
2043	1.77	0.37	0.41	0.13	2.68	3.50	0.19	1.08	0.48	5.25	23.59
2044	1.76	0.37	0.41	0.13	2.67	3.41	0.19	1.07	0.48	5.15	23.48
2045	1.75	0.37	0.41	0.13	2.66	3.31	0.19	1.05	0.48	5.04	23.35
2046	1.75	0.36	0.40	0.13	2.65	3.21	0.19	1.04	0.48	4.92	23.23
2047	1.75	0.36	0.40	0.13	2.65	3.10	0.19	1.02	0.48	4.80	23.10
2048	1.76	0.36	0.40	0.13	2.65	2.99	0.19	1.01	0.48	4.67	22.96
2049	1.76	0.36	0.40	0.13	2.65	2.88	0.19	0.99	0.48	4.55	22.83
2050	1.76	0.36	0.40	0.13	2.65	2.78	0.19	0.98	0.48	4.43	22.70
2051	1.76	0.36	0.40	0.13	2.65	2.68	0.19	0.96	0.48	4.32	22.56
2052	1.76	0.36	0.40	0.14	2.65	2.57	0.19	0.95	0.48	4.19	22.46
2053	1.75	0.36	0.40	0.14	2.64	2.50	0.19	0.94	0.48	4.11	22.37
2054	1.74	0.36	0.40	0.14	2.64	2.41	0.19	0.93	0.48	4.02	22.24
2055	1.74	0.36	0.40	0.14	2.64	2.40	0.19	0.93	0.48	4.01	22.24
2056	1.74	0.36	0.40	0.14	2.64	2.39	0.19	0.94	0.48	4.00	22.25
2057	1.74	0.36	0.40	0.14	2.64	2.38	0.19	0.94	0.48	3.99	22.25
2058	1.74	0.36	0.40	0.14	2.64	2.37	0.19	0.94	0.48	3.99	22.20
2059	1.74	0.36	0.40	0.15	2.64	2.37	0.19	0.94	0.48	3.98	22.15
2060	1.74	0.36	0.40	0.15	2.65	2.36	0.19	0.95	0.48	3.98	22.11

C. Total Expenditure

(unit: trillion won)

	Public Assistance	Social Insurance				Sub Total	Pension					Sub Total
	National Basic	Health Insurance	Long term care	Employment	Industrial Accident		National	Military	Teacher's	Gov. Employee's	Basic old age	
2012	7.0	5.4	0.5	4.1	3.9	13.9	11.8	2.5	1.8	10.3	3.0	29.4
2013	7.4	6.3	0.5	4.6	4.0	15.4	12.5	2.7	1.9	10.7	3.4	31.1
2014	7.8	6.9	0.6	4.9	4.3	16.7	14.1	2.8	2.0	11.7	3.6	34.3
2015	8.2	7.5	0.6	5.3	4.5	17.9	15.9	3.0	2.2	12.7	3.9	37.6
2016	8.7	8.0	0.7	5.6	4.8	19.1	17.9	3.2	2.4	13.6	4.2	41.3
2017	9.2	8.8	0.7	6.0	5.1	20.6	19.6	3.3	2.6	14.8	4.7	45.0
2018	9.8	9.7	0.8	6.4	5.4	22.3	21.7	3.5	2.9	15.9	5.5	49.6
2019	10.4	10.6	0.9	6.9	5.7	24.1	24.1	3.7	3.2	17.1	6.8	55.0
2020	11.1	11.8	0.9	7.3	6.0	26.1	26.8	3.9	3.5	18.4	8.5	61.1
2021	11.9	13.0	1.0	7.8	6.4	28.2	29.6	4.1	3.9	19.6	10.4	67.6
2022	12.7	14.4	1.1	8.3	6.7	30.5	32.6	4.4	4.2	20.9	12.6	74.7
2023	13.5	15.9	1.2	8.7	7.1	32.9	35.6	4.6	4.6	22.3	15.1	82.2
2024	14.3	17.5	1.3	9.1	7.4	35.4	39.0	4.8	5.0	23.6	18.2	90.6
2025	15.2	19.3	1.4	9.5	7.8	38.0	42.7	5.1	5.5	25.0	21.2	99.4
2026	16.1	21.2	1.5	9.9	8.2	40.8	46.8	5.3	6.0	26.4	24.3	108.7
2027	17.0	23.2	1.6	10.3	8.6	43.8	51.2	5.5	6.4	27.8	27.4	118.3
2028	17.8	24.8	1.7	10.7	9.1	46.3	55.8	5.7	6.9	29.2	30.8	128.4
2029	18.8	26.5	1.9	11.1	9.6	49.0	60.8	6.0	7.3	30.7	33.9	138.8
2030	19.7	28.3	2.0	11.5	10.1	51.9	66.4	6.2	7.7	32.1	36.9	149.4
2031	20.7	30.2	2.1	12.0	10.6	54.8	72.1	6.5	8.2	33.5	39.9	160.1
2032	21.8	32.1	2.2	12.4	11.1	57.9	78.4	6.7	8.7	35.0	42.9	171.7
2033	22.8	34.1	2.4	12.9	11.6	61.0	85.1	7.0	9.2	36.5	46.3	184.0
2034	24.0	36.1	2.5	13.3	12.2	64.2	92.5	7.3	9.7	37.9	50.0	197.4
2035	25.1	38.2	2.6	13.8	12.8	67.4	100.7	7.5	10.2	39.4	53.9	211.7
2036	26.4	40.3	2.8	14.3	13.4	70.8	109.6	7.8	10.7	40.9	57.9	226.8
2037	27.6	42.5	2.9	14.7	14.1	74.2	119.2	8.1	11.2	42.4	62.1	242.9
2038	28.9	44.6	3.1	15.2	14.7	77.7	129.4	8.4	11.7	44.0	66.4	259.7
2039	30.3	46.9	3.2	15.7	15.4	81.3	140.2	8.7	12.2	45.5	70.6	277.2
2040	31.7	49.2	3.4	16.3	16.2	85.1	152.5	9.0	12.7	47.0	74.8	296.0
2041	33.2	51.6	3.6	16.8	16.9	89.0	166.3	9.2	13.2	48.5	79.0	316.3
2042	34.8	54.0	3.9	17.3	17.7	93.0	180.9	9.5	13.7	50.0	83.2	337.3
2043	36.3	56.3	4.1	17.9	18.6	96.9	196.6	9.9	14.1	51.4	87.5	359.5
2044	38.0	58.6	4.4	18.5	19.4	100.9	213.7	10.2	14.6	52.7	92.0	383.2
2045	39.7	60.9	4.7	19.0	20.3	104.9	232.3	10.5	15.1	54.1	96.8	408.6
2046	41.4	63.1	5.0	19.6	21.2	108.9	252.1	10.8	15.5	55.3	101.8	435.5
2047	43.2	65.2	5.3	20.2	22.2	112.9	272.5	11.1	15.9	56.5	106.7	462.7
2048	45.1	67.3	5.5	20.8	23.1	116.8	292.9	11.4	16.3	57.7	111.4	489.8
2049	47.0	69.4	5.8	21.4	24.2	120.8	307.8	11.8	16.8	58.9	115.8	511.0
2050	48.9	71.4	6.1	22.1	25.2	124.9	322.2	12.1	17.1	60.0	120.0	531.6
2051	50.7	73.4	6.4	22.8	26.3	128.9	335.8	12.4	17.5	61.1	124.1	550.9
2052	52.4	75.2	6.7	23.5	27.5	132.8	349.8	12.7	17.9	62.0	128.1	570.5
2053	54.3	76.9	7.0	24.2	28.6	136.7	363.9	13.0	18.3	62.9	132.0	590.2
2054	56.1	78.6	7.3	24.9	29.8	140.6	378.5	13.4	18.7	63.8	136.0	610.3
2055	58.0	80.1	7.6	25.6	31.0	144.3	393.9	13.6	19.1	64.5	140.3	631.3
2056	59.9	81.5	7.9	26.3	32.3	148.0	410.2	13.9	19.6	65.1	144.8	653.5
2057	61.8	82.9	8.2	27.0	33.7	151.7	427.4	14.2	20.0	65.7	149.5	676.8
2058	63.7	84.1	8.5	27.7	35.0	155.3	445.4	14.5	20.4	66.2	154.3	700.8
2059	65.6	85.3	8.8	28.4	36.4	158.8	463.8	14.9	20.9	67.1	159.1	725.8
2060	67.6	86.3	9.1	29.0	37.9	162.3	482.6	15.2	21.3	67.9	163.8	750.8

(unit: Trillion won)

	Other Mandatory Expenditure				Sub Total	Transfer to local government		Sub Total	Mandatory	Discretionary	Total
	Patriots Veterans	Child Care	Interest Payment	Other		Local Allocation	Local Financial				
2012	3.1	2.3	15.4	6.0	26.8	33.0	38.4	71.5	148.6	176.8	325.4
2013	3.2	2.4	16.9	6.9	29.4	35.7	41.0	76.7	159.9	181.6	341.5
2014	3.3	2.5	18.8	6.9	31.5	38.6	44.2	82.8	173.0	193.9	367.0
2015	3.4	2.6	19.7	7.1	32.8	41.6	47.5	89.1	185.3	205.5	390.8
2016	3.5	2.7	20.8	7.2	34.2	44.1	50.1	94.2	196.4	217.0	413.4
2017	3.6	2.9	23.4	7.5	37.4	46.8	54.2	101.0	213.2	230.3	443.5
2018	3.7	3.0	22.7	7.8	37.2	49.6	57.4	106.9	225.8	244.2	469.9
2019	3.8	3.1	24.2	8.2	39.2	52.5	60.8	113.3	241.9	258.6	500.6
2020	3.9	3.2	26.3	8.5	41.9	55.5	64.3	119.8	260.0	273.6	533.7
2021	4.0	3.3	28.3	8.8	44.5	58.5	67.8	126.3	278.4	289.1	567.4
2022	4.1	3.4	30.9	9.2	47.6	61.7	71.4	133.1	298.5	305.1	603.5
2023	4.2	3.5	33.7	9.6	51.0	65.0	75.3	140.2	319.7	321.5	641.2
2024	4.3	3.6	36.7	9.9	54.5	68.4	79.2	147.6	342.4	338.5	680.9
2025	4.4	3.7	40.2	10.3	58.6	72.0	83.4	155.4	366.6	356.0	722.5
2026	4.5	3.7	44.2	10.7	63.1	75.6	87.6	163.2	391.9	373.9	765.8
2027	4.6	3.8	48.5	11.1	68.1	79.3	91.9	171.2	418.3	392.2	810.5
2028	4.7	3.8	53.4	11.5	73.5	83.3	96.5	179.7	445.9	410.7	856.6
2029	4.8	3.9	59.4	12.0	80.1	87.4	101.2	188.6	475.2	429.8	905.0
2030	4.9	3.9	64.8	12.4	86.1	91.6	106.0	197.6	504.6	448.8	953.5
2031	5.0	3.9	71.4	12.8	93.1	95.7	110.8	206.5	535.3	468.6	1,003.9
2032	5.1	3.9	78.4	13.3	100.7	99.9	115.6	215.4	567.4	488.5	1,055.9
2033	5.2	3.9	85.7	13.8	108.6	104.2	120.6	224.7	601.1	509.2	1,110.3
2034	5.3	3.9	93.6	14.2	116.9	108.6	125.7	234.3	636.8	530.0	1,166.8
2035	5.3	3.9	102.2	14.7	126.1	113.2	131.0	244.2	674.6	551.7	1,226.3
2036	5.4	3.8	111.7	15.2	136.2	117.9	136.4	254.3	714.5	573.7	1,288.1
2037	5.5	3.8	121.4	15.7	146.4	122.7	141.9	264.6	755.7	595.9	1,351.6
2038	5.6	3.7	131.6	16.2	157.1	127.7	147.6	275.3	798.8	618.5	1,417.3
2039	5.6	3.7	142.0	16.7	168.1	132.7	153.4	286.1	843.0	641.4	1,484.4
2040	5.7	3.7	153.1	17.3	179.8	137.8	159.3	297.1	889.7	665.1	1,554.7
2041	5.8	3.7	164.7	17.8	192.0	142.8	165.1	307.9	938.4	689.0	1,627.4
2042	5.8	3.7	176.1	18.4	204.0	147.9	170.9	318.7	987.8	712.9	1,700.7
2043	5.9	3.7	187.2	18.9	215.6	153.0	176.8	329.8	1,038.2	736.3	1,774.5
2044	5.9	3.7	198.5	19.4	227.6	158.3	182.8	341.1	1,090.8	760.0	1,850.8
2045	5.9	3.7	209.7	20.0	239.3	163.3	188.7	352.0	1,144.6	783.7	1,928.3
2046	6.0	3.8	221.1	20.5	251.4	168.5	194.7	363.2	1,200.4	807.3	2,007.7
2047	6.0	3.8	232.3	21.1	263.2	173.8	200.7	374.4	1,256.4	830.9	2,087.3
2048	6.1	3.8	243.7	21.6	275.2	178.7	206.4	385.1	1,312.0	854.2	2,166.2
2049	6.1	3.9	254.9	22.1	286.9	183.7	212.1	395.8	1,361.5	877.2	2,238.7
2050	6.1	3.9	265.4	22.7	298.1	188.6	217.8	406.4	1,409.8	899.9	2,309.7
2051	6.1	3.9	275.9	23.2	309.1	193.3	223.2	416.5	1,456.1	922.3	2,378.4
2052	6.1	3.9	282.9	23.7	316.6	198.2	228.8	426.9	1,499.3	942.5	2,441.8
2053	6.2	4.0	292.6	24.2	326.8	203.1	234.4	437.6	1,545.5	964.0	2,509.5
2054	6.2	4.0	301.9	24.7	336.7	207.4	239.4	446.8	1,590.6	985.1	2,575.7
2055	6.2	4.0	314.1	25.1	349.4	212.0	244.6	456.7	1,639.6	1,004.4	2,644.0
2056	6.2	4.0	325.3	25.5	361.0	216.6	249.9	466.5	1,688.9	1,023.1	2,712.0
2057	6.2	4.0	336.9	26.0	373.1	220.9	254.8	475.6	1,738.9	1,041.4	2,780.3
2058	6.2	4.1	347.8	26.4	384.4	224.1	258.6	482.7	1,786.9	1,059.1	2,846.0
2059	6.2	4.1	358.4	26.8	395.4	227.4	262.3	489.7	1,835.4	1,076.3	2,911.6
2060	6.1	4.1	369.1	27.2	406.5	230.6	266.1	496.8	1,884.0	1,092.9	2,976.9

(unit: % of GDP)

	Public Assistance	Social Insurance				Sub Total	Pension					Sub Total
	National Basic	Health Insurance	Long term care	Employment	Industrial Accident		National	Military	Teacher's	Gov. Employee's	Basic old age	
2012	0.53	0.41	0.04	0.32	0.30	1.06	0.90	0.19	0.14	0.79	0.23	2.24
2013	0.53	0.45	0.04	0.33	0.29	1.10	0.89	0.19	0.14	0.77	0.24	2.23
2014	0.52	0.47	0.04	0.33	0.29	1.12	0.95	0.19	0.14	0.78	0.24	2.30
2015	0.52	0.47	0.04	0.33	0.29	1.13	1.01	0.19	0.14	0.80	0.25	2.38
2016	0.52	0.48	0.04	0.34	0.28	1.14	1.07	0.19	0.14	0.82	0.25	2.47
2017	0.52	0.50	0.04	0.34	0.29	1.16	1.11	0.19	0.15	0.83	0.27	2.54
2018	0.52	0.51	0.04	0.34	0.29	1.19	1.16	0.19	0.15	0.85	0.29	2.64
2019	0.52	0.54	0.04	0.35	0.29	1.21	1.21	0.19	0.16	0.86	0.34	2.76
2020	0.53	0.56	0.04	0.35	0.29	1.24	1.28	0.19	0.17	0.87	0.40	2.90
2021	0.53	0.58	0.05	0.35	0.29	1.27	1.33	0.19	0.17	0.88	0.47	3.04
2022	0.54	0.61	0.05	0.35	0.29	1.30	1.39	0.19	0.18	0.89	0.54	3.18
2023	0.54	0.64	0.05	0.35	0.29	1.33	1.44	0.19	0.19	0.90	0.61	3.32
2024	0.55	0.67	0.05	0.35	0.29	1.36	1.50	0.18	0.19	0.91	0.70	3.48
2025	0.55	0.70	0.05	0.35	0.29	1.39	1.56	0.18	0.20	0.91	0.77	3.63
2026	0.56	0.74	0.05	0.34	0.29	1.42	1.63	0.18	0.21	0.92	0.84	3.78
2027	0.56	0.77	0.05	0.34	0.29	1.45	1.70	0.18	0.21	0.92	0.91	3.92
2028	0.56	0.79	0.06	0.34	0.29	1.47	1.77	0.18	0.22	0.93	0.98	4.07
2029	0.57	0.80	0.06	0.34	0.29	1.48	1.84	0.18	0.22	0.93	1.03	4.20
2030	0.57	0.82	0.06	0.33	0.29	1.50	1.92	0.18	0.22	0.93	1.07	4.33
2031	0.57	0.84	0.06	0.33	0.29	1.52	2.00	0.18	0.23	0.93	1.11	4.44
2032	0.58	0.85	0.06	0.33	0.29	1.54	2.09	0.18	0.23	0.93	1.14	4.57
2033	0.58	0.87	0.06	0.33	0.30	1.56	2.17	0.18	0.23	0.93	1.18	4.70
2034	0.59	0.89	0.06	0.33	0.30	1.57	2.27	0.18	0.24	0.93	1.23	4.84
2035	0.59	0.90	0.06	0.33	0.30	1.59	2.37	0.18	0.24	0.93	1.27	4.99
2036	0.60	0.91	0.06	0.32	0.30	1.60	2.48	0.18	0.24	0.93	1.31	5.14
2037	0.60	0.93	0.06	0.32	0.31	1.62	2.60	0.18	0.24	0.93	1.35	5.30
2038	0.61	0.94	0.06	0.32	0.31	1.63	2.72	0.18	0.25	0.92	1.39	5.46
2039	0.61	0.95	0.07	0.32	0.31	1.65	2.84	0.18	0.25	0.92	1.43	5.62
2040	0.62	0.96	0.07	0.32	0.32	1.66	2.98	0.18	0.25	0.92	1.46	5.79
2041	0.63	0.97	0.07	0.32	0.32	1.68	3.14	0.17	0.25	0.92	1.49	5.97
2042	0.63	0.98	0.07	0.32	0.32	1.70	3.30	0.17	0.25	0.91	1.52	6.15
2043	0.64	0.99	0.07	0.32	0.33	1.71	3.47	0.17	0.25	0.91	1.54	6.35
2044	0.65	1.00	0.08	0.32	0.33	1.73	3.65	0.17	0.25	0.90	1.57	6.56
2045	0.66	1.01	0.08	0.32	0.34	1.74	3.85	0.17	0.25	0.90	1.61	6.78
2046	0.67	1.02	0.08	0.32	0.34	1.75	4.06	0.17	0.25	0.89	1.64	7.01
2047	0.68	1.02	0.08	0.32	0.35	1.77	4.26	0.17	0.25	0.88	1.67	7.24
2048	0.69	1.02	0.08	0.32	0.35	1.78	4.46	0.17	0.25	0.88	1.70	7.46
2049	0.70	1.03	0.09	0.32	0.36	1.79	4.56	0.17	0.25	0.87	1.72	7.57
2050	0.71	1.03	0.09	0.32	0.36	1.80	4.65	0.18	0.25	0.87	1.73	7.68
2051	0.71	1.03	0.09	0.32	0.37	1.82	4.73	0.17	0.25	0.86	1.75	7.77
2052	0.72	1.04	0.09	0.32	0.38	1.83	4.82	0.18	0.25	0.86	1.77	7.87
2053	0.73	1.04	0.09	0.33	0.39	1.84	4.91	0.18	0.25	0.85	1.78	7.96
2054	0.74	1.04	0.10	0.33	0.39	1.85	4.99	0.18	0.25	0.84	1.80	8.05
2055	0.75	1.04	0.10	0.33	0.40	1.87	5.10	0.18	0.25	0.83	1.82	8.17
2056	0.76	1.04	0.10	0.33	0.41	1.88	5.21	0.18	0.25	0.83	1.84	8.30
2057	0.77	1.03	0.10	0.34	0.42	1.89	5.34	0.18	0.25	0.82	1.87	8.45
2058	0.78	1.03	0.10	0.34	0.43	1.91	5.47	0.18	0.25	0.81	1.89	8.60
2059	0.79	1.03	0.11	0.34	0.44	1.92	5.60	0.18	0.25	0.81	1.92	8.77
2060	0.80	1.03	0.11	0.35	0.45	1.93	5.74	0.18	0.25	0.81	1.95	8.93

(unit: % of GDP)

	Other Mandatory Expenditure				Sub Total	Transfer to local government		Sub Total	Mandatory	Discretionary	Total
	Patriots Veterans	Child Care	Interest Payment	Other		Local Allocation	Local Financial				
2012	0.23	0.17	1.18	0.46	2.04	2.52	2.93	5.45	11.33	13.48	24.81
2013	0.23	0.17	1.21	0.49	2.10	2.56	2.94	5.49	11.45	13.00	24.45
2014	0.22	0.17	1.26	0.46	2.11	2.59	2.96	5.55	11.60	13.00	24.60
2015	0.21	0.17	1.25	0.45	2.08	2.63	3.00	5.63	11.72	13.00	24.72
2016	0.21	0.16	1.25	0.43	2.05	2.64	3.00	5.64	11.77	13.00	24.77
2017	0.20	0.16	1.32	0.43	2.11	2.64	3.06	5.70	12.03	13.00	25.03
2018	0.20	0.16	1.21	0.42	1.98	2.64	3.06	5.69	12.02	13.00	25.02
2019	0.19	0.16	1.21	0.41	1.97	2.64	3.05	5.69	12.16	13.00	25.16
2020	0.18	0.15	1.25	0.40	1.99	2.64	3.05	5.69	12.35	13.00	25.35
2021	0.18	0.15	1.27	0.40	2.00	2.63	3.05	5.68	12.52	13.00	25.52
2022	0.17	0.14	1.32	0.39	2.03	2.63	3.04	5.67	12.72	13.00	25.72
2023	0.17	0.14	1.36	0.39	2.06	2.63	3.04	5.67	12.93	13.00	25.93
2024	0.17	0.14	1.41	0.38	2.09	2.63	3.04	5.67	13.15	13.00	26.15
2025	0.16	0.13	1.47	0.38	2.14	2.63	3.04	5.67	13.39	13.00	26.39
2026	0.16	0.13	1.54	0.37	2.20	2.63	3.05	5.67	13.63	13.00	26.63
2027	0.15	0.13	1.61	0.37	2.26	2.63	3.05	5.67	13.86	13.00	26.86
2028	0.15	0.12	1.69	0.37	2.33	2.64	3.05	5.69	14.11	13.00	27.11
2029	0.15	0.12	1.80	0.36	2.42	2.64	3.06	5.70	14.37	13.00	27.37
2030	0.14	0.11	1.88	0.36	2.49	2.65	3.07	5.72	14.62	13.00	27.62
2031	0.14	0.11	1.98	0.36	2.58	2.65	3.07	5.73	14.85	13.00	27.85
2032	0.14	0.10	2.09	0.35	2.68	2.66	3.08	5.73	15.10	13.00	28.10
2033	0.13	0.10	2.19	0.35	2.77	2.66	3.08	5.74	15.35	13.00	28.35
2034	0.13	0.10	2.29	0.35	2.87	2.66	3.08	5.75	15.62	13.00	28.62
2035	0.13	0.09	2.41	0.35	2.97	2.67	3.09	5.76	15.90	13.00	28.90
2036	0.12	0.09	2.53	0.34	3.09	2.67	3.09	5.76	16.19	13.00	29.19
2037	0.12	0.08	2.65	0.34	3.19	2.68	3.10	5.77	16.49	13.00	29.49
2038	0.12	0.08	2.76	0.34	3.30	2.68	3.10	5.79	16.79	13.00	29.79
2039	0.11	0.08	2.88	0.34	3.41	2.69	3.11	5.80	17.09	13.00	30.09
2040	0.11	0.07	2.99	0.34	3.51	2.69	3.11	5.81	17.39	13.00	30.39
2041	0.11	0.07	3.11	0.34	3.62	2.69	3.11	5.81	17.70	13.00	30.70
2042	0.11	0.07	3.21	0.33	3.72	2.70	3.12	5.81	18.01	13.00	31.01
2043	0.10	0.07	3.30	0.33	3.81	2.70	3.12	5.82	18.33	13.00	31.33
2044	0.10	0.06	3.40	0.33	3.89	2.71	3.13	5.83	18.66	13.00	31.66
2045	0.10	0.06	3.48	0.33	3.97	2.71	3.13	5.84	18.99	13.00	31.99
2046	0.10	0.06	3.56	0.33	4.05	2.71	3.13	5.85	19.33	13.00	32.33
2047	0.09	0.06	3.64	0.33	4.12	2.72	3.14	5.86	19.66	13.00	32.66
2048	0.09	0.06	3.71	0.33	4.19	2.72	3.14	5.86	19.97	13.00	32.97
2049	0.09	0.06	3.78	0.33	4.25	2.72	3.14	5.87	20.18	13.00	33.18
2050	0.09	0.06	3.83	0.33	4.31	2.72	3.15	5.87	20.37	13.00	33.37
2051	0.09	0.06	3.89	0.33	4.36	2.72	3.15	5.87	20.52	13.00	33.52
2052	0.08	0.05	3.90	0.33	4.37	2.73	3.16	5.89	20.68	13.00	33.68
2053	0.08	0.05	3.95	0.33	4.41	2.74	3.16	5.90	20.84	13.00	33.84
2054	0.08	0.05	3.98	0.33	4.44	2.74	3.16	5.90	20.99	13.00	33.99
2055	0.08	0.05	4.07	0.32	4.52	2.74	3.17	5.91	21.22	13.00	34.22
2056	0.08	0.05	4.13	0.32	4.59	2.75	3.18	5.93	21.46	13.00	34.46
2057	0.08	0.05	4.21	0.32	4.66	2.76	3.18	5.94	21.71	13.00	34.71
2058	0.08	0.05	4.27	0.32	4.72	2.75	3.17	5.93	21.93	13.00	34.93
2059	0.07	0.05	4.33	0.32	4.78	2.75	3.17	5.91	22.17	13.00	35.17
2060	0.07	0.05	4.39	0.32	4.84	2.74	3.17	5.91	22.41	13.00	35.41

D. Fiscal Balance and National Debt Projections

	(unit: Trillion won)				(unit: % of GDP)			
	Consolidated Fiscal balance	Social Security fund balance	Managed Budget balance	National Debt	Consolidated Fiscal balance	Social Security fund balance	Managed Budget balance	National Debt
2012	16.0	32.2	-16.2	448.1	1.22	2.46	-1.24	34.17
2013	19.5	35.4	-15.9	478.3	1.40	2.54	-1.14	34.25
2014	19.4	37.7	-18.3	499.9	1.30	2.53	-1.23	33.52
2015	21.1	40.7	-19.7	532.8	1.33	2.58	-1.25	33.70
2016	20.1	42.7	-22.6	569.8	1.21	2.56	-1.35	34.14
2017	15.3	45.6	-32.1	632.6	0.86	2.58	-1.81	35.71
2018	12.9	47.0	-36.0	686.8	0.69	2.50	-1.91	36.57
2019	8.6	48.2	-41.6	747.5	0.43	2.42	-2.09	37.57
2020	3.4	49.2	-47.8	815.1	0.16	2.34	-2.27	38.72
2021	-2.6	50.0	-54.6	890.0	-0.11	2.25	-2.46	40.02
2022	-9.3	50.7	-62.1	973.2	-0.40	2.16	-2.65	41.47
2023	-16.8	51.5	-70.6	1,065.5	-0.68	2.08	-2.85	43.08
2024	-25.1	52.1	-79.7	1,167.5	-0.97	2.00	-3.06	44.84
2025	-34.2	52.3	-89.1	1,279.7	-1.25	1.91	-3.25	46.73
2026	-44.5	52.2	-99.4	1,402.7	-1.55	1.81	-3.46	48.77
2027	-57.8	52.0	-112.7	1,539.5	-1.92	1.72	-3.74	51.03
2028	-69.4	51.6	-124.0	1,687.9	-2.20	1.63	-3.93	53.43
2029	-82.3	50.6	-136.2	1,849.3	-2.49	1.53	-4.12	55.94
2030	-94.9	49.1	-147.4	2,021.8	-2.75	1.42	-4.27	58.56
2031	-109.8	47.3	-160.7	2,208.6	-3.05	1.31	-4.46	61.27
2032	-126.3	44.9	-175.0	2,409.9	-3.36	1.20	-4.66	64.13
2033	-144.5	41.9	-190.4	2,627.5	-3.69	1.07	-4.86	67.08
2034	-164.2	38.0	-206.4	2,861.3	-4.03	0.93	-5.06	70.18
2035	-186.1	33.2	-223.7	3,113.5	-4.39	0.78	-5.27	73.37
2036	-209.9	27.6	-242.1	3,384.6	-4.76	0.63	-5.49	76.70
2037	-236.4	19.8	-261.0	3,675.0	-5.16	0.43	-5.69	80.17
2038	-264.2	11.2	-280.5	3,985.3	-5.55	0.24	-5.90	83.76
2039	-293.4	1.8	-300.4	4,315.9	-5.95	0.04	-6.09	87.47
2040	-324.6	-8.4	-321.6	4,668.7	-6.34	-0.16	-6.29	91.26
2041	-360.5	-22.1	-344.2	5,044.4	-6.80	-0.42	-6.49	95.17
2042	-398.5	-37.7	-366.7	5,442.6	-7.27	-0.69	-6.69	99.25
2043	-438.2	-55.8	-388.5	5,862.0	-7.74	-0.98	-6.86	103.49
2044	-478.0	-73.7	-410.7	6,303.9	-8.18	-1.26	-7.02	107.83
2045	-520.8	-93.8	-433.6	6,768.7	-8.64	-1.56	-7.19	112.28
2046	-565.3	-115.4	-456.7	7,256.5	-9.10	-1.86	-7.35	116.85
2047	-610.8	-138.1	-479.6	7,767.1	-9.56	-2.16	-7.50	121.53
2048	-657.4	-161.3	-503.3	8,301.1	-10.01	-2.46	-7.66	126.34
2049	-698.3	-179.2	-526.5	8,858.1	-10.35	-2.66	-7.80	131.27
2050	-738.4	-196.9	-549.1	9,437.1	-10.67	-2.84	-7.93	136.33
2051	-778.1	-214.4	-571.5	10,038.1	-10.97	-3.02	-8.06	141.50
2052	-813.8	-233.1	-588.6	10,653.4	-11.22	-3.22	-8.12	146.95
2053	-850.5	-250.5	-614.3	11,296.1	-11.47	-3.38	-8.28	152.33
2054	-890.3	-269.4	-638.8	12,022.7	-11.75	-3.56	-8.44	158.03
2055	-925.7	-283.6	-661.3	13,141.6	-11.98	-3.67	-8.62	164.10
2056	-960.6	-298.7	-683.3	14,113.8	-12.21	-3.80	-8.81	170.70
2057	-997.7	-314.8	-703.5	15,121.5	-12.45	-3.93	-9.01	177.87
2058	-1,037.7	-331.6	-726.1	16,167.5	-12.74	-4.07	-9.22	185.60
2059	-1,078.0	-348.9	-749.1	17,251.9	-13.02	-4.21	-9.44	193.93
2060	-1,117.9	-366.7	-771.2	18,374.6	-13.30	-4.36	-9.68	202.87

2. Rising Interest Rate Scenario

(unit: trillion won)

	Government bond (3 yrs.)	Total Expenditure	Total Revenue	Consolidated Fiscal Balance	Managed Budget Balance	Government Debt
2012	3.5	325.4	341.4	16.0	-16.2	448.1
2013	4.0	341.5	361.0	19.5	-15.9	478.3
2014	4.7	367.0	386.3	19.4	-18.3	499.9
2015	4.2	390.8	411.9	21.1	-19.7	532.8
2016	3.9	413.4	433.5	20.1	-22.6	569.8
2017	3.9	442.0	458.7	16.7	-30.7	631.2
2018	3.9	470.6	482.8	12.2	-36.7	686.2
2019	3.8	501.3	509.1	7.8	-42.3	747.6
2020	3.8	534.4	537.0	2.6	-48.6	816.0
2021	3.8	568.2	564.9	-3.3	-55.4	891.8
2022	3.8	604.3	594.2	-10.1	-63.0	975.9
2023	3.8	642.1	624.5	-17.6	-71.5	1,069.1
2024	3.7	681.8	655.7	-26.1	-80.6	1,172.1
2025	3.7	723.5	688.3	-35.2	-90.1	1,285.2
2026	3.7	766.7	721.3	-45.5	-100.4	1,409.1
2027	3.7	811.5	752.6	-58.9	-113.7	1,547.0
2028	3.7	857.6	787.2	-70.5	-125.1	1,696.5
2029	3.6	906.1	822.7	-83.5	-137.3	1,859.0
2030	3.6	954.6	858.6	-96.1	-148.6	2,032.8
2031	3.6	1,005.2	894.3	-110.9	-161.8	2,220.6
2032	3.7	1,057.8	932.6	-125.2	-175.9	2,422.8
2033	3.8	1,113.1	970.6	-142.5	-192.4	2,642.5
2034	3.9	1,171.1	1,009.4	-161.7	-210.1	2,880.0
2035	4.0	1,232.7	1,049.3	-183.5	-229.6	3,138.1
2036	4.0	1,296.8	1,088.4	-208.4	-251.0	3,418.1
2037	4.1	1,363.9	1,128.6	-235.3	-273.6	3,721.0
2038	4.2	1,434.2	1,170.6	-263.6	-297.8	4,048.6
2039	4.3	1,507.3	1,212.7	-294.7	-324.1	4,402.9
2040	4.4	1,585.1	1,254.9	-330.2	-353.0	4,787.1
2041	4.5	1,667.2	1,297.0	-370.2	-384.4	5,203.1
2042	4.5	1,751.4	1,336.0	-415.4	-418.0	5,652.6
2043	4.5	1,838.1	1,374.6	-463.6	-452.9	6,136.3
2044	4.6	1,929.4	1,415.3	-514.1	-490.1	6,657.6
2045	4.7	2,025.1	1,454.5	-570.6	-531.2	7,220.0
2046	4.8	2,125.5	1,493.1	-632.4	-575.8	7,827.0
2047	4.8	2,228.8	1,528.8	-700.0	-622.8	8,480.8
2048	4.9	2,335.1	1,563.7	-771.4	-673.6	9,185.1
2049	4.9	2,438.1	1,596.1	-842.0	-727.3	9,942.7
2050	5.0	2,544.5	1,628.1	-916.5	-785.2	10,757.9
2051	5.0	2,651.4	1,654.7	-996.7	-846.6	11,633.9
2052	4.9	2,758.3	1,678.8	-1,079.5	-907.8	12,568.4
2053	5.1	2,875.9	1,711.3	-1,164.6	-973.0	13,569.8
2054	5.4	3,023.2	1,747.0	-1,276.3	-1,071.2	14,668.8
2055	6.3	3,171.7	1,754.3	-1,417.4	-1,183.4	15,877.6
2056	6.4	3,335.3	1,770.2	-1,565.1	-1,300.0	17,202.3
2057	6.5	3,506.7	1,782.0	-1,724.7	-1,640.2	18,866.6
2058	6.7	3,707.6	1,801.0	-1,906.6	-1,891.6	20,781.5
2059	6.8	3,921.5	1,823.8	-2,097.8	-2,081.6	22,885.8
2060	6.9	4,154.8	1,846.5	-2,308.3	-2,291.1	25,198.8

(unit: % of GDP)

	Total Expenditure	Total Revenue	Consolidated Fiscal Balance	Managed Budget Balance	Government Debt
2012	24.81	26.03	1.22	-1.24	34.17
2013	24.45	25.85	1.40	-1.14	34.25
2014	24.60	25.90	1.30	-1.23	33.52
2015	24.72	26.05	1.33	-1.25	33.70
2016	24.77	25.98	1.21	-1.35	34.14
2017	24.95	25.89	0.94	-1.74	35.63
2018	25.05	25.70	0.65	-1.95	36.53
2019	25.19	25.59	0.39	-2.13	37.58
2020	25.39	25.51	0.12	-2.31	38.77
2021	25.55	25.40	-0.15	-2.49	40.11
2022	25.75	25.32	-0.43	-2.69	41.59
2023	25.96	25.25	-0.71	-2.89	43.22
2024	26.18	25.18	-1.00	-3.09	45.01
2025	26.42	25.14	-1.29	-3.29	46.93
2026	26.66	25.08	-1.58	-3.49	49.00
2027	26.90	24.95	-1.95	-3.77	51.28
2028	27.15	24.92	-2.23	-3.96	53.70
2029	27.41	24.88	-2.52	-4.15	56.23
2030	27.65	24.87	-2.78	-4.30	58.88
2031	27.89	24.81	-3.08	-4.49	61.60
2032	28.15	24.82	-3.33	-4.68	64.47
2033	28.42	24.78	-3.64	-4.91	67.46
2034	28.73	24.76	-3.97	-5.15	70.64
2035	29.05	24.73	-4.32	-5.41	73.95
2036	29.39	24.66	-4.72	-5.69	77.46
2037	29.75	24.62	-5.13	-5.97	81.17
2038	30.14	24.60	-5.54	-6.26	85.09
2039	30.55	24.58	-5.97	-6.57	89.24
2040	30.98	24.53	-6.45	-6.90	93.57
2041	31.45	24.47	-6.98	-7.25	98.17
2042	31.94	24.36	-7.58	-7.62	103.08
2043	32.45	24.27	-8.18	-8.00	108.34
2044	33.00	24.21	-8.79	-8.38	113.88
2045	33.59	24.13	-9.47	-8.81	119.77
2046	34.23	24.04	-10.18	-9.27	126.03
2047	34.87	23.92	-10.95	-9.74	132.70
2048	35.54	23.80	-11.74	-10.25	139.80
2049	36.13	23.65	-12.48	-10.78	147.35
2050	36.76	23.52	-13.24	-11.34	155.41
2051	37.37	23.32	-14.05	-11.93	163.99
2052	38.05	23.16	-14.89	-12.52	173.36
2053	38.78	23.08	-15.71	-13.12	182.99
2054	39.90	23.05	-16.84	-14.14	193.58
2055	41.05	22.71	-18.35	-15.32	205.51
2056	42.38	22.49	-19.89	-16.52	218.58
2057	43.78	22.25	-21.53	-20.47	235.52
2058	45.51	22.11	-23.40	-23.22	255.08
2059	47.37	22.03	-25.34	-25.14	276.43
2060	49.42	21.96	-27.46	-27.25	299.75

3. Sustainable Scenario

(unit: trillion won)					
	Basic Fiscal Balance		Consolidated Fiscal Balance	Managed Budget Balance	Government Debt
	Scenario: Interest rate rises	Scenario: Sustainability			
2012	31.4	31.4	16.0	-16.2	448.1
2013	36.5	36.5	19.5	-15.9	478.3
2014	38.2	38.2	19.4	-18.3	499.9
2015	40.8	40.8	21.1	-19.7	532.8
2016	41.0	41.0	20.1	-22.6	569.8
2017	38.6	38.6	16.7	-30.7	631.2
2018	35.6	35.6	12.2	-36.7	686.2
2019	32.7	32.7	7.8	-42.3	747.6
2020	29.7	29.7	2.6	-48.6	816.0
2021	25.7	25.7	-3.3	-55.4	891.8
2022	21.6	21.6	-10.1	-63.0	975.9
2023	16.9	16.9	-17.6	-71.5	1,069.1
2024	11.5	11.5	-26.1	-80.6	1,172.1
2025	5.9	5.9	-35.2	-90.1	1,285.2
2026	-0.3	-0.3	-45.5	-100.4	1,409.1
2027	-9.3	-9.3	-58.9	-113.7	1,547.0
2028	-16.0	-16.0	-70.5	-125.1	1,696.5
2029	-22.9	-22.9	-83.5	-137.3	1,859.0
2030	-30.1	-30.1	-96.1	-148.6	2,032.8
2031	-38.3	-38.3	-110.9	-161.8	2,220.6
2032	-45.2	-45.2	-125.2	-175.9	2,422.8
2033	-54.1	-54.1	-142.5	-192.4	2,642.5
2034	-63.7	-40.8	-138.7	-187.1	2,857.0
2035	-74.6	19.5	-88.3	-134.4	3,019.9
2036	-87.4	20.7	-94.7	-137.2	3,186.2
2037	-101.0	21.5	-101.8	-140.1	3,355.6
2038	-114.2	22.4	-109.5	-143.7	3,529.1
2039	-128.5	22.7	-118.0	-147.5	3,706.8
2040	-145.2	24.0	-126.3	-149.1	3,887.0
2041	-164.2	24.9	-135.3	-149.5	4,068.2
2042	-186.9	25.8	-144.3	-147.0	4,246.6
2043	-210.9	26.6	-153.0	-142.3	4,419.7
2044	-234.9	27.5	-161.6	-137.6	4,588.5
2045	-261.8	27.7	-171.0	-131.6	4,751.4
2046	-290.7	29.2	-179.2	-122.6	4,905.1
2047	-323.1	29.4	-188.0	-110.8	5,046.9
2048	-355.6	30.9	-195.3	-97.5	5,175.1
2049	-384.5	31.0	-202.9	-88.1	5,293.7
2050	-412.6	32.5	-209.1	-77.8	5,401.4
2051	-443.8	33.3	-214.9	-64.7	5,495.6
2052	-475.6	33.3	-220.2	-48.5	5,570.7
2053	-502.6	34.1	-224.7	-33.1	5,632.2
2054	-523.7	34.9	-235.4	-30.4	5,690.4
2055	-568.3	34.8	-246.3	-12.2	5,728.0
2056	-608.4	34.6	-255.8	9.3	5,743.4
2057	-652.8	34.4	-263.1	-178.6	5,946.1
2058	-688.0	33.4	-285.9	-270.8	6,240.3
2059	-719.0	32.3	-313.3	-297.1	6,560.0
2060	-749.6	31.9	-342.7	-325.5	6,907.5

(unit: % of GDP)

	Basic Fiscal Balance		Consolidated Fiscal Balance	Managed Budget Balance	Government Debt
	Scenario: Interest rate rises	Scenario: Sustainability			
2012	2.39	2.39	1.22	-1.24	34.17
2013	2.61	2.61	1.40	-1.14	34.25
2014	2.56	2.56	1.30	-1.23	33.52
2015	2.58	2.58	1.33	-1.25	33.70
2016	2.45	2.45	1.21	-1.35	34.14
2017	2.18	2.18	0.94	-1.74	35.63
2018	1.89	1.89	0.65	-1.95	36.53
2019	1.64	1.64	0.39	-2.13	37.58
2020	1.41	1.41	0.12	-2.31	38.77
2021	1.16	1.16	-0.15	-2.49	40.11
2022	0.92	0.92	-0.43	-2.69	41.59
2023	0.68	0.68	-0.71	-2.89	43.22
2024	0.44	0.44	-1.00	-3.09	45.01
2025	0.22	0.22	-1.29	-3.29	46.93
2026	-0.01	-0.01	-1.58	-3.49	49.00
2027	-0.31	-0.31	-1.95	-3.77	51.28
2028	-0.51	-0.51	-2.23	-3.96	53.70
2029	-0.69	-0.69	-2.52	-4.15	56.23
2030	-0.87	-0.87	-2.78	-4.30	58.88
2031	-1.06	-1.06	-3.08	-4.49	61.60
2032	-1.20	-1.20	-3.33	-4.68	64.47
2033	-1.38	-1.38	-3.64	-4.91	67.46
2034	-1.56	-1.00	-3.40	-4.59	70.08
2035	-1.76	0.46	-2.08	-3.17	71.17
2036	-1.98	0.47	-2.15	-3.11	72.20
2037	-2.20	0.47	-2.22	-3.06	73.20
2038	-2.40	0.47	-2.30	-3.02	74.17
2039	-2.61	0.46	-2.39	-2.99	75.13
2040	-2.84	0.47	-2.47	-2.91	75.98
2041	-3.10	0.47	-2.55	-2.82	76.75
2042	-3.41	0.47	-2.63	-2.68	77.44
2043	-3.72	0.47	-2.70	-2.51	78.03
2044	-4.02	0.47	-2.76	-2.35	78.49
2045	-4.34	0.46	-2.84	-2.18	78.82
2046	-4.68	0.47	-2.89	-1.97	78.98
2047	-5.06	0.46	-2.94	-1.73	78.97
2048	-5.41	0.47	-2.97	-1.48	78.76
2049	-5.70	0.46	-3.01	-1.31	78.45
2050	-5.96	0.47	-3.02	-1.12	78.03
2051	-6.26	0.47	-3.03	-0.91	77.46
2052	-6.56	0.46	-3.04	-0.67	76.84
2053	-6.78	0.46	-3.03	-0.45	75.95
2054	-6.91	0.46	-3.11	-0.40	75.09
2055	-7.36	0.45	-3.19	-0.16	74.14
2056	-7.73	0.44	-3.25	0.12	72.98
2057	-8.15	0.43	-3.28	-2.23	74.23
2058	-8.44	0.41	-3.51	-3.32	76.60
2059	-8.68	0.39	-3.78	-3.59	79.24
2060	-8.92	0.38	-4.08	-3.87	82.17

4. Preparation for population aging scenario

(unit: trillion won)

	Total Expenditure	Total Revenue	Consolidated Fiscal Balance	Managed Budget Balance	Government Debt
2012	325.4	341.4	16.0	-16.2	448.1
2013	341.7	366.5	24.8	-10.8	473.1
2014	366.7	395.0	28.3	-9.6	486.1
2015	390.0	429.4	39.3	-6.9	506.2
2016	412.3	457.4	45.2	-3.7	524.2
2017	440.4	487.9	47.5	-7.0	562.0
2018	465.4	535.8	70.4	13.4	566.9
2019	493.2	565.3	72.2	12.7	573.2
2020	523.2	603.3	80.1	11.7	581.3
2021	553.3	635.3	82.0	10.4	591.2
2022	585.5	669.1	83.5	8.8	603.5
2023	619.1	704.0	84.8	6.7	618.5
2024	654.4	740.2	85.8	4.3	636.6
2025	691.0	786.0	95.1	2.1	657.4
2026	728.7	825.1	96.4	-0.6	681.6
2027	767.6	862.9	95.3	-5.9	711.7
2028	807.6	904.1	96.5	-8.8	745.0
2029	849.6	946.6	97.0	-12.1	782.2
2030	891.1	989.8	98.6	-14.0	821.3
2031	934.1	1,032.6	98.5	-17.5	864.9
2032	978.2	1,075.8	97.6	-21.6	912.8
2033	1,024.4	1,120.0	95.6	-26.4	966.4
2034	1,072.1	1,165.1	93.0	-31.3	1,025.1
2035	1,122.1	1,211.4	89.3	-36.8	1,090.4
2036	1,173.8	1,258.6	84.9	-42.8	1,162.2
2037	1,226.9	1,304.3	77.4	-49.1	1,240.7
2038	1,281.7	1,351.1	69.4	-55.6	1,326.1
2039	1,337.9	1,398.4	60.5	-62.4	1,418.7
2040	1,396.8	1,447.9	51.1	-69.9	1,519.9
2041	1,457.7	1,494.1	36.4	-78.6	1,630.1
2042	1,519.2	1,538.1	18.9	-87.5	1,749.1
2043	1,581.5	1,580.2	-1.3	-96.1	1,876.0
2044	1,645.8	1,626.5	-19.3	-104.7	2,011.9
2045	1,711.1	1,670.7	-40.4	-114.4	2,157.6
2046	1,777.9	1,715.1	-62.8	-124.3	2,313.0
2047	1,845.0	1,758.7	-86.3	-134.0	2,478.1
2048	1,911.5	1,800.0	-111.5	-144.8	2,653.6
2049	1,972.2	1,840.5	-131.8	-155.6	2,839.6
2050	2,032.1	1,880.0	-152.2	-166.3	3,035.8
2051	2,090.1	1,917.0	-173.1	-177.2	3,242.4
2052	2,145.2	1,946.0	-199.2	-185.1	3,454.2
2053	2,202.8	1,991.7	-211.1	-193.4	3,676.0
2054	2,258.8	2,025.5	-233.4	-203.9	3,907.8
2055	2,313.3	2,054.5	-258.8	-211.3	4,144.4
2056	2,368.0	2,089.6	-278.4	-217.9	4,387.1
2057	2,422.1	2,122.6	-299.5	-225.3	4,636.4
2058	2,473.8	2,149.8	-324.0	-235.6	4,895.3
2059	2,525.6	2,176.6	-349.0	-246.0	5,163.9
2060	2,576.8	2,203.6	-373.2	-255.3	5,441.1

(unit: % of GDP)

	Total Expenditure	Total Revenue	Consolidated Fiscal Balance	Managed Budget Balance	Government Debt
2012	24.81	26.03	1.22	-1.24	34.17
2013	24.46	26.24	1.78	-0.77	33.88
2014	24.58	26.48	1.90	-0.64	32.59
2015	24.67	27.16	2.49	-0.44	32.02
2016	24.70	27.41	2.71	-0.22	31.41
2017	24.86	27.54	2.68	-0.40	31.72
2018	24.78	28.52	3.75	0.72	30.18
2019	24.79	28.42	3.63	0.64	28.81
2020	24.85	28.66	3.81	0.56	27.62
2021	24.89	28.57	3.69	0.47	26.59
2022	24.95	28.51	3.56	0.38	25.72
2023	25.03	28.46	3.43	0.27	25.01
2024	25.13	28.42	3.29	0.17	24.45
2025	25.23	28.71	3.47	0.08	24.01
2026	25.34	28.69	3.35	-0.02	23.70
2027	25.44	28.60	3.16	-0.20	23.59
2028	25.56	28.62	3.05	-0.28	23.58
2029	25.70	28.63	2.93	-0.37	23.66
2030	25.81	28.67	2.86	-0.40	23.79
2031	25.91	28.65	2.73	-0.49	23.99
2032	26.03	28.63	2.60	-0.58	24.29
2033	26.15	28.60	2.44	-0.67	24.67
2034	26.30	28.58	2.28	-0.77	25.14
2035	26.44	28.55	2.10	-0.87	25.70
2036	26.60	28.52	1.92	-0.97	26.34
2037	26.76	28.45	1.69	-1.07	27.07
2038	26.94	28.40	1.46	-1.17	27.87
2039	27.12	28.34	1.23	-1.27	28.75
2040	27.30	28.30	1.00	-1.37	29.71
2041	27.50	28.19	0.69	-1.48	30.75
2042	27.70	28.05	0.35	-1.60	31.89
2043	27.92	27.90	-0.02	-1.70	33.12
2044	28.15	27.82	-0.33	-1.79	34.41
2045	28.38	27.71	-0.67	-1.90	35.79
2046	28.63	27.62	-1.01	-2.00	37.24
2047	28.87	27.52	-1.35	-2.10	38.77
2048	29.09	27.40	-1.70	-2.20	40.39
2049	29.23	27.28	-1.95	-2.31	42.08
2050	29.36	27.16	-2.20	-2.40	43.85
2051	29.46	27.02	-2.44	-2.50	45.70
2052	29.59	26.84	-2.75	-2.55	47.65
2053	29.71	26.86	-2.85	-2.61	49.57
2054	29.81	26.73	-3.08	-2.69	51.57
2055	29.94	26.59	-3.35	-2.73	53.64
2056	30.09	26.55	-3.54	-2.77	55.74
2057	30.24	26.50	-3.74	-2.81	57.88
2058	30.36	26.39	-3.98	-2.89	60.09
2059	30.51	26.29	-4.22	-2.97	62.37
2060	30.65	26.21	-4.44	-3.04	64.72

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