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The Actuarial Valuation of Public Pensions Reflecting the Trends in Average Life Span Extension

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Chapter 1

Introduction

Taking into account the theme of the era of centenarians, which has attracted keen attention from the early 2011, this paper is designed to check the financial status of public pensions and identify related policy implications. The 2nd actuarial valuation of National Pension announced in 2008 set as the financial projection period the years leading up to 2078, which is similar to the first actuarial valuation. However, given that the era of centenarians is raised as a social issue, a financial projection period of about 70 years is not long enough to properly identify problems immanent in the National Pension System. It is also desirable to set the financial projection period based on a generation. In this vein, this research extended the financial projection period to the year 2100. In order to analyze the sensitivity of financial prediction reflecting population changes, the assumption (1.28) of birth rates reflecting realities were made, along with that (1.70) of birth rates that the government tried to achieve through the 2nd Basic Plan for the Aging Society Featuring Low Birth Rates. By applying the two assumptions, a long-term financial status was estimated. Based on the long-term financial prospect and financial assessment indices enabling financial stability (the non-depletion of the fund; a twice higher or five times higher reserve ratio), required premium rates were calculated in order to provide basic data for devising plans to

ensure financial stability. The initiative was designed to make it possible to achieve financial stability in super long-term perspectives.

Then, considering trends in average life span extension, this research tried to compare and analyze the benefit structure of National Pension and Pensions for Public Sector Workers. The analyses of National Pension and Pensions for Public Sector Workers in terms of benefit structure were already conducted in diverse ways, but which were based on different assumptions by system. Reflecting institutional characteristics, this research will look into the structure and identify its implications by using the same analysis framework.

Chapter

02

The Actuarial Valuation of National Pension Reflecting Trends in Average Life Span Extension

Chapter 2

The Actuarial Valuation of National Pension Reflecting Trends in Average Life Span Extension

The National Pension System refers to a social insurance scheme for the public as a whole. Therefore, in case the average life span is extended in the future, the resulting changes in population structure are expected to have significant effects on the financial status of the pension such as benefit payment and reserve fund on a long-term basis. If a worker joins the National Pension System and obtains pension rights, benefits are paid until he or she dies. Therefore, it is very closely related to the average life span. As of now, the National Pension Service conducts financial calculations every five years to check the financial status from a long term point of view, where population- related variables including average life span function as key factors. The 2nd Financial Projection for National Pension implemented in 2008 assumed that Korea's average life span would grow to 83.1 by 2030 and to 86 by 2050 and thereafter.

This paper is designed to analyze the effects of extended average life span on the financial status of National Pension and to identify appropriate counter-measures.

1. Analysis Overview

1.1 Projection Period and Economic Variables

In order to analyze the effects of extended average life span on the financial status of National Pension, the assessment period was extended from 70 years (projection for the years leading up to 2078) to 90 years (projection for the years leading up to 2100). The estimation period for the 2008 actuarial valuation of National Pension was 70 years (by 2078).

Regarding 2010 as the baseline year, the projection period was assumed to range from 2011 to 2100. Based on the actuarial valuation of National Pension for the year 2008, the years following 2078 were considered to be the same as 2078 in terms of economic variable assumption.

For the assumption of economic variables, performance data were reflected for the years to 2010, with the 2nd actuarial valuation for National Pension applying to the years between 2010 and 2078. The assumption for the years between 2079 and 2100 was regarded as the same as that for the year 2078

〈Table 1〉 Assumption of Economic Variables for the Actuarial Valuation of National Pension

(Unit: %)

Classification	2011 ~2020	2021 ~2030	2031 ~2040	2041 ~2050	2051 ~2060	2061 ~2100
Real Economic Growth	4.1	2.8	1.7	1.2	0.9	0.7
Real Wage Growth	3.6	3.3	2.9	2.6	2.5	2.5
Real Interest Rate	3.6	2.9	2.4	2.2	2.0	1.8
Real Return on Fund Investment	4.2	3.4	2.8	2.6	2.4	2.2
Inflation[1)]	2.7/2.4	2.0				

Note: 1) Based on the Second Financial Estimation of National Pension(2008). The assumption for the years following 2078 is thought to be the same as that for the year 2078
2) 2.7% is the inflation for 2011~2015; 2.4% is the inflation for 2016~2020
Source: Lee Sam-sik, etc. (2011), 『The Future Strategy for the Era of Centenarians -- Prospects and Challenges in Population and Social Insurance Finance』, KIHASA.

1.2 Population Scenario

A. Average Life Span

In accordance with the population scenario considering the extension of average life span, the average life span was assumed to reach 87.99 for men and 93.36 for women by 2070, analyzing its effects on the financial status of National Pension in a long-term perspective.

Using the assumption of future population[1)] prepared by

1) Reflecting the average life span (the projection period is extended to 2050) of the future population estimated by Statistics Korea (2006), the actuarial valuation of National Pension for the year 2008 assumed that the life span for the years following 2050 was the same as that for the year 2050.

Statistics Korea in 2006, the average life span for the 2008 actuarial valuation of National Pension was presumed to rise to 82.87 for men and 88.92 for women by 2070. The mortality was set to '1' at the age of 95. Namely, people were assumed to survive until the age of 95.

Considering the average life span extension, the average life span was assumed to reach 85.14 for men and 90.89 for women by 2050, 87.99 for men and 93.36 for women by 2070, and 91.78 for men and 96.07 for women by 2100. Compared to the figures for the 2008 actuarial valuation of National Pension, the average life span rose by 2 for men and 1.5 for women by 2030, by 2.3 for men and 2 for women by 2050, by 5 for men and 4 for women by 2070, and by 9 for men and 7 for women by 2100. The mortality was set to '1' at the age of 100. In other words, people were assumed to survive until the age of 100.

For each case, where the average life span is extended more than assumed, its effects on the financial status of National Pension were analyzed on a long-term basis.

B. Total Fertility Rate

The total fertility rate assumed for the estimation of future population prepared by Statistics Korea in 2006 was 1.28 (after 2030) while the government goal (total fertility rate) presented through the 2nd Basic Plan for the Aging Society Featuring Low Birth Rates was 1.70 (after 2020). The two cases were considered for this research.

The total fertility rate for the 2008 actuarial valuation of National

Pension was assumed to be 1.28 for the years leading up to 2050, which was also presented through the estimation of future population prepared by Statistics Korea. The same figure (1.28) applied to the years following 2050[2].

C. Population Scenario[3]

The two assumptions (existing assumption of average life span, extended average life span) of average life span were combined with the two assumptions (1.28, 1.70) of total fertility rates to produce four different types of population scenarios. In relation to the scenarios, the financial status of National Pension was assessed in a long-term perspective.

〈Table 2〉 Population Scenario for the Financial Projection of National Pension

Classification	Assumption of Average Life Span (Baseline: 2070)	Assumption of Total Fertility Rate (After 2030)
Scenario Ⅰ	Assumption by Statistics Korea (M: 82.87, F: 88.92)	Assumption by Statistics Korea(1.28)
Scenario Ⅱ		The Government's Goal(1.70)
Scenario Ⅲ	Average Life Span Extension (M: 87.99, F: 93.36)	Assumption by Statistics Korea(1.28)
Scenario Ⅳ		The Government's Goal(1.70)

Source: Lee Sam-sik, etc (2011), op. cit.

2) Reflecting the average life span of the future population estimated by Statistics Korea in 2006 (the results for the years leading up to 2050 were announced), the actuarial valuation of the National Pension for the year 2008 assumed that the average life span for the years following 2050 was the same as that for the year 2050.

3) Economic variables were assumed to be the same, regardless of population scenarios.

〈Table 3〉 Assumption of Average Life Span and Total Fertility Rates

Year	Average Life Span (Years)						Total Fertility Rate (Person)	
	Assumption by Statistics Korea (A)		Extended Average Life Span (B)		Difference (B - A)		Assumption by Statistics Korea (1.28 person)	The Government's Goal (1.70 person)
	M	F	M	F	M	F		
2010	76.15	82.88	77.23	83.93	1.08	1.05	1.15	1.18
2020	78.04	84.68	79.71	86.01	1.67	1.33	1.20	1.70
2030	79.79	86.27	81.78	87.76	1.99	1.49	1.28	
2040	81.39	87.67	83.52	89.38	2.13	1.71		
2050	82.87	88.92	85.14	90.89	2.27	1.97		
2060			86.61	92.18	3.74	3.26		
2070			87.99	93.36	5.12	4.44		
2080			89.30	94.39	6.43	5.47		
2090			90.57	95.23	7.70	6.31		
2100			91.78	96.07	8.91	7.15		

Source: Lee Sam-sik, etc (2011), op. cit.

2. The Financial Analysis of National Pension by Population Scenario

By population scenario based on the assumption of extended average life span and total fertility rates, its effects on the financial status of National Pension will be analyzed.

First, changes in population structure (the number of insured and the number of beneficiaries) in the National Pension System were studied by population scenario, with its effects on the financial status of National Pension being analyzed. Then, required premium rates were identified by financial assessment goal.

2.1 Population Prospects in the National Pension System

A. Number of Insured and Pension Beneficiaries

1) In case the total fertility rate is assumed to be 1.28

In case the total fertility rate is 1.28 and the average life span is maintained as already assumed, the number of National Pension insurants is expected to reach 19,911,000 by 2015, then gradually fall to 7,999,000 by 2070, and further drop to 4,709,000 by 2100[4]. The number of old-age pension beneficiaries reached 2,094,000 in 2010. As the system gets more mature, the number of beneficiaries is projected to have soared to 10,355,000 by 2050 and 10,577,000 by 2060. Then, it is expected to gradually fall to 5,378,000 by 2100. In particular, the system dependency ratio of National Pension (the % of old-age pension beneficiaries in the number of insured) reached 11% in 2010. Then, it is expected to skyrocket to 100.5% by 2055, exceeding the level of 100% and reach 118.8% by 2070. It is projected to slightly fall to 114.2% by 2100.

In case the trends in average life span extension are reflected, the number of insured is forecast to slightly rise, as mortality falls. However, the overall trend will be similar to what was

4) "In case the average life span is maintained as predicted in the existing assumption" in the main text does not mean that the average life span does not rise at all. It means that as described in Scenario I in <Table 2>, the assumption reflecting the rise in the average life span (the maximum average life span for the year 2050, 82.9 for males and 89.9 for females) was adopted.

assumed. Specifically speaking, the number of national pension insured is projected to reach 19,915,000 by 2015 and gradually drop to 8,025,000 by 2070 and 4,732,000 by 2100. On the other hand, the number of old-age pension beneficiaries is expected to rise by a greater margin than already assumed in relation to average life span. Specifically, it reached 2,094,000 in 2010. However, as the system gets more mature, it is forecast to skyrocket to 11,466,000 by 2060. Then, it is expected to gradually drop to 10,873,000 by 2070 and 7,109,000 by 2100. In particular, the system dependency ratio (the percentage of old-age pension beneficiaries in the number of insured) is projected to rise by a greater margin than already assumed in relation to average life span, as the number of beneficiaries soars due to a rise in the average life span. The system dependency ratio was estimated at 11% in 2010. Then, it is forecast to soar to 106.9% by 2055, exceeding the level of 100%, and then continue to rise to 135.5% by 2070 and 150.2% by 2100.

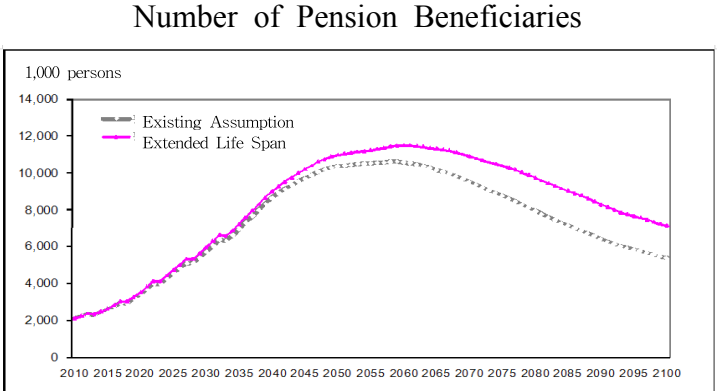
〈Table 4〉 Population Prospects in the National Pension System
: Total Fertility Rate 1.28

(Unit: 1,000 persons)

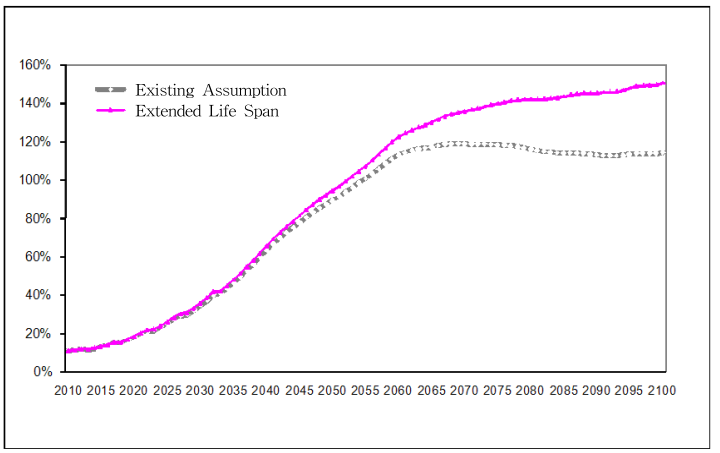
Year	Existing Assumption of Average Life Span			Extended Average Life Span		
	Number of Insured (A)	Number of Old-age Pension Beneficiaries (B)	System Dependency Ratio (B/A)	Number of Insured (A)	Number of Old-age Pension Beneficiaries (B)	System Dependency Ratio (B/A)
2010	19,117	2,094	11.0%	19,117	2,094	11.0%
2020	19,268	3,406	17.7%	19,273	3,498	18.2%
2030	16,624	5,694	34.3%	16,630	5,930	35.7%
2040	13,704	8,639	63.0%	13,715	8,969	65.4%
2050	11,637	10,355	89.0%	11,652	10,956	94.0%
2060	9,377	10,577	112.8%	9,399	11,466	122.0%
2070	7,999	9,503	118.8%	8,025	10,873	135.5%
2080	6,834	7,921	115.9%	6,861	9,717	141.6%
2090	5,668	6,398	112.9%	5,693	8,255	145.0%
2100	4,709	5,378	114.2%	4,732	7,109	150.2%

Source: Calculated by the Author

〔Figure 1〕 Population Prospects in the National Pension System
: Total Fertility Rate: 1.28



System Dependency Ratio



2) In case the total fertility rate is assumed to be 1.70

In case the total fertility rate is 1.70 and the average life span is maintained as already assumed, the number of insured by the National Pension is expected to reach 19,911,000 by 2015 and then gradually fall to 10,406,000 by 2070 and 7,786,000 by 2100. The number of old-age pension beneficiaries was estimated at 2,094,000 in 2010. As the system gets more mature, it is projected to skyrocket to 10,355,000 by 2050 and 10,577,000 by 2060. Then, it is forecast to consistently drop to 6,781,000 by 2100. On the other hand, the system dependency ratio of National Pension (the percentage of old-age pension beneficiaries in the number of insured) is expected to notably enhance as support capabilities are improved in a long-term perspective due to a rise in total fertility rate. Specifically, the ratio reached

11% in 2010, which is projected to soar to 95.0% by 2060 and then slightly fall to 91.3% by 2070 and 87.1% by 2100. The trend can be regarded as stable.

In case trends in the average life span extension are reflected, the number of insured by National Pension is projected to rise by a small margin as the mortality becomes lower than assumed. However, the general trend is expected to be similar to what was already assumed. Specifically speaking, the number of insured by National Pension is forecast to reach 19,915,000 by 2015 and then slowly fall to 10,441,000 by 2070 and to 7,824,000 by 2100. On the other hand, the number of old-age pension beneficiaries is projected to increase by a greater margin than already assumed in relation to the average life span. Specifically, it was estimated at 2,094,000 in 2010. As the system gets more mature, it is expected to soar to 11,466,000 by 2060. Thereafter, it is forecast to gradually fall to 10,875,000 by 2070 and 8,865,000 by 2100. The system dependency ratio (the percentage of old-age pension beneficiaries in the number of insured) is projected to more sharply rise than already assumed, due to a rapid increase in the number of pension beneficiaries from a rise in average life span. The ratio that was maintained at about 11% in 2010 is expected to sharply rise to 102.7% by 2060 and continue to go up to 113.3% by 2100.

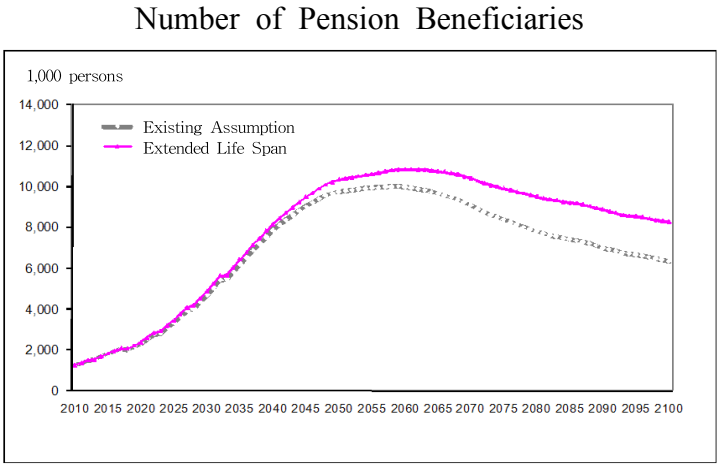
〈Table 5〉 Population Prospects in the National Pension System
: Total Fertility Rate 1.70

(Unit: 1,000 persons)

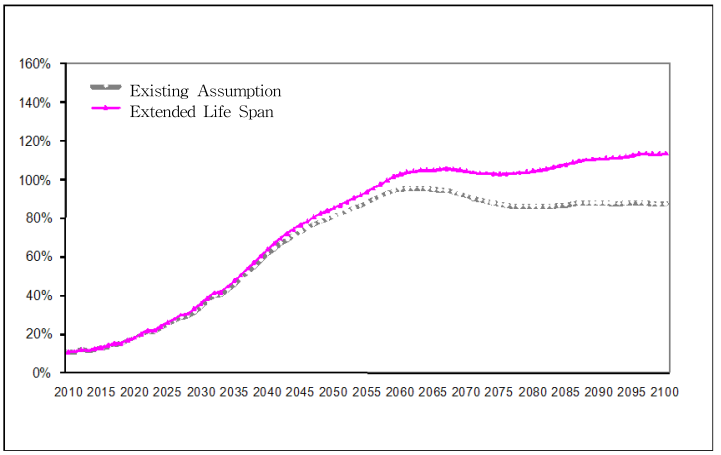
Year	Existing Assumption of Average Life Span			Extended Average Life Span		
	Number of Insured (A)	Number of Old-age Pension Beneficiaries (B)	System Dependency Ratio (B/A)	Number of Insured (A)	Number of Old-age Pension Beneficiaries (B)	System Dependency Ratio (B/A)
2010	19,117	2,094	11.0%	19,117	2,094	11.0%
2020	19,268	3,406	17.7%	19,273	3,498	18.2%
2030	16,630	5,694	34.2%	16,636	5,930	35.6%
2040	14,070	8,639	61.4%	14,082	8,969	63.7%
2050	12,843	10,355	80.6%	12,860	10,956	85.2%
2060	11,134	10,577	95.0%	11,160	11,466	102.7%
2070	10,406	9,505	91.3%	10,441	10,875	104.2%
2080	9,697	8,337	86.0%	9,736	10,156	104.3%
2090	8,544	7,492	87.7%	8,581	9,483	110.5%
2100	7,786	6,781	87.1%	7,824	8,865	113.3%

Source: Calculated by the author

〔Figure 2〕 Population Prospects in the National Pension System
: Total Fertility Rate 1.70



System Dependency Ratio



B. Prospects for Benefit Rates for Population Aged 65 or Older[5)]

1) In case the total fertility rate is assumed to be 1.28[6)]

In case the existing assumption of average life span is adopted, the number of old-age pension beneficiaries aged 65 or older that was maintained at 1,234,000 in 2010 is projected to soar to 9,977,000 by 2060 and then gradually drop to 9,080,000 by 2070 and 5,108,000 by 2100.

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5) The national pension benefit rate for population aged 65 or older is defined as the percentage of old-age pension beneficiaries aged 65 or over in the total population aged 65 or older.

6) In case the number of old-age pension beneficiaries with a total fertility rate of 1.70 is compared to that with a total fertility rate of 1.28, differences therebetween are incurred from the 2060s when the people reach the age of 65.

The percentage of old-age pension beneficiaries in the number of people aged 65 or older reached 22% in 2010. Then, it is forecast to skyrocket to 61.4% by 2060 and continue to rise to 65.8% by 2070 and 66.7% by 2100.

If the average life span is assumed to rise, the number of old-age pension beneficiaries aged 65 or older is expected to grow more than previously assumed.

It is projected to soar to 10,829,000 by 2060 and then gradually fall to 10,405,000 by 2070 and 6,769,000 by 2100.

The National Pension benefit receipt rate of people aged 65 or older is forecast to soar to 60.4% by 2060 and then continue to rise to 64.9% by 2070 and to 66.4% by 2100.

〈Table 6〉 National Pension Benefit Rates (Based on Population Aged 65 or older): Total Fertility Rate 1.28

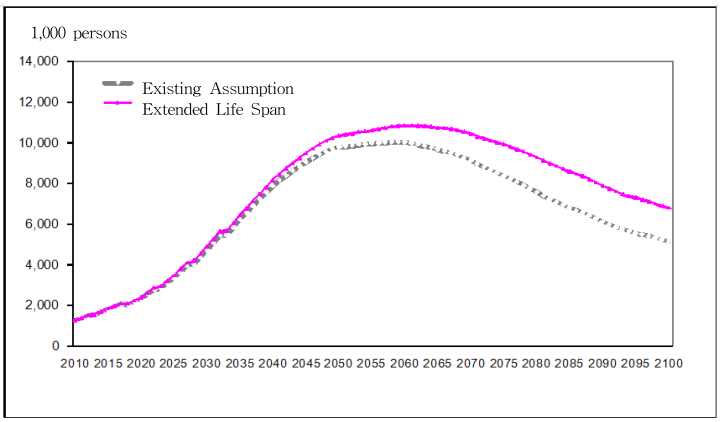
(Unit: 1,000 persons)

Year	Existing Assumption of Average Life Span			Extended Average Life Span		
	Number of People Aged 65 or Older (A)	Number of Old-age Pension Beneficiaries Aged 65 or Older (B)	National Pension Benefit Rates (B/A)	Number of People Aged 65 or Older (A)	Number of Old-age Pension Beneficiaries Aged 65 or Older (B)	National Pension Benefit Rates (B/A)
2010	5,601	1,234	22.0%	5,608	1,234	22.0%
2020	8,472	2,294	27.1%	8,672	2,356	27.2%
2030	13,024	4,666	35.8%	13,507	4,861	36.0%
2040	16,593	7,829	47.2%	17,440	8,134	46.6%
2050	17,536	9,746	55.6%	18,711	10,322	55.2%
2060	16,244	9,977	61.4%	17,931	10,829	60.4%
2070	13,796	9,080	65.8%	16,035	10,405	64.9%
2080	11,144	7,525	67.5%	13,740	9,249	67.3%
2090	9,028	6,078	67.3%	11,698	7,859	67.2%
2100	7,655	5,108	66.7%	10,199	6,769	66.4%

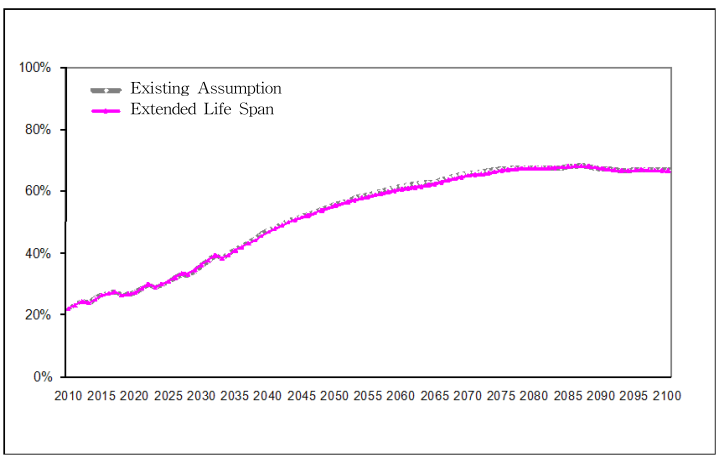
Source: Calculated by the Author

〔Figure 3〕 National Pension Benefit Rates (Based on Population Aged 65 or older): Total Fertility Rate 1.28

Pension Beneficiaries



National Pension Benefit Rates



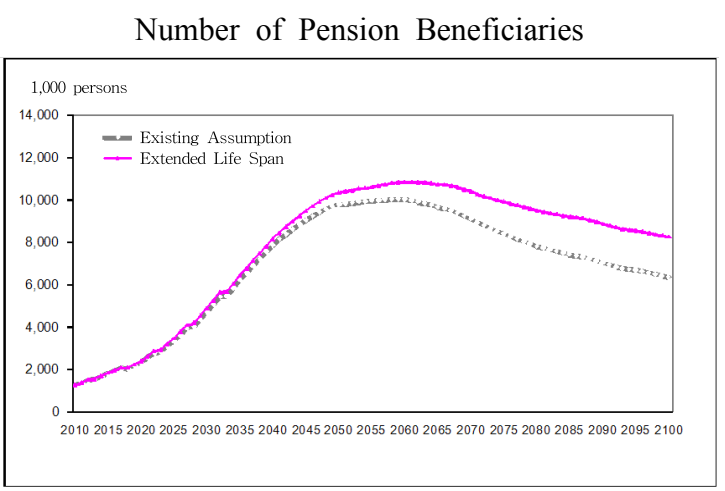
〈Table 7〉 National Pension Benefit Rates (Based on Population Aged 65 or older): Total Fertility Rate 1.70

(Unit: 1,000 persons)

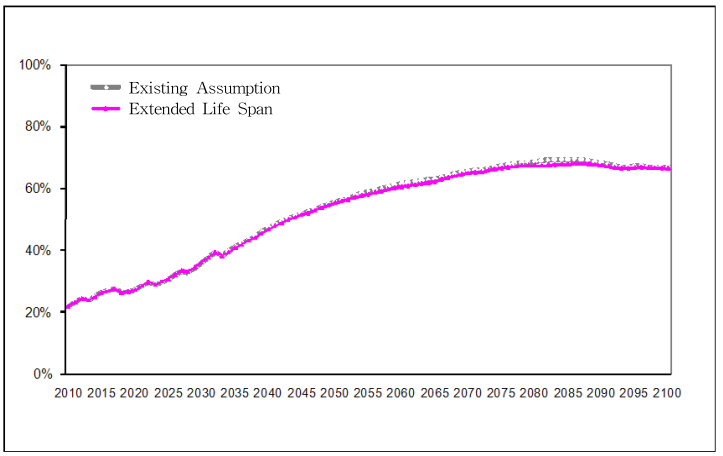
Year	Existing Assumption of Average Life Span			Extended Average Life Span		
	Number of People Aged 65 or Older (A)	Number of Old-age Pension Beneficiaries Aged 65 or Older (B)	National Pension Benefit Rates (B/A)	Number of People Aged 65 or Older (A)	Number of Old-age Pension Beneficiaries Aged 65 or Older (B)	National Pension Benefit Rates (B/A)
2010	5,601	1,234	22.0%	5,608	1,234	22.0%
2020	8,472	2,293	27.1%	8,672	2,356	27.2%
2030	13,024	4,666	35.8%	13,507	4,861	36.0%
2040	16,593	7,829	47.2%	17,440	8,134	46.6%
2050	17,536	9,746	55.6%	18,711	10,322	55.2%
2060	16,244	9,978	61.4%	17,931	10,830	60.4%
2070	13,796	9,064	65.7%	16,035	10,386	64.8%
2080	11,344	7,784	68.6%	13,948	9,481	68.0%
2090	10,262	6,995	68.2%	13,025	8,855	68.0%
2100	9,479	6,331	66.8%	12,351	8,249	66.8%

Source: Calculated by the Author

〔Figure 4〕 National Pension Benefit Rates (Based on Population Aged 65 or older): Total Fertility Rate 1.70



National Pension Benefit Rates



2.2 Financial Prospects for National Pension

A. In case the total fertility rate is assumed to be 1.28

In case the existing assumption of average life span is adopted (<Table 2>, Scenario I), the income is larger than payment before the 2040s when National Pension beneficiaries show up massively. Thereafter, as the benefit payment rises, a balance deficit is expected to be incurred for the first time by 2042. As a result, after the reserve fund reaches 987 trillion won (constant amount as of 2010) in 2041, the fund is projected to sharply fall and be depleted by 2058. The percentage of total payment in GDP that was maintained at 0.8% in 2010 is forecast to skyrocket to 4.6% by 2050 and continue to grow to 7.3% by 2100.

〈Table 8〉 The Financial Prospect of National Pension: The Existing Assumption of Average Life Span (Total Fertility Rate 1.28)

(Unit: Billion Won, Times)

Year	Total Income			Total Payment	Balance	Reserve Fund		Reserve Rate[3]	The % of Total Payment in GDP	Pay-as-you-go Premium Rate[4]
	Total	Premium[1]	Investment Income			Ordinary Amount	2010 Constant Amount[2]			
2010	44,763	21,275	23,488	8,834	35,929	319,380	319,380	37.1	0.8%	3.6%
2020	92,928	41,893	51,036	27,563	65,365	831,421	646,352	28.1	1.3%	5.8%
2030	142,629	66,521	76,108	73,980	68,649	1,481,476	944,802	19.2	2.2%	9.9%
2040	185,597	95,882	89,716	168,361	17,236	1,921,694	1,005,377	11.4	3.4%	15.7%
2050	202,836	135,606	67,230	312,100	-109,263	1,438,839	617,526	5.0	4.6%	20.6%
2060	171,724	171,724	0	492,824	-321,100	-	-	-	5.5%	25.7%
2070	228,411	228,411	0	689,559	-461,148	-	-	-	5.9%	27.0%
2080	301,789	301,789	0	907,413	-605,624	-	-	-	5.9%	26.9%
2090	388,665	388,665	0	1,218,116	-829,451	-	-	-	6.1%	28.0%
2100	504,568	504,568	0	1,917,068	-1,412,500	-	-	-	7.3%	34.0%

Note: 1) Premium income incurred when the premium rate is maintained at 9%
2) Discounted by inflation
3) The % of the reserve fund for the previous year in total payment for the year
4) The % of benefit in total income (those for whom premiums are imposed)
Source: Calculated by the Author

On the other hand, in case the average life span is extended (<Table 2>, Scenario Ⅱ), patterns similar to the existing assumption are expected to show up, with the time point of balance deficit and the depletion of the fund arriving earlier than previously assumed. Specifically speaking, the reserve fund is expected to reach 956 trillion won (constant amount, as of 2010) in 2040 and then fall very sharply. As a result, the fund is projected to be completely depleted by 2056. The percentage of total payment in GDP is forecast to rise to 4.9% by 2050 and to 11.7% by 2100, as the payment amount expands due to a rise in average life span and in benefit receipt period.

The percentage of total payment in GDP is expected to get higher than the figures identified through the existing assumption of average life span and to reach 11.7% (2100) in a long-term perspective.

〈Table 9〉 The Financial Prospect of National Pension: Extended Average Life Span (Total Fertility Rate 1.28)

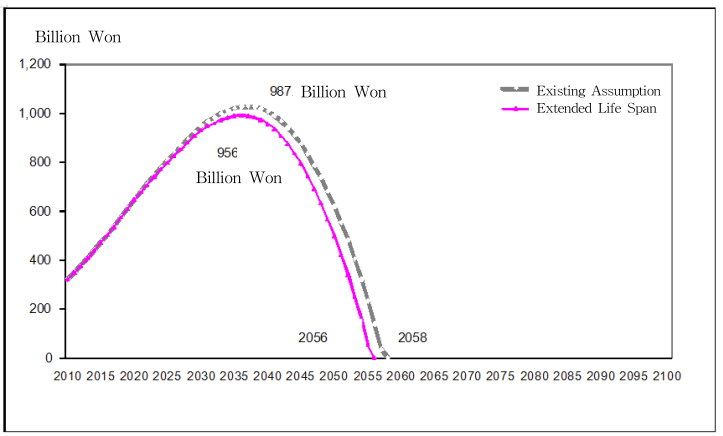
(Unit: Billion Won, Times)

Year	Total Income			Total Payment	Balance	Reserve Fund		Reserve Rate[3]	The % of Total Payment in GDP	Pay-as-you-go Premium Rate[4]
	Total	Premium[1]	Investment Income			Ordinary Amount	2010 Constant Amount[2]			
2010	44,763	21,275	23,488	8,834	35,929	319,380	319,380	37.1	0.8%	3.6%
2020	92,797	41,901	50,895	28,153	64,644	828,863	644,363	27.5	1.3%	5.9%
2030	141,389	66,542	74,847	76,806	64,583	1,455,438	928,197	18.2	2.2%	10.3%
2040	181,463	95,959	85,504	174,704	6,759	1,826,574	955,612	10.5	3.5%	16.3%
2050	190,803	135,790	55,013	328,585	-137,782	1,152,788	494,757	3.9	4.9%	21.7%
2060	172,114	172,114	0	530,731	-358,617	-	-	-	5.9%	27.6%
2070	229,104	229,104	0	783,056	-553,952	-	-	-	6.7%	30.6%
2080	302,866	302,866	0	1,117,836	-814,971	-	-	-	7.3%	33.1%
2090	390,195	390,195	0	1,662,179	-1,271,984	-	-	-	8.3%	38.1%
2100	506,685	506,685	0	3,041,334	-2,534,649	-	-	-	11.7%	53.8%

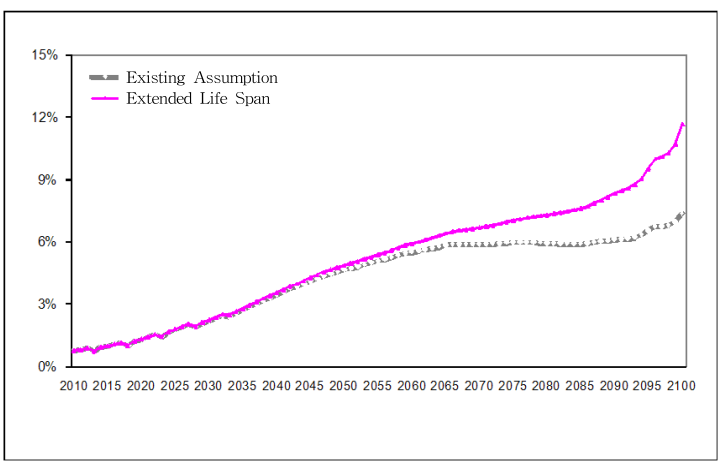
Note: 1) Premium income incurred when the premium rate is maintained at 9%
2) Discounted by inflation
3) The % of the reserve fund for the previous year in total payment for the year
4) The % of benefit in total income (those for whom premiums are imposed)
Source: Calculated by the author

〔Figure 5〕 The Financial Prospect of National Pension: Total Fertility Rate 1.28

Reserve Fund



The % of Total Payment in GDP



B. In case the total fertility rate is assumed to be 1.70

In case the existing assumption of average life span (<Table 2>, Scenario Ⅲ) is adopted or if the trends in average life span extension are not reflected, a balance deficit is expected to be incurred by 2042. The reserve fund of National Pension is projected to go up to 993 trillion won (constant amount, as of 2010) in 2041, then to sharply fall thereafter, and be depleted by 2059. The fund depletion year is deferred by one year, compared to the case where the total fertility rate is assumed to be 1.28. The percentage of total payment in GDP that was maintained at 0.8% in 2010 is forecast to soar to 4.6% by 2050 and continue to rise to 8.6% by 2100 on a long-term basis.

〈Table 10〉 The Financial Prospect of National Pension: Existing Assumption of Average Life Span (Total Fertility Rate 1.70)

(Unit: Billion Won, Times)

Year	Total Income			Total Payment	Balance	Reserve Fund		Reserve Rate[3]	The % of Total Payment in GDP	Pay-as-you-go Premium Rate[4]
	Total	Premium[1]	Investment Income			Ordinary Amount	2010 Constant Amount[2]			
2010	44,763	21,275	23,488	8,834	35,929	319,380	319,380	37.1	0.8%	3.6%
2020	92,928	41,893	51,036	27,563	65,365	831,421	646,352	28.1	1.3%	5.8%
2030	142,646	66,537	76,109	73,980	68,666	1,481,498	944,816	19.2	2.2%	9.9%
2040	188,102	98,063	90,039	168,362	19,741	1,929,858	1,009,648	11.4	3.4%	15.4%
2050	221,699	150,086	71,613	312,114	-90,415	1,545,808	663,435	5.3	4.6%	18.6%
2060	205,899	205,899	0	492,908	-287,009	-	-	-	5.5%	21.5%
2070	297,224	297,224	0	690,100	-392,876	-	-	-	5.9%	20.8%
2080	427,928	427,928	0	948,349	-520,421	-	-	-	6.2%	19.8%
2090	591,792	591,792	0	1,383,151	-791,359	-	-	-	6.9%	20.9%
2100	836,331	836,331	0	2,246,253	-1,409,922	-	-	-	8.6%	24.0%

Note: 1) Premium income incurred when the premium rate is maintained at 9%
2) Discounted by inflation
3) The % of the reserve fund for the previous year in total payment for the year
4) The % of benefit in total income (those for whom premiums are imposed)

Source: Calculated by the author

On the other hand, in case the average life span is extended (<Table 2>, Scenario Ⅳ), patterns similar to the existing assumption is expected to show up, with the time point of balance deficit and the depletion of the fund arriving earlier than previously assumed. Specifically, the reserve fund is projected to go up to 960 trillion won (constant amount, as of 2010), then to sharply drop, and be depleted by 2057. The percentage of total payment in GDP is forecast to reach 4.9% by 2050 and rise to 13.2% by 2100 due to a rise in average life span and benefit receipt period.

〈Table 11〉 The Financial Prospect of National Pension: Extended Average Life Span (Total Fertility Rate 1.70)

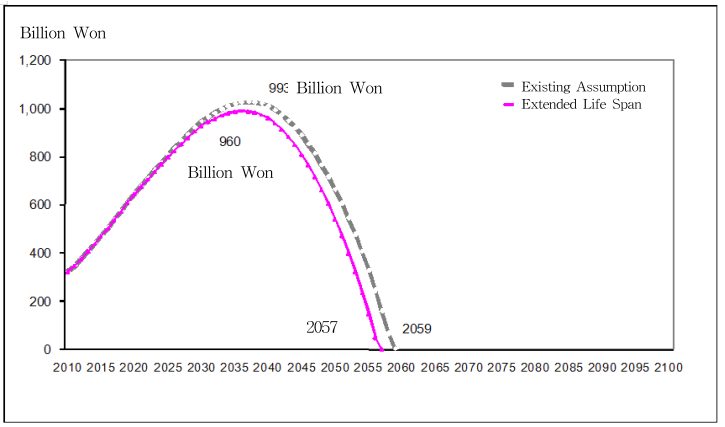
(Unit: Billion Won, Times)

Year	Total Income			Total Payment	Balance	Reserve Fund		Reserve Rate[3]	The % of Total Payment in GDP	Pay-as-you-go Premium Rate[4]
	Total	Premium[1]	Investment Income			Ordinary Amount	2010 Constant Amount[2]			
2010	44,763	21,275	23,488	8,834	35,929	319,380	319,380	37.1	0.8%	3.6%
2020	92,797	41,901	50,895	28,153	64,644	828,863	644,363	27.5	1.3%	5.9%
2030	141,406	66,558	74,848	76,806	64,600	1,455,460	928,211	18.2	2.2%	10.3%
2040	183,972	98,144	85,828	174,705	9,267	1,834,751	959,890	10.5	3.5%	15.9%
2050	209,695	150,292	59,403	328,599	-118,904	1,259,928	540,740	4.2	4.9%	19.6%
2060	206,364	206,364	0	530,815	-324,451	-	-	-	5.9%	23.1%
2070	298,165	298,165	0	783,603	-485,438	-	-	-	6.7%	23.5%
2080	429,548	429,548	0	1,160,932	-731,385	-	-	-	7.6%	24.2%
2090	594,131	594,131	0	1,847,168	-1,253,036	-	-	-	9.2%	27.8%
2100	840,085	840,085	0	3,452,285	-2,612,200	-	-	-	13.2%	36.8%

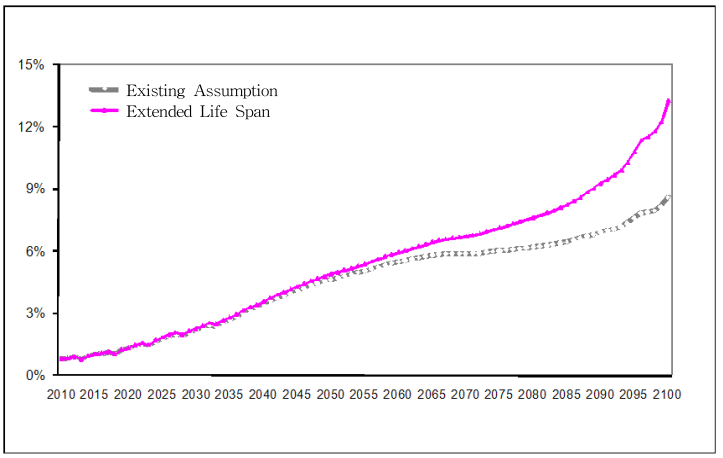
Note: 1) Premium income incurred when the premium rate is maintained at 9%
2) Discounted by inflation
3) The % of the reserve fund for the previous year in total payment for the year
4) The % of benefit in total income (those for whom premiums are imposed)
Source: Calculated by the author

〔Figure 6〕 The Financial Prospect of National Pension: Total Fertility Rate 1.70

Reserve Fund



The % of Total Payment in GDP



〈Table 12〉 The Financial Prospect of National Pension (Summary)

Total Fertility Rate Assumed	Average Life Span Assumed	Fund Depletion Year	The % of Total Payment in GDP	Pay-as-you-go Premium Rate
1.28	Existing Assumption	2058	0.8%(2010) 5.9%(2070) 7.3%(2100)	3.6%(2010) 27.0%(2070) 34.0%(2100)
	Extended Average Life Span	2056	0.8%(2010) 6.7%(2070) 11.7%(2100)	3.6%(2010) 30.6%(2070) 53.8%(2100)
1.70	Existing Assumption	2059	0.8%(2010) 5.9%(2070) 8.6%(2100)	3.6%(2010) 20.8%(2070) 24.0%(2100)
	Extended Average Life Span	2057	0.8%(2010) 6.7%(2070) 13.2%(2100)	3.6%(2010) 23.5%(2070) 36.8%(2100)

2.3 Analysis of Premium Rate by Financial Assessment Goal

The financial status of National Pension will be assessed, considering a rise in average life span. The financial assessment point will be set to 2080 and 2100, analyzing required premium rates by financial goal.[7)]

For financial assessment indices, a twice higher reserve rate, a five times higher reserve rate, and the non-depletion of the fund (compared to the reserve fund at the time point of assessment) will be used as three different cases in order to predict required premium rates by case.

Assuming that the premium rate which is now maintained at 9% will rise consistently every five years from the year 2013 and be maintained at the same level after the year 2033, required

7) In case the financial assessment times are 2080 and 2100, the financial assessment period is 70 years and 90 years, respectively.

premium rates are analyzed by financial assessment goal.

As of the year 2100 (financial assessment point), premium rates were analyzed by assessment goal. In case the total fertility rate is assumed to be 1.28, the premium rate for the non-depletion of the fund is expected to reach 16.65%, with the premium rates for a twice higher reserve rate and a five times higher reserve rate being 17.05% and 17.75%, respectively.

In case the average life span is assumed to rise, premium rates by financial goal are 19.75%, 20.3%, and 21.45%, being 3.1%pt ~ 3.7%pt higher than figures identified through the existing assumption of average life span.

In case the total fertility rate is assumed to be 1.70, the premium rate for the non-depletion of the fund is expected to reach 14.6%, with the premium rates for a twice higher reserve rate and a five times higher reserve rate being 15% and 15.75%, respectively.

In case the average life span is assumed to rise, premium rates by financial goal are 17.3%, 17.85%, and 18.95%, being 2.7%pt ~ 3.2%pt higher than figures identified through the existing assumption of average life span.

In case the financial assessment point is set to 2080, premium rates by assessment goal were also analyzed. If the total fertility rate is assumed to be 1.28, the premium rate for the non-depletion of the fund is expected to reach 14.3%, with the premium rates for a twice higher reserve rate and a five times higher reserve rate being 14.8% and 15.75%, respectively.

If the average life span is assumed to rise, premium rates by financial goal are 15.85%, 16.45%, and 17.6%, being 3.1%pt ~ 3.7%pt higher than the figures identified through the existing

assumption of average life span.

In case the total fertility rate is assumed to be 1.70, the premium rate for the non-depletion of the fund is projected to reach 12.85%, with premium rates for a twice higher reserve rate and a five times higher reserve rate being 13.35% and 14.25%, respectively.

In case the average life span is assumed to rise, the premium rates by financial goal are estimated at 14.25%, 14.85%, and 15.9%, being 2.7%pt ~ 3.2%pt higher than the figures identified through the existing assumption of average life span.

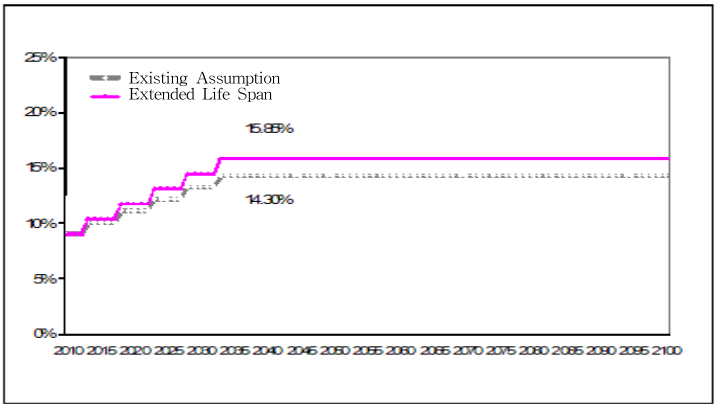
〈Table 13〉 Premium Rates by Goal of Financial Assessment of National Pension

Population Scenario Classification		Financial Assessment Time Point: 2080 (Premium Rate after 2033)			Financial Assessment Time Point: 2100 (Premium Rate after 2033)		
Total Fertility Rate Assumption	Average Life Span Assumption	Non-depletion of Fund	Twice higher reserve rate	Five times higher reserve rate	Non-depletion of Fund	Twice higher reserve rate	Five times higher reserve rate
Total Fertility Rate 1.28	Existing Assumption	14.30%	14.80%	15.75%	16.65%	17.05%	17.75%
	Extended Life Span	15.85%	16.45%	17.60%	19.75%	20.30%	21.45%
Total Fertility Rate 1.70	Existing Assumption	12.85%	13.35%	14.25%	14.60%	15.00%	15.75%
	Extended Life Span	14.25%	14.85%	15.90%	17.30%	17.85%	18.95%

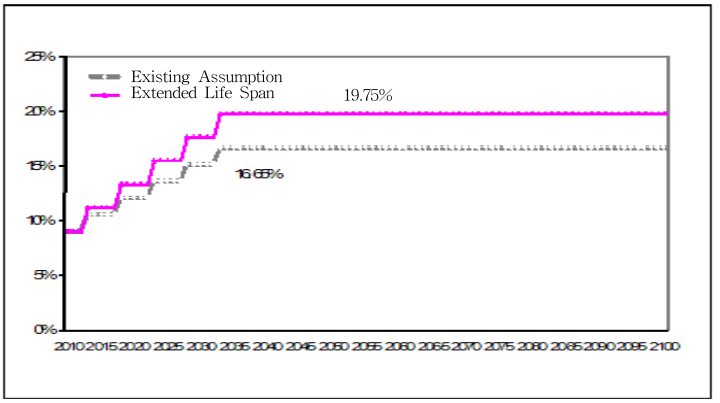
Note: The premium rate now maintained at 9% will rise consistently every five years from the year 2013, which will be controlled by the assessment point following 2033.
Source: Calculated by the Author

〔Figure 7〕 Required Premium Rate: Total Fertility Rate 1.28

The Goal of Financial Assessment: Non-depletion of Fund, Financial Assessment Point 2080

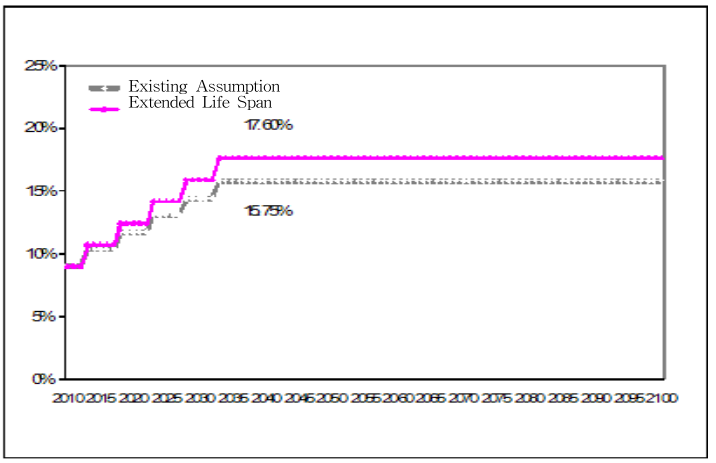


The Goal of Financial Assessment: Non-depletion of Fund, Financial Assessment Point 2080

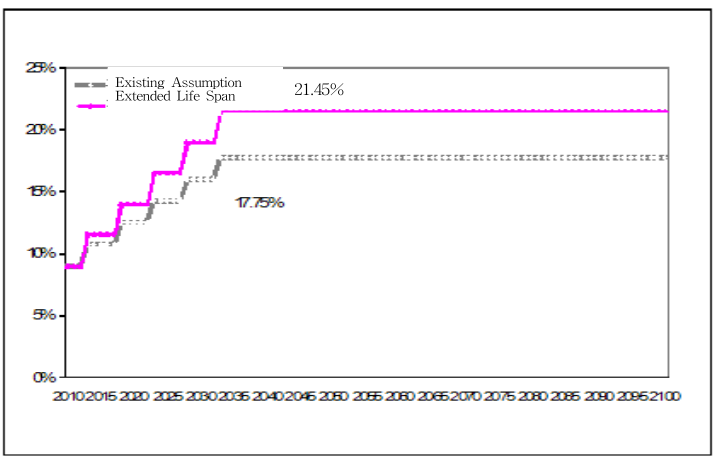


〔Figure 7〕 Required Premium Rate: Total Fertility Rate 1.28 (Continued)

The Goal of Financial Assessment: Reserve Rate Five Times, Financial Assessment Time Point 2080

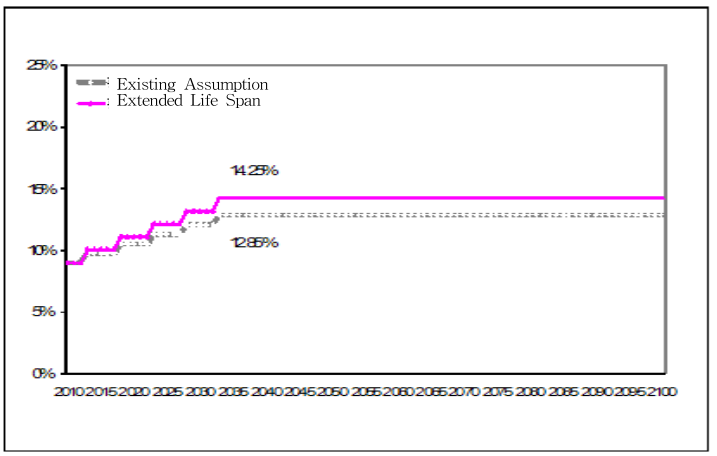


The Goal of Financial Assessment: Reserve Rate Five Times, Financial Assessment Time Point 2100

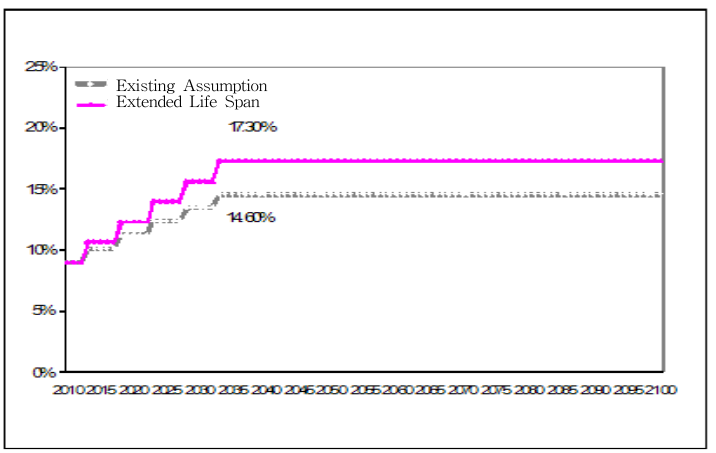


〔Figure 8〕 Required Premium Rate: Total Fertility Rate 1.70

The Goal of Financial Assessment: Non-depletion of Fund, Financial Assessment Time Point 2080

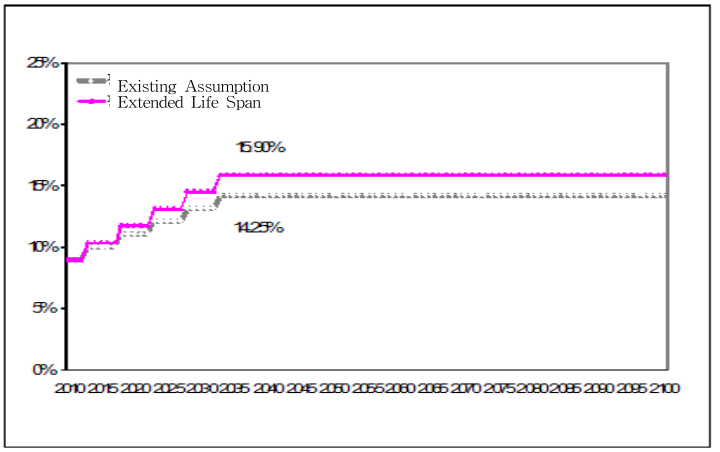


The Goal of Financial Assessment: Non-depletion of Fund, Financial Assessment Time Point 2100

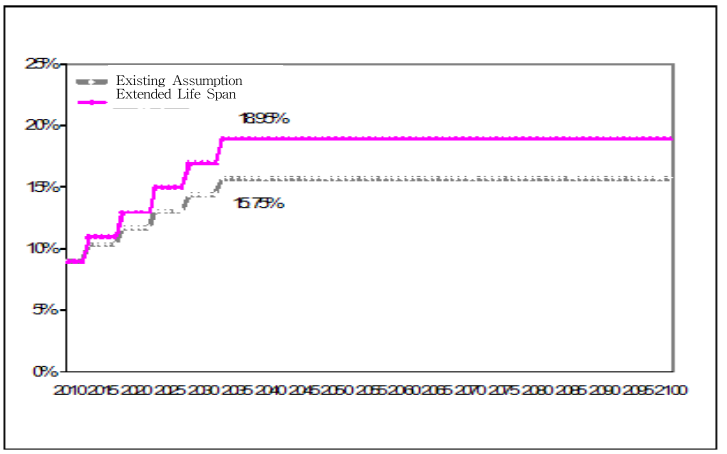


〔Figure 8〕 Required Premium Rate: Total Fertility Rate 1.70 (Continued)

The Goal of Financial Assessment: Reserve Rate Five Times. Financial Assessment Time Point 2080



The Goal of Financial Assessment: Reserve Rate Five Times. Financial Assessment Time Point 2100



3. Conclusion and Policy Issues

3.1 Key Analysis Summary

In order to analyze the effects of a rise in average life span on the financial status of National Pension, the assessment period was extended from 70 years (by 2078) for the 2008 actuarial valuation of National Pension to 90 years (by 2100)

The future population scenario assumed that the average life span would rise to 85.14 for men and 90.89 for women by 2050, to 87.99 for men and 93.36 for women by 2070, and to 91.78 for men and 96.07 for women by 2100.

The total fertility rates were set to 1.28 (after 2030) and 1.70 (after 2020) for analysis. The former was assumed through the 2006 projection of future population by Statistics Korea while the latter was assumed by the government (goal) through the 2nd Basic Plan for an Aging Society Featuring Low Birth Rates.

In case a rise in average life span is reflected, the number of National Pension beneficiaries went up sharply, rapidly increasing the system dependency ratio.

In case the total fertility rate is assumed to be 1.28, the system dependency ratio that was maintained at 11% in 2010 is expected to soar to 135.5% by 2070 and to 150.2% by 2100, as the system gets more mature.

In case the total fertility rate is assumed to be 1.70, the rising trend of the system dependency ratio slows down, but incurring no change in the growing trend itself.

The ratio is projected to reach 102.7% by 2060, exceeding

the level of 100%, and continue to grow to 104.2% by 2070 and to 113.3% by 2100.

In case the average life span rises, the benefit receipt period is expected to be extended, with the time point of balance deficit and the depletion of the fund arriving earlier than previously assumed.

If the total fertility rate is assumed to be 1.28, the reserve fund is expected to reach 956 trillion won (constant amount, as of 2010) in 2040 and to drop sharply thereafter. As a result, the fund is projected to be depleted by 2056.

The pay-as-you-go premium rate (the % of benefit payment in income for which premiums are imposed) is forecast to reach 21.7% by 2050 and 53.8% by 2100, increasing more rapidly as the final estimation year gets closer.

The percentage of total payment in GDP is expected to become higher than the figures identified through the existing assumption of average life span (as of 2100, the % of total payment in GDP reaches 7.3%) and to rise to 11.7% by 2100.

In case the total fertility rate is assumed to be 1.70, the reserve fund is forecast to reach 960 trillion won (constant amount, as of 2010) in 2041 and then be depleted by 2057.

The pay-as-you-go premium rate is expected to sharply go up to 19.6% by 2050 and to 36.8% by 2100. By 2080, the rate is projected to rise more sharply but to get much smaller (53.8% -> 36.8%) than those registered for the case where the total fertility rate is assumed to be 1.28.

However, the percentage of total payment in GDP is expected to reach 13.2% by 2100, which is bigger than those identified

through the existing assumption of average life span (7.3%, by 2100) or for the case (11.7%, by 2100) where the average life span is extended and the total fertility rate is assumed to be 1.28.

Under the assumption that the average life span is extended and in the case where the financial assessment time point is the year 2100, premium rates by financial assessment goal were also analyzed. In case the total fertility rate is assumed to be 1.28, the premium rate for the non-depletion of the fund reached 19.75%, with the premium rates for a twice higher reserve rate and a five times higher reserve rate being estimated at 20.3% and 21.45%, respectively. The figures are 3.1%pt ~ 3.7%pt higher than those identified through the existing assumption of average life span.

In case the total fertility rate is assumed to be 1.70, the premium rate for the non-depletion of the fund reached 17.3%, with the premium rates for a twice higher reserve rate and a five times higher reserve rate being estimated at 17.85% and 18.95%, respectively. The figures are 2.7%pt ~ 3.2%pt higher than those identified through the existing assumption of average life span.

In short, as the average life span is extended, the system dependency ratio rises sharply. As a result, the time point of balance deficit and the depletion of the fund arrives earlier than assumed, rapidly raising the required premium rate for financial stability.

3.2 Policy Issues

In the case where the total fertility rate is assumed to be 1.28 or 1.70 (the government's goal), a rise in average life span

leads the number of pension beneficiaries to grow rapidly, sharply raising the system dependency ratio.

Rising fertility rates can slow down the rapid growth trend of the system dependency ratio. However, due to diverse factors including the different value system of marriage/delivery and the financial burden from private education for children, the fertility rate can not be easily enhanced within a short period of time, despite the government's active initiative. However, given that the negative effects from a rise in average life span show up accumulatively in a very long-term perspective, the initiative to enhance fertility rates should put more emphasis on long-term perspectives than on mid-to-short term contexts.

The rise in average life span makes the time point of balance deficit and the fund depletion arrive earlier than expected, rapidly raising the required premium rates for financial stability. In order to achieve the financial stability of National Pension, premiums should be raised or benefits must be reduced. Given that the benefit level of National Pension already fell from 70% (average income for forty years) to 40% (2028) through two rounds of pension reforms, additional benefit reduction for financial stability lacks reality. Therefore, the desirable scheme for financial stability in a mid-to-short term perspective is to raise premiums, rather than cut benefits.

The degree and timing of premium increase should be determined by the 3rd actuarial valuation of National Pension scheduled to be announced in 2013. Then, the government should make all-out efforts to prevent premium increase timing from being delayed.

Compared to other advanced nations, Korea's National Pension is in its infancy. Therefore, in mid-to-short term perspectives, the current framework needs to be maintained in order to prevent frequent system reforms from lowering confidence and causing confusion.

However, in a long-term perspective, it has to be shifted to an earnings-related pension by reinforcing the connection between payment and benefits. The resulting issue over the low pension benefits of low-income brackets (vulnerable classes) should be resolved by the introduction of the pension guarantee system where minimum benefits for later lives can be guaranteed for faithful pension insurants. Such a dual approach should be taken to overcome difficulties.

The three nations (Sweden, Finland, Norway) on the Scandinavian Peninsula have already implemented pension reforms in the aforementioned direction in order to cope with the financial pressure from an aging society featuring low birth rates. At the same time, a built-in stabilizer where the benefit receipt period links to a rise in average life span (even though the average life span rises, the average benefit receipt period is not raised) should be actively reviewed and introduced to ensure the financial soundness of National Pension. In particular, the National Pension and Basic Old-age Pension system, which has yet to have a clear road map, must be restructured in order to ensure sustainability in finance and politics even in the era of centenarians.

As the average life span rises sharply, the distinction between working and retirement can be easily blurred. In order to help

people to remain in a working environment as long as possible, the possibility of middle and old-age people being employed should be raised through HR retraining that can meet the changing needs of society. At the same time, a wage system (salary peak system) proportional to labor productivity should also be introduced. A desirable working environment needs to be also formed, where gradual retirement can be activated through part-time work and partial pension. In particular, in order to activate the deferred pension of National Pension, a working environment where motivation and partial employment can be ensured through a pension system should be created.

Chapter

03

Analysis of Benefit Structure of Public Pensions

Chapter 3

Analysis of Benefit Structure of Public Pensions

The benefit-cost ratio is used as an analysis index in order to analyze and compare the benefit structure of National Pension and Pensions for Public Sector Workers by system.

The benefit-cost ratio is designed to compare the total premiums paid during the duration of entitlement to the pension system with the total benefits received after retirement. Namely, it refers to the index which shows how much benefit a beneficiary will receive based on the premiums paid during the period of entitlement to the pension.

1. Analysis Overview

1.1 Life Expectancy and Economic Variables

In the case of National Pension, Old-age Pension, and Retirement Pension, a beneficiary receives benefits after retirement until he or she dies. Therefore, it requires the assumption of life expectancy. By applying the assumption of life expectancy in the projection of future population announced by Statistics Korea at the end of 2011, the benefit-cost ratio is analyzed. Compared to the assumption of life expectancy in the 2006 projection of future population by Statistics Korea, life expectancy rose fairly on a long-term basis.

On the other hand, the projection of future population by Statistics Korea is made for the general public, which can be used as the assumption of benefit receipt period of Old-age Pension (National Pension). Given that life expectancy for Government Employees Pension and Teachers Pension is higher than that for the general public, it may not be appropriate to use the projection data. However, life expectancy data announced by Statistics Korea was used as an assumption.

〈Table 14〉 Life Expectancy Assumption: 2011 Estimation of Future Population by Statistics Korea

(Unit: Years)

Classification	1970	1980	1990	2000	2010	2020	2030	2040	2050	After 2060
Male	58.67	61.78	67.29	72.25	77.20	79.31	81.44	83.42	85.09	86.59
Female	65.57	70.04	75.51	79.60	84.07	85.67	86.98	88.21	89.28	90.30

Source: Statistics Korea (2011), Future Population Estimation, 2010~2060.

For the assumption of economic variables, the 2008 actuarial valuation of National Pension is applied. The income growth of Pensions for Public Sector Workers was different from that of private employees but the two were assumed to be the same on a long-term basis.

〈Table 15〉 Economic Variable Assumption for Analysis of Benefit-Cost Ratio: 2008 Actuarial Valuation of National Pension

(Unit: %)

Economic Variable Assumption[1)]	2011 ~2020	2021 ~2030	2031 ~2040	2041 ~2050	2051 ~2060	2061~
Economic Growth (Nominal)	6.8 / 6.5	4.8	3.7	3.2	2.9	2.7
Wage Growth (Nominal)	6.3 / 6.0	5.3	4.9	4.6	4.5	4.5
Interest Rate (Nominal)	6.3 / 6.0	4.9	4.4	4.2	4.0	3.8
Inflation[2)]	2.7 / 2.4	2.0				

Note: 1) For economic variable assumption, the total fertility rate was assumed to be 1.28. Therefore, in case 1.40, the median value of the total fertility rate (2011 projection of future population by Statistics Korea), is reflected, the economic variable assumption needs to be changed.
2) 2.7% for 2011~2015, 2.4% for 2016~2020
Source: Committee of National Pension Actuarial Valuation(2008)

1.2 Benefit Structure of Public Pensions

In order to analyze the benefit-cost ratio of National Pension and Pensions for Public Sector Workers and to identify premiums/benefits, premium rates and benefit formula by system should be specifically studied.

First of all, Old-age Pension (National Pension) consists of the basic pension amount and the dependency pension amount. In the case of the basic pension amount, the benefit amount is determined depending on income replacement rates, the income level of the insured as a whole, and the income level of the person. In the case of disability pension, if the duration of entitlement thereto is less than 20 years, the pension amount

is calculated, regarding the period of entitlement to the pension as 20 years. In case the period of entitlement thereto is longer than 20 years, the pension amount rises in proportion to the duration exceeding 20 years.

National Pension Amount = Basic Pension Amount + Pension Amount for Dependents

Basic Pension = $k \times (A+B) \times (1+0.05n)$

k: Income replacement rate in case premiums were paid for 40 years (2.4~1.2 by pension entitlement time point)

A: Average monthly income for the recent three years of the insured

B: Average monthly income (life-time) of the person

n: The duration of entitlement to the pension (20 years or longer)

One of the key variables that determine the benefit of Disability Pension (National Pension) is 2.4~1.2, the variable that determines the income replacement rate(k) of benefit formula. The figures gradually fell by the time point of the entitlement to the pension through two rounds of pension reforms in 1998 and 2007.

〈Table 16〉 Income Replacement Rate (National Pension) by Entitlement Time Point

Entitlement Time Point	Income Replacement Rate (Duration of Entitlement: 40 Years)	A Constant for Income Replacement Rate in the Benefit Formula	Revision
1988 ~ 1998	70%	2.4	
1999 ~ 2007	60%	1.8	Law Revision in 1998
2008	50%	1.5	Law Revision in 2007
2009 ~ 2027	Drop 0.5% Every Year	1.485 ~ 1.215	
After 2028	40%	1.2	

〈Table 17〉 Institutional Contents Reflected as the Benefit-cost Ratio (National Pension) is Analyzed

Classification	Entitlement before 2007	Entitlement between 2008 and 2027	Entitlement after 2028
Premium Rate	- Of monthly income · 3%: entitlement 1988~1992 · 6%: entitlement 1993~1997 · 9%: entitlement after 1998	- 9% of monthly income	
Benefit Receipt Age	- 60	- 61:2013~2017 - 62:2018~2022 - 63:2023~2027	- 64: receive benefits, 2028~2032 - 65: receive benefits after 2033
Benefit Formula	- 2.4× (average monthly income of the total number of insured +0.75× average monthly income of the person)×(1+(entitlement period-20)×0.5)) - 1.8×(average monthly income of the number of insured + average monthly income of the person)×(1+(entitlement period-20)×0.5)) - 2.4: entitlement 1988~1998 - 1.8: entitlement 1999~2007	- (1.5~1.215)× (average monthly income of the total number of insured+ average monthly income of the person)×(1+(entitlement period-20)×0.5)) - 1.5: entitlement, 2008 - 1.485~1.215: entitlement, 2009~2027	- 1.2×(average monthly income of the total number of insured + average monthly income of the person)×(1+(entitlement period-20)×0.5)) - 1.2: entitlement, after 2028
Change the methods to adjust the pension amount	- Inflation		
Introduce an income ceiling	None	- 3.6 million by 2010 - Raise the income ceiling depending on inflation from 2011	

How the retirement pension amount (Pensions for Public Sector Workers) is calculated needs to be discussed. In the case of Government Employees Pension and Teachers Pension, before the year 2010, rules prepared before the law is revised are reflected while after the year 2010, regulations devised after the law is revised are applied. For Military Pension, the law has yet to be revised. However, like Government Employees Pension, the reformed law applies to those who joined the pension system after the year 2010, in order to calculate the retirement pension amount.

For Government Employees Pension and Teachers Pension, in accordance with the reformed Act, the income criterion for calculating premiums and the pension amount was shifted from the monthly wage to the basic monthly income from the year 2010. As a result, in relation to the rate of premiums paid by the insured, the contribution is raised from the current 5.5% to 7.0%. In case the entitlement period exceeds 33 years, the premiums should continue to be paid.

For calculating the pension amount, the income level assessment period and criterion are changed from the average monthly wage for three years before the retirement to the average monthly income for the whole period. Inflation and wage increase rate were used to calculate the continuous pension amount (policy adjustment) but under a new system, only inflation is considered for amount adjustment.

In order to prevent beneficiaries from receiving very high benefits, the income ceiling system was introduced, with the ceiling being 1.8 times larger than the average monthly income

of the insured as a whole.

The basic direction of Military Pension reform is similar to that of Government Employees Pension and Teachers Pension. Unlike Government Employees Pension where the pay-more and get-less system was newly adopted, under the Military Pension system, the premium is raised but the current level of benefits is maintained for existing pension insurances. Furthermore, differences between when premium rates are raised and when the continuous pension amount is adjusted are also incurred.

〈Table 18〉 Institutional contents reflected as the benefit-cost ratio of government employees pension and teachers pension is analyzed

Classification	Entitlement before 2010	Entitlement after 2010
Basic income for identifying premiums and the benefits formula	Monthly wage[1)]	- The basic monthly income is the sum of monthly wage and taxable benefits[2)] - Assumed to be 1.53 times larger than monthly wage
Premium Rate	- 5.525% of the basic monthly income · It applies for up to 33 years	- Of the basic monthly income · 6.3% (2010) · 6.7% (2011) · 7.0% (2012) - The ceiling of entitlement period does not apply
Benefit Receipt Age	- No limitation (entitlement before 1996) - 60 (new entitlement after 1996)	- Same as the existing system (entitlement before 2010) - 65 (entitlement after 2010)
Benefit Formula	- Average monthly wage for three years before retirement × (50%+ 20 years or longer employment period × 2%) - It applies for up to 33 years	- Basic average monthly income for the whole period × employment period × 1.9%
Change the methods to adjust the pension amount	- Inflation + policy adjustment - Adjusted within ±2%pt between income and inflation	- Inflation + policy adjustment (2010~2014) - Adjusted every three years within ±3%pt between income and inflation - Inflation: from the year 2015
Introduce income ceiling	None	- The income ceiling is set. · 1.8 times larger than the basic average monthly income of government employees as a whole

Note: 1) The monthly income refers to basic pay, a bonus for good attendance, and additional dues for a bonus for good attendance.
2) Taxable benefits mean the bonuses for family support, holidays, transportation, position, meals, and performance.

〈Table 19〉 Institutional Contents Reflected as the Benefit-Cost Ratio of Military Pension is analyzed

Classification	Entitlement before 2010	Entitlement after 2010[1)]
Basic income for identifying premiums and the benefits formula	- Monthly wage	- The basic monthly income is the sum of monthly wage and taxable benefits - Assumed to be 1.53 times larger than the monthly wage
Premium Rate	- 5.525% of the basic monthly income · It applies for up to 33 years	- Of the basic monthly income · 5.525% (2010) · 6.7% (2011) · 7.0% (2012) - The ceiling of the entitlement period does not apply.
Benefit Receipt Age	- No limitation	- No limitation
Benefits formula	- Average monthly wage for three years before retirement × (50%+20 years or longer employment period × 2%) - It applies for up to 33 years	- The basic average monthly income for the whole period × employment period × 1.9% - The payment is maintained at the current level.
Change the methods to adjust the pension amount	- Inflation + Policy adjustment - Adjust every three years the differences between wage and inflation (±2%pt)	- Inflation - Adjust every three years the differences between wage and inflation (±3%pt) - The policy adjustment will be abolished in 2019
Introduce income ceiling	None	The income ceiling is set - 1.8 times larger than the basic average monthly income of government employees as a whole

Note: 1) The revision to the Military Pension Act now under discussions in the National Assembly applies from the year 2010.

The income criteria for comparing and analyzing the benefit-cost ratio of National Pension and Pensions for Public Sector Workers are analyzed for average income earners by system. The benefit formula of National Pension reflects not only the income of the member (B value) but also the average income of the insured as a whole (A value). It is different from Pensions for Public Sector Workers where benefits are in proportion to the income of the member. This research analyzes

the benefit-cost ratio of National Pension average income earners to compare National Pension with Pensions for Public Sector Workers, excluding the effects of income redistribution. For the comparison between National Pension and Pensions for Public Sector Workers, average income earners by system are to be analyzed.

Because the benefits of National Pension and Pensions for Public Sector Workers differ depending on the entitlement period, the duration of entitlement thereto is classified into 10 years, 20 years, 30 years, and 40 years for analysis. In the case of Pensions for Public Sector Workers, the maximum entitlement period is limited to 33 years before the year 2010. For the comparison between National Pension and Pensions for Public Sector Workers, even the case where the entitlement period is 40 years is analyzed. The time point of entitlement to National Pension and Pensions for Public Sector Workers will be set to 1990, 2010, and 2030, considering when the revised law applies by system.

The year 2010 is used as an analysis criterion because part of the revised bill applies to those insured who joined the system in 2010 in accordance with the Government Employees Pension Act and the Teachers Pension Act reformed at the end of the year 2009. In the case of Military Pension, as of the year 2011, the revised bill is under discussion in the National Assembly, but which is also analyzed for those who joined the system in 2010. After 2028, an income replacement rate (National Pension) of 40% (based on the entitlement period of 40 years) is applied, setting 2030 as the basic year. Furthermore, in accordance with the 2011 projection of future population by

Statistics Korea, life expectancy was assumed to gradually rise. Given that benefits from public pensions are paid until beneficiaries die, the year 2030 is set as the basic year in order to analyze the effects of rising life expectancy.

Life expectancy differs depending on gender. The population group is classified into men and women in order to assume the benefit receipt period.

The National Pension and Pensions for Public Sector Workers was also reformed as related laws were revised in 2007 and 2010. As a result, the same-premium and less-benefit system applied to National Pension while the pay-more and receive-less system applied to Pensions for Public Sector Workers. For comparison and analysis based on law revision, the year 1990 was set as the basic year in entitlement time point in order to analyze the benefit-cost ratio for those insured who joined the pension system in 2007 and 2010.

〈Table 20〉 Analysis of Benefit-Cost Ratio of Public Pensions

Entitlement Time Point	Entitlement Period	Income Criteria	Benefit Receipt Age		
			National Pension	Government Employees Pension and Teachers Pension	Military Pension
1990	10 years 20 years 30 years 40 years	Average income by system	60~64	55	42
2010			62~65	65	53
2030			65		55

2. Analysis Results

Looking into the benefit-cost ratio analysis result of those who joined the system in 2010, the benefit-cost ratio of National Pension (male) is 1.19 times (20 years) ~ 1.16 times (40 years), depending on the entitlement period. The longer the entitlement period, the lower the benefit-cost ratio. Such a phenomenon can be regarded as a temporary one that is incurred due to a rise in benefit receipt age.[8] The benefit receipt duration for women is longer than that of men, with the ratio reaching 1.65 times (20 years) ~ 1.70 times (40 years) depending on the entitlement period.

The benefit-cost ratio of Government Employees Pension and Teachers Pension reaches 1.34 times (20 years) ~ 1.37 times (40 years) depending on the entitlement period. The longer the entitlement period, the higher the benefit-cost ratio. The ratio of Government Employees Pension and Teachers Pension is 18%pt higher than that of National Pension.

The ratio of Military Pension is projected to reach 1.87 times (20 years) ~ 2.4 times (40 years), more than twice higher than that of National Pension. In case the entitlement period is 20 years or longer, benefits can be given regardless of the retirement age. As a result, the benefit receipt period of Military Pension becomes longer than those of Government Employees Pension and Teachers Pension. The benefit-cost ratio of the former is

8) The benefit receipt age (entitlement in 2010) rose from 62 to 65, depending on benefit receipt time points.

judged to be 75%pt higher than that of the latter.

In 2010, Pensions for Public Sector Workers was revised or reviewed in order to introduce the pay-more and get-less system. Even after it was revised, the benefit-premium ratio thereof is still higher than that of National Pension.

〈Table 21〉 The Benefit-Cost Ratio of Public Pensions by Employment Period (New Entitlement in 2010)

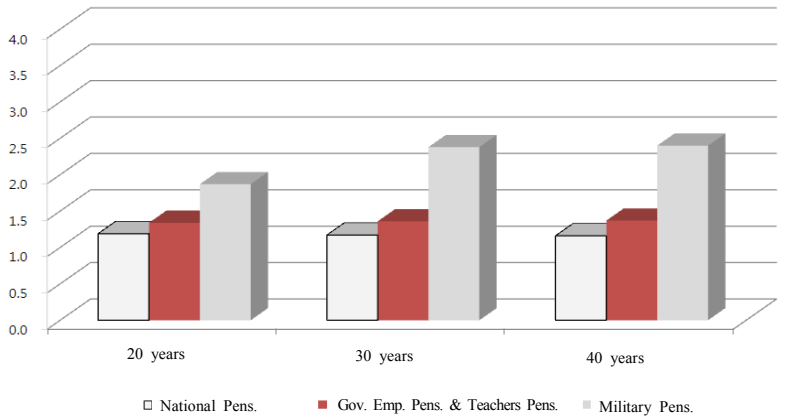
(Unit: Times)

Classification		Assumption of Benefit Receipt Age	10 years	20 years	30 years	40 years
Male	National Pension	62~65	1.22	1.19	1.17	1.16
	Government Employees Pension and Teachers Pension	65		1.34	1.36	1.37
	Military Pension[1)]	53[2)]		1.87	2.38	2.40
Female	National Pension	62~65	1.68	1.65	1.71	1.70
	Government Employees Pension and Teachers Pension	65		1.87	1.99	2.01
	Military Pension[3)]	53[2)]		1.87	2.38	2.40

Note: 1) In the case of Military Pension, for new entitlement in 2010, the revised bill now under discussions in the National Assembly has been applied.
2) The benefit receipt age of Military Pension is based on 2009 performance data. As of now, there is no limitation in the age, which is not dealt with in the revised bill. As a result, the age is assumed to be 53.
3) In the case of Military Pension, there is no distinction between men and women, analyzing data based on men.

Source: Calculated by the Author

〔Figure 9〕 The Benefit-Cost Ratio of Public Pensions by Employment Period (New Entitlement in 2010)



The benefit-cost ratio for those who newly join the system in 2030 is expected to get higher than that of the year 2010, as life expectancy gets longer. However, for Military Pension, the benefit receipt initiation age was assumed to extend by two years, which is lower by a small margin than that of the year 2010. In the case of National Pension, the income replacement rate was set to 49% for those who joined the system in 2010, which is expected to continuously fall every year to 40% in 2028. An income replacement rate of 40% is applied from the year 2030, widening the gap with those of Pensions for Public Sector Workers. Namely, the rate of Government Employees Pension and Teachers Pension is 24%pt higher than that of National Pension.

〈Table 22〉 The Benefit-Cost Ratio of Public Pensions by Employment Period (New Entitlement in 2030)

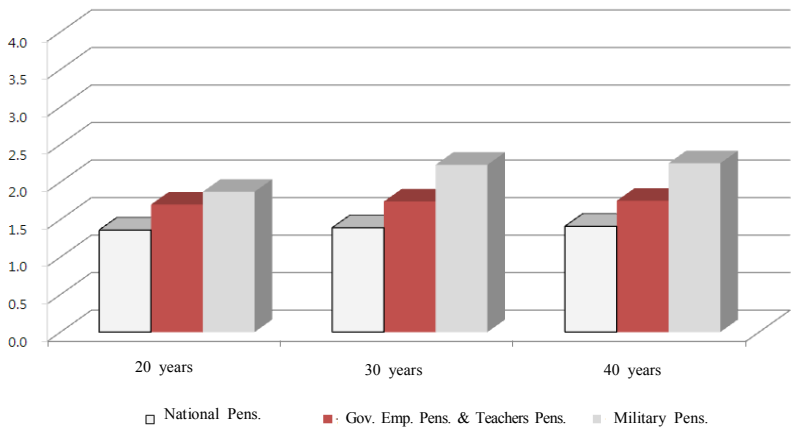
(Unit: Times)

Classification		Assumption of Benefit Receipt Age	10 years	20 years	30 years	40 years
Male	National Pension	65	1.32	1.36	1.39	1.41
	Government Employees Pension and Teachers Pension			1.70	1.74	1.75
	Military Pension[1]	55[2]		1.87	2.23	2.25
Female	National Pension	65	1.44	1.49	1.79	1.81
	Government Employees Pension and Teachers Pension			1.87	2.23	2.25
	Military Pension[3]	55[2]		1.87	2.23	2.25

Note: 1) In the case of Military Pension, for new entitlement in 2010, the revised bill now under discussions in the National Assembly has been applied.
2) As the revised bill does not apply any limitation to the benefit receipt age of the Military Pension, the age is assumed to rise from 53 to 55, as of the year 2009.
3) In the case of Military Pension, there is no distinction between men and women, analyzing data based on men.

Source: Calculated by the Author

〔Figure 10〕 The Benefit-Cost Ratio of Public Pensions by Employment Period (New Entitlement in 2030)



The effects of law revision can be reviewed by looking into the case where people joined the pension system in 1990. This case is subject to the rules implemented before National Pension and Pensions for Public Sector Workers were revised. In other words, for those who joined or will join the system in 2010 and 2030, the revised law or bills in progress apply to National Pension and Pensions for Public Sector Workers. For those who joined the system in 1990, part of the pre-revision system applied.

In the case of National Pension, the benefit-cost ratio reaches 2.83 times (20 years) ~ 1.77 times (40 years), depending on the entitlement period, which is 53%pt higher than that of those who participated in the system in 2010. The ratio exceeds two

times, which can be attributed to a lower premium rate (6%) and a high income replacement rate (70%) applied when the pension system was in its infancy.

In the case of Government Employees Pension and Teachers Pension, the benefit-cost ratio reaches 2.5 times (20 years) ~ 1.85 times (40 years), depending on the entitlement period. Namely, the longer the entitlement period, the lower the ratio. This can be attributed to the fact that the premium rate gradually rose from 11% of monthly wage in the 1990s to 17% thereof. Reviewing the effects of the law revision (2010), the benefit-cost ratio is estimated to be 35%pt higher than that of those who joined the system in 2010. Those insured who joined the system after the law was revised in 2010 are expected to be given less benefits than those who participated in the system before it was revised, incurring the issue over equality between generations.

In the case of Military Pension, the average benefit receipt age is 42, with the benefit-cost ratio reaching 3.42 times (20 years) ~ 3.3 times (40 years). The ratio is 38%pt higher than the figure estimated when the law was revised in 2010.

〈Table 23〉 The Benefit-Cost Ratio of Public Pensions by Employment Period (New Entitlement in 1990)

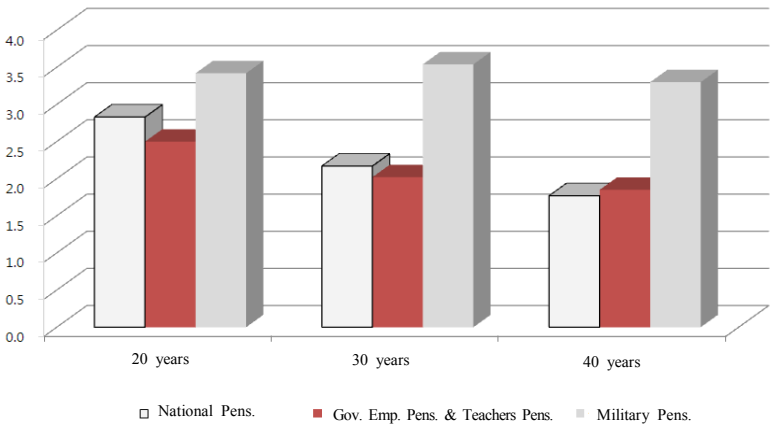
(Unit: times)

Classification		Assumption of Benefit Receipt Age	10 years	20 years	30 years	40 years
Male	National Pension	60~64	4.05	2.83	2.17	1.77
	Government Employees Pension and Teachers Pension	55		2.50	2.02	1.85
	Military Pension[1)]	42[2)]		3.42	3.54	3.30
Female	National Pension	60~64	4.22	2.95	2.90	2.50
	Government Employees Pension and Teachers Pension	55		3.42	3.13	2.90
	Military Pension[3)]	42[2)]		3.42	3.54	3.30

Note: 1) In the case of Military Pension, for new entitlement in 2010, the revised bill now under discussions in the National Assembly has been applied.
2) As Military Pension does not apply any limitation to the benefit receipt age, the age is assumed to be 42.
3) In the case of Military Pension, there is no distinction between men and women, analyzing data based on men.

Source: Calculated by the Author

〔Figure 11〕 The Benefit-Cost Ratio of Public Pensions by Employment Period (New Entitlement in 1990)



3. Conclusion and Policy Issues

A lot of research has been conducted to analyze the benefit structure of National Pension and Pensions for Public Sector Workers, but which is based on different assumptions regarding average life span and economic variables by system. This paper reflected characteristics by system, using the same non-system assumption variables and analysis framework in order to compare and analyze the benefit structure of National Pension and Pensions for Public Sector Workers.

The time point of entitlement to National Pension and Pensions for Public Sector Workers was classified into 1990 and 2010, considering when the revised Act applies to Pensions for Public Sector Workers. Then, analyzing the benefit-cost ratio, the effects

of law revision (revised bill) and the benefit structure between generations were researched.

In case people newly join the government employees pension and teachers pension system to which a revised law is applied in 2010, the benefit-cost ratio is expected to be 18%pt higher than that of National Pension. In the case of Military Pension, if premiums are paid for twenty years or longer, pension beneficiaries can receive benefits when they retire regardless of age. Therefore, the benefit period is longer than those of Government Employees Pension and Teachers Pension, with the benefit-cost ratio being 75%pt higher than that of National Pension.

In 2010, Pensions for Public Sector Workers were either reformed to accept 'the pay more and get less' system or are promoting system reforms as of now. However, even after the system is revised, the percentage of benefits in total payment is still higher than that of National Pension.

The effects of law revisions on National Pension and Pensions for Public Sector Workers can be summarized as follows: First, in the case of National Pension, if people joined the system in 1990 when the system before revision applies, they could enjoy 53% pt higher benefits than those who participated in the scheme in 2010

In the case of Government Employees Pension and Teachers Pension, the members who joined the system in 1990 can earn 35%pt higher benefits than those who participated in the scheme in 2010. After the law was revised, benefits were relatively lowered, which can incur the issue over equality in benefit between generations.

A large portion of the financial saving of Pensions for Public Sector Workers through law revision came from changes in the benefit structure of Pensions for Public Sector Workers. The shortfall in benefit payment incurred after law revision has to be transferred to future generations. Therefore, proper measures should be devised as quickly as possible. The future financial burden of the government, especially the size of national subsidy, should be accurately predicted, identifying system improvement methods.

As of the year 2010 when the revised Act applied, the issue over equality between generations incurred due to the dualized benefit structure of government employees generations should also be actively reviewed.