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Who Bears the Fiscal Burden of the National Pension System? A Generational Accounting Approach

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Abstract

We address the financial sustainability of the National Pension System (NPS) of Korea and the intergenerational inequity due to the system using generational accounting. We find that the current system is not financially sustainable and shifts the fiscal burden excessively to the future generations, even when the recent 2007 National Pension Act revision is reflected. Moreover, the parametric reform, which raises the contribution rate and alters the timing of the contribution adjustment, is not found to solve the problem of the system fundamentally. The prefunding, which raises the contribution rate before the NPS fund's depletion, is effective to restore the fiscal soundness of the NPS and enhance the intergenerational equity, in the sense that it equalizes the net tax burden across generations. However, the revision plan increases the NPS fund excessively, and the market power of the NPS fund in the financial market, which causes the distortion of the behavior of the financial market participants. A more structural reform, which recovers the financial sustainability and minimizes the distortion of the economic behavior, should be prepared.

Keywords: Fiscal Sustainability, Generational Accounting, Intergenerational Inequity, Public Pension

1. Introduction

The role of public pensions is becoming important in an aging society like Korea. Public pensions are crucial sources of post-retirement consumption. In addition, the private savings rate has declined in recent years, because of the increase in non-discretionary household expenditure, such as educational expenditure and housing costs. Therefore, many people in Korea do not accumulate adequate wealth for consumption at older ages.

Despite its importance, the National Pension System (NPS), Korea's largest public pension system, is facing a financial sustainability problem. The problem of the imbalance between the revenue and the expenditure of the NPS was foreseen even at the time of its introduction, because the government promised a benefit amount higher than that which can be financed with the contribution revenue under the NPS policy implemented at that time. The financial problem has deteriorated with the fast population aging resulting from the low fertility rate and prolonged life expectancy. Therefore, there have been many discussions on its reform. The outcome of the discussions is a series of NPS reforms. The first NPS reform is the 1998 National Pension Act revision, which lowered the replacement ratio from 70% to 60%, and introduced the 'financial recalculation rule', which requires the evaluation of the fiscal sustainability of the NPS every five years. After the first financial evaluation in 2003, the revision plans, to restore the financial sustainability through the adjustment of NPS contribution and benefit level and the structural change of the system, have been discussed. Despite the importance of the timely reform of the NPS, the fundamental reform was delayed, because it was not politically supported. Most of the revision plans imple-

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mented were parametric reforms. The most recent NPS revision is the 2007 NPS Act revision, which lowered the replacement ratio and raised the entitlement age. This reform is relatively extensive compared with the previous NPS revisions, in the sense that the replacement ratio is scheduled to be lowered in a large scale to 40% until mid-2020s, and the entitlement age is raised reflecting the increase in the life expectancy. However, the revision is considered insufficient to guarantee financial sustainability, because the contribution rate is still maintained at a level, which is not high enough to raise the NPS revenue to cover its expenditure.

We address this issue by making a financial projection and using Generational Accounting (GA)[1], which is designed to evaluate the financial sustainability and the intergenerational inequity. We compare the revenue and the expenditure of the NPS, taking into explicit account the 2007 revision, and compute the change in the contribution rate and the tax burden required to restore the long-term budgetary balance of the NPS. Using the estimated changes, we compute the GA, which is a set of the net tax burden across generations, and evaluate the intergenerational inequity due to the NPS and its revisions. We find that the current system is not financially sustainable and shifts the fiscal burden excessively to the future generations even when the recent reform is reflected. Moreover, a parametric reform, which raises the contribution rate, is not found to solve the problem of the system fundamentally. If the rise in the contribution rate is accompanied by prefunding, which is to raise the contribution rate before the exhaustion of the NPS fund, the budgetary problem will be solved. However, it will cause other problems in other sectors in the economy, such as the distortion of the financial market due to the exorbitant market power of the NPS fund.

The remainder of the paper is organized as follows. In section 2, we explain our projection method, the concept of the GA, and the process of its computation. Then, we report the generational accounts and evaluate the intergenerational inequity in section 3. Finally, in section 4, we conclude our discussion.

2. Projection and GA Methods

We update the financial projection of the NPS using the 2008 financial projection of NPS benefits and contributions by age and year, made by the National Pension Cooperation (NPC). The 2008 NPC projection made assumptions on population and macroeconomic variables, reflecting the situation as of 2008. We recalculate the distribution of NPS participants and benefit recipients, the contribution per participant, and the benefit amount per recipient using the 2010 population projection of the National Bureau of Statistics (NBS) of Korea and the macroeconomic variables assumption used by the Korean Ministry of Strategy and Finance (MOSF) for the Midterm Financial Plan, 2011-2015 (Table 1).

For the recalculation of NPS participants and benefit recipients by age and year, we use the method of 5. We adjust the distribution of the participants and benefit recipients with the ratio of the population by age and year between the 2006 population projection of the NBS, used for the 2008 NPC projection, and the 2010 NBS projection. We alter the contribution per participant and the benefit amount per recipient by recomputing the income level of the participants and the benefit level using updated assumptions on macroeconomic variables and the NPS benefit formula. Then, we compute the aggregate contribution revenue and total benefit expenditure over time using the distributions and per capita values.

Generational accounting was designed to evaluate the fiscal sustainability of public finance by[1]. The generational account for each cohort is defined as the present value of the net tax payment for the remaining lifetime. The net tax is the difference between the tax payment to the government and the transfer income from the government. Because the subject of analysis of this paper is the NPS, the tax here is the NPS contribution and the transfer income

$$\sum_{s=0}^{D} N_{t,t-s} P_{t,t-s} + \sum_{s=1}^{\infty} N_{t,t+s} P_{t,t+s} + W_t^{NPS} = 0 \qquad (1)$$

[1]The generational accounting is designed to investigate the fiscal sustainability of the government finance of the US by1. Following1, the GA has been widely used in many countries[2,8] made international comparison of the fiscal sustainability, and[5] evaluated the financial soundness of the public finance of Korea. The GA is also used to address the specific issues as well as to investigate the viability of overall fiscal policies[3]. Studied the effect of immigration on the government budget of the US[4]. Estimated the overall cost of Korean reunification, and the resulting change in the net tax burden across generations and between South and North Koreans[6]. Examined the fiscal impact of the public fund raising for the restructuring of the financial institutions at the economic crisis of 1997-1998 in Korea. The GA is also used to identify the optimal tax burden level and structure from the viewpoint of the generational equity[7]. This paper focuses on the National Pension, which covers more than 90% of public pension participants in Korea, and evaluates its financial sustainability and the effects of the revision plans on the generational equity, taking into explicit consideration the recent NPS reform.

is the NPS benefit. The GA is based on the government's intertemporal constraint, written as equation (1).

The first summation on the left-hand side of (1) adds together the generational accounts of current generations, who are alive in the benchmark year, t. The terms $N_{t,t-s}$ and $P_{t,t-s}$ stand for the account, which is the net tax of the representative individual of the generation born in year t-s, and the cohort's population. The index s in this summation runs from age 0 to age D, the maximum length of life. The second summation on the left-hand side of (1) adds together the present value of the net payments of future generations, with s representing the number of years after year t that each future generation is born. The remaining term, W_t^{NPS}, denotes the NPS fund. Equation (1) indicates the zero sum nature of the intergenerational fiscal policy. A reduction in the present value of net taxes extracted from current generations (a decline in the first summation on the left side of (1)) necessitates an increase in the present value of the net tax payment of future generations.

For the calculation of $N_{t,k}$, which is the account evaluated in the benchmark year, *t*, for the cohort born at *k*, we use the updated distribution of the NPS participants and the benefit recipients and the projected per capita value of contribution and benefit by age over time. In addition, we make a projection of the tax burden by age over time, because our policy simulations include tax financing to fill in the gap between the revenue and the expenditure of the NPS. For the tax burden projection, we take the following four steps. Firstly, we estimate the age profile of the tax burden, which is the set of average levels of the tax burden across age groups, under the current tax policies, using micro-data sets. Secondly, we compute the amount of aggregate tax burden increase required to remove the budgetary deficit of the NPS in each year. Thirdly, we allocate the required tax increase amount among the age groups in each year, assuming that the age profile of the tax burden does not change. Finally, we compute the present value of the tax increase for the remaining lifetime for the representative individual of each cohort[2].

We adopt a modified version of GA presentation. The traditional approach treated future generations as one cohort and compared the accounts of future generations with those of current generations, assuming the existing policy for current generations. Because some of the burden of NPS revision is likely to be placed on current generations, and the policy reform will have heterogeneous effects on the net tax burden across generations, we classify the future generations as well as the current generation by the year of birth to compare the accounts among the whole generations. We report the account for each cohort in terms of Lifetime Income (LI), which is defined as the present value of the wage income for the remaining lifetime. To compute the LI, we first estimate the age profile of wage income using micro-data sets. Then, we allocate each year's projected aggregate wage income, which is currently 60% of the National Income in Korea, among the age groups based on the population distribution by age and the age profile of wage income, assuming that the age profile does not change over time. Finally, we compute the present value of the wage income for the remaining lifetime of each cohort.

3. Results

The budget balance of the NPS is currently a surplus, because of its short history. Not many participants in the NPS have acquired the entitlement to pension benefits since the introduction of this system, due to the required participation period for the right of full pension benefit receipt of 20 years. The aggregate benefit expenditure is

Table 1. Assumptions for the financial projection (%)

Variables	2010-2013	2014-2020	2021-2030	2031-2040	2041-2050	2050-
Productivity Growth	2.5	2.5-3.0	3.0	2.5	2.0	2.0
GDP Growth	1.7-3.3	2.9-3.2	2.6-2.8	1.3-1.9	0.6-0.8	0.5
Inflation Rate	4.0-2.2	2.2	2.1	2.0	2.0	2.0
Real Interest Rate	2.1	2.1	2.1	2.1	2.1	2.1

[2]The discount rate, which we use to compute the present value, is the real interest rate Table 1

about 1% of the GDP as of 2013; however, it will increase to 2.7% (2030), 6.9% (2060), and 7.7% (2100) of the GDP. On the other hand, the total pension contribution revenue will increase by a much smaller magnitude from the current 2.4% of the GDP as of 2013 to 2.6-2.7% of the GDP in the long run. Therefore, the budget balance is projected to turn into a deficit in the near future and its magnitude will increase up to 4.3% of the GDP in 2060 (Figure 1). The NPS fund was 31% of the GDP in 2013, but it will be exhausted around 2053 because of the imbalance between the revenue and the expenditure of the NPS.

To restore financial sustainability, a large increase in the tax burden or contribution is inevitable. To compute the magnitude of the required tax or contribution adjustment, we take three more cases in addition to our benchmark case: [A] maintaining the current policy. The three alternative revision plans are: [B] tax financing after the exhaustion of the NPS fund; [C] raising the contribution rate after the NPS fund's exhaustion; and [D]prefunding from 2015 by increasing the contribution rate[3]. In case [A], the contribution rate and the tax burden ratio, the ratio of the aggregate tax burden to the GDP, are 9% and 19.6%, respectively. If the deficit is financed by tax revenue, the tax burden ratio should be raised by 3.3%P in 2054, 4.2%P in 2070, and 4.7%P in 2100 (Figure 2, [B]). An increase in the tax burden by 3-5% of the GDP is not negligibly small. According to our projection, the total expenditure of the general government of Korea will increase to 40% of the GDP around the 2050s, even without any fiscal policy revision. This indicates that the tax burden needs to be raised on a large scale. In the situation in which the tax burden as a percentage of the GDP needs to be raised by about 15%P until around the 2050s, the additional tax burden increase by 3-5%P is not a trivial or easy task. The required adjustment of the contribution rate is also large. The rate needs to rise from the current 9% to 21.6% in 2054, 24.5% in 2060, and 26.3% in 2100 ([C]). If the contribution is adjusted in 2015 to prevent the exhaustion of the NPS fund, the rate needs to rise to 24% ([D])[4].

We computed the generational accounts reflecting the results of the financial projection for the four cases ([A]-[D]). If the current NPS policy is maintained, the net payment, which is defined as the present value of the tax and contribution burden less the benefit for the remaining lifetime, is negative for all the cohorts, which implies that the NPS is not financially sustainable even taking into consideration the NPS Act revision in 2007 (Figure 3)[5]. The absolute value of the net transfer income, which is the negative value of the net payment, is about 5% of the LI even for the future generations. This indicates that the imbalance between the contributions and the benefits is large, even after the implementation of the recent NPS reform. Reflecting the revision plans to restore the long-term budgetary balance changes the fiscal burden across cohorts. All the revision plans ([B]-[D]) increase the fiscal burden of the future generations. If we adopt tax financing ([B]), the 2015 newborns have to pay 4.7% of their lifetime income to finance the NPS, 2030 newborns 6.5%, and 2050 newborns 8.2%. If we adopt the contribution rate increase alternative, the 2015 newborns have to pay 4.7% of their lifetime income to finance the NPS, 2030 newborns 7.8%, and 2050 newborns 9.0%. In the case of tax financing, the fiscal burden of the current (future) generations is relatively higher (lower), because the age distribution of the tax burden is more skewed towards older cohorts than the contribution burden[6]. However, the accounts for the current generations do not change much, because the adjustment of the contribution rate and tax burden is made after the NPS fund is

[3]We do not include the revision plan, which lowers the benefit level, because the replacement ratio is going to fall to 40% until mid-2020s. This level of the replacement ratio is not high compared with that for most of OECD countries. Therefore, assuming further reduction of the NPS benefit is not realistic.

[4]Even though the contribution rate is raised long before the NPS fund depletion, the required change is still large. This is because the real interest rate, which reflects the rate of return of the NPS fund, is assumed at a low level. We try sensitivity analyses assuming higher interest rates (3%, 4%). Assuming 3% (4%) interest rate lowers the required contribution rate to 17.1% (13.2%). This result indicates that the required change in the contribution rate is very sensitive to the rate of return to capital, which is closely related with the economic growth. Therefore, if the trend of the low growth rate continues, the prefunding is not effective to reduce the overall level of fiscal burden due to the NPS.

[5]Scenario [A] does not satisfy the government's intertemporal budget constraint. Therefore, the accounts under [A] are not GA in the strict sense. They should be regarded as a benchmark case to compare the accounts under the alternative policy revision plans.

[6]The NPS contribution is imposed primarily on the labor, most of which is earned by those at the age of the labor force (15-64), while the tax is imposed on consumption and capital income as well as labor income. The distribution of consumption and capital income are more skewed to the older population groups than that of labor income, because a substantial part of wealth is owned by the older age groups and the magnitude of the elderly's consumption is larger than that of their labor income.

exhausted, under [B]and [D]. These results indicate that the revision for the NPS revenue increase needs to be implemented earlier than the time of the fund's depletion to make the current generations share the fiscal cost of the NPS. Therefore, the prefunding alternative plan ([D]) equalizes the fiscal burden across generations, and the financial sustainability is maintained in the sense that the NPS fund will not be exhausted. Figure 4 shows that the difference in the net tax burden between the current and the future generations is reduced under plan [D]. Despite the merits of alternative [D], the enhancement of the generational equity and the financial stability of the NPS, it causes problems in another sector of the economy. The NPS fund is projected to increase to an extremely large magnitude.

Under the prefunding assumption ([D]), the magnitude of the fund is projected to increase to up to 300% of the GDP in 2100. The excessively large magnitude of the public fund will be a source of distortion of the financial market, because the decision making of the NPS fund manager will affect the behavior of the financial market participants due to the market power of the fund. The ratio of the financial asset to the GDP of Korea, 8.6 as of 2014, is close to that of Germany (8.5) and lower than those of the US (9.7), the UK (18.1), and Japan (10.9) (see[9]). The financial market is likely to extend to the level of the US, the UK, or Japan; however, the absolute level of the NPS fund is extremely large. In that case, its market power will still be enormous and the distortion of the market will be serious. In addition, even the NPS fund management will not be easy, because the NPS fund investment is regulated to invest only in the top-rated bonds and blue-chip stocks, the magnitude of which is limited. A way to avoid this problem is to increase the NPS investment in foreign markets. However, it is not a viable solution, because of the recent increase in the uncertainty and the investment risk in international markets.

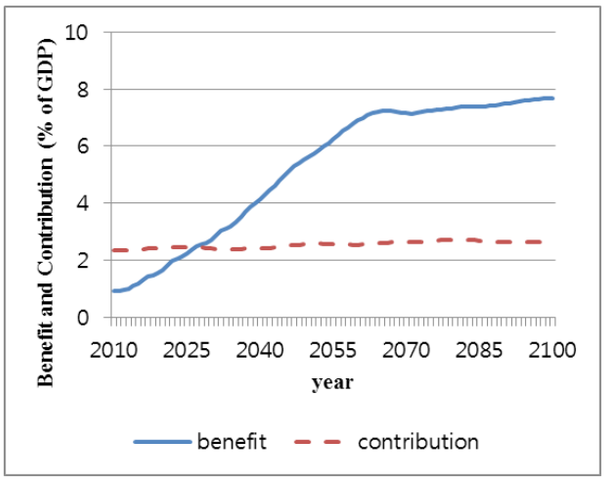

Figure 1. Aggregate benefit and contribution

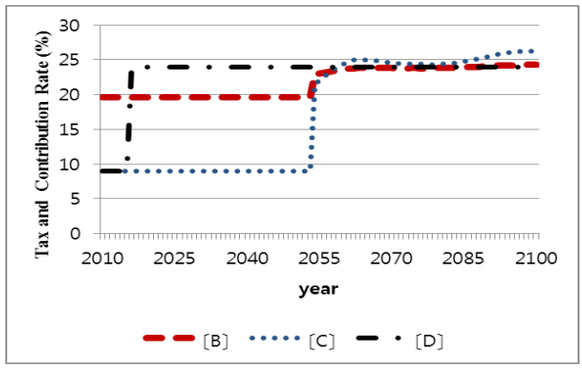

Figure 2. Tax and contribution rates under the alternative revision plans.
Note: Tax rate ([B]); contribution rate ([C], [D])

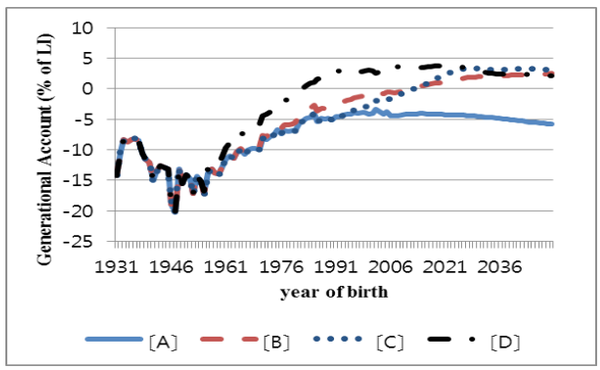

Figure 3. Generational accounts.

4. Conclusions

We investigated the financial sustainability of the NPS and addressed the intergenerational inequity due to the NPS using generational accounting. We found that the current NPS is not financially sustainable despite the 2007 NPS Act revision. Considering the fact that the NPS benefit level is already scheduled to be lowered by the NPS Act revision, we simulated the NPS revision plans, which raise the contribution rate and the tax burden. The magnitude of the contribution or the tax burden increase, required to restore the fiscal soundness, is large. The tim-

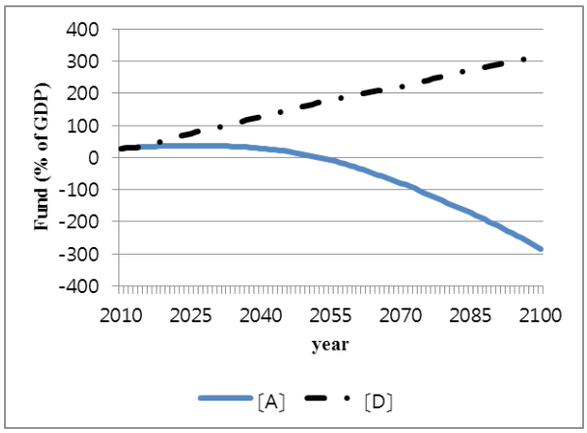

Figure 4. NPS fund magnitude.

ing of the implementation of the revision plans is crucial for the improvement of generational equity. If the contribution of the tax burden is adjusted after the NPS fund's depletion, the future generations will have to shoulder a heavy fiscal burden. Prefunding, which increases the tax or contribution burden before the exhaustion of the NPS fund, will contribute to the equalization of the net fiscal burden across generations; however, it will cause serious distortions of the economy, including the financial market.

With all these considerations, the parametric revision of the NPS system, which raises the contribution rate, the tax burden, or entitlement age, does not solve the structural problem of the NPS fundamentally. A more structural reform, which recovers the financial sustainability, minimizes the distortion of the economic behavior, and supports the targeted population, such as low-income classes, should be prepared.

5. Acknowledgement

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6. References

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