GENERATIONAL ACCOUNTING IN KOREA

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ABSTRACT

This paper reassesses the long-term fiscal position of Korea using Generational Accounting, modified to reflect the special features of the Korean fiscal situation, such as prospective changes in public pension benefit profiles and social welfare expenditures due to the maturing of public pensions, increasing demand for social welfare expenditures, and population aging. Our findings suggest that unless policy toward existing generations is substantially altered, future generations will face an excessively heavy fiscal burden. For reasonable growth and interest rate assumptions, the difference between 2000 newborns and those born after 2000 ranges from 60% to 120%. We also find that a substantial part of the fiscal burden on the future generations is explained by the long-run budgetary imbalance of public pensions and Medical Insurance.

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1. Introduction

The government budget in Korea has been viewed as relatively sound compared with other OECD countries, based on positive government net wealth and consolidated budget surpluses in recent years. For Korea, however, both government net wealth and consolidated budget balance suffer from some conceptual problems. First, the consolidated budget's coverage is not wide enough to include all relevant fiscal policies, omitting local government and important government activities such as the Medical Insurance. Second, government budget balance and net wealth are the results of past and present government activities. Therefore, they cannot be used to evaluate the effects of future changes in the economic environment, future cash flows of the government budget, or future fiscal policies. For example, population aging will raise Medical Insurance benefits and the Medical Insurance budget deficit unless the Medical Insurance contribution rate is substantially raised. The budget balance of the National Pension system, currently in surplus, will turn into a rapidly increasing deficit in the near future. The increasing demand for social welfare programs will contribute to the increase in government expenditure in the future.

Generational Accounting (GA) provides a useful tool for the investigation of the sustainability of fiscal policies in Korea. GA covers all relevant government fiscal policies. Moreover, its forward-looking properties allow us to explore how the sustainability of the public finances is affected by various future developments such as maturing of the National Pension, increase in social welfare expenditure and population aging.

The purpose of this paper is to assess Korea's long-term fiscal position using Generational Accounting. In order to take into account the special features of Korea's fiscal situation, we extend the traditional GA calculation in two ways. First, we incorporate prospective changes in the age profiles and aggregate benefits and contributions of public pensions. Maturing of the National Pension, whose benefit amount is currently small, will increase benefit payments to older age groups in the future, which will substantially change the age profile of transfer payments. A second extension of the standard method is that we incorporate expected changes in social welfare expenditures in the future. Even though its aggregate amount was limited in the past, social welfare spending has been increasing rapidly and this increasing trend is expected to continue for the time being.

Our findings suggest a much larger fiscal burden on future generations than on 2000 newborns under current policy. For reasonable growth and interest rate assumptions, the difference between the two cohorts ranges from 60% to 120%. We also find that a substantial part of fiscal burden on the future generations is explained by the long-run budgetary imbalance of public pensions and Medical Insurance. The generational accounts of public

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pensions and Medical Insurance explain about 34% and 12% respectively of the net payments (defined as the present value of tax payments minus transfer income from the government) for future generations. The magnitude of the adjustment of tax and social insurance contributions burden required to attain long-run government budget balance is substantial. A 56-59% increase in tax burden will be needed if the adjustment is just the tax side and applies only for the generations born after 2000. If the adjustment is made to all cohorts alive in 2004 and later, the required adjustment is a 19-20% increase in the tax burden. If we delay the tax adjustment until 2030, the required tax increase reaches 37-39%. All these findings suggest that unless policy toward existing generations in Korea is substantially altered, future generations will face very heavy fiscal burdens

The rest of the paper is organized as follows. Section 2 briefly describes the fiscal situation in Korea. Section 3 explains GA calculation procedure. In this section we describe our extensions of the standard methodology of Generational Accounting, and data used to construct the accounts. Section 4 presents the accounts and discusses their implications. Section 5 summarizes findings and draws conclusions.

2. The Fiscal Situation in Korea

Table 1 shows some recent developments of the Korean fiscal situation. The first remarkable change is the rapid increase in government expenditure and debt, even though their level is not high compared with that of OECD countries. The expenditure of the consolidated budget (CB), whose coverage includes the central government (general account, special account, and public trust funds) and non-financial public enterprises, has increased from 19.0% of GDP in 1995 to 25.1% in 2001. Government debt has increased from 9.4% of GDP to 20.8% during the same period. Despite these recent changes, the government budget in Korea has been evaluated as relatively sound compared with other OECD countries. Except for the (IMF bailout) period 1997-1999, a period of financial crisis triggered by the shortage of foreign currencies in 1997, the consolidated budget was in surplus and government net wealth (gross wealth less debt) is still positive.

However, the surplus of the CB and positive net wealth do not necessarily imply that current fiscal policies in Korea are sustainable. Excluding the National Pension (NPS) budget transforms the consolidated budget balance from surplus to deficit. Excluding the NPS fund (75.6 trillion won as of December 2001) eliminates government net wealth (75.2 trillion won as of December 2001). The NPS budget surplus will be maintained for the time being, because the number of current pension benefit recipients is limited; it will take a considerable time for the majority of current NPS participants to acquire entitlement to NPS benefits

because of its short history[1]. However, the budget will eventually turn to deficit, since promised pension benefits are too generous relative to contributions. According to the projection of the National Pension Corporation, the administrative organization of the NPS, the NPS budget will turn to deficit in 2034 and its fund will be exhausted in 2049.

Another important trend in Korean budget structure is the rapid increase in social welfare expenditure. The rate of increase in social welfare expenditure for the period 1995-2001 (25%) is much higher than that of total central government expenditure (12.4%). Until the mid-1990s, social welfare expenditure was limited, as the Korean government placed a higher priority on other sectors, including economic development and national defense. The government restricted Medical Insurance benefits and maintained fees for services at low levels. Eligibility for the benefits of the public aid programs to low income classes was very restrictive and benefit levels were quite low. Coverage of other social insurance programs was also limited. However, since the mid 1990s social welfare expenditure has been increasing rapidly. This reflects structural change in the social welfare policies. The coverage of social insurance programs such as the NPS, Medical Insurance, Employment Insurance[2], and Industrial Accident Compensation Insurance[3] has been expanded. Public aid programs are also experiencing a structural change. In 2000, the Livelihood Protection System, which restricted eligibility by age and working ability, was replaced by the Minimum Living Standards Security System, which guarantees a minimum living standard to everyone who passes an income-and-asset-based means test, regardless of one's working ability. Therefore, we expect a substantial increase in social welfare expenditure, one that will be accelerated by population aging. Our projection shows that aggregate public pension benefits will increase from 1.1% of GDP currently to 16% in 2080. Benefits of the Medical Insurance and public aid programs are projected to increase from 1.7% and 1.1% of GDP, respectively, to 5.1%, 2.1%[4] during the same period.

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[1] The NPS, which covers the largest proportion of the Korean population, was introduced in 1988. The minimum requirement for entitlement to a "full-old-age pension," which will eventually account for the largest share of NPS benefit expenditure, is 20-year participation, which implies that this benefit has not yet been paid. Therefore, the NPS benefit payment at present is limited.

[2] Employment Insurance activities include the provision of unemployment insurance, employment stability promotion, and vocational ability development activities.

[3] This program is the Korean version of workers' compensation, i.e., it insures the risks of accidents in the workplace.

[4] This projection is based on a conservative assumption about the income elasticities of social welfare expenditure (1.2) and MI benefits (1.2). Considering reduction of work incentives caused by the MLSS and the increase in fees for services by the MI, the expenditure of social welfare programs could increase more rapidly than our projection.

Unfortunately, social insurance contributions are not projected to increase fast enough to match the increase in social welfare expenditure. With population aging further contributing to a decrease in tax bases, a substantial increase in rates of tax and social insurance contributions, to which there would likely be strong resistance, would be needed. Absent this, the Korean government will eventually face large fiscal deficits. For example, our projection shows that the deficit of the NPS and the Medical Insurance will amount to 12.6% and 3% of GDP in 2080, if the current levels of benefits and contribution rates are maintained.

These prospective changes in government budget indicate that the current consolidated budget and government net wealth are poor indices of Korea's fiscal sustainability. A better assessment of Korea's fiscal position requires a method, such as Generational Accounting, that incorporates prospective changes in the economic environment, government budget flows, and fiscal policies.

3. GA Calculation Procedures

3.1. Basic Framework[5]

Generational Accounting is based on the government's intertemporal budget constraint. This constraint, written as equation (1), requires that the future net tax payments of current and future generations be sufficient, in present value, to cover the present value of future government consumptions as well as service the government's initial net indebtedness.[6]

(1)
$$\sum_{s=0}^{D} N_{t,t-s} + \sum_{s=t}^{\infty} N_{t,t+s} = \sum_{s=t}^{\infty} G_s (1+r)^{-(s-t)} - W_t^g$$

The first summation on the left-hand side of (1) adds together the generational accounts (the present value of the remaining lifetime net payments) of existing generations. The term $N_{t,t-s}$ stands for the account of the generation born in year t-s. The index s in this summation runs from age 0 to age D, the maximum length of life.[7] The second summation on the left-

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[5] See Auerbach, Gokhale, and Kotlikoff (1991, 1992a, 1992b, 1994) and Kotlikoff (1992) for further discussion and development of the method of generational accounting.

[6] The constraint does not assume that government debt is ever fully paid off, merely that the debt grows less quickly than the rate of discount, i.e., that it does not explode. Thus, it is consistent with the long-run existence of government deficits, as long as deficits are smaller than the amount needed simply to service the level of outstanding debt.

[7] Hence, the first element of this summation is $N_{t,t}$, which is the present value of net payments of the generation born in year t, the last is $N_{t,t-D}$, the present value of remaining net payments of the oldest generation alive in year t, namely those born in year t-D.

hand side of (1) adds together the present value of remaining net payments of future generations, with *s* representing the number of years after year *t* that the generation is born. The first term on the right-hand side of (1) is the present value of government consumption. In this summation the values of government consumption, G_s in year *s*, are discounted by the pre-tax real interest rate, *r*. The remaining term on the right-hand side, W_t^g, denotes the government's net wealth in year *t* − its assets minus its explicit debt.

Equation (1) indicates the zero sum nature of intergenerational fiscal policy. Holding the present value of government consumption fixed, 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 net tax payment of future generations.

The term $N_{t,k}$ is defined by:

$$(2) \qquad N_{t,k} = \sum_{s=\max(t,k)}^{k+D} T_{s,k} P_{s,k} (1+r)^{-(s-t)}$$

In Expression (2), $T_{s,k}$ stands for the projected average net tax payments to the government made in year *s* by the generation born in year *k*. The term $P_{s,k}$ stands for the number of surviving members of the cohort in year *s* who were born in year *k*. For the generations who are born in year *k*, where *k>t*, the summation begins in year *k*. Regardless of the generation's year of birth, the discounting is always back to year *t*.

A set of generational accounts is simply a set of values of $N_{t,k}$, one for each existing and future generation, with the property that the combined present value adds up to the right-hand side of equation (1). Though we distinguish male and female cohorts in the results presented below, we suppress sex subscripts in (1) and (2) to ease notation.

Note that generational accounts reflect only taxes and social insurance contributions (taxes henceforth) paid less transfers received. With the exception of government expenditure on education[8], the accounts do not impute to particular generations the value of government's purchases of goods and services because it is difficult to attribute the benefits of such purchases[9]. Therefore, the accounts do not show the full net benefit or burden that any

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[8] We compute the generational accounts under two alternative assumptions about government expenditures on education, treating them as (i) government consumption expenditures; and (ii) government transfers.

[9] Bovenberg and ter Rele (1999) tried to incorporate the incidence of government consumption into generational accounts, assuming that all current generations enjoy the same (per capita) benefits from both government consumption and the public capital stock. The latter benefits are set at the imputed rent on the public capital stock, computed as depreciation plus the product of the interest rate and the public capital stock. However, their approach does not adequately deal with the "public" nature of government public goods.

generation receives from government policy as whole, although they can show a generation's net benefit or burden from a particular policy change that affects only taxes and transfers. Thus, generational accounting tells us which generations will pay for government spending, rather than telling us which generations will benefit from that spending. Another characteristic of generational accounting that should be understood at the outset is that, as its name suggests, it is an accounting exercise that, like deficit accounting, does not incorporate induced behavioral effects or macroeconomics responses of policy changes. As a corollary, it does not incorporate the deadweight loss of taxation in its measure of fiscal burden, again following the tradition of budget incidence analysis.

3.2. Assessing the Fiscal Burden Facing Future Generations

Generational Accounts are calculated in two steps. The first step involves calculation of the net tax payment of current generations (the first term on the left-hand-side of equation (1)). This is done on the basis of current fiscal rules without being constrained by the intertemporal budget constraint of the government. In the second step, given the right-hand-side of equation (1) and the first term on the left-hand-side of equation (1), we determine, as a residual, the value of the second term on the left-hand side of equation (1), which is the collective payment, measured as a time-t present value, required of future generations. Accordingly, whereas the fiscal burdens for current generations are based entirely on current fiscal rules, the government budget constraint fully determines the fiscal burdens for future generations. Future generations are thus assumed to absorb the entire adjustment that is required to make the claims of various generations consistent with the intertemporal budget constraint.

Based on the collective amount required of future generations, we determine the average present value lifetime net tax payment for each member of each future generation under the assumption that the average lifetime tax payment of successive generations rises at the economy's rate of productivity growth. Leaving out this growth adjustment, the lifetime net tax payments of future generations are directly comparable with those of current newborns, since the generational accounts of both newborns and future generations take into account net tax payments over these generations' entire lifetimes. Measuring the generational imbalances as the difference between two lifetime tax burdens provides a measure for the sustainability of the public finances. If future generations bear a heavier tax burden than the newly born do, current fiscal rules will have to be adjusted in the future to meet the budget constraint.

3.3. Extending the Standard Method

The standard method used to project the average values of particular taxes and transfer payments by age and sex starts with government forecasts of the aggregate amounts of each

type of tax and transfer payment in future years. These aggregate amounts are then distributed by age and sex based on cross-sectional relative age-sex-tax and age-sex-transfer profiles derived from cross-sectional micro-data sets. For years beyond those for which government forecasts are available, age- and sex-specific average tax and transfer amounts are set equal to those for the latest year for which forecasts are available, with an adjustment for growth.

This procedure is based on the assumption that the age-sex-profiles of transfer payments and tax burden do not change over time. The standard procedure also assumes that government purchases, transfer payments and tax revenues grow at the same rate as GDP, although in some cases they are broken down into age-specific components, with the assumption that each component remains constant per member of the relevant population, adjusted for the overall growth of GDP per capita.

We extend this standard method in two ways. As the first extension, we incorporate the prospective changes in the age profiles and aggregate amounts of benefits and contributions of public pensions. At present, the average National Pension benefit per member of cohorts aged 70 and older is low compared with that for the aged between 55 and 70, since the NPS does not cover a large proportion of the older age groups. In addition, the number of beneficiaries and the aggregate benefit amount are limited, since most of those covered by the NPS, in older age cohorts, have not acquired the entitlement to full benefits because of its short history. However, maturation of the system will increase the average amount of benefit payments to the old-age groups, which will flatten the age profile of benefits and increase the number of the pension recipients and aggregate pension benefit amount. The proportions of the participants of the Pension for Civil Servants and Pension for Private School Employees are expected to change, since population aging is likely to change the demand for government service and education. Therefore, the change in the age profiles of benefits and contribution will be inevitable.

Another extension of the standard method is that we incorporate expected future changes in social welfare expenditures. Even though the aggregate amount of transfer payments by Medical Insurance and social welfare services and public assistance was limited in the past, its amount has been increasing rapidly for the past decade due to the recent structural changes in social welfare policies. However, the current level of social welfare expenditure in Korea remains much lower than OECD average level, despite its increase in recent years. Therefore, the social welfare expenditure is expected to increase more rapidly than other components of government expenditure for a considerable period. Based on this expectation, we assume that the per capita amount of social welfare expenditure will increase more rapidly than per capita GDP until they reach the OECD average[10].

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[10] For detailed information about the future path of social welfare expenditure, see section 3.4.3.

3.4. Calculation Procedure and Underlying Assumptions

To produce generational accounts for Korea, we require projections of population, taxes, transfers, and government expenditures, initial government wealth, and a discount rate. We consider the impact of total, not national, government. The fiscal policies in Korea are classified into following groups: social welfare policies, tax system, seigniorage, and government consumption (see Table 3). The social welfare policies are composed of public pensions, Medical Insurance (MI), Employment Insurance (EI), Industrial Accident Compensation Insurance (IACI), and social welfare services and public assistance (Minimum Living Standards Security System (MLSS) and other social transfer programs (OSTP)). Taxes are classified as labor income tax, capital income tax, consumption tax, taxes on asset-holdings, taxes on asset-transactions and other taxes. Government consumption is broken down into expenditure on education and other government consumption.

We follow the standard procedure, mentioned in section 3.3, to produce the generational accounts for most of the components of fiscal policies, except for the cases of public pensions, the MI, the MLSS and the OSTP. To project contributions and benefits of public pensions, we construct projection models for each public pension scheme. The aggregate benefits of the MI, the MLSS and the OSTP are assumed to increase more rapidly than the GDP growth rate, until they reach the OECD average.

3.4.1. Population Projection

The projections used to compute generational accounts are based on the 2001 population projection model of National Statistics Office (NSO). The 2001 NSO population projection covers the period 2001-2050. We extend the population projection up to 2110 using fertility rates[11], mortality rates[12], and international mobility rates[13]. Baseline calculations are conducted under the assumption that the total fertility rate and age-sex mortality rates will remain constant at their 2050 levels until 2110.

3.4.2. Projecting Contributions and Benefits of Public Pensions

Public pensions in Korea consist of 2 different plans: National Pension (NPS); and Occupational Pensions. The Occupational Pensions has 3 different plans: Pension for Civil

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[11] The fertility rates (per 1000 women) are projected to decrease from currently 1.47 to 1.40 in 2050. For the time path of fertilities and alternative assumptions about the fertilities, see Table 2.

[12] The average life expectancy is projected to rise from currently 76 years to 83 years in 2050.

[13] International movement of population is limited in Korea. For example, net immigration in 2000 was 11 thousand (emigration 43 thousand, immigration 54 thousand). We assume that the international movement rates remain constant at their 2050 levels until 2110.

Servants (PCS); Pension for Private School Employees (PPS); and Pension for Military Personnel (PMP). The PMP is excluded in GA calculation, since the data necessary for calculation are not published. Instead, we treat the deficit of the PMP budget as government consumption[14].

The National Pension

We project the contributions and benefit payments of the NPS by year-sex-age, using the long-term projections of the National Pension Corporation (NPC) and data published in *National Pension Statistical Yearbook*.

The projections of the NPC consist of: (i) projection of macroeconomic variables; (ii) projection of the number of insurants and their average income by year, sex, and age; and (iii) projection of the number of new pension benefit recipients and their average pension benefits by year-sex-age. The *National Pension Statistical Yearbook* publishes the items (ii) and (iii) for existing pension participants and pension recipients. We adjust the projection of the NPC in two ways: we recalculate the distributions of the NPS insurants and pension benefit recipients based on the 2001 population projection, since the projection of the NPC is based on the 1996 population projection; we also recalculate the average income of the pension participants and the average level of benefit amount, since our assumptions about macroeconomic variables, such as growth and inflation rates, are different from projected values of the NPC.

We assume that the current NPS policies including replacement ratio of benefits and contribution rates is maintained, in order to evaluate the sustainability of the current system.

The Occupational Pensions

We construct a projection model for benefits and contribution of the PCS and the PPS, since their administrative organizations do not provide long-term projections. The projection model consists of 3 parts: (i) projection of the number and the distribution of participants and retirees by year-sex-age-period of service[15]; (ii) projection of contributions by participants by year-sex-age-period of service; (iii) projection of the number of benefit recipients and average benefit payment by year-sex-age.

Projection of the number and the distribution of participants and retirees begins with an imputation of their distribution in benchmark year 2000. Neither the *Statistical Yearbook for*

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[14] The total expenditure of the PMP for recent years is about 20-30% of that of the PCS. Since the ratio of expenditure for the former to that for the latter is declining, ignoring the PMP will not produce highly biased results.

[15] The distribution of participants and retirees by period of service is needed, since participants' income and the benefits of the retirees depend crucially on the period of service.

the PCS nor the *Statistical Yearbook for the PPS* reports the joint distribution of the participants and the retirees by age-period of service. Instead, they report the distributions by age and by period of service separately[16]. In order to estimate the joint distribution, we assume that the age and the period of service are positively correlated: i.e. the insurants with shorter period of service are more likely to be younger. Under this assumption, we allocate the insurants with shorter period of service to younger age groups. The distributions after the benchmark year are computed based on the retirement rates by sex-age-period of service and distribution of new entrants estimated with the data reported in the Statistical Yearbooks. The number of new entrants of the PCS (the PPS) is assumed to increase at the rate of population growth rate for all ages (for those aged 16-24)[17].

Projection of contributions requires the projection of average wage profile by sex-age-period of service. We generally assume that wages of participants depend only on sex and period of service, although for PCS participants the wage is assumed not to depend on the sex, based on the facts that (1) a civil servant's wage is determined by position and period of service and (2) there is little sex discrimination on wages among civil servants, compared with the private sector in Korea. The wage level of each group is imputed using the data reported in the *Statistical Yearbook for the PCS*, the *Statistical Yearbook for the PPS*, and the *Statistical Yearbook of Ministry of Government Administration and Home Affairs*. Contribution rates for the occupational pensions are assumed to remain constant at the current rates.

The distribution of new recipients of the pension benefits by year, sex, age, and period of service is projected using the retirement rates and the distribution of participants. The average amount of benefits of new recipients by year-sex-age-period of service is computed based on the pension benefit formula. The *Statistical Yearbook for the PCS* and the *Statistical Yearbook for the PPS* publish the distribution of the existing benefit recipients and average benefit level of each group in the benchmark year. Using these values and distributions for the existing and new pension recipients, we compute the distribution of pension recipients and average benefit amount by sex-age after the benchmark year.

Projection of the path of contributions and benefits by sex and age requires an assumption about the rate of wage growth, since new pension recipients' benefits increase at this rate and the benefits of existing pension recipients are wage-indexed. We assume the same path of wage growth as that in the case of the NPS.

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[16] The Statistical Yearbook for the PCS does not report the sex-age distribution. We assume that the proportion of female government employees is 30% for all age groups, based on the fact that the proportion is about 30% in recent years.

[17] This assumption is based on the fact that the role of government employees is closely related with the welfare of the whole population while the distribution of the students attending private schools is concentrated on the group aged 16-24.

Income Tax on Pension Benefits

Income tax is newly imposed on the pension benefits from 2002. Since data on taxation of pension income are not available, we project the tax burden on the pension benefits under the assumption that the average effective tax rates across income levels (adjusted for overall growth of GDP per capita) remain constant at current levels.

The tax burdens by year, sex, and age so estimated are reflected in the accounts for public pensions reported in Tables 4, 5, and 6, instead of being added to the accounts for income tax burden, under the implicit assumption that the tax revenue from taxation on pension income is transferred to the public pension trust funds.

3.4.3. Fiscal Projections of Other Components

Determining Generational Profiles

The profiles of taxes and transfers are estimated in two steps. The first step involves the calculation of the profiles of the components belonging to each program. In the second step, we compute the weighted average of profiles of components for each program, where the weight is the tax revenue (benefit amount) proportion of each tax (each benefit). In order to estimate tax and transfer profiles we use various micro-data sets and statistical yearbooks published by the government (see Table 3). The micro-data sets include Daewoo Panel[18], Korea Labor Panel[19], Family Income and Expenditure Survey[20], and National Survey of Income and Expenditure[21].

The Daewoo Panel is used to estimate the profiles of most taxes and social insurance contributions and some components of social welfare programs such as the Minimum Living Standards Security System. The profiles for consumption taxes and seigniorage are estimated using the Family Income and Expenditure Survey, since more detailed information about consumption and cash-holdings is contained in that data set. The Korea Labor Panel Survey contains the information needed to estimate the age-sex-profiles of net wealth. We use this to estimate the profiles of taxes on asset holdings, and also some components of capital income

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[18] This data set is a PSID-type micro-data set constructed by Daewoo Economic Research Institute, which is a private research institute. The data set covers the whole population and the period 1993-1998.

[19] This data set is a PSID-type micro-data set constructed by Korea Institute of Labor, a state-run research institute. This data set covers the whole population and the period since 1998.

[20] This data set is annually constructed by the National Statistics Office. Unlike the Daewoo Panel and the Korea Labor Panel, this data set is not panel data. The sample is renewed every five years. The Family Income and Expenditure Survey covers families in urban areas with two or more members. It contains detailed information about consumption expenditures.

[21] This data set is constructed by the National Statistics Office every five years. It covers the whole population and contains detailed information about income, consumption, asset holdings and asset transactions.

tax and labor income tax such as corporation tax and Inhabitant Tax, since the standard method attributes the corporation tax burden to asset holders and the Inhabitant Tax burden is dependent upon the corporation tax burden. The National Survey of Family Income and Expenditure is used to estimate the profiles of Taxes on Asset Transactions, since it surveys the transactions in financial assets and real estate. Tax bases of Education tax and Special Tax for Rural Development Tax consist of: (1) the tax amount of some components of labor income tax, capital income tax, consumption tax, and tax on asset holding and transactions; (2) receipts of banks and insurance companies; and (3) some tax expenditures. Therefore, we use various data sources, containing information about the tax burden, financial asset holdings and tax expenditures, for the estimation of the profiles of the tax burden.

For the components that are not covered by the micro-data sets, we use statistical yearbooks published by the government. In the case of Medical Insurance and Expenditure on Education, the government's statistical yearbooks report their age-sex profiles of the benefits and contributions. For the case of other components such as Employment Insurance, Industrial Accident Compensation Insurance, the social transfer programs other than the MLSS, we impute the profiles in two steps. In the first step, we decompose the benefits of each social welfare program into age-specific benefits and non-age-specific benefits. The age-specific benefits and the non-age-specific benefits are assumed to distribute equally to the relevant age-sex groups and to the whole population respectively. In the next step, we compute the weighted average of the benefits for each age-sex group, with the weight being the proportion of each benefit's amount, and impute its relative age-sex profile, with the level for the representative male aged 40 being normalized to be 1. Figures 1-20 show the age-sex profiles of benefits and tax burdens.

Projection of Aggregates

In order to project the aggregates of government consumption, taxes and transfers, we need to define the scope of government. We follow the definition of the National Income and Product Account (NIPA) of Korea. The government defined by the NIPA covers the central government, local governments, public education institutions, some social insurance programs, and non-profit organizations financed by the government and providing services such as research on the economy, science and public administration. Social Insurance programs classified as government organizations include the National Pension (NPS), Medical Insurance (MI), Employment Insurance (EI), Industrial Accident Compensation Insurance (IACI) and other programs into which to participation is mandatory. The Occupational Pensions that consist of the Pension for Civil Servants (PCS), the Pension for Private School Employees (PPS) and the Pension for Military Personnel (PMP) are not

defined as government organizations but as financial corporations in Korean NIPA, since they do not cover the whole population. We include the Occupational Pensions in the scope of the government program since the government controls them though various fiscal policies and guarantees their benefit payments

The total expenditure of the government defined in Korean NIPA as of 2000 amounts to 119 trillion won (23% of GDP). This amount includes government final consumption expenditure, subsidies, social security benefits and assistance grants, current transfers, gross fixed capital formation and capital transfers. We define government consumption expenditure as total expenditure on these items[22] less social insurance benefits and benefits of social welfare services and public assistance. In order to prevent double counting of social insurance benefits, we subtract the benefits of social welfare programs such as the NPS (1.61 trillion won), the MI (8.79 trillion won), the EI (2.06 trillion won), IACI (1.68 trillion won), the MLSS (2.40 trillion won) and OSTP (3.20 trillion won), since these benefits are included in the NIPA measure of government expenditure.

Our procedure for projecting the future path of total government consumption begins with decomposing 2000 government consumption expenditure into (1) age-specific expenditures and (2) non-age-specific expenditures. The NIPA in Korea classifies government expenditure into 13 groups: general public service (10.7% of government consumption as of 2000), defense (12.4%), public order and safety (6.2%), education (17.5%), health (1.3%), social security and welfare services (18.2%)[23], housing and community amenities (6.6%), recreation-culture-religion (2.7%), fuel and energy (1.3%), agriculture-forestry-fishing (7.2%), mining-manufacture-construction (2.3%), transportation and communication (11.7%) and others (2.2%). The government consumption on education, health, and social security and welfare services are defined as age-specific expenditures, and other groups are defined as non-age-specific. The per capita level of non-age-specific government consumption is assumed to increase at the rate of productivity growth, whose real value is assumed to be 1.5% per annum in the base case. All government transfer programs including social insurance and social welfare programs such as the MLSS and OSTP are age-specific, since the distribution of participants and benefit recipients depends on the demographic structure.

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[22] As pointed out by Auerbach et al. (1991), an important issue that arises in considering government as well as private consumption is the treatment of durables. The proper economic treatment involves imputing rent on private and government durables and including this rent (and excluding expenditures on durables) in private and government consumption, respectively. However, the Korean NIPA does not compute and report the imputed rent. The government capital income reported in NIPA is mainly composed of interest income from financial assets. Therefore, we include capital expenditures such as gross fixed capital formation and capital transfers in government consumption expenditure. This simplification affects the annual estimates of government consumption expenditures, but not their present value and hence our estimates of generational imbalance.

[23] This proportion includes the amount subtracted for prevention of double counting. When computing the GA, we subtract the amount from this item.

Government consumption on education is assumed proportional to the population aged 0-24, and the per capita level of expenditure for the relevant group is assumed to increase at the rate of productivity growth. Government consumption on health care, social security and welfare services are assumed as dependent upon the sex-age distribution of the MI benefits and government social transfers (the MLSS and the OSTP) respectively. We assume that government consumption on health, social security and welfare services, and the benefits of MI, the MLSS and the OSTP will increase more rapidly than per capita GDP until they reach the OECD average, since current levels of these expenditures are much lower than those of other OECD countries. Per capita levels of health and MI benefits (government consumption on social security and welfare services and the MLSS and OSTP benefits) of relevant age-sex groups are assumed to increase at the rate of per capita GDP growth multiplied by the income elasticity (1.2)[24], until the total amount of government consumption on the health care and MI benefits (or on government consumption on social welfare and the MLSS and the OSTP benefits) reaches the OECD average as of 1995, 5.94% (or 4.12%) of GDP. The per capita benefits of relevant age groups for other social insurance programs, such as the EI and the IACI, are assumed to increase at the rate of productivity growth.

Social insurance contributions are age-specific, since the bases for the contributions are labor income and business income that are associated with the economically active population. We assume that per capita contributions of relevant age groups will increase at the productivity growth rate except for the case of the MI. The MI contributions are treated separately in order to take into account the tendency of per capita MI benefits to increase more rapidly than productivity growth, and the structural problem of the MI budget in Korea. In recent years, MI contribution revenues have fallen far short of MI benefits. As of 2000, revenues were 80% of benefits; the difference between them is financed by government subsidy. We assume that the difference between the contribution revenue and the benefit expenditure per participant remain constant at the level of 2000[25], since there is strong resistance to increases in the MI contribution rate.

Aggregate labor income tax and capital income tax revenues are projected under the assumption that per capita values depend on productivity growth and the size of the

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[24] The income elasticity of the government expenditure on health care is based on the estimates by Newhouse (1997), Leu (1983, 1986), Gertham et al. (1998, 1992) and the OECD (1993), whose values range between 1.2 and 1.4. Exceptionally low or high estimates are produced by Gerdtham (1991, 1992) (0.74), Moon (2000) (1.75) and the OECD (1993) (1.6). In the case of the government expenditure on social security and welfare services, Moon (2000) produced a high estimate of income elasticity (1.54). We make a very conservative assumption about the income elasticity (1.2) in order to avoid the over-projection of the government expenditure on these sectors. We also try sensitivity analyses assuming the estimates of Moon (2000) and lower values for the elasticities (see section 4.4).

[25] The population aging will widen the gap between the total MI contribution revenue and benefits expenditure.

economically active population, i.e., labor income tax and capital income tax revenues are assumed to be proportional to the product of the economically active population (aged 18-65) and average productivity of those belonging to these age groups, and average productivity is assumed to increase at the rate of productivity growth. Other taxes are treated as non-age-specific, i.e. the total tax revenue increases at the rate of GDP growth.

3.5. Treatment of Corporation Tax

The corporation tax burden is assumed proportional to the wealth. The distribution of net wealth is estimated using the Korea Labor Panel. The corporation tax requires special treatment, because of two related problems with using measured corporation tax revenue to determine the burden of corporate income taxation. First, existing assets may have excess future taxes capitalized into their values; such taxes should not be assigned to new investors even if they occur in the future. On the other hand, the timing of payments of taxes from new investment may have a different pattern than would an income tax, meaning that the ratio of current annual tax payments may not provide an accurate measure of the effective marginal tax rate facing new investment. To correct these biases, we use the following methodology. Our calculation is based on the user cost of capital approach, which assumes that the marginal product of capital equals the user cost of capital, C, where

$$(3) \qquad C = \frac{(r+\delta)(1-\tau z)}{1-\tau}$$

where r is the investor's required after-tax return, δ is the investment's economic rate of depreciation, τ is the investor's marginal tax rate, and z is the present value of depreciation allowances.

Two measures are necessary for the allocation of capital income taxes: the tax-based discount on old capital (Q) and difference between the marginal effective tax rate on new capital and average capital income tax rate (Δ).

$$(4) \qquad Q = \tau(z - z^0)$$

where z^0 is the present value of depreciation allowances per unit of old capital.

$$(5) \qquad \Delta = (\alpha - m)(C - \delta)$$

where

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(6)
$$m = \frac{C - (r + \delta)}{C - \delta}$$

is the marginal effective tax rate on new capital and

(7)
$$\alpha = \frac{\tau(C - b)}{C - \delta}$$

is the average capital income tax rate.

In order to calculate z^0, we need to consider past patterns of investment. We assume that investment grows at a constant rate n. Then at date 0 (the present) the nominal amount of capital purchased at date $-s$ was $I_0 e^{-(n+\pi)s}$, where π is the inflation rate. If this investment has been written off at the constant geometric rate φ, the asset at date 0 has a basis of $I_0 e^{-(n+\pi)s} e^{-\varphi s}$ and receives depreciation allowances of φ times this basis. Thus total allowances on the existing capital stock K are

(8)
$$bK = \varphi \int_0^\infty I_0 e^{-(n+\pi)s} e^{-\varphi s} ds = \frac{\varphi}{n + \pi + \varphi} I_0$$

Since the capital stock equals the sum of depreciated net investment we have

(9)
$$K = \int_0^\infty I_0 e^{-ns} e^{-\delta s} ds = \frac{1}{n + \delta} I_0$$

As a result, we have

(10)
$$b = \frac{\varphi(n + \delta)}{n + \pi + \varphi}$$

The present value of all depreciation allowances on old capital equals the basis of each vintage multiplied by the present value of remaining depreciation deductions on that vintage:

(11)
$$z^0 = \frac{1}{K} \int_0^\infty I_0 e^{-(n+\pi)s} e^{-\varphi s} \int_0^\infty e^{-(r+\pi)v} \varphi e^{-\varphi v} dv ds$$
$$= \frac{\varphi}{r + \pi + \varphi} \frac{I_0}{K(n + \pi + \varphi)} = \frac{\varphi}{r + \pi + \varphi} \frac{n + \delta}{n + \pi + \varphi} = \hat{z} \frac{n + \delta}{n + \pi + \varphi}$$

where $\hat{z}$ is the present value of depreciation allowances per unit of depreciated basis.

Substituting (6), (7), and (10) into (5) yields

(12) $\qquad \Delta = (r+\delta)\tau z - \dfrac{(r+\pi+\varphi)(n+\delta)}{n+\pi+\varphi}\tau\hat{z}$

Substituting (11) into (4) implies

(13) $\qquad Q = \tau z - \tau\hat{z}\dfrac{n+\delta}{n+\pi+\varphi}$

By assuming that $\hat{z} = z$, we have

(14) $\qquad \Delta = (r+\delta)\tau z\left(1 - \dfrac{(r+\pi+\varphi)(n+\delta)}{(n+\pi+\varphi)(r+\delta)}\right)$

(15) $\qquad Q = \tau z\left(1 - \dfrac{n+\delta}{n+\pi+\varphi}\right)$

(16) $\qquad z = \displaystyle\int_0^\infty e^{-(r+\pi)v}\varphi e^{-\varphi v}\,dv = \dfrac{\varphi}{r+\pi+\varphi}$

We select values of the parameters used for the calculation of Δ and Q based on the realized values of variables related to corporation management and tax law for the period 1991-2001. The economic depreciation rate δ is calculated using the analysis of Kwack (1985) and the estimated asset proportion reported in Pyo (2002). The resulting value of economic depreciation is 8%. The inflation rate and real growth rate of investment are assumed to be 5% and 4% respectively. The geometric rate of the depreciation allowance φ is assumed to be 15% based on the estimate of Chun (2003). The investor's required after-tax rate of return is calculated using the formula for cost of capital for each type of marginal fund source and the estimated proportion of investment by source of fund reported in the *Analysis of Private Enterprise Management*; the resulting value is 8.5%. The present value of depreciation allowances (z) is 0.528, based on the calculation using equation (16). The

corporation tax rate is assumed 0.32. The resulting values for Q and Δ are 0.0844 and 0.0038[26]. These fractions are multiplied by the 404 trillion won, the value of depreciable assets held by the corporation in 2000 to arrive at a 34.1 trillion won capitalized burden on old capital and 1.53 trillion won subtraction from current total corporation income taxes. With these values, we correct for the capitalization of corporation tax in old capital values and the timing of taxes on new capital.

3.6. Determining Government Net Wealth and Discount Rates

We take net capital income (6.3 trillion won as of 2000), including net interest income and rents, divided by the sum of our assumed real interest rate (3.5%) and an assumed inflation rate (3%)[27] as our measure of 2000 government net wealth, as in Auerbach et al. (1991). The resulting value of government net wealth as of 2000 is 97.1 trillion won. We assume that the value is 100 trillion won at the end of 2000.

The discount rate for the evaluation of GA is assumed 6.5%, based on the values of the assumed real interest rate and the assumed inflation rate. We also try sensitivity analysis using higher discount rate (7.5%), since in the presence of uncertainty the discount rate should probably be higher than the government's borrowing rate[28].

4. Findings

The benchmark year in the GA calculation is 2000. We regard the generations alive in the benchmark year as current generations and classify cohorts by the age. We treat cohorts born in 2001 and after as future generations. We compute net payments (or net taxes) across generations under the alternative assumptions of treatment of corporation tax and educational expenditure. Net Payment (I) is the generational account taking account of the infra-marginal corporation tax adjustment, explained in section 3.5. Net Payment (II) is the account without consideration of the tax adjustment. Net Payment (III) is the net payment, treating educational expenditure as a transfer. We also compute the composition of generational accounts for fiscal policies including social insurance programs, social transfer programs and taxation of various tax bases separately.

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[26] The values of Q and Δ differ noticeably from those in Auerbach et al. (1991). The difference for the values is due mainly to the difference in the required after-tax rate for investors. The value adopted in this study is 8.5% while that used in Auerbach et al. (1991) is 4%. The other parameter values related to Q and Δ adopted in the two studies are quite similar.

[27] The assumed real interest rate and inflation rate are based on the values of interest rates for government bonds and inflation rates realized in recent years.

[28] In the presence of uncertainty, we need to adjust the risk of uncertain government spending and taxes in the future. If the risk aversion on the uncertain taxes is larger than that of uncertain spending, a higher discount rate than the risk-free government's borrowing rate should be adopted.

4.1. The Burden on Future Generations

   Tables 4-6 report the generational accounts for male, female and sex-combined cohorts, under the base case assumptions for the productivity growth rate (1.5%), the discount rate (6.5%) and fertility rate (medium fertility). All of these tables show positive values of the net payments for most cohorts alive in 2000 except for cohorts aged 90 or older, indicating that most generations will, on balance, pay more in present value than receive. This result is robust under the alternative assumptions regarding the treatment of intra-marginal capital income taxes and educational expenditure. One reason for positive burdens even among the elderly is the high taxes on consumption, capital income and assets, relative to taxes on labor income[29]. The age profile of the average tax burden on capital is shown more skewed to older age groups than that of labor income tax and the average level of consumption tax burden for older age groups is quite high (see Figures 13-16).

   The more important reason for the result is that the aggregate amounts of social welfare benefits such as public pensions benefits, Medical Insurance (MI) benefits, Minimum Living Standards Security (MLSS) Benefits and other social welfare services (OSTP) are quite small as of 2000 (see Figures 25-27). Aggregate public pension and MI benefits are 1.1% and 1.7% of GDP respectively as of 2000 and those for the MLSS and the OSTP are 0.5% and 0.6% of GDP respectively. As a result, the net taxes as of 2000 are positive for most cohorts except for the groups aged 90 or more (see Figures 21-23). However, maturation of the public pension system[30] and the projected increase in social welfare expenditures will increase transfer payments to old-age groups. As a result, the accounts for a wider range of old-age groups will turn to negative. For example, net taxes for groups aged 65 or more as of 2050 are negative (see Figure 24).

   There are some differences among the three measures of net payment. Net Payment (I) is larger than Net Payment (II) for older generations[31]. This is mainly due to the fact that older cohorts hold much larger proportion of net wealth, whose prices are reduced because of capitalization of capital income taxation. Treating all capital income taxes as marginal taxes on new capital income lowers the fiscal burden on older living generations, since these groups are no longer being assigned the reduction in capital values associated with the infra-marginal taxation on old capital. The difference between the two measures is larger for males, since the proportion of net wealth owned by males is larger than that owned by females. The

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[29] Revenues from consumption tax, capital income tax, taxes on asset holding, and labor income tax as of 2000 were 9.1%, 5.1%, 1.3%, and 2.2% of GDP respectively.

[30] Figure 4 shows that the maturing of the public pension will increase the benefit levels of the aged groups and flatten the age profile of public pension benefits.

[31] For example Net Payment (II) of the age-85 cohort is lower than Net Payment (I) by 46%.

importance of the special treatment of capital income taxes is also demonstrated in the changes of net payments for younger living cohorts. Net payment (II) for younger generations is larger than net payment (I)[32], since these groups hold little capital and will face many years of somewhat higher marginal tax rates. Treating expenditure on education as a transfer to the relevant age groups decreases net payments, especially for younger age groups[33].

A common feature of the three measures of the net payment is that the net payments for younger cohorts are much larger than those for older generations. This primarily reflects the fact that older generations, whose members typically expect a shorter period until retirement than younger generations, can expect to pay relatively small amounts of taxes and social insurance contributions over the rest of their lives, while receiving MI benefits, public pensions benefits and other social welfare benefits, even though their amount is not very large as of 2000. In addition, the net payments for males are larger than for females for most cohorts, because of lower female economic participation rates, and the fact that many women receives social insurance survivor's benefits as dependents of the deceased and tend to receive larger amount of the MI benefits and social transfer payments than men.

Net payments are largest around age 20, because around this age people tend to join the labor market and start to work. Therefore, they expect the longest economic participation periods from this age. For example, the age-20 account (Net Payment (I) and Net Payment (II)) is at least 25% higher than the age-0 account, for both males and females. In the case of Net Payment (III), the difference is larger. The age-20 account is at least 100% higher than the age-0 account. Net payments decline from age 20 onward. In particular, there is a sharp decrease in net payments between age 50 and age 60, since around age 55 many workers tend to retire and acquire eligibility for social welfare benefits, including public pension benefits. However, the net payments of many older age groups are still positive because they pay substantial amounts of consumption tax and tax on capital and the amount of social welfare benefits is limited as of 2000.

The bottom row of each table, labeled "Future Generations," indicates the present value of amounts that those born in 2001 will, on average, pay, assuming that subsequent generations pay this same amount except for an adjustment for growth. The accounts (Net Payment (I) and Net Payment (II)) for future generations for males, females, and combined cohorts are about 115% larger than those for the aged 0. In the case of the Net Payment (III), the accounts for the future generations are about 195% higher than those for the aged 0[34].

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[32] For groups aged less than 20, Net Payment (II) is higher than Net Payment (I) by about 18%.

[33] For groups aged less than 20, Net Payment (III) is 59-84% of Net Payment (I).

[34] The difference in accounts between age-0 and future generations is much larger in the case of Net Payment (III) since education services are concentrated among age groups below 20 (see Figure 20).

This finding implies that the current fiscal policies are not sustainable and the substantial amount of fiscal burden is shifted to the future generations. This finding can be contrasted with the fact that for the last few years, we have observed the "surplus" of the consolidated budget balance and positive government net wealth. Considering the conceptual problems of the consolidated budget balance and government net wealth as indices for the fiscal sustainability, the generational accounts will contribute to correct the fiscal illusions caused by the consolidated budget.

4.2. Composition of Generational Accounts

In Tables 4-6, the generational accounts are broken down into tax and transfer components. For social insurance programs, the figures reflect present values of net payments. The accounts for public pensions across age groups show irregular patterns, since public pensions consist of two different systems: National Pension (NPS) and Occupational Pensions.

In the case of the National Pension, net payments are most negative for those aged 35 to 55. This means that these groups benefit the most from the NPS, and simply reflects the fact that age groups 35-55 are the main participants of the system at this early stage of its introduction. For older age groups, the net benefits are smaller, since the number of them covered by the system is limited and thus the average level of benefits is low. Net benefits are smaller for younger age groups, since they expect longer economic participation periods and have to pay larger amounts of contributions for the rest of their lives, while benefits are more heavily discounted than for older age groups. The lower values of net benefits also reflect the fact that the replacement ratio has been lowered[35] since the introduction of the system in order to decrease the implicit debt of the system. The male generational accounts for the NPS are more negative than the female accounts, since the NPS mainly covers income-earners and economic participation rates for males are higher than for females. Because of generous benefits compared with contributions, the budgetary burden will be shifted to the future generations. For the future generations, the generational account of the NPS represents about 25% of the Net Payment (I) or the Net Payment (II), and accounts for 31% of the Net Payment (III).

The PCS turns out to be a much more generous pension scheme than the NPS. The combined account of the PCS for those aged 0 is about 15.3% of the NPS for the same age group while the number covered is only about 5.6% of the latter[36]. This means that the

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[35] The 1998 revision of the NPS Act lowered the replacement ratio from 70% to 60% for the benefit recipients with 40-year participation period. In the process of the NPS revisions, the government adopted a phase-out scheme that, for the period before the revision, the replacement ratio under the old system is applied, while for the period after the revision, the new pension benefit formula is employed for the calculation of benefits.

[36] The number of the participants in the NPS was 16.2 million as of December 2000, while that to the PCS was about 909 thousand.

average per capita lifetime net benefit of participants to the PCS is about 2.7 times as large as that of participants in the NPS.

The difference in the magnitude of net benefits is primarily due to the difference in the replacement ratio, the base income for benefits and contributions, the benefit entitlement age, and the indexation method for benefits. The replacement ratio of the NPS for an average income earner with 20 years of contribution is 30%, while that of the PCS is about 50%. The base income for the NPS benefits is lifetime average income[37] while the base income for the PCS (and other Occupational Pension schemes) is the average wage income for the last three years before the recipient's retirement. The wage level around retirement is much higher than the lifetime average income, since the wage structure of the government employees specifies a higher level for one with a longer period of service. Furthermore, in the case of the NPS, an upper bound for the base income is specified, in order to prevent it from providing excessive benefits for high-income workers, while the PCS does not limit base income for high-income workers. Another difference is that the benefits of the PCS are totally income-related while the NPS benefit formula has a strong redistributive element. Finally, the differences in the benefit entitlement age[38] and indexing method further widen the gap of benefits between the two pension plans. The entitlement age for the NPS is currently 60, while pension benefits of the Occupational Pension schemes are paid immediately after retirement. For government employees, private school employees and military personnel who joined the Occupational pensions after 1995, the pension benefit entitlement age is 60, but those who joined before 1995 will receive pension benefits immediately after retirement. The method for maintaining the real value of benefits is based on inflation indexing for the NPS while the Occupational Pension schemes are indexed to wage growth. Thus, PCS benefits grow faster than prices, given normal productivity growth.

Compared with the NPS, the per capita net benefits of the PCS for older age groups are larger. Unlike the NPS, which has limited coverage for those above age 60, the PCS covered most of the older age groups owing to its earlier introduction (in 1960). For future generations, the generational account of the PCS represents 31.6% of that of the NPS, which is equivalent to 7.9% of Net Payment (I) or Net Payment (II) (or 9.8% of the Net payment (III)). This means that the fiscal burden shifted to future generations per one participant of the PCS is about 5.6 times as large as the value for the NPS[39].

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[37] The base income for the NPS benefits is the average of income during the participation period of each participant. Henceforth, we denote this average income as lifetime average income.

[38] The difference in entitlement age further widens the gap of the benefit level between the two public pension schemes, since the participants in the PCS expect a longer benefit-receiving period.

[39] In addition to more generous benefits of the PCS and larger net benefit of older age groups, a smaller pension fund is another reason for the heavier fiscal burden of future generations caused by the PCS. The funds of the

Comparing the net benefits across sex groups, it is found that males benefit much more from the PCS than females, since the proportion of male government employees is much higher than female employees. The proportion of male government employees is about 70% as of 2000 and the proportion was much higher before 2000. It is also remarkable that for groups aged more than 70 the net benefits for females are much smaller than for males, and the age groups whose accounts are most negative are younger for females[40]. This reflects the facts that the PCS has not covered many females in the past and that female government employees tend to retire earlier than their males counterparts.

The net benefit per participant of the Pension for Private School employees (PPS) is smaller than that of the PCS, even though these two pension plans share the same formula for contributions and benefits. The lifetime net benefit from the PPS under the current policy regime, which is represented by the accounts for age 0, is about 7.9% that of the PCS, while the number of participants of the former is 23.2% of the latter[41]. This is primarily due to the expected future decrease in the number of students due to population aging and the shorter duration of service of private school employees. In the financial projection models of the PCS and the PPS, the numbers of new entrants of the two plans are assumed proportional to the whole population and the population aged 0-24, respectively. The decrease in fertility rates and death rates will decrease the proportion of the younger age groups, and this will reduce the ratio of those covered by the PPS to those covered by the PCS. As of 2000, the average lengths of continuous service of government employees and private school employees are 14.8 years and 11.3 years respectively. In particular, the average expected duration of service of female private school employees is only 8.0 years, while that of males is 13.2 years. The shorter expected period of participation for the PPS caused by the shorter expected duration of service will lower the level of benefits. The fiscal burden shifted to future generations by the PPS is much smaller than that of the PCS. The generational account of the PPS for the future generations is only 12.9% of that of PCS, as opposed to the ratio of the number of participants (23.2%). This implies that the fiscal burden per participant shifted to the future generations by the PPS is about 55.6% of the value for the PCS. This is primarily due to the shorter history[42] and larger magnitude of pension funds (4.0 trillion won as of 2000) as well as the shorter duration of service. Because of the shorter history of the PPS, its coverage of older age groups is narrower than that of the PCS and, as a result, the net benefits of older age groups from the

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NPS and the PCS as of 2000 are 60.6 trillion won and 1.8 trillion won, respectively.

[40] The accounts are most negative between ages 45 and 70 for males, and between ages 30 and 65 for females.

[41] The number of the participants in the PPS was 211 thousand as of December 2000, while that in the PCS was about 909 thousand.

[42] The PPS was introduced in 1975.

PPS are relatively small. Even though the number of the new female entrants to the PPS is larger than that of new male entrants[43], males benefit much more from the PPS than females, since the expected duration of service for males is much longer than that of females.

The fiscal burden of the future generations caused by public pensions is substantial. For future generations, the account of the whole public pension system explains 34% of Net Payment (I) or Net Payment (I), and accounts for 42% of Net Payment (III).

The accounts of Medical Insurance (MI) for all the sex-age cohorts alive in 2000 show negative values. This simply reflects the fact that Medical Insurance contributions fall short of the benefit expenditure. As of 2000, MI contribution revenue is about 80% of MI benefits. The current gap is explained primarily by the fact that government provides subsidies to the self-employed in the form of contribution discounts[44]. The magnitude of the gap will not be easily reduced. There are increasing pressures on MI expenditure because of the current low level[45]: a pressure to widen the scope of medical treatments covered by MI to more expensive medical cases[46], a pressure to increase fees for medical services[47], and population aging. Experience over the past few years shows the difficulty of substantially increasing contribution rates. Labor unions and non-governmental organizations have proposed to increase government subsidies in order to recover the MI budget balance, which has deteriorated due to the recent rapid increase in MI expenditure. Considering all these facts, we assume that the government does not raise MI contribution rates.

The generational accounts calculated based on these assumptions indicates that the fiscal burden of future generations is quite heavy. The account of MI for the future generations explains about 11.7% of Net Payment (I) or Net Payment (II), and about 14.5% of Net Payment (III) for the future generations. In contrast to the heavy burden of future generations, all age groups currently alive benefit from the MI. For example, the net benefit from MI for age 0 individuals is about 65.6% of the value for the NPS. The net benefits from the MI are quite high for older age cohorts, since older people are more susceptible to chronic and long-term diseases. Comparing net benefits across the sexes, females benefit much more from the MI than males.

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[43] The numbers of newly-hired male and female private school employees in 2002 were 5,448 and 11,965, respectively.

[44] The government also pays for the administrative cost of Medical Insurance, which is counted as government consumption expenditure.

[45] The level of government expenditure for health is relatively low compared with that of other OECD countries. The ratio of the expenditure to GDP for Korea is 2.98% as opposed to 5.94% for the OECD average.

[46] The scope of medical treatment covered by MI has been widened to chronic diseases and long-term treatment.

[47] Fees for medical treatment are quite low. This is the outcome of the government's "small contribution plus small expenditure" policy.

The accounts for Employment Insurance (EI) and Industrial Accident Compensation Insurance (IACI) indicate a relatively sound financial situation. The accounts of the EI and the IACI for future generations are relatively small compared with those of public pensions or Medical Insurance. This reflects the fact that the unemployment rate in Korea is relatively low and the coverage of accidental events by the IACI is considered quite narrow. However, we cannot preclude the possibility that expenditures of the EI and IACI will increase rapidly, since unemployment is expected to rise in the future and the coverage of accidental events by IACI is being extended. It is notable that the accounts of age groups classified as economically inactive are not balanced, since the EI and the IACI also provide survivors' benefits and some annuity-type benefits. Comparing the accounts across sexes, the accounts of the IACI for females are smaller than for males, and the accounts are negative for all female age groups. This is mainly due to survivor's benefits that go more to females.

The fiscal burden caused by the social welfare programs such as the Minimum Living Standards Security (MLSS) system and other social welfare services and public assistance (OSTP) will not be very heavy, since in the projection of their aggregates we make a very conservative assumption about the income elasticity of social welfare expenditure (1.2), which is applied until the ratio of the sum of expenditure on the MLSS, the OSTP, and government expenditure on social welfare to GDP reaches the OECD average (4.12% of GDP). The present value of benefits from these programs for age 0 is about 80.7% of the value for the labor income tax. However, we cannot preclude the possibility that the expenditure of the MLSS will increase more rapidly than we projected, considering the reduction of work incentives caused by the MLSS.

Another important feature of these programs is that, considering the age structure of the MLSS and OSTP benefits, they redistribute resource form the young to the old. Thus, population aging can impose an extra burden on future generations (see Figure 10). The benefits of these programs are shown to provide more to females than to males, since females are a large proportion of those in poverty.

Tables 4-6 also report the present value, rest-of-life tax burdens by category. The largest present value (for ages 0 and age 30) is the consumption tax, followed by the capital income tax[48], the tax on asset transactions, labor income tax, other taxes, and taxes on asset holdings. Three important characteristics of the Korean tax system are: (i) the large share of consumption taxes; (ii) the relative unimportance of labor income taxes; and (iii) the large proportion accounted for by taxes on asset transactions. Among consumption taxes, Value Added Tax (VAT) raises the largest revenue of all the taxes, and Special Excise Tax and

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[48] Capital income tax (1) and (2) represent the capital income tax burden with and without the infra-marginal income tax adjustment, respectively.

Transportation Tax also contribute substantially to tax revenue. The average effective labor income tax rate is quite low, primarily due to the large proportion of tax-exempt workers, about 46% in 2000. However, labor-tax progressivity is quite high, since most labor income tax revenue is raised from relatively high-income workers. The large share of taxes on asset transactions is due to the high frequency of asset transactions rather than high tax rates. The circulation rate of equities in Korea is the highest in the world[49], and the frequency of real estate transactions is also very high[50]. Compared to revenues from taxes on asset transactions, revenues from taxes on asset holding are very small. Taxing asset transactions, rather than asset holding, relatively heavily is but one illustration of the efficiency and fairness problems of Korea's tax system.

The present value tax burden on older age groups, relative to that on younger age groups, is heaviest in the case of consumption taxes, followed by capital income taxes (1) (or capital income taxes (2)), taxes on asset holding, taxes on asset transactions, and labor income taxes. The age profile of accounts of the capital income tax is similar to that of the tax on asset holding, since the age profile of corporation tax burden, which comprises a large proportion of the capital income tax burden, is assumed to be the same as that of net wealth. It is remarkable that the accounts for the tax on asset transactions are relatively high for the younger age groups. This reflects the fact that securities (and owner-occupied housing) transactions are performed by relatively young age groups (see Figure 17).

4.3. Establishing Generational Balance

Tables 7 and 8 show that the magnitude of the adjustment of tax and social insurance contributions (tax, hence forth) and transfer payments required to attain long-run government budget balance is substantial[51]. Under the base case assumptions (g=1.5%, r=6.5%, medium fertility), the required tax adjustment is a 56-59% increase in tax burden under if the adjustment is made only for generations born in 2001 and thereafter. If the adjustment is made to all cohorts alive in 2004 and later, the required tax adjustment represents a 19-20% increase in tax burden. Delay in the tax adjustment raises its magnitude. For example, if we delay the tax adjustment until 2030, the required tax adjustment reaches 37-39%. If the proportional increase in the tax burden is accompanied with the same percentage decrease in transfer

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[49] The rate is about 400% per year as of 2000.

[50] The frequency of real estate transactions is due primarily to expectations of appreciation. The rate of return on real estate was much higher than that from financial assets for the past several decades. Therefore, speculation in real estates markets was considered an effective way of accumulating wealth.

[51] Long-run budget balance is defined as the situation where the summation of current government net wealth and the present value of present and future flows of taxes and social insurance contributions is equal to that of transfer payments and government consumption.

payments to attain long-run government budget balance, the magnitude of the required adjustment decreases to 34-39% (if the adjustment is made only for the generations born in 2001 and later years), 12-13% (if the adjustment is made to all the cohorts alive in 2004 and later) and 21-22% (if we delay the tax adjustment until 2030).

4.4. Sensitivity Analysis

Tables 9-13 report the results of sensitivity analyses under alternative assumptions about the fertility rate, the growth rate of labor productivity (g), the discount rate (r), and the income elasticity of the per capita level of MI benefits and social welfare expenditures (the MLSS and the OSTP). The alternative assumptions do not change the qualitative results explained above, even though the absolute levels of generational accounts are substantially affected by the changes in assumptions.

It is remarkable that increase in the labor productivity increases the ratio of accounts for future generations to those for current generations (e.g. those for the age-0 cohort), which implies that the higher the growth rate is, the more fiscal burden is shifted to the future generations. This is due to the fact that the budgetary imbalance of public pensions and the MI is worsened as the growth rate increases. Our calculation shows that the present value of public pension benefits is more than double that of future contribution revenues[52]. Therefore, the gap between benefits and contributions will increase faster than contributions with productivity growth, since the benefits and contributions are proportionally related to the income level of participants. The budgetary imbalance of the MI is primarily due to the population aging. The population aging increases the ratio of benefits to contributions, if the ratio of the per capita contributions to benefits of the relevant age groups remains constant, since the ratio of the number of benefit recipients to that of contributors increases with population aging. Therefore, the gap between the benefits and contributions will increase with productivity growth, since the benefits and contributions are assumed exponentially related to the income level. Figures 25 and 26 show that the budgetary gap of public pensions and the MI become larger than contribution revenue starting around 2040, with the gap becoming larger afterwards.

The ratio of accounts for future generations to those for current generations is quite sensitive to assumptions about the income elasticity of MI benefits and social welfare expenditures, which implies that future social welfare policies might substantially affect the long-run fiscal position of the Korean government. Under the high elasticity assumption

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[52] The required adjustment to attain long-run budget balance of public pensions is estimated at about a 120% increase in contributions if the adjustment is made beginning in 2004. If the adjustment is delayed until 2010 (2020), the required adjustment will increase to 135% (175%).

where the elasticities of MI benefits and social welfare expenditure are 1.73 and 1.53, respectively, the ratio (for Net Payment (I)) of accounts for future generations to that for age-0 cohorts is about 265%, while under the low elasticity assumptions, where the elasticity for both benefits is 1, the ratio is about 185%.

5. Conclusion

This paper have reevaluated the long-term fiscal position using the Generational Accounting, which is modified to reflect the special features of fiscal situation in Korea, such as prospective change in the public pension benefit profiles and expected increase in social welfare expenditure. The findings of this paper suggest that unless policy toward existing generations in Korea is substantially altered, future generations will face excessively heavy fiscal burden over the course of their lives. The magnitude of the adjustment of tax and social insurance contributions burden required to attain the long-run government budget balance is substantial and delays of the adjustment exponentially increases the magnitude of adjustment required. It is also shown that a substantial part of fiscal burden on the future generations is explained by the long-run budgetary imbalance of public pensions and Medical Insurance.

To establish the generational balance, the structural reform of the public pensions is needed. The imbalance between the benefit level and contributions should be removed. However, the combination of the benefit decrease and the increase in contribution may provide another distortion to the financial market and the economy, since the NPS fund is single fund operated by the government. Projection of the NPC indicates that the NPS fund will reach 40% of GDP early 2030's, if the current NPS policy is maintained. A simple adjustment of benefit level and contribution rate will deteriorate the situation of the financial market. Another issue related to the public pension is the imbalance of net transfer between the NPS and the occupational pensions. Therefore, we need more structural approach to the public pension reform, which minimizes the distortion of the financial market and removes the inequity between the NPS and the occupational pension participants.

The imbalance between benefits and contribution of the Medical Insurance should be removed, through the increase in the contribution rates and revision of the compensation method for medical services under the Medical Insurance coverage, which provides the incentives to save the medical expense to the insurants and medical service providers. The revision of the MLSS is also needed. Even though the current expenditure by the MLSS is not very large, reduction of work incentives caused by the MLSS may cause rapid increase in the expenditure.

In addition to the structural reforms of the social welfare policies, efforts to decrease the government consumption are necessary, since there will be many factors, which will require

the additional government increase, such as premature reunification and the default of the government guaranteed bonds, which amount to 106.8 trillion won (19.6% of GDP), as of 2001.

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Table 1. Consolidated Budget and Net Wealth of Korean Government

(Unit: 1 trillion won (current prices), %)

	1995	1996	1997	1998	1999	2000	2001	Growth Rate (1995-2000)
Consolidated Budget (CB)[1]								
Expenditure	71.6 (19.0)[2]	84.4 (20.2)	100.3 (22.1)	115.4 (26.0)	121.0 (25.1)	129.3 (24.8)	136.8 (25.1)	12.7
Revenue	72.8	85.5	93.4	96.7	107.9	135.8	144.0	13.5
Balance	1.2 (0.3)[2]	1.1 (0.3)	-7.0 (-1.5)	-18.8 (-4.2)	-13.1 (-2.7)	6.5 (1.3)	7.3 (1.3)	-
NPS Balance	3.5	4.5	4.7	6.0	7.0	11.2	13.4	-
CB excluding NPS	-2.2 (-0.6)[2]	13.4 (-0.8)	-11.7 (-2.6)	-24.7 (-5.6)	-20.0 (-4.1)	-4.7 (-0.9)	-6.1 (-1.1)	-
Composition of Central Government Expenditure								
Total	71.0	83.8	99.1	112.4	118.2	126.8	132.2[3]	12.4
General Public Service	3.0	3.4	4.2	5.0	4.4	6.7	-	19.1
Defense	11.1	12.6	13.2	13.6	13.2	14.4	-	5.4
Public Order and Safety	3.9	4.5	4.8	5.4	5.9	5.8	-	8.2
Education	12.8	14.4	16.2	16.7	17.7	19.4	-	8.8
Health Care	0.5	0.7	0.8	1.0	1.1	0.9	-	13.9
Social Security and Welfare	6.4	7.9	9.6	12.3	14.7	19.3	-	25.0
Housing and Community Amenities	5.7	7.1	6.7	7.0	9.6	6.8	-	6.2
Recreational, Cultural, Religious Activities	0.4	0.5	0.7	0.8	0.9	1.0	-	20.0
Fuel and Energy	0.5	1.2	1.4	2.5	1.9	0.8	-	27.4
Economic Development	11.1	14.3	12.6	16.1	19.0	18.5	-	12.1
Transportation and Communication	6.1	6.5	10.3	11.7	11.7	12.6	-	17.4
Other expenditure	9.5	10.9	18.6	20.4	18.3	20.5	-	19.3
Government Wealth and Debt								
Wealth	124.4	131.2	139.7	150.4	163.1	175.9	188.3	-
Debt	35.6 (9.4)[2]	36.8 (8.8)	50.5 (11.1)	71.4 (16.1)	89.7 (18.6)	100.9 (19.3)	113.1 (20.8)	-
Net Wealth	88.7 (23.5)[2]	94.4 (22.6)	89.2 (19.7)	79.0 (17.8)	73.4 (15.2)	75.0 (14.4)	75.2 (13.8)	-

Note: 1) Includes the central government budget (general account, special account, public trust funds) and non-financial public enterprises.
2) Ratio to GDP (%)
3) The composition of government expenditure by function is not reported, since the composition is not comparable between 2000 and 2001. The government expenditure for each functional category in 2001 GFS of Korea is defined as the sum of government purchase and "lending", while that reported in GFS of 2000 and earlier includes "net lending" rather than "lending". The total government expenditure reported here is based on the 2000 definition.

Table 2. Assumptions on Fertility (unit: persons / 1,000 women)

Year	Low Fertility	Medium Fertility (base case)	High Fertility
2000	1.47	1.47	1.47
2005	1.35	1.38	1.43
2010	1.32	1.37	1.45
2015	1.31	1.37	1.50
2020	1.27	1.37	1.54
2025	1.21	1.38	1.61
2030	1.15	1.39	1.69
2040-	1.10	1.40	1.80

Table 3. Data Sources for Generational Profile Calculation

Classification	Programs	Components	Data Sources
	Public Pensions	National Pension (NPS)	- Long-Term Projection by National Pension Corporation (NPC) - *National Pension Statistical Yearbook*
		Pensions for Civil Servants (PCS)	- *Statistical Yearbook for Pension for Civil Servants*
		Pension for Government Employees (PPS)	- *Statistical Yearbook for Pension for Private School Employees* - *Statistical Yearbook of Ministry of Government Administration and Home Affairs*
		Pension for Military Personnel (PMP)	- Net transfer (= pension benefit – contribution) treated as government consumption
Social Welfare System	Medical Insurance (MI)	-	- *Medical Insurance Statistical Yearbook*
	Employment Insurance (EI)	-	- *Yearly Statistics of Employment Insurance* - *Annual Report on Economically Active Population Survey* - *Survey Report on Wage Structure* - *Survey Report on Labor Conditions at Small Size Establishments*
	Industrial Accident Compensation Insurance (IACI)	-	- *Statistical Yearbook of Industrial Accident Compensation Insurance* - *Annual Report on Economically Active Population Survey* - *Survey Report on Wage Structure* - *Survey Report on Labor Conditions at Small Size Establishments*
	Social Welfare Services and Public Assistance	Minimum Living Standards Security System (MLSS)	- Daewoo Panel
		Other Social Transfer Programs (OSTP)	- *Summary for Budget of Fiscal Year (each year)* - *Yearbook of Health and Welfare Statistics* - *Annual Report on Economically Active Population Survey*

Table 3, Continued

Classification	Programs	Components	Data Sources
	Labor Income Tax	Wage and Salary Income Tax, Retirement Income Tax, 60% of Global Income Tax, 60% of Inhabitant Tax, Farmland Tax, 60% of Business Place Tax	- Daewoo Panel - Korea Labor Panel Survey
	Capital Income Tax	40% of Global Income Tax, Timber Income Tax, Interest and Dividend Tax, Corporation Tax, 40% of Inhabitant Tax	- Daewoo Panel - Korea Labor Panel Survey - *Analysis of Private Enterprise Management*
Tax System	Consumption Tax	Value Added Tax (VAT), Special Excise Tax, Liquor Tax, Stamp Tax, Transportation Tax, Local Transportation Tax, Race-Pari-Mutuel Tax, Tobacco Consumption Tax	- Family Income and Expenditure Survey
	Tax on Asset-Holdings	Inheritance Tax, Gift Tax, License Tax, Community Facility Tax, Property Tax, Automobile Tax, Aggregate Land Tax, Urban Planning Tax, 40% of Business Place Tax	- Daewoo Panel - Korea Labor Panel Survey
	Tax on Asset-Transactions	Capital Gains Tax, Security Transactions Tax	- Daewoo Panel - National Survey of Family Income and Expenditure
	Other Taxes	Excess Profit Tax, Education Tax, Local Education Tax, Special Tax for Rural Development, Regional Development Tax, Butchery Tax	- Daewoo Panel - Family Income and Expenditure Survey - *Statistical Yearbook of National Tax* - *Annual Local Tax Statistical Report* - *2000 Tax Expenditure Report*
Monetary Policy	Seigniorage	-	- Family Income and Expenditure Survey
Government Consumption	Expenditure on Education	-	- *Statistical Yearbook of Educational Expenditure* - *Financial Yearbook of Local Government*
	Other Government Consumption	-	- *National Income and Product Account (NIPA)* - *Summary of Budget for Fiscal Year* - *Government Finance Statistics in Korea*

Table 4. Combined (Male and Female) Generational Accounts (base case) (unit: 1,000 won)

Age	Net Payment (I)[1]	Net Payment (II)[2]	Net Payment (III)[3]	Public Pensions				Medical Insurance	Employment Insurance	IACI
				Subtotal	NPS	PCS	PPS			
0	56,355	57,376	33,476	-9,216	-7,908	-1,212	-96	-5,187	-608	217
5	62,733	63,830	37,260	-8,819	-7,546	-1,169	-104	-4,167	-696	254
10	67,695	68,868	48,202	-9,072	-7,516	-1,425	-131	-3,748	-786	278
15	67,811	69,080	56,936	-14,461	-12,804	-1,503	-153	-3,614	-885	295
20	77,244	77,912	74,977	-11,311	-9,829	-1,325	-157	-3,659	-920	295
25	73,719	74,100	73,655	-15,128	-13,389	-1,531	-208	-4,335	-791	271
30	64,716	64,849	64,683	-17,993	-14,444	-3,154	-396	-5,145	-685	198
35	39,299	39,566	39,268	-35,155	-29,544	-4,780	-832	-5,828	-611	174
40	36,728	36,982	36,699	-27,779	-20,810	-5,860	-1,109	-6,723	-580	43
45	32,384	32,195	32,357	-23,461	-15,055	-7,009	-1,397	-7,399	-504	11
50	22,158	21,935	22,134	-22,865	-12,274	-9,091	-1,501	-7,914	-443	-6
55	12,705	12,180	12,684	-21,361	-14,090	-5,802	-1,469	-8,097	-404	99
60	14,277	13,819	14,259	-8,367	-1,977	-5,735	-655	-7,647	-318	18
65	8,374	8,015	8,359	-6,314	-367	-5,892	-55	-6,753	-239	21
70	6,356	5,786	6,344	-3,754	-325	-3,386	-42	-5,374	-228	-52
75	5,813	5,218	5,803	-1,367	-296	-1,052	-19	-4,098	-176	-41
80	2,831	2,451	2,823	-991	-243	-742	-6	-3,174	-132	-32
85	569	309	563	-647	-159	-486	-2	-2,323	-95	-24
90	-2,491	-2,530	-2,494	-341	-40	-300	-1	-1,579	-64	-17
95	-1,281	-1,297	-1,284	-33	-24	-8	-1	-985	-40	-11
99	-486	-502	-487	-10	-9	0	0	-381	-15	-4
Future Generations	122,280	121,289	98,899	41,676	30,708	9,718	1,250	14,316	1,478	-487

Notes: 1) Net Payment with infra-marginal capital income tax adjustment
2) Net Payment without infra-marginal capital income tax adjustment
3) Net Payment with infra-marginal capital income tax adjustment (regarding education expenditure as transfer)

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Table 4, continued

Age	MLSS	Other Social Transfer	Labor Income Tax	Capital Income Tax (1)[1]	Capital Income Tax (2)[2]	Consumption Tax	Tax on Asset Holding	Tax on Asset Transactions	Other Taxes	Seigniorage	Educational Expenditure
0	-2,542	-3,342	7,288	12,806	13,828	37,755	3,926	8,727	6,224	172	-22,878
5	-2,490	-3,334	8,168	14,778	15,875	38,382	4,378	9,488	6,522	193	-25,473
10	-2,419	-3,215	8,975	16,839	18,012	38,830	4,829	10,148	6,785	216	-19,493
15	-2,353	-3,146	9,810	19,155	20,424	39,481	5,342	10,846	7,087	244	-10,875
20	-2,268	-3,118	10,610	22,389	23,057	40,010	5,922	11,632	7,387	274	-2,268
25	-2,169	-3,085	10,777	23,464	23,845	38,951	6,177	11,860	7,465	262	-64
30	-2,131	-3,034	9,941	23,022	23,155	36,284	6,156	10,802	7,046	256	-33
35	-2,089	-2,904	9,527	21,937	22,204	32,915	5,910	8,873	6,314	237	-31
40	-2,083	-2,807	7,756	20,814	21,069	29,451	5,541	7,253	5,609	234	-29
45	-2,060	-2,690	6,165	19,963	19,775	25,987	5,291	5,909	4,962	209	-26
50	-1,978	-2,564	4,031	17,185	16,962	22,701	4,662	4,883	4,271	196	-24
55	-1,939	-2,445	1,983	15,111	14,585	19,115	3,803	3,235	3,432	173	-21
60	-1,876	-2,351	587	11,226	10,768	15,681	2,934	1,597	2,630	161	-18
65	-1,724	-2,257	54	8,523	8,164	12,538	2,062	392	1,941	128	-15
70	-1,452	-1,860	0	6,276	5,706	9,767	1,502	38	1,386	107	-13
75	-966	-1,465	0	4,069	3,474	7,878	898	0	1,009	73	-10
80	-656	-1,122	0	2,223	1,844	5,395	560	0	698	61	-8
85	-335	-846	0	969	709	3,179	231	0	417	41	-6
90	-257	-593	0	126	87	51	31	0	121	32	-4
95	0	-383	0	42	26	33	3	0	74	18	-3
99	0	-150	0	25	10	13	1	0	29	6	-1

Notes: 1) Capital income tax burden with infra-marginal capital income tax adjustment
2) Capital income tax burden without infra-marginal capital income tax adjustment

Table 5. Male Generational Accounts (base case) (unit: 1,000 won)

Age	Net Payment (I)[1]	Net Payment (II)[2]	Net Payment (III)[3]	Public Pensions				Medical Insurance	Employment Insurance	IACI
				Subtotal	NPS	PCS	PPS			
0	72,097	73,504	49,205	-11,451	-9,831	-1,524	-96	-3,423	-689	772
5	80,530	82,023	55,046	-10,542	-8,994	-1,444	-104	-2,218	-789	858
10	88,709	90,302	69,212	-9,652	-7,754	-1,765	-133	-1,618	-892	950
15	89,255	90,983	78,376	-17,495	-15,452	-1,898	-145	-1,239	-1,009	1,056
20	103,187	104,358	100,917	-12,874	-11,034	-1,689	-151	-960	-1,052	1,168
25	101,526	102,320	101,463	-16,578	-14,568	-1,907	-103	-1,507	-913	1,210
30	91,376	92,042	91,345	-21,584	-17,086	-4,138	-359	-2,411	-727	1,168
35	54,361	54,683	54,332	-49,449	-42,209	-6,271	-970	-3,344	-571	1,110
40	54,144	54,319	54,117	-36,901	-27,572	-7,751	-1,578	-4,435	-517	925
45	43,905	43,807	43,881	-33,451	-21,944	-9,376	-2,131	-5,534	-474	747
50	34,341	33,750	34,319	-29,510	-15,193	-11,997	-2,320	-6,506	-439	546
55	18,920	18,382	18,901	-28,144	-18,226	-7,515	-2,403	-7,179	-420	448
60	20,132	19,476	20,116	-12,420	-3,210	-8,081	-1,130	-7,216	-357	178
65	11,962	11,114	11,949	-9,719	-614	-9,006	-99	-6,608	-289	64
70	7,434	6,462	7,423	-6,385	-589	-5,710	-86	-5,467	-285	-40
75	7,622	6,680	7,613	-2,582	-566	-1,983	-34	-4,332	-223	-32
80	3,661	3,005	3,654	-2,032	-518	-1,502	-11	-3,322	-171	-24
85	219	-142	214	-1,488	-414	-1,073	-1	-2,540	-130	-19
90	-2,408	-2,594	-2,411	-911	-109	-801	-1	-1,792	-93	-13
95	-1,273	-1,388	-1,275	-84	-83	0	-1	-1,243	-65	-9
99	-453	-575	-454	-34	-34	0	0	-501	-26	-4
Future Generations	157,048	155,992	146,322	51,959	38,306	12,264	1,248	9,403	1,678	-1,791

Notes: 1) Net Payment with infra-marginal capital income tax adjustment
2) Net Payment without infra-marginal capital income tax adjustment
3) Net Payment with infra-marginal capital income tax adjustment (regarding education expenditure as transfer)

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Table 5, continued

Age	MLSS	Other Social Transfer	Labor Income Tax	Capital Income Tax (1)[1]	Capital Income Tax (2)[2]	Consumption Tax	Tax on Asset Holding	Tax on Asset Transactions	Other Taxes	Seigniorage	Educational Expenditure
0	-2,459	-3,122	11,266	17,278	18,685	37,605	5,367	13,413	7,245	174	-22,892
5	-2,420	-3,095	12,496	19,770	21,264	38,239	5,935	14,419	7,618	195	-25,483
10	-2,363	-2,940	13,773	22,532	24,125	38,684	6,546	15,460	7,985	218	-19,497
15	-2,310	-2,833	15,235	25,815	27,543	39,336	7,286	16,729	8,433	245	-10,879
20	-2,238	-2,766	16,722	30,006	31,176	39,821	8,093	18,112	8,879	276	-2,271
25	-2,134	-2,698	17,570	32,086	32,880	38,544	8,504	18,194	8,994	254	-63
30	-2,040	-2,616	17,198	32,385	33,050	36,026	8,519	16,644	8,565	250	-31
35	-1,968	-2,507	16,539	32,683	33,005	32,233	8,441	13,342	7,623	228	-29
40	-1,916	-2,393	14,033	31,328	31,503	28,617	8,014	10,476	6,692	222	-27
45	-1,897	-2,253	11,302	29,067	28,969	25,003	7,449	7,976	5,773	196	-24
50	-1,822	-2,103	7,462	25,699	25,108	21,622	6,633	7,523	5,047	188	-22
55	-1,732	-1,968	3,857	21,801	21,263	17,826	5,544	4,736	3,995	156	-19
60	-1,714	-1,840	1,200	17,654	16,998	14,638	4,463	2,337	3,064	146	-16
65	-1,605	-1,721	109	14,373	13,526	11,190	3,149	736	2,184	99	-13
70	-1,414	-1,376	0	9,644	8,673	8,697	2,316	96	1,541	109	-11
75	-967	-1,071	0	6,553	5,612	7,492	1,531	0	1,187	65	-8
80	-641	-817	0	3,881	3,225	4,816	1,097	0	806	70	-6
85	-173	-615	0	1,401	1,040	2,878	439	0	433	33	-5
90	0	-436	0	600	413	45	47	0	103	44	-3
95	0	-304	0	300	185	31	21	0	70	10	-2
99	0	-123	0	198	76	13	9	0	29	-11	-1

Notes: 1) Capital income tax burden with infra-marginal capital income tax adjustment
2) Capital income tax burden without infra-marginal capital income tax adjustment

Table 6. Female Generational Accounts (base case) (unit: 1,000 won)

Age	Net Payment (I)[1]	Net Payment (II)[2]	Net Payment (III)[3]	Public Pensions				Medical Insurance	Employment Insurance	IACI
				Subtotal	NPS	PCS	PPS			
0	39,038	39,636	16,175	-6,757	-5,792	-869	-96	-7,127	-519	-392
5	42,409	43,053	16,948	-6,851	-5,892	-856	-103	-6,394	-590	-436
10	43,902	44,600	24,414	-8,415	-7,246	-1,040	-128	-6,160	-665	-481
15	44,507	45,277	33,635	-11,164	-9,927	-1,075	-162	-6,196	-751	-532
20	49,891	50,030	47,627	-9,664	-8,559	-941	-164	-6,505	-782	-624
25	43,721	43,656	43,657	-13,563	-12,117	-1,126	-320	-7,385	-659	-742
30	37,346	36,932	37,312	-14,308	-11,731	-2,143	-433	-7,952	-643	-798
35	23,264	23,472	23,232	-19,937	-16,060	-3,193	-685	-8,474	-654	-823
40	18,920	19,256	18,890	-18,453	-13,897	-3,926	-630	-9,064	-645	-859
45	20,718	20,439	20,690	-13,347	-8,081	-4,614	-653	-9,287	-535	-734
50	9,755	9,907	9,729	-16,100	-9,302	-6,132	-666	-9,347	-448	-569
55	6,320	5,809	6,298	-14,393	-9,841	-4,042	-509	-9,040	-388	-259
60	8,868	8,592	8,848	-4,622	-838	-3,567	-217	-8,046	-282	-129
65	5,465	5,501	5,448	-3,554	-167	-3,367	-20	-6,870	-198	-13
70	5,644	5,340	5,631	-2,015	-151	-1,851	-12	-5,313	-190	-59
75	4,749	4,358	4,738	-651	-138	-503	-11	-3,960	-149	-46
80	2,415	2,174	2,407	-469	-105	-362	-3	-3,100	-113	-35
85	695	472	689	-343	-67	-274	-2	-2,244	-83	-26
90	-2,513	-2,513	-2,517	-189	-21	-166	-1	-1,523	-57	-18
95	-1,283	-1,283	-1,285	-24	-14	-9	-1	-943	-36	-11
99	-491	-491	-492	-6	-6	0	0	-364	-14	-4
Future Generations	85,037	84,117	48,100	30,660	22,569	6,991	1,251	19,579	1,263	911

Notes: 1) Net Payment with infra-marginal capital income tax adjustment
2) Net Payment without infra-marginal capital income tax adjustment
3) Net Payment with infra-marginal capital income tax adjustment (regarding education expenditure as transfer)

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Table 6, continued

Age	MLSS	Other Social Transfer	Labor Income Tax	Capital Income Tax (1)[1]	Capital Income Tax (2)[2]	Consumption Tax	Tax on Asset Holding	Tax on Asset Transactions	Other Taxes	Seigniorage	Educational Expenditure
0	-2,633	-3,585	2,911	7,886	8,484	37,919	2,340	3,573	5,101	170	-22,863
5	-2,569	-3,607	3,226	9,077	9,720	38,545	2,599	3,857	5,271	191	-25,462
10	-2,484	-3,525	3,542	10,393	11,091	38,995	2,884	4,134	5,427	214	-19,488
15	-2,399	-3,487	3,914	11,918	12,688	39,638	3,231	4,452	5,625	241	-10,871
20	-2,300	-3,489	4,167	14,358	14,497	40,208	3,633	4,800	5,814	272	-2,265
25	-2,208	-3,503	3,449	14,164	14,098	39,391	3,667	5,026	5,814	271	-65
30	-2,224	-3,463	2,491	13,410	12,997	36,549	3,730	4,804	5,488	262	-34
35	-2,219	-3,326	2,062	10,496	10,704	33,640	3,215	4,115	4,921	247	-32
40	-2,254	-3,231	1,338	10,064	10,400	30,304	3,013	3,958	4,502	246	-30
45	-2,224	-3,132	964	10,746	10,466	26,983	3,107	3,817	4,140	223	-28
50	-2,136	-3,034	537	8,517	8,669	23,799	2,656	2,196	3,481	204	-26
55	-2,152	-2,935	58	8,237	7,726	20,439	2,015	1,693	2,854	190	-23
60	-2,024	-2,823	21	5,288	5,012	16,645	1,521	914	2,229	175	-20
65	-1,820	-2,692	8	3,780	3,816	13,632	1,182	114	1,744	151	-17
70	-1,477	-2,179	0	4,051	3,746	10,474	965	0	1,283	105	-14
75	-966	-1,697	0	2,607	2,216	8,105	525	0	904	77	-11
80	-664	-1,275	0	1,393	1,151	5,686	291	0	644	57	-8
85	-393	-929	0	813	589	3,288	156	0	412	44	-6
90	-325	-635	0	0	0	52	26	0	126	29	-4
95	0	-396	0	0	0	33	0	0	75	20	-3
99	0	-154	0	0	0	13	0	0	29	9	-1

Notes: 1) Capital income tax burden with infra-marginal capital income tax adjustment
2) Capital income tax burden without infra-marginal capital income tax adjustment

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Table 7. Required Tax Adjustment[1] for Long-Term Government Budgetary Balance (unit: %)

	Labor productivity	g = 0%			g = 1.5%							g = 3.0%	
	Discount rate	r = 5.5%	r = 6.5%	r = 7.5%	r = 5.5%	r = 6.5%					r = 7.5%	r = 6.5%	r = 7.5%
	Fertility[2] / Welfare expenditure[2]	MF MW	MF MW	MF MW	MF MW	LF MW	MF LW	MF MW	HF MW	MF HW	MF	MF	MF
Net Payment (I)	Current[3]	26.1	13.5	5.6	61.7	24.6	35.0	26.4	29.3	35.0	12.8	100.7	29.7
	Future[4]	75.8	59.7	35.5	66.3	65.2	77.7	58.7	51.4	77.7	45.9	54.2	48.3
	2004[5]	21.4	12.5	5.7	33.7	19.6	26.2	19.8	20.2	26.2	11.2	36.4	19.7
	2010[5]	25.2	15.5	7.4	36.7	22.7	30.0	22.8	22.9	30.0	13.5	38.3	22.1
	2020[5]	34.1	22.8	12.0	42.8	29.8	38.6	29.4	28.7	38.6	19.1	42.0	27.2
	2030[5]	47.3	34.7	19.9	50.5	40.3	51.0	38.6	36.5	51.0	27.6	46.2	33.9
Net Payment (II)	Current	25.4	13.1	5.6	59.4	23.5	33.9	25.3	28.3	33.9	12.2	95.7	28.1
	Future	73.6	58.1	35.0	63.8	62.4	75.4	56.4	49.6	75.4	43.9	51.5	45.7
	2004	20.8	12.2	5.6	32.4	18.7	25.4	19.0	19.5	25.4	10.7	34.6	18.7
	2010	24.5	15.1	7.3	35.3	21.7	29.1	21.9	22.1	29.1	13.0	36.4	20.9
	2020	33.2	22.2	11.8	41.2	28.5	37.5	28.2	27.7	37.5	18.3	39.9	25.7
	2030	45.9	33.8	19.6	48.6	38.6	49.5	37.1	35.1	49.5	26.4	43.9	32.1
Net Payment (III)	Current	26.1	13.5	5.6	61.7	24.6	35.0	26.4	29.3	35.0	12.8	100.7	29.7
	Future	75.8	59.7	35.5	66.3	65.2	77.7	58.7	51.4	77.7	45.9	54.2	48.3
	2004	21.4	12.5	5.7	33.7	19.6	26.2	19.8	20.2	26.2	11.6	36.4	19.7
	2010	25.2	15.5	7.4	36.7	22.7	30.0	22.8	22.9	30.0	13.5	38.3	22.1
	2020	34.1	22.8	12.0	42.8	29.8	38.6	29.4	28.7	38.6	19.1	42.0	27.2
	2030	47.3	34.7	19.9	50.5	40.3	51.0	38.6	36.5	51.0	27.6	46.2	33.9

Notes: 1) Percentage increase in tax burden to attain long-run budgetary balance
2) LF: low fertility, MF: medium fertility, HF: high fertility
LW: low welfare expenditure, MW: medium welfare expenditure, HW: high welfare expenditure
3) Tax burden of current generations (as of 2000) is adjusted, while that of future generations not changed.
4) Tax burden of future generations is adjusted, while that of current generations not changed.
5) Adjust tax burden for all the age groups from the respective year.

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Table 8. Required Tax and Benefits Adjustment[1] for Long-Term Government Budgetary Balance (unit: %)

	Labor productivity	g = 0%			g = 1.5%							g = 3.0%	
	Discount rate	r = 5.5%	r = 6.5%	r = 7.5%	r = 5.5%	r = 6.5%					r = 7.5%	r = 6.5%	r = 7.5%
	Fertility[2] / Welfare expenditure[2]	MF MW	MF MW	MF MW	MF MW	MF LW	LF MW	MF MW	HF MW	MF, HW	MF MW	MF MW	MF MW
Net Payment (I)	Current[3]	16.8	9.1	4.0	38.9	13.2	16.3	17.5	19.5	22.3	8.8	65.9	20.3
	Future[4]	49.9	42.3	26.4	39.7	30.7	42.8	38.8	34.4	49.7	32.5	32.7	32.1
	2004[5]	13.5	8.3	3.9	20.4	9.9	12.7	12.9	13.2	16.4	7.6	22.4	13.2
	2010[5]	15.3	9.8	4.9	21.7	11.1	14.2	14.4	14.6	18.2	8.9	23.2	14.4
	2020[5]	19.2	13.3	7.2	24.3	13.6	17.6	17.6	17.5	22.1	11.8	24.9	17.0
	2030[5]	24.8	18.7	10.9	27.7	17.2	22.4	21.9	21.3	27.7	16.1	26.9	20.5
Net Payment (II)	Current	16.3	8.8	3.9	37.4	12.4	15.6	16.8	18.8	21.7	8.4	62.6	19.2
	Future	48.5	41.1	26.0	38.2	29.0	40.9	37.3	33.1	48.2	31.1	31.1	30.4
	2004	13.2	8.1	3.9	19.6	9.3	12.1	12.4	12.8	15.9	7.3	21.3	12.5
	2010	14.9	9.5	4.8	20.9	10.5	13.6	13.8	14.1	17.6	8.5	22.1	13.7
	2020	18.7	12.9	7.1	23.4	12.9	16.8	16.9	16.9	21.4	11.3	23.7	16.1
	2030	24.1	18.2	10.7	26.6	16.2	21.4	21.1	20.6	26.9	15.3	25.6	19.4
Net Payment (III)	Current	16.2	8.7	3.8	37.8	12.7	15.8	16.9	18.8	21.6	8.5	64.0	19.6
	Future	43.4	35.0	20.9	36.6	26.8	37.7	34.3	30.2	44.1	27.4	30.6	28.7
	2004	12.8	7.8	3.7	19.4	9.3	12.0	12.1	12.4	15.5	7.2	21.2	12.4
	2010	14.5	9.3	4.6	20.7	10.4	13.5	13.6	13.7	17.3	8.4	22.1	13.6
	2020	18.4	12.7	6.8	23.3	12.9	16.9	16.7	16.5	21.1	11.2	23.7	16.2
	2030	23.8	17.9	10.5	26.5	16.4	21.6	21.0	20.2	26.6	15.3	25.7	19.5

Notes: 1) Percentage increase in tax burden and (the same) percentage decrease in benefits to attain long-run budgetary balance
2) LF: low fertility, MF: medium fertility, HF: high fertility
LW: low welfare expenditure, MW: medium welfare expenditure, HW: high welfare expenditure
3) Tax burden and benefits of current generations (as of 2000) are adjusted, while those of future generations not changed.
4) Tax burden and benefits of future generations are adjusted, while those of current generations not changed.
5) Adjust tax burden and benefits for all the age groups from the respective year.

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Table 9. Sensitivity Analysis I (r=6.5%, g=1.5%) (unit: 1,000 won)

Age	Net Payment (I)[1]			Net Payment (II)[2]			Net Payment (III)[3]		
	Low Fertility	Base Case	High Fertility	Low Fertility	Base Case	High Fertility	Low Fertility	Base Case	High Fertility
0	55,835	56,355	57,146	56,891	57,376	58,124	32,956	33,476	34,267
5	62,207	62,733	63,544	63,329	63,830	64,607	36,734	37,260	38,070
10	67,198	67,695	68,468	68,389	68,868	69,616	47,705	48,202	48,975
15	67,361	67,811	68,509	68,642	69,080	69,761	56,486	56,936	57,633
20	76,856	77,244	77,843	77,532	77,912	78,500	74,589	74,977	75,575
25	73,395	73,719	74,214	73,780	74,100	74,587	73,331	73,655	74,150
30	64,465	64,716	65,102	64,601	64,849	65,230	64,432	64,683	65,069
35	39,110	39,299	39,594	39,378	39,566	39,859	39,079	39,268	39,564
40	36,590	36,728	36,944	36,846	36,982	37,197	36,562	36,699	36,916
45	32,288	32,384	32,536	32,100	32,195	32,348	32,262	32,357	32,510
50	22,095	22,158	22,260	21,872	21,935	22,037	22,071	22,134	22,237
55	12,666	12,705	12,770	12,141	12,180	12,245	12,645	12,684	12,750
60	14,254	14,277	14,316	13,796	13,819	13,858	14,236	14,259	14,298
65	8,361	8,374	8,396	8,002	8,015	8,037	8,346	8,359	8,381
70	6,349	6,356	6,368	5,780	5,786	5,798	6,337	6,344	6,355
75	5,810	5,813	5,818	5,215	5,218	5,224	5,800	5,803	5,808
80	2,830	2,831	2,832	2,450	2,451	2,453	2,822	2,823	2,825
85	568	569	569	309	309	309	563	563	563
90	-2,490	-2,491	-2,491	-2,530	-2,530	-2,530	-2,494	-2,494	-2,494
95	-1,281	-1,281	-1,281	-1,297	-1,297	-1,297	-1,284	-1,284	-1,284
99	-486	-486	-486	-502	-502	-502	-487	-487	-487
Future generations	127,282	122,280	115,473	126,085	121,289	114,721	104,026	98,899	92,006

Notes: 1) Net Payment with infra-marginal capital income tax adjustment
2) Net Payment without infra-marginal capital income tax adjustment
3) Net Payment with infra-marginal capital income tax adjustment (regarding education expenditure as transfer)

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Table 10. Sensitivity Analysis II (Net Payment I, medium fertility) (unit: 1,000 won)

Age	g = 0%			g = 1.5%			g = 3.0%	
	r = 5.5%	r = 6.5%	r = 7.5%	r = 5.5%	r = 6.5%	r = 7.5%	r = 6.5%	r = 7.5%
0	46,596	38,414	30,836	67,610	56,355	45,075	86,694	68,651
5	52,927	44,827	37,052	73,549	62,733	51,652	91,724	74,731
10	58,097	50,932	43,554	76,732	67,695	57,719	93,704	79,143
15	57,855	54,528	49,358	70,863	67,811	61,530	88,158	79,488
20	67,839	64,324	59,403	81,275	77,244	71,067	96,500	87,850
25	63,916	63,325	60,623	74,286	73,719	70,340	89,480	84,406
30	55,074	56,019	54,946	63,997	64,716	63,040	77,919	74,788
35	26,822	34,213	38,105	31,321	39,299	43,295	48,290	51,655
40	26,922	31,000	33,196	32,995	36,728	38,495	44,797	45,781
45	25,274	27,277	28,381	30,909	32,384	32,992	38,768	38,733
50	17,210	18,503	19,299	21,186	22,158	22,643	26,471	26,590
55	9,280	10,307	11,028	11,872	12,705	13,238	15,435	15,760
60	13,297	12,902	12,508	14,762	14,277	13,792	15,791	15,215
65	7,798	7,641	7,470	8,556	8,374	8,173	9,155	8,929
70	6,066	5,961	5,846	6,463	6,356	6,236	6,740	6,622
75	5,737	5,651	5,561	5,890	5,813	5,729	5,944	5,872
80	2,820	2,839	2,850	2,800	2,831	2,853	2,797	2,832
85	597	664	725	491	569	638	457	537
90	-2,463	-2,406	-2,352	-2,551	-2,491	-2,433	-2,580	-2,518
95	-1,273	-1,256	-1,239	-1,299	-1,281	-1,264	-1,307	-1,290
99	-487	-486	-485	-487	-486	-485	-486	-485
Future generations	116,919	77,435	47,871	187,758	122,280	80,186	236,083	137,499

Table 11. Sensitivity Analysis III (Net Payment II, medium fertility) (unit: 1,000 won)

Age	g = 0%			g = 1.5%			g = 3.0%	
	r = 5.5%	r = 6.5%	r = 7.5%	r = 5.5%	r = 6.5%	r = 7.5%	r = 6.5%	r = 7.5%
0	47,401	38,938	31,186	69,242	57,376	45,734	88,787	69,950
5	53,815	45,435	37,480	75,212	63,830	52,396	93,801	76,088
10	59,075	51,639	44,078	78,419	68,868	58,558	95,755	80,555
15	58,943	55,359	50,009	72,590	69,080	62,489	90,200	80,973
20	68,345	64,593	59,499	82,342	77,912	71,454	97,834	88,708
25	64,152	63,346	60,483	75,012	74,100	70,470	90,431	84,953
30	55,085	55,842	54,625	64,416	64,849	62,958	78,520	75,060
35	26,984	34,212	37,976	31,826	39,566	43,378	48,942	52,038
40	27,091	31,034	33,119	33,440	36,982	38,598	45,357	46,129
45	25,018	26,912	27,926	30,868	32,195	32,684	38,815	38,618
50	16,937	18,144	18,869	21,073	21,935	22,329	26,422	26,422
55	8,718	9,684	10,352	11,424	12,180	12,647	15,031	15,273
60	12,814	12,378	11,948	14,353	13,819	13,290	15,411	14,782
65	7,423	7,240	7,046	8,227	8,015	7,786	8,843	8,585
70	5,488	5,368	5,240	5,910	5,786	5,651	6,196	6,060
75	5,138	5,045	4,949	5,303	5,218	5,127	5,361	5,281
80	2,439	2,455	2,463	2,423	2,451	2,470	2,421	2,454
85	337	403	464	232	309	378	198	277
90	-2,502	-2,446	-2,392	-2,590	-2,530	-2,472	-2,619	-2,558
95	-1,289	-1,272	-1,256	-1,315	-1,297	-1,280	-1,324	-1,306
99	-503	-502	-501	-503	-502	-501	-502	-501
Future generations	116,126	77,104	48,060	186,605	121,289	79,593	235,118	136,373

Table 12. Sensitivity Analysis IV (Net Payment III, medium fertility) (unit: 1,000 won)

Age	g = 0%			g = 1.5%			g = 3.0%	
	r = 5.5%	r = 6.5%	r = 7.5%	r = 5.5%	r = 6.5%	r = 7.5%	r = 6.5%	r = 7.5%
0	25,105	19,277	13,743	41,841	33,476	24,701	59,287	44,318
5	28,390	21,921	15,616	46,178	37,260	27,882	63,307	48,294
10	39,072	32,738	26,128	56,311	48,202	39,081	72,781	59,176
15	47,124	44,057	39,133	59,703	56,936	50,920	76,846	68,467
20	65,598	62,130	57,252	78,954	74,977	68,847	94,150	85,555
25	63,856	63,271	60,573	74,213	73,655	70,283	89,401	84,338
30	55,045	55,994	54,925	63,956	64,683	63,013	77,872	74,752
35	26,794	34,190	38,085	31,283	39,268	43,270	48,247	51,621
40	26,896	30,978	33,176	32,961	36,699	38,471	44,759	45,750
45	25,249	27,256	28,363	30,878	32,357	32,969	38,734	38,705
50	17,188	18,483	19,282	21,158	22,134	22,623	26,441	26,564
55	9,260	10,290	11,013	11,848	12,684	13,220	15,409	15,738
60	13,280	12,887	12,494	14,741	14,259	13,776	15,769	15,196
65	7,784	7,628	7,458	8,539	8,359	8,159	9,137	8,913
70	6,054	5,949	5,836	6,450	6,344	6,224	6,726	6,609
75	5,727	5,642	5,553	5,880	5,803	5,720	5,933	5,862
80	2,813	2,832	2,843	2,792	2,823	2,845	2,788	2,825
85	591	659	720	486	563	633	451	531
90	-2,467	-2,410	-2,356	-2,555	-2,494	-2,437	-2,584	-2,522
95	-1,275	-1,258	-1,242	-1,301	-1,284	-1,267	-1,310	-1,292
99	-488	-487	-486	-488	-487	-486	-487	-486
Future generations	95,156	58,178	30,711	160,299	98,899	59,619	204,665	112,178

Table 13. Sensitivity Analysis V (r=6.5%, g=1.5%, Medium fertility) (unit: 1,000 won)

Age	Net Payment (I)[1]			Net Payment (II)[2]			Net Payment (III)[3]		
	Low Welfare Expenditure[4]	Base case	High Welfare Expenditure[4]	Low Welfare Expenditure	Base case	High Welfare Expenditure	Low Welfare Expenditure	Base case	High Welfare Expenditure
0	59,680	56,355	53,478	60,702	57,376	54,500	36,802	33,476	30,600
5	66,026	62,733	59,758	67,122	63,830	60,855	40,552	37,260	34,285
10	70,953	67,695	64,345	72,126	68,868	65,519	51,460	48,202	44,852
15	71,050	67,811	63,810	72,319	69,080	65,080	60,174	56,936	52,935
20	80,432	77,244	72,451	81,100	77,912	73,119	78,164	74,977	70,183
25	76,809	73,719	68,161	77,190	74,100	68,542	76,746	73,655	68,097
30	67,671	64,716	58,483	67,804	64,849	58,616	67,638	64,683	58,450
35	42,052	39,299	32,703	42,319	39,566	32,969	42,022	39,268	32,672
40	39,261	36,728	30,038	39,515	36,982	30,293	39,232	36,699	30,010
45	34,644	32,384	26,015	34,456	32,195	25,826	34,618	32,357	25,988
50	24,095	22,158	16,494	23,873	21,935	16,271	24,072	22,134	16,470
55	14,283	12,705	8,012	13,758	12,180	7,487	14,262	12,684	7,991
60	15,493	14,277	10,660	15,034	13,819	10,201	15,475	14,259	10,642
65	9,245	8,374	5,816	8,885	8,015	5,456	9,230	8,359	5,800
70	6,933	6,356	4,703	6,363	5,786	4,133	6,920	6,344	4,690
75	6,167	5,813	4,830	5,573	5,218	4,235	6,158	5,803	4,820
80	3,033	2,831	2,286	2,654	2,451	1,907	3,026	2,823	2,279
85	675	569	291	416	309	31	670	563	285
90	-2,445	-2,491	-2,607	-2,484	-2,530	-2,646	-2,448	-2,494	-2,611
95	-1,268	-1,281	-1,316	-1,284	-1,297	-1,332	-1,270	-1,284	-1,318
99	-486	-486	-486	-502	-502	-502	-487	-487	-487
Future generations	110,379	122,280	141,961	109,388	121,289	140,970	86,998	98,899	118,579

Notes: 1) Net Payment with infra-marginal capital income tax adjustment
2) Net Payment without infra-marginal capital income tax adjustment
3) Net Payment with infra-marginal capital income tax adjustment (regarding education expenditure as transfer)
4) Income elasticities of MI benefits and social welfare expenditure are 1.75 and 1.53 respectively (1 and 1) under the high welfare expenditure (low welfare expenditure) assumption.

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Fig.1 Public Pension Benefits (2000)
(1,000 won)
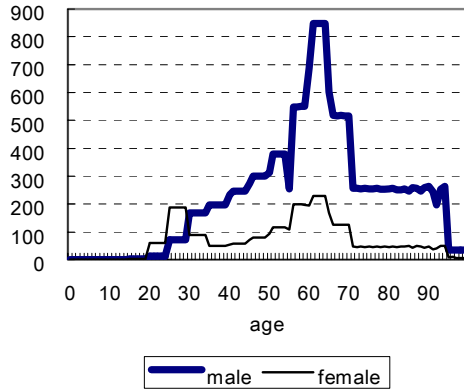
Fig.2 Pension Contribution (2000)
(1,000 won)
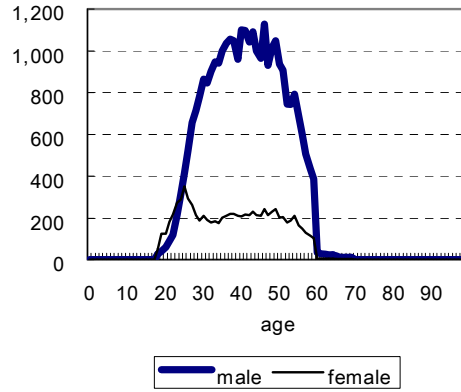
Fig. 3 Public Pension Benefit (2080)
(1000 won)
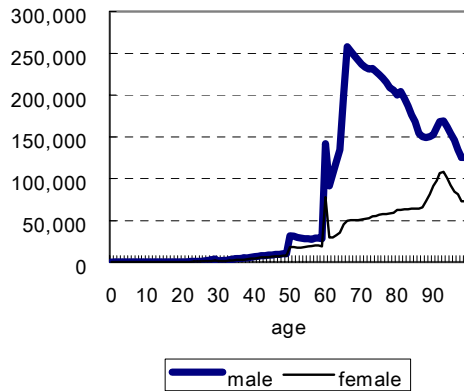
Fig.4 Public Pension Benefit Profile
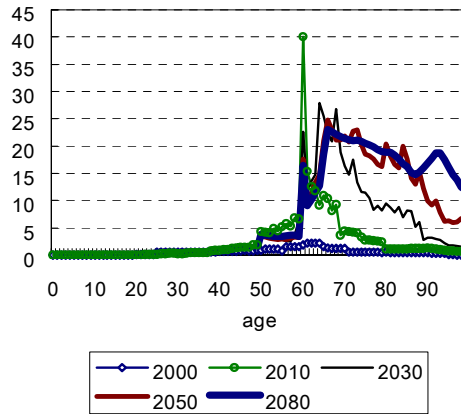
Fig.5 Public Pension Contribution Profile
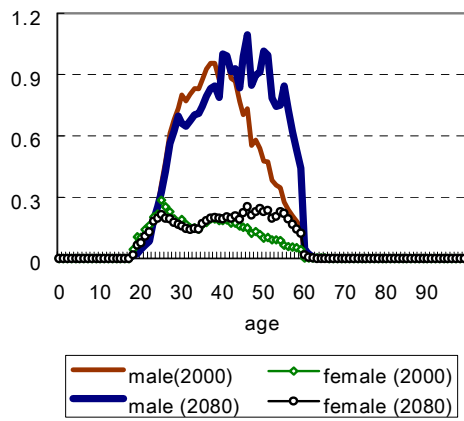
Fig.6 MI Benefit (2000)
(1,000 won)

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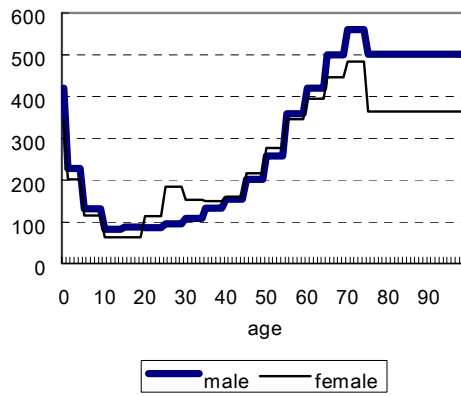
Fig.7 EI Benefit (2000)
(1,000 won)
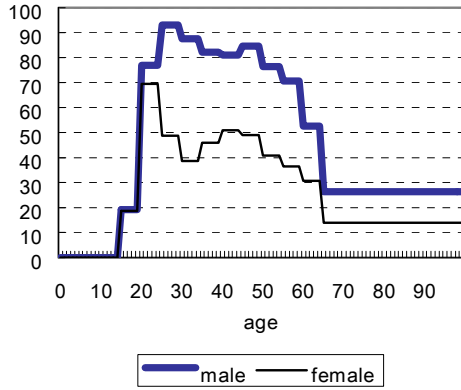
Fig.8 IACI Benefit (2000)
(1,000 won)
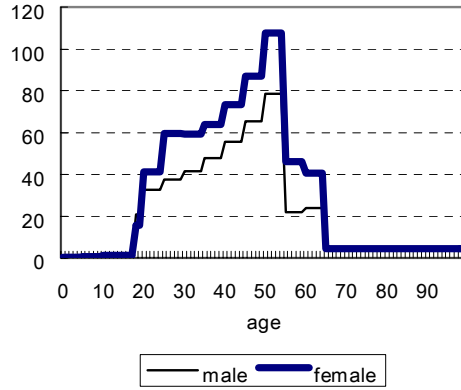
Fig.9 MI, EI, IACI Contribution (2000)
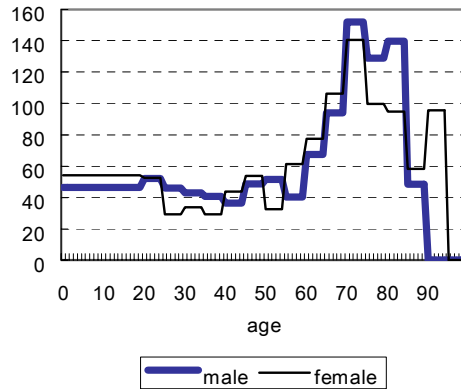(1,000 won)
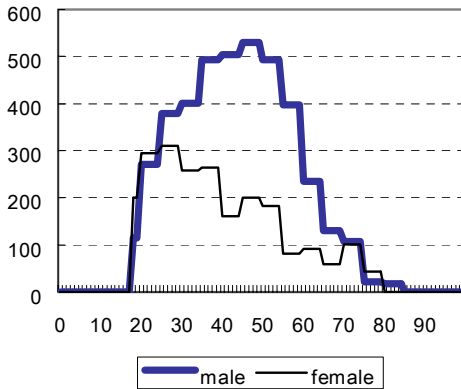
Fig.10 MLSS Benefit (2000)
(1,000 won)

Fig.11 OSTP Benefit (2000)
(1,000 won)
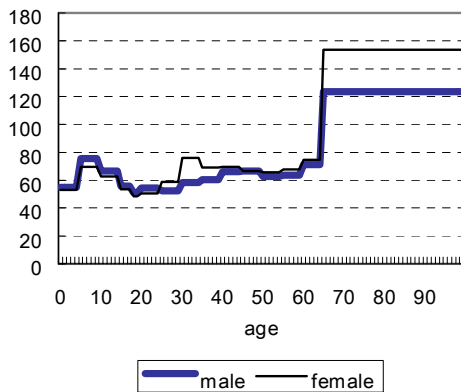
Fig.12 Labor Income Tax (2000)
(1,000 won)
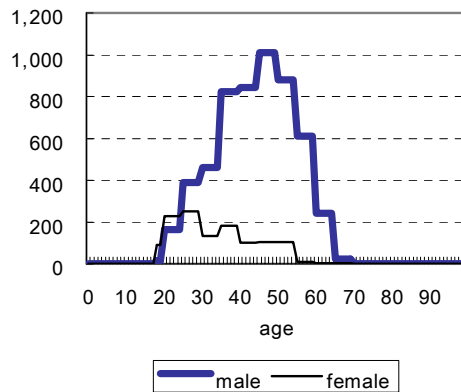
Fig.13 Capital Income Tax (1) (2000)
(1,000 won)
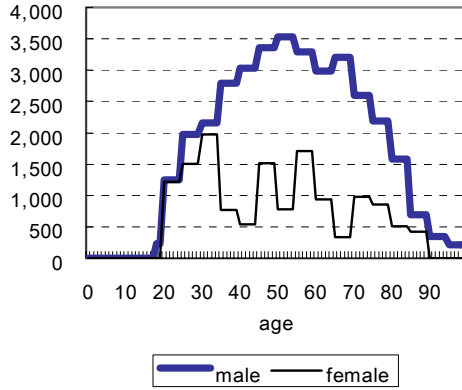
Fig. 14 Capital Income Tax (2) (2000)
(1,000 won)
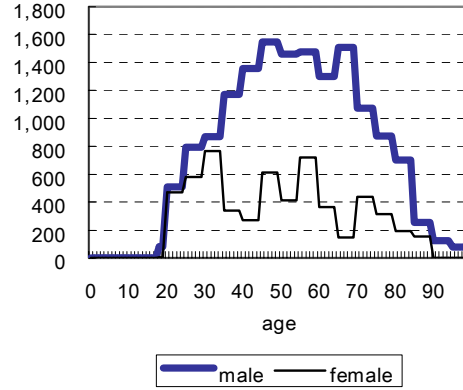
Fig.15 Consumption Tax (2000)
(1,000 won)
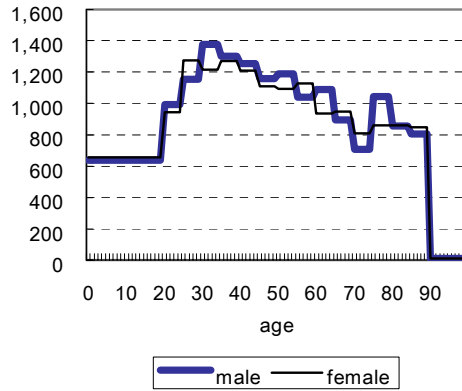
Fig.16 Tax on Asset- Holding (2000)
(1,000 won)
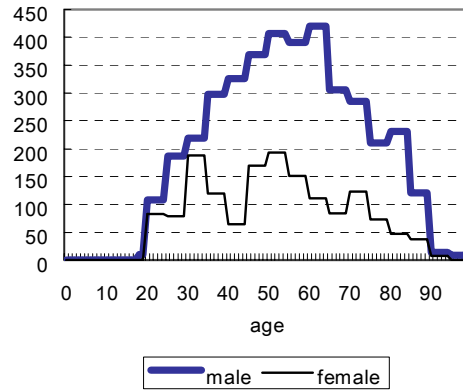
Fig.17 Tax on Asset Transactions (2000)
(1,000 won)
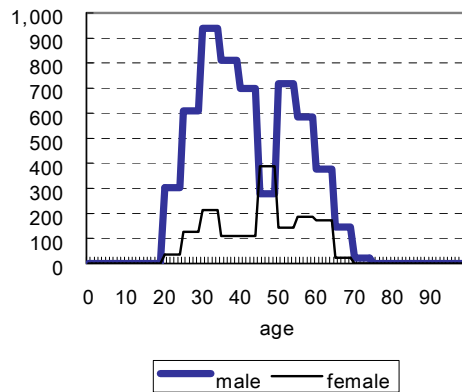
Fig.18 Other Taxes (2000)
(1,000 won)

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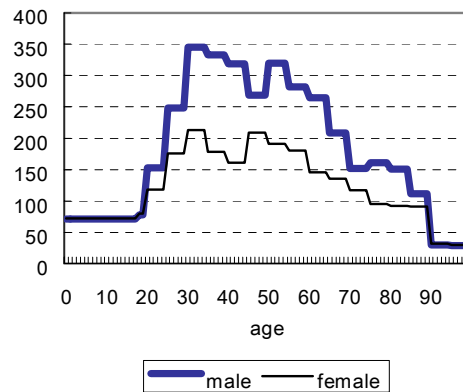
Fig.19 Seigniorage (2000)
(1,000 won)

male   female
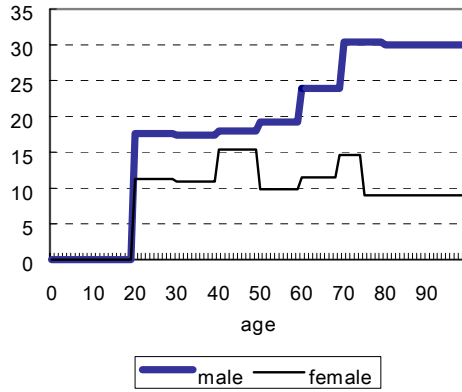
Fig.20 Educational Benefits (2000)
(1,000 won)

male and female
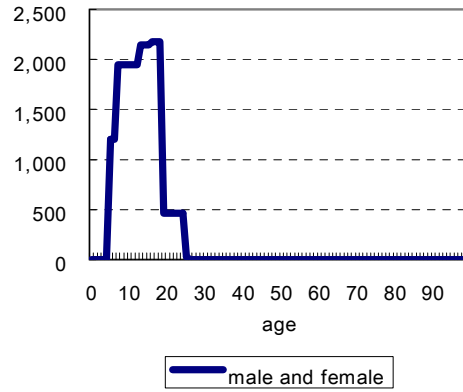
Fig.21 Net Tax I (2000)
(1,000 won)

male   female
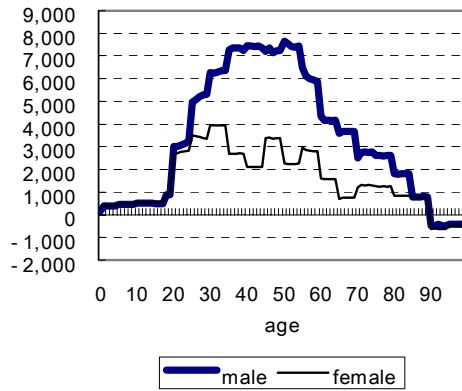
Fig.22 Net Tax II (2000)
(1,000 won)

male   female
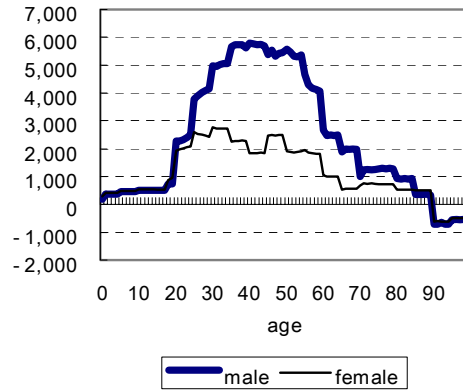
Fig.23 Net Tax III (2000)
(1,000 won)

male   female
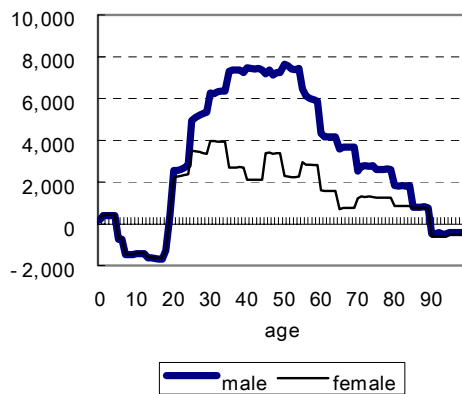
Fig.24 Net Tax I Profile of selected years

2000   2010   2030
2050   2080

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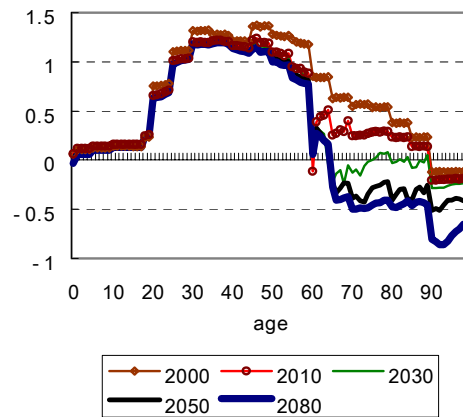
Fig.25 Aggregate Public Pension Benefits
and Contributions
(% of GDP)

pension benefits   pension contribution
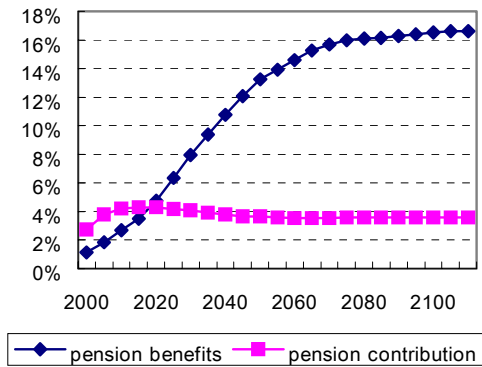
Fig.26 Aggregate MI Benefits and
Contributions (% of GDP)

MI benefits   MI contributions
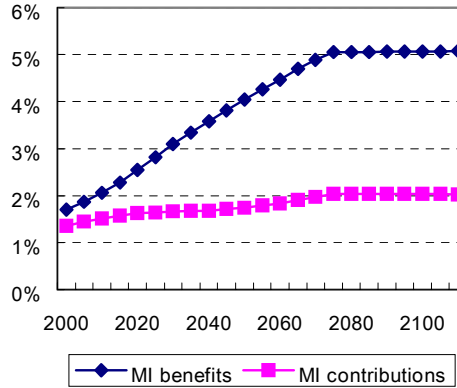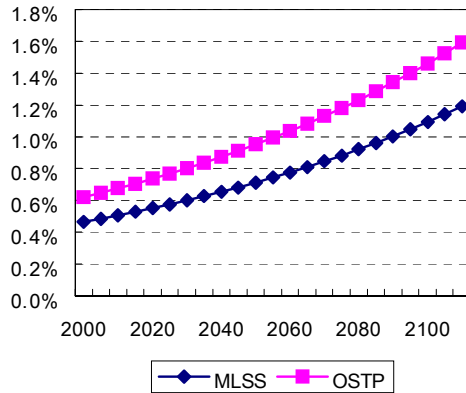
Fig.27 Aggregatge MLSS, OSTP
Expenditure(% of GDP)

MLSS   OSTP

Fig.28 Aggregate Tax Revenue (% of
GDP)

Labor Income Tax   Capital Income Tax
Consumption Tax

Fig.29 Aggregate Tax Revenue
(% of GDP)
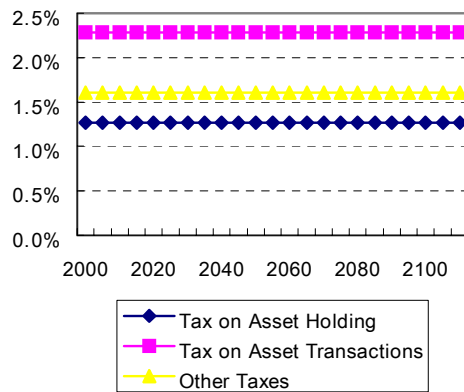

Tax on Asset Holding
Tax on Asset Transactions
Other Taxes
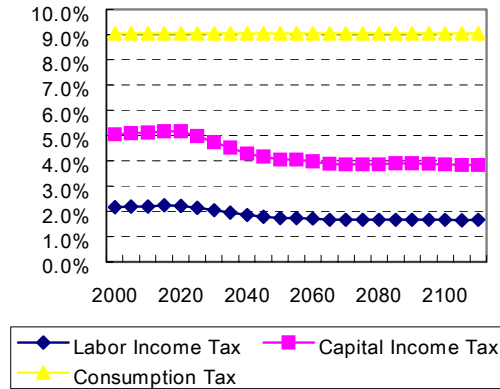
Fig.30 Aggregate Government
Expenditure (% of GDP)

Educational Expenditure
government Consumption