Preliminary

Policy Options for Financing the Future Health and Long-term Care Costs in Japan*

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Abstract

It would be necessary for arguing the sustainability of social security system to make long-term forecasts of the economy and the population during 50 years or longer. However, it is impossible to predict such a long term exactly, because of uncertainty over future circumstances. This paper examines the problems and possible improvements on the forecasts of the government, and presents some ideas of social security reforms.

This paper assumes that all the present factors but the population structure will sustain in the future, and projects the labor force, economic growth, the health care expenditure, and the long-term care costs mechanically, instead of constructing a sophisticated model for forecasting.

Our projection on the health care expenditure and the long-term care service costs are roughly consistent with the ones estimated by other economic studies, and their projections and ours are a bit less than the projection made by the Ministry of Health, Labor and Welfare (MHLW). The forecast of MHLW somewhat overstates the future increase in social security costs, although even our projection shows a considerable growth of costs.

The paper then conducts some policy simulations that consider how to finance the future health and long-term care costs. We project these costs from FY2004 to FY2100. It is shown that the balanced budget operation of health and long-term care insurances will create a large inequity of burdens among generations. Raising the premium immediately and pre-funding for the future rising costs will help to equate the burdens of generations. The premium has to be raised by around 90 percent immediately.

We then propose a reform of the public pension system, the health insurance, and the long-term care insurance, paying special attention to how policy contends with future uncertainty. Pre-funding is necessary for the health and long-term care insurances to prepare for the predicted increase in the future benefit costs.

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1. Introduction

The 2003 Annual Report on Japanese Economy and Public Finance (the Japanese Cabinet Office) wrote "the sustainability of fiscal and the social security systems goes unsure and the early accomplishment of bold institutional reforms is requested," and listed for the first time the social security reforms preparing for aging population not as a problem in the future but as an urgent issue.

It would be necessary for arguing the sustainability of social security system to make long-term forecasts of the economy and the population during 50 years or longer. However, it is impossible to predict such a long term exactly, because of uncertainty over future circumstances. For instance, the government population projections have not been able to foresee the decline of fertility that have sustained in the last three decades. The actual decline has been more drastic than projected. The unexpected deviation affects the design of public pension system heavily. Although many economic analyses have tried to grasp the future trend more accurately, our understanding is still far from complete.

This paper examines the problems and possible improvements on the forecasts of the government, and presents some ideas of social security reforms. This paper assumes that all the present factors but the population structure will sustain in the future, and projects the labor force, economic growth, the health care expenditure, and the long-term care costs *mechanically*, instead of constructing a sophisticated model for forecasting. The reason why we use such a naive method is that an elaboration of the model does not necessarily improve the accuracy of forecasts, and that complexity of the model sometimes prevents us from understanding the structure underlying numbers. A virtue of the mechanical projection is its easiness to grasp the relations among variables. Comparing the projected values with the government's forecasts and the projections of economic analyses which have many endogenous variables can clarify how projections are influenced by assumptions that the government and economic analyses employ.

The organization of the paper is as follows: Section 2 examines the reliability of governmental projections, and points out their several problems. They are based on point estimates, and do not take enough consideration for uncertainty. Since different

organizations employ different assumptions about the future, the whole government does not share a consistent prospect. Although aging population has a severe damage on the economic growth, the government perspectives tend to be optimistic.

Section 3 is concerned with the health care expenditure and the long-term care service costs. The section also presents our mechanical projections. Our projection is roughly consistent with the ones estimated by other economic studies, and their projections and ours are a bit less than the projection made by the Ministry of Health, Labor and Welfare (MHLW). The forecast of MHLW somewhat overstates the future increase in social security costs, although even our projection shows a considerable growth of costs.

Section 4 conducts some policy simulations that consider how to finance the future health and long-term care costs. We project these costs from FY2004 to FY2100. It is shown that the balanced budget operation of health and long-term care insurances will create a large inequity of burdens among generations. Raising the premium immediately and pre-funding for the future rising costs will help to equate the burdens of generations. However, the premium has to be raised by around 90 percent immediately.

Section 5 proposes a reform of the public pension system, the health insurance and the long-term care insurance, paying special attention to how policy with future uncertainty. Pre-funding is necessary for the health and long-term care insurances to prepare for the predicted increase in the future benefit costs. The paper considers two possible ways to implement pre-funding; one is transforming the health insurance and the long-term care insurance to a funded system, and the other is that the funded public pension pays the health and long-term care insurance premiums that reflect the expected expenditures by the elderly. The paper also points out that an appropriate public pension system is a combination of a pay-as-you-go first tier benefit and a fully funded second tier benefit.

2. Population Aging and Economic Growth

This section and next section will discuss the properties of governmental projections, and provide our alternative projections on labor force, economic growth, health care cost, and long-term care cost. This section focuses on the effects of population aging on variables that determine income.

2.1 Economic growth

The most important official forecast on the economic activity is "Fiscal Economic Outlook and Basic Stance for Macroeconomic and Fiscal Management," which is decided at the Cabinet Meeting every January. It contains the economic forecast for next fiscal year.[1] From FY2001, the newly established Council on Economy and Fiscal Policy has made a medium-term, economic and fiscal perspective. The most recent one at the writing of this paper is called "Structural Reform and Medium-Term Economic and Fiscal Perspectives: FY 2004 Revision," which became a Cabinet Decision in January 2005. At the same time, the Cabinet Office prepares a projection for future five years as an accompanying document.[2] Table 1 shows the past four projections.

[1] This forecast revises January in the next year, and is further revised to be actual values in the national accounts published in the next December.

[2] Although a medium-term economic and fiscal perspective is a Cabinet Decision, the concrete value becomes a reference document, which is not a part of the Cabinet Decision. The 2004 revision provides forecasts up to 2012, when primary balances of central and regional governments are expected to turn into a surplus.

Table 1: Medium-Term Economic and Fiscal Perspectives

(percent)

Fiscal year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Real growth rate											
2001	0.0	0.6	1.5	1.5	1.6				1.9		
2002	0.9	0.6	0.9	1.3	1.5	1.6			1.9		
2003	1.2	2.0	1.8	2.0	2.0	2.1	2.1				
2004		1.9	2.1	1.6	1.5	1.5	1.6	1.5	1.6	1.6	1.6
Inflation rate											
2001	-0.9	0.0	0.8	1.0	1.1				1.0		
2002	-1.5	-0.9	-0.3	0.2	0.7	1.0			1.3		
2003	-0.6	-0.2	-0.2	0.5	1.2	1.5	1.9				
2004		-1.1	-1.3	-0.3	0.5	1.1	1.8	2.2	2.3	2.4	2.4
Unemployment rate											
2001	5.6	5.6	5.4	5.2	4.9				4.2		
2002	5.4	5.6	5.7	5.6	5.4	5.2			4.4		
2003	5.4	5.2	5.1	5.1	4.9	4.8	4.6				
2004			4.7	4.6	4.4	4.2	3.9	3.6	3.4	3.2	3.2

Note: The Raw is the fiscal year of forcasts. The column is the fiscal year which the perspectives were reported (January in the next calender year). The meshes are the intensive adjustment periods.
Source: Memorandum of the Cabinet Office, each year.

Social security programs are one of policy areas which are deeply concerned with long-run economic forecasts The Ministry of Health, Labor and Welfare (MHLW) released in May 2004 “Projection of Benefit and Burden of Social Security,” which assumes the growth rate of real wage as 0.8 percent until FY2008 and 1.1 percent after FY2009.

Although it is described that the value until FY2008 conforms to the above-mentioned medium-term economic and fiscal perspectives, the growth rate is assumed to be constant every year, unlike the original numbers in the medium-term economic and fiscal perspective are estimated by a macroeconometric model. The assumed the growth rate after FY2009 is based on the MHLW Social Security Council’s Pension Fund Management Section report. This report states that when structural reforms are well carried out, the total factor productivity (TFP) growth rate will be about 0.5-1 percent, and it estimates the growth rate of real wage and the interest rate under three settings in which the TFP growth rate is 1 percent, 0.7 percent, and 0.4 percent respectively.

The wage growth rate, the economic growth rate, and the TFP growth rate have the following relationship. A production function is homogeneous of degree one with capital K and labor L, and has a labor-augmenting technological progress. It is written as

$$Y = F(K, AL). \tag{1}$$

Here, Y and A represent the output and the efficiency of labor respectively. Differentiating (1) with respect to time yields

$$\frac{\dot{Y}}{Y} = \frac{F_K K}{Y}\left(\frac{\dot{K}}{K} - \frac{\dot{A}}{A} - \frac{\dot{L}}{L}\right) + \frac{\dot{A}}{A} + \frac{\dot{L}}{L}. \tag{2}$$

When the growth rates of capital and efficiency unit of labor are the same, the first term of the RHS of (2) becomes zero. The economic growth rate is then the sum of the growth rate of labor-augmenting technological change (the wage growth rate) and the growth rate of labor force. Additionally, the TFP growth rate becomes

$$\frac{1 - F_K K}{Y}\frac{\dot{A}}{A}, \tag{3}$$

which is a product of the wage growth rate and the labor share.

"The Perspective of the Benefit and Burden of Social Security" assumes the growth rate of real national income is the sum of the growth rates of wage and labor force. The growth rate of labor force is assumed to be 0.1 percent until FY2008, -0.2 percent in FY2009 and FY2010, and -0.5 percent after FY2011.

Although the Japanese governmental projections often use the ratio to national income at factor cost, the ratio to GDP is widely used outside Japan. Our discussion will be based on the ratio to GDP.

The *ex ante* project evaluations of public works need a long-term forecast of economic growth, too. In 2002, the Ministry of Land, Infrastructure and Transport (MLIT) revised their traffic forecast (*Zenkoku Shorai Kotsu Juyou Tokei*). It assumed that the GDPs until FY2010 would follow the perspective of the Cabinet Office in January 2002 (assumed annual 1.9 percent real economic growth from 2007 until 2010), and the values after FY2011 are shown in Table 2. This projection until FY2025 is used as background data of the basic framework that the MLIT assembles for planning long-term plans of various public works.

Table 2: The Economic Perspective Made by Ministry of Land, Infrastructure and Transport

(percent)

Fiscal year	2011-2015	2016-2020	2021-2025	2026-2030	2031-2040	2041-2050
Real GDP	1.5	1.3	1.0	0.8	0.4	0.4
Labor force	0.0	-0.5	0.5	-0.7	-1.1	-1.1
Labor productivity	1.5	1.8	1.5	1.5	1.5	1.5

Note: The values are annual growth rate.
Source: Zenkoku Shorai Kotsu Juyo Suikei (June 2002, Ministry of Land, Infrastructure and Transport.)

The projections made by MHLW and MLIT is consistent with "Reform and Perspectives" at least in the medium-term. However, they are far from wholly consistent in a longer term. Further adjustments within the government seem to be necessary. In particular, an important point that should be addressed is that MHLW assumed 1.1 percent wage growth whereas MLIT assumed 1.5 percent labor productivity growth.

2.2 Labor force

A long-term trend of Gross National Income (GNI)[3] is determined by labor force, saving, and technological level (knowledge). In the following subsections, we discuss the forecasts of these three inputs.

Due to the fall in fertility rate during the last three decades, a large decrease in labor force is expected in this century. Iwamoto (1998) surveyed the existing studies on the labor force, and also projected the labor force by 2020 *mechanically*. The *mechanical projection* assumes that the present labor force participation rates by age group will sustain in the future and that the future population structure will change. Although this method is not very sophisticated, it is useful as a point of departure for examining how a change in labor force participation of each age group affects the total labor force. Iwamoto's (1998) estimates are not quite different from preceding estimates. One reason is that the labor force participation rates of working-age population do not have a room for changing drastically, and another reason is that the future population of now existing generations can be predicted considerably surely, although the trend of the birth rate in the future is uncertain.

We extended the projection of the labor force by 2050, following Iwamoto's

[3] GNI was formally called Gross National Product (GNP). The 1993 System of National Account manual changed its name, because it is an income concept.

(1998) method. We used the labor force participation rates by age from the Population Census 2000 and the future population from the Population Projections for Japan: 2001-2050, January 2001 (National Institute of Population and Social Security Research). The Population Census reports the labor force participation rates of every single age to 84 year-old (85 year-old and over are en bloc). We rescaled the labor force participation rates by age groups so that our estimates of the total labor force in 2000 matches with the values reported in the 2000 Labor Force Survey (Here after, the LFS).[4]

Table 3 shows our projection. The labor force will decrease by 8.34 million from 2000 to 2025 to be 61.34 million persons. A decrease in the labor force will continue after 2025 and every decade will lose about five million labor forces. In 2050, the total labor forces will be 45.54 million people, which is less by 15.79 million and the rate of change from 2000 is 23.3 percent.

[4] The Population Census reports the labor force in 2000 to be 66.1 million, while the Labor Force Survey reports it to be 67.66 million.

Table 3: Mechanical Prediction of the Labor Force

(thousand person)

Year	2000	2010	Labor Force Participation 2020	2025	2030	2040	2050	the Change from 2000 to 2025	the Rate of Change (percent)	the Change from 2000 to 2050	the Rate of Change (percent)
Medium variant (baseline)											
Both sexes	67,660	65,388	61,335	59,325	56,928	51,057	45,541	-8,335	-12.3	-15,794	-23.3
Males	40,140	39,169	36,649	35,468	34,138	30,756	27,432	-4,672	-11.6	-9,217	-23.0
Females	27,520	26,219	24,686	23,857	22,790	20,301	18,109	-3,663	-13.3	-6,577	-23.9
Low variant											
Both sexes	67,660	65,388	61,311	59,085	56,193	48,959	41,995	-8,575	-12.7	-19,316	-28.5
Males	40,140	39,169	36,636	35,343	33,744	29,544	25,337	-4,797	-12.0	-11,299	-28.1
Females	27,520	26,219	24,675	23,742	22,449	19,415	16,658	-3,778	-13.7	-8,017	-29.1

Note: Author's calculation using the labor force participation rates by age groups reported in the 2000 Labor Force Survey and the 2000 Population Census (Ministry of Internal Affairs and Communications) and the Population Projections for Japan: 2001-2050, January 2001 (National Institute of Population and Social Security Research) on the assumption that 2000 labor force participation rates will sustain.

At the stage of 2004 public pension reform, MHLW released in May 2004 a forecast of future financial positions of public pension under the reform plan, The forecast used the labor force participation rates that were reported in "A Forecast of Labor Force Participation Rates" (*Roudouryoku-ritsu no Mitooshi*) compiled by the Employment Security Bureau of MHLW. Table 4 shows that projected labor forces, which we calculate by multiplying the labor force participation rates reported by the Employment Security Bureau and the official population projection (baseline case) for each age group. The calculated labor forces in 2025 are 62.97 million people, which is larger by 3.64 million than 59.33 million people shown in Table 3. The MHLW projection thus expects an increase in the labor force participation rates of the elderly and women.

Table 4: The Perspective of Labor Force and Participation Rate by MHLW

	Male		Female	
Year	2000	2025	2000	2025
Labor force	40,140	36,310	27,520	26,655
Labor force participation Rates by age group				
15-19	18.4	20.1	16.6	17.8
20-24	72.7	77.6	72.7	73.7
25-29	95.8	95.9	69.9	75.3
30-34	97.7	97.6	57.1	65.0
35-39	97.8	97.8	61.4	67.4
40-44	97.7	97.8	69.3	75.2
45-49	97.3	97.5	71.8	77.0
50-54	96.7	96.9	68.2	73.5
55-59	94.2	94.4	58.7	67.5
60-64	72.6	85.0	39.5	60.5
65-	34.1	29.5	14.4	13.0

Note: The 2025 labor force is calculated by multiplying the projected population reported in the Population Projections for Japan (January 2002, National Institute of Population and Social Security Research) by the labor force participation rates by age groups.

Source: the 2025 labor force reported in the Perspective of the Labor Force Participation Rate (July 2002, the Employment Security Bureau, Ministry of Health, Labor and Welfare) and the 2000 labor force and labor force participation rate reported in the Labor Force Survey (the Statistics Bureau, Ministry of Internal Affairs and Communications.)

The MLIT perspective mentioned in Section 2.1 presumes that the labor force participation rate of the women will reach the level of the present rate in Sweden by FY2015. It also assumes that the participation rate of male who are age 60-64 will be the same as that of the present male who are age 55-59. MLIT states that these assumptions follow the interim report of the Section of the Basic Policy at the Council of National Land submitted in November 2001. However, the report only said "A qualitative decrease in regional labor force is eased to some extent, if we assume that the labor force participation rate of the women will be the same as the present rate in Sweden by FY2015, and that the participation rate of the male who are age 60-64 will be the same as that of those who are 55-59." The statement of the report is not a solid forecast but is just a hope. It seems dangerous to use it for the *ex ante* evaluation of public works.

The interim report of the Study Group on the Population Decreasing Society (*Jinko Gensho-ka no Keizai ni Kansuru Kenkyu-kai*) of the former Economic Planning Agency (now the Cabinet Office) stands on an optimistic perspective, too. Although the report configured the estimation in which the labor force participation rates by age group are fixed as a baseline, it said "Nonetheless the decreasing population exerts a negative effect on the economy, the effect will be offset by an increase in labor force participation of the elderly and women or by the productivity growth driven by IT Revolution ". However, Iwamoto (1998) indicated that the increase in the labor force participation rate driven by the removal of the factors that inhibit women and the elderly from working (such as the shortage of child care center or the work-discouraging pension benefit design for the working elderly) lay far below from the perspectives of EPA and MLIT. It seems that the governmental projections expect an invalid future increase in the labor force participation rate.

2.3 Capital stock

At first, let us imagine a two-period overlapping generations model that describes theoretically the movement of capital stock by aging population. When a pay-as-you-go public pension is not constituted, a decline of population growth diminishes the labor force largely as compared with the saving stock of the elderly. In a small open economy, in which the ratio of capital to the efficiency unit of labor remains constant, the net

external asset increases. In a closed economy, a decrease in labor force lowers the ratio of capital to the efficiency unit of labor. Although we have to pay attention to a possible shift in saving behavior by a change in factor prices, it is often the case that the movement of the ratio of capital to the efficiency unit of labor is not reversed under reasonable parameter values. Even in a large open economy, it is valid that a change in factor prices offsets only a part of the increase in the net external asset that is brought by a decrease in population.

When a pay-as-you-go public pension is constituted, a decrease in population growth pulls up the pension premium of the working generations so that the incentives to the life cycle saving will be weakened. However, a response of capital stock depends on the values of parameters.

Many studies projecting the future capital stock have used a multi-period overlapping generations model, because a two-period model is too simple to predict a saving behavior and to describe complicated real behavior of population. Uemura (2002) reviewed the existing simulation analyses on Japanese economy. Kawasaki and Shimasawa (2003) surveyed some representative simulation analyses and concluded that an increase in the capital-labor ratio brings on an increase in the wage rate and a decrease in the interest rate in a closed economy. Honma et al. (1987) examined the economy which has a defined-contribution and pay-as-you-go public pension, and showed that the decrease in the population growth rate from 1 percent to 0 percent induced 8.3 percent decrease in the capital-effective labor ratio.

Long-term projections made by the government so far take no account of the behavior of net external assets. This presumption can be justified when the production function is homogeneous of degree one and the growth rates of effective labor and capital are the same. GDP and labor income turn out to grow at the same rate, because the wage rate per effective labor and the interest rate are constant. Moreover, the capital-effective labor ratio is constant, and we can derive a consistent interpretation both in a closed economy and in an open economy. GNI and GDP will grow at the same rate in this case.

Although the setting of constant capital-effective labor ratio is arbitrary, it is difficult to derive the information about a quantitative change in saving from the existing studies that made the capital-effective labor ratio endogenous. There are several

reasons for this. First, there are not enough attempts that compare numerical results of existing studies. The second reason is that the simulation analysis based on multi-period overlapping generations model has difficulty in calibrating the initial point, which is a common technical problem of this type of studies. The general process of the simulations based on multi-period overlapping generations model is as follows; first, solving a balanced growth path in the beginning, and then, setting the estimated path as an initial point, and calculating a transitional path. However, the real economy does not correspond to the initial point on the estimated balanced growth path. For this reason, it is difficult to adjust the calculated initial values to actual values in order to reproduce the transition of the real economy. Moreover, the reaction of the household to unexpected changes in circumstances put on the simulated values; whereas such movements do not appear in the real world. The third reason is that the saving behavior of the elderly who live with their adult child cannot be comprehended from the actual data.

It is not be clear how saving behavior of them is well reproduced in the simulation analysis.[5] It calls for further discussion to make a consensus on the future saving transition by researchers who study the simulation analysis.

2.4 Technological progress

Since there are many difficulties in projecting a long-term trend of technological progress based on economic theory, most simulation analyses configure it as given. Unfortunately, it is not easy to find a certain ground for setting the value. For instance, the above-mentioned interim report of *Jinko Gensho-ka no Keizai ni Kansuru Kenkyu-kai* emphasizes a productivity growth driven by the IT revolution. It might be a convincing prospect at least when the report was submitted in June 2000, however, the burst of the IT bubble just behind has made such a projection obsolete.

We shall review the setting of technological progress in several simulation analyses. Honma et al. (1987), which is a pioneering research of multi-period overlapping generations model in Japan, set the technological progress rate at zero. Most of later studies have adopted the same assumption (for example, Kato [1998],

[5] Another problem is that the simulated saving behavior cannot give an enough explanation for the actual saving behavior. However, it is a kind of common problems lying on the economic analyses.

Uemura [2001], and Okamoto [2003]). This assumption facilitates the intertemporal comparison of GDPs. However, a setting of the technological progress rate might influence the behavior of the model, since the technological progress directly affects the saving behavior.

Some studies have extended the theoretical model to treat the technological progress and the labor force participation as endogenous variables. However, it is premature to incorporate the results from such studies into a governmental projection, because their accuracy has not been secured. We think that assuming that the capital grows at the same rate as the effective unit of labor and that the technology progresses at some given rate is, though simplest, superior in making the entire structure intelligible.

We project the economic growth rate, using the predicted change in labor force represented in Table 1. We assume here that the labor-augmenting technological progress rate (the wage growth rate) is 0, 1, and 1.5 percent. Table 5 reports the annual growth rate of every 10 years. Basically, an increase in capital stock or TFP is necessary for attaining to economic growth exceeding one percent because of a decrease in labor force. The remaining task is to make a consensus about the projection of technological progress in the government.

Table 5: The Projection of the Economic Growth

(percent)

Fiscal Year	2000-2010	2010-2020	2020-2030	2030-2040	2040-2050
Labor force	-0.3	-0.6	-0.7	-1.1	-1.1
Economic growth rate					
1.0 percent annual technological change	0.7	0.4	0.3	-0.1	-0.1
1.5 percent annual technological change	1.2	0.9	0.8	0.4	0.4

Note: The values are annual growth rate.
Source: Author's calculation.

3. Long-Term Projection of Social Security Benefit Costs

3.1 Health care cost

MHLW occationally publishes the “Future Benefit and Burden of the Social Security System” (*Shakai-hoshou no Kyufu to Futan no Mitooshi*), which projects the benefit and burden of public pension, health care, and social works including long-term care. Table 6 compares recent five projections about health care and long-term care. Since projections in different years assume different inflation rates, comparing raw numbers is misleading. A comparison with the ratios to National Income turns out that predicted health expenditures differ mildly.

Table 6: The Perspectives of Health Care and Long-term Care Costs Reported by Ministry of Health, Labor and Welfare

(trillion yen)

Projected date	Projected in March 1994	Projected in November 1996		Projected in September 1997	Projected in October 2000	Projected in May 2002	Projected in May 2004
Fiscal Year			Introduction of the Long-Term Care Insurance	Introduction of the Long-Term Care Insurance			
Health Care Costs							
1993	24						
1995		24	24	24			
2000	38				26		
2010	68					35	34
2025	141	107 - 108	96	90	71	60	59
	(11 - 19)	(11.5 - 18)	(10 - 16)	(10 - 15)	(11)	(11)	(11)
Long-Term Care Service Costs							
2005						6	
2010						8	9
2015							12
2025			13 - 20	14 - 21	21	20	19
			(2)	(2.5)	(3)	(3.5)	(3.5)

Note: Numbers are benefits of each social insurance. The Numbers in parentheses are the ratio to National Income.
Source: Welfare Vision for the 21st Century, Ministry of Health and Welfare, May 1994 and others.

The future health expenditures are predicted by extrapolating the most recent actual values of nominal health expenditure, which do not synchronize with the setting of the inflation rate and the economic growth rate. The extrapolation of nominal health expenditure without any reasonable link to inflation can be problematic from the viewpoint of economics. Most projections done by economists are based on real values, and their methodologies belong to a family of mechanical projection. Iwamoto (2004) surveyed the several projections made by the existing studies such as Ogura and Irifune (1990), Ogura (1995), Niki (1995), and Iwamoto et al. (1997), Nishimura (1997), and Tokita et al. (1997), and concluded that the national health expenditure would become about 1.4 times as big as the level of 2000 in the following 30 years. We here follow the method established by existing studies and assumed that the per capita health expenditure by age group reported in "National Medical Expenditure (FY2002)" of MHLW (shown in Table 7) will sustain in the future. From this procedure, all future values come to being measured at the FY2002 income level.

Since we want to make our mechanical projection comparable with the MHLW's projection, they were converted to the FY2004 income level. First, the national aggregate of health care cost of in the FY2004 is calculated as a product of projected population in 2004 and per capita cost by age group. Per capita health costs by age group was proportionally adjusted so that the national aggregate matches the numbers of *MEDIAS*, which reports health care costs paid by public health insurance.[6] The adjusted age-cost profile is used to project the future health care cost.

We also decompose the total cost to social security payment and out-of-pocket expenses by using statutory coinsurance rates in 2004 and assuming they will sustain in the future. Since April 2003, the coinsurance rate has been 20 percent for 0-2 year-old, 30 percent for 3-69 year-old. For 70 year-old and more, the rate is 10 percent in principle (high-income earners are applied to 20 percent). Due to the lack of data, we assume that 10 percent coinsurance rate applies to all of the aged 70 and over. Since available health expenditure data do not separately report the spending of age 0-2 and age 3-5, we assume health expenditure per capita will be uniform in this age group, and

[6] At the writing of this paper, data for the latter half of FY2004 was not available. We interpolated it by multiplying the value in the latter half of FY2003 by the ratio of health care costs in the first half of FY2004 to that in the first half of FY2003.

then calculate the average coinsurance rate. Since actual costs concentrate on newborn babies, this procedure may slightly overestimate the true social security payment. However, at the same time, many municipal governments offer extra benefits to health expenditure of infants from their general budget. Since we do not incorporate these subsidies into our estimation, it results in underestimation of social security benefits. The overall impact on an estimation bias is ambiguous.

Table 7: The Expenditures for Health Care and Long-Term Care per Capita by Age Group (2004 Fiscal Year)

(yen)

Age Group	Health care		Long-term care	
0-4	164,100			
5-9	93,600			
10-14	71,000			
15-19	57,700			
20-24	75,000			
25-29	93,500			
30-34	98,400			
35-39	106,600			
40-44	120,800		5,700	(40-64)
45-49	144,000			
50-54	199,100			
55-59	246,500			
60-64	306,800			
65-69	415,500		43,800	
70-74	540,500		97,000	
75-79	750,900	(75-)	203,200	
80-84			429,400	
85-89			799,900	
90-94			1,236,100	
95-			1,786,500	

Note: The values are the sum of benefit from insurer and co-payment of patients.
Health care expenditure is calculated by proportionally adjusting the FY2002 value reported in *National Health Expenditure* (MHLW) so that the national aggregate matches the FY health care expenditure reported by MEDIAS, which totals payments of the public health insurance. *National Health Expenditure* categorizes those who are 75 year-old and over as one age group.
Long-term care expenditure: the values are calculated by multiplying 12 by the actual benefit for service in October 2004 reported in *Monthly Report of Long-Term Care Benefit* (MHLW). Those who are 40 year-old and over can be the recipient of long-term care insurance. The Report categorizes those who are from 40 to 64 year-old as one age group.

Panel (A) of Table 8 reports the estimated health care cost in selected years from

FY2004 to FY2050, and Panel (B) reports the social insurance payment. The current policy debates on the social security system focuses on the periods until FY2025. Our projection shows that the total health expenditure in FY2025 will be 1.19 times as much as that in FY2001. The social insurance payment will grow by 1.23 times during the same period. Although both will decline afterwards, this does not imply that a burden of paying health expenditure will be lightened after FY2025. These numbers are measured at the FY2004 GDP level, but the ability to pay will decline in the future as labor forces decline. A more appropriate measure of burden is given as health care costs per labor force.[7] As shown in Panel (C) of Table 7, social security payment per labor force will keep increasing afterwards, and the ratio to the FY2004 level will be 1.58 times in FY2040 and be 1.73 times in FY2050. In other words, FY2025 is not the terminal point for thinking about the sustainability of the health insurance system.

Table 8: Social Security Benefits for Health Care and Long-Term Care

[7] Labor force should have been measured as the efficient unit. This procedure will be incorporated in the next section.

Fiscal Year	2004	2010	2015	2025	2030	2040	2050
[Authors' Projection]							
(A) Total expenditure (billion yen)							
Health care	32,560	35,090	36,720	38,610	38,500	37,350	36,120
		(1.08)	(1.13)	(1.19)	(1.18)	(1.15)	(1.11)
Long-term care	6,372	8,137	9,737	12,540	13,650	14,825	14,748
		(1.28)	(1.53)	(1.97)	(2.14)	(2.33)	(2.31)
(B) Social security benefit (billion yen)							
Health care	25,430	27,720	29,270	31,340	31,260	30,410	29,790
		(1.09)	(1.15)	(1.23)	(1.23)	(1.20)	(1.17)
Long-term care	5,716	7,296	8,728	11,234	12,226	13,276	13,210
		(1.28)	(1.53)	(1.97)	(2.14)	(2.32)	(2.31)
(C) Social security benefit per worker (yen)							
Health care	378,000	423,900	462,400	528,200	549,200	595,600	654,100
		(1.12)	(1.22)	(1.40)	(1.45)	(1.58)	(1.73)
Long-term care	8,500	11,200	13,800	18,900	21,500	26,000	29,000
		(1.31)	(1.62)	(2.23)	(2.53)	(3.06)	(3.41)
[MHLW Projection]							
The ratio of social security benefit to NI (percent)							
Health care	7.1	8.2	9.2	11.2			
		(1.16)	(1.29)	(1.58)			
Long-term care	1.4	2.2	2.7	3.6			
		(1.59)	(1.96)	(2.65)			

Note: The values in parentheses are a relative ratio to the 2004 level.
Sources: Authors' calculation, and the Projection of Benefit and Burden of Social Security (Ministry of Health, Labor and Welfare).

To compare our projected values with the MHLW projection, we have to transform them into the ratios to National Income. Here, we use the following simplified transformation method. We assume that the per capita health expenditure of each age will grow at the economic growth rate. We also assume that GDP and NI will grow at the same rate. In addition, the capital-effective labor ratio is assumed to be constant. Then, the growth rate of NI is represented as the sum of the growth rate of labor productivity and labor force participation, as shown in equation (2). Therefore, the growth rate of health expenditure compared with NI becomes equal to the growth rate of health expenditure per labor force.

The MHLW projection reports that the ratio of health expenditure to National Income in FY2025 will become 1.58 times as much as the level of FY2004. Therefore,

the projection of MHLW stands on more pessimistic prospects of a future increase in health expenditure than our projection.

The mechanical projection like ours may be biased upward, because they do not take into account the effect of aging on the terminal care expense. In Japan, Suzuki and Suzuki (2001) and Ohkusa (2002a) provided a modified projection that took account of this point. Since the terminal care expense for more aged becomes lower, a longer longevity will shift the average age of death to further elder so that the future health expenditure by age group is expected to be lower than the present level. Taking this effect into consideration, the above-mentioned studies pointed out that the MHLW projection overestimated the future health expenditure. Suzuki and Suzuki (2001) reported it amounted to about 4.4 percent of the health expenditures for the elderly. On the other hand, Ohkusa (2002a) concluded that the overestimate reached about from 15 to 30 percent of the total health expenditures. The divergence in their estimates is quite large, because the restriction in data made it difficult for them to separate medical expenditures of survivors and those who died.

There may be some other measures that control the future health expenditure. For instance, Evidence Based Medicine and preventive medicine are now encouraged. If these attempts succeed, the future health expenditure may decline. However, their overall quantitative effect is uncertain individual disease.

In addition, the health spending may be influenced by some economic factors like moral hazard of health insurance or physician-induced demand. The income and price elasticities of health expenditure are key parameters in evaluating a quantitative impact of economic factors on health expenditure. The estimation of price elasticity has been difficult because there are few changes in official prices of medical services under the universal public health insurance system. Nakanishi (2000) estimated that the price elasticity using aggregate quarterly data from 1971 to 1997, and reported it was between -0.53 and -0.68. Iwamoto and Kishida (2002) used changes in the coinsurance rate caused by past health insurance reforms to estimate the price elasticity, which was about in the range between -0.1 and -0.3. Ohkusa and Ii (2002) used micro data from an original survey, which asked whether a respondent visited a medical institution under virtual price changes in a case of a light disease. Though the price elasticity is not reported in their paper, we calculated it from the information presented in the paper, and

it was -0.26.[8]

A rough consensus of the existing literature is that the price elasticity of the demand for medical care is low. The projection cannot capture the response of medical expenditure to the future change in prices of medical services because the future price changes are difficult to predict accurately. A change in coinsurance rate will also affect the medical expenditure. There is no room for raising the coinsurance rate for the young because it is already a high level, 30 percent. However, raising the coinsurance rate for the elderly may be possible. It will decrease several percents of the future health expenditure.[9]

In Table 8, we implicitly assume the income elasticity of health expenditure is one. Most existing studies using aggregate time-series data estimated that it was close to one or above one. On the other hand, Nakanishi (2000) used aggregate time-series data and found it was around 0.26 to 0.28.

3.2 The long-term care cost

The cost incurred in the long-term care insurance will cause serious concern, because the expenditure for it keeps growing greatly.

As Iwamoto (2001) argued, the actual cost for long-term care at the introduction of the long-term care insurance was largely distant from the projection made before that. Tajika and Kikuchi (2003) examined the gaps between the actual cost and the MHLW projection during the period between the introduction of the long-term care insurance and January 2002. They found that the care required were certified to a more severe disability category than projected, and that the actual per capita cost for in-home care exceeded the MHLW projection. A substantial increase in the number of those who used

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[8] There are many other studies which investigate the reaction of consultation rate and consulting frequency per case to price changes. Iwamoto and Kishida (2002) surveyed such studies and summarized that all but one result said that the absolute value of the price elasticity was below 0.36. Many studies have targeted variables other than medical expenditure, because the data on medical expenditures are rather difficult to obtain.

[9] The health expenditure for those who are 75 year-old and over occupies 38.3 percent of the National Medical Expenditure in FY2002. Suppose that the coinsurance rate of this age group is 10 percent initially and that it increases to 20 percent. The resluting price change evaluated at the midpoint becomes 67 percent. When the price elasticity is -0.1, the medical expenditure for the age group will decrease by 6.7 percent. If the medical expenditure for those who are 70 year-old and over decrease at that rate, the National Medical Expenditure will decrease by 2.6 percent. However, note also that the National Medical Expenditure is a broader measure than health expenditure for the insured.

in-home care service suggested that those who were waiting for using in-facility care had shifted to using in-home service.[10]

The care service cost per capita is decomposed into four factors as follows:

$$\frac{Care\ Service\ Cost}{Total\ Population} = \frac{The\ Care\ Reqired}{Total\ Population}\frac{The\ Certified}{The\ Care\ Reqired}\frac{Service\ User}{The\ Certified}\frac{Care\ Service\ Cost}{Service\ User}$$
$$= Frequency \cdot Certificat ion\ Rate \cdot Recipient\ Rate \cdot Service\ Cost\ per\ Subject$$

The future behavior of certification rate, recipient rate, and cost per subject affect the projection of long-term care cost. All these factors are expected to increase in the future. An increase in the elderly brings an increase in the care required under a constant frequency. Although the certification rate, the recipient rate, and the cost per subject were low at the introduction of the long-term care insurance, those are expected to grow with pervasion of the scheme.

The municipal governments prepare a five-year business plan for the long-term care insurance and revise it every three years. Before the first revision was made in FY2003, the Projection of Demand for Long-term Care (*Kaigo-Sahbis-ryou-tou no Mitoosh*, *June 2002*) were provided by MHLW, and expected the increased care in the following five years. For example, the provisional nationwide sum of usage of home-visit service will increase by 39.3 percent from FY2003 (142,194 visits) to FY2007 (198,033 visits).[11] The projection did not provide the total amount of long-term care costs. We calculate the sum of the provisions weighted by the actual costs in FY2003, and the resulting growth during FY2003-2007 amounted to 26.4 percent.

Suzuki (2002) and Shimizutani and Noguchi (2004) projected the future long-term care cost. They assumed that the certification rate, the recipient rate, and the cost per subject would increase as the penetration of the scheme. The certification rate is expected to increase by 83 percent (Suzuki [2002]) or about 90 percent (Shimizutani and Noguchi [2004]). The actual recipient rate reached 80.2 percent in April 2001 and it

[10] This fact is, however, a factor which decreases a total of care service costs because the in-facility service is replaced by in-home service which is at a lower cost per capita than in-facility service.

[11] In parentheses, this projection presumed that the number of the certified as the care required in FY2003 was 3,279,000, whereas the actual number of the certified was 2,983,000 at the end of FY2003.

has been below 80 percent afterwards. The penetration of the scheme has already reflected on the current recipient rate. If so, the projections by these studies may overestimate the future costs.

According to the projection of MHLW in May 2004, the long-term care insurance benefit in FY2025 (the ratio to National Income) will be 2.7 times as much as that in FY2004. Suzuki (2002) reported the projected cost in FY2025 would be 3 times as much as the level of August 2001, and 2.3 times as much as the level of October 2003. Shimizutani and Noguchi (2003) projected the future cost for home-visit care, commuting care and short stay. Shimizutani and Noguchi's (2003) estimate is smaller by 28 percent than Suzuki's (2002).

We report our mechanical projection of long-term care insurance benefits from FY2004 to FY2050 with a similar methodology with health insurance. Since the most recent annual spending by age group is FY2002 at the writing of this paper, we estimate annual spending from monthly data. The long-term care expenditure by age group in October 2004 is obtained from "Monthly Report of Long-Term Care Benefits Survey" (MHLW). We calculate annual spending by multiplying it by 12, and report it in the left column in Table 7. The future long-term care expenditure is then projected under the assumption that the age-expenditure profile will not change and that only the population structure will change. The numbers in selected years is reported in Panel (A) of Table 8. We decomposed them into social security benefit and out-of-pocket expense by assuming the current statutory coinsurance rate of 10 percent will sustain. The social security benefits for long-term care are reported in Panel (B) of Table 8, and the benefits per labor force are shown in panel (C).

Let us summarize the properties of MHLW projection of health and long-term care insurance benefits by comparing with our counterpart reported in Panel (C) of Table 8. The health care insurance benefit in FY2025 will become 1.58 times as much as in FY2004, which is a little more than our projection, which is 1.40 times. MHLW projected the long-term care insurance benefit in FY2025 would be 2.65 times of that in FY2004. Our projection shows a smaller number, 2.23 times. By implicitly assuming costs of each age group will grow more than economic growth, the MHLW projection is more pessimistic than our mechanical projection, while even our projection poses a serious challenge for policymakers.

Although the mechanical projection implicitly assumes that the demand for long-term care service is fulfilled, the provision of in-facility service is restricted so that some users substitute in-home service for in-facility service.[12] Therefore, fulfilling the demand by extending in-facility service will bring an increase in long-term care service cost. Since the mechanical projection configures the usage of in-facility service is constant at the present level, the predicted values may result in underestimation to some extent.

Like health care, changes in price and income are excluded from the mechanical projection. Ohkusa (2002b, 2002c, 2003) and Shimizutani and Noguchi (2004) estimated the price elasticity and income elasticity of demand for long-term care service based on the data after the introduction of the long-term care insurance.

Ohkusa (2002b) used micro data from an original survey. The target group of the survey was the household whose head was the elderly and had been certified as the care required in 2000 by authorities of two cities and three counties in Gifu Prefecture. The surveyed sample was 1,075 households (The elderly who live with their child was not included). The income elasticity estimated by Ohkusa (2002b) was greater than one. Ohkusa (2002c) estimated a price elasticity using the same data. He found that the demand was elastic to price changes; the price elasticity of those who are care level 1 or support-required is -1 and that of those who are care level 2 and over is less than -2.

Ohkusa (2003) also estimated the price elasticity based on the micro data from another original survey. The target group of the survey is the office providing in-home care. Using a CV method, he estimated that the elasticity of the demand for physical care to be below -1 and that for other services within -0.2 and -0.4. Ohkusa (2003) also estimated the price elasticity based on the actual demand data. The elasticity for physical care, home helper and mixed care was below –3, and the elasticity for home-visit nursing was not statistically significant.

Shimizutani and Noguchi (2004) used micro data of the Survey of Long-term Care Service Usage of the Elderly (*Koureisha no Kaigo-riyou-joukyou ni kansuru Ankehto Chosa*) surveyed by Cabinet Office. The number of sampled household, was

[12] Tajika and Kikuchi (2003) argue like this. However, the same relationship can be observed even if enough in-facility service is provided. Therefore, we are not sure whether their approach is adequate for a test of the hypothesis on restricted provision. The hypothesis should be confirmed by the presence of those waiting for in-facility service.

577 for FY2001 survey and 474 for FY2002 Survey. Price elasticities estimated by a CV method were from -0.3 to -0.4 for home help, from -0.2 to -0.3 for physical care and mixed care, and from -0.2 to -0.3 for commuting rehabilitation, day care and short stay. Income elasticities ranged between 0.2 and 0.4 for commuting rehabilitation and day care, however, they were not statistically significant for other kinds of service. From the estimation using the actual data, the price elasticity of demand for day care was -0.38 and income elasticity for day care was 0.43. For other services, no statistically significant price elasticity and income elasticity was obtained. For in-facility care service, based on the data from the same survey in 2003 and using a CV method, price elasticity of -0.3 to -0.5 and income elasticity of 0.11 were estimated.

The evidence of existing studies indicates that the demand for long-term care service responds to changes in price and income to some extent. However, the estimated values by existing studies are so widely spread that we do not well understand the precise values yet. The most difficult problem for identifying the price elasticity is likely to be created by the fact that it is not easy to obtain enough variations in prices from actual cross-section data, because prices of long-term care service are official and homogeneous under the social insurance scheme.[13] Ohkusa (2002c, 2003) focused on the special measure that lightened the coinsurance rate of low-income households to be 3 percent. He regarded a difference in coinsurance rates as a change in price. On the other hand, Shimizutani and Noguchi (2004) regarded coinsurance payment as a price. However, it is uncertain whether such a method successfully identifies price changes or not.

4. Simulation of Health care and Long-Term Care Insurance Policy

4.1 Procedures of the simulation

This section conducts a simulation study of policies that finance future health and long-term care insurance benefits projected in the previous section. The effect on fiscal balances and burdens on generations are discussed.

[13] Although unit prices of care treatment fee are permitted to differ among municipalities, the purpose of this system is to adjust differences in local price level. Therefore, we can interpret that real unit prices are approximately uniform nationwide.

Since these costs at a particular age are assumed to grow at the economic growth rate, the benefit level relative to income is uniform across generations. Therefore, our simulation can focus only on the financing side.

When we focus on the proportion of the burdens to income, not the absolute level but the difference between the interest rate and the growth rate matters. Therefore, we thus put three settings about the difference between them; 0 percent, 1 percent and 2 percent. The MHLW projection on public pension finance in May 2004 assumed that the nominal interest rate would be 3.2 percent and that the growth rate of nominal wage would be 2.1 percent. Our baseline case sets one percentage point difference between the interest rate and the growth rate.

We assume that the social insurance premium and taxes devoted for social insurance benefits are paid from the compensation of employees and mixed income in terms of national accounts. For simplicity, we also assume that these incomes will grow at the same rate as GDP after FY2004 and that there is no administrative cost in social insurance programs. Actually, the administrative cost of Society-Managed Health Insurance is about 4 percent of total benefits in FY2001, for instance.

The initial year and the terminal year of the simulation were set FY2004 and FY2100 respectively, because the population projection by the National Institute of Population and Social Security Research is available within these periods.

We examine two policies:

Policy A: Balanced budget operation in which the benefit of each year is financed by taxes and premiums of each year

Policy B: Constant contribution rate until FY2100 which attempts to reduce the intergenerational inequity of burdens

4.2 Balanced budget

We define a burden rate as the ratio of burdens (the sum of insurance premium and government subsidies financed by taxes) to the sum of compensation of employees and mixed income. Under the balanced budget, the burden is equal to social insurance benefits (excluding out-of-pocket payment). Therefore, we actually calculated the ratio of benefit to incomes. Figure 1 shows the burden rates for health care, long-term care,

and the total of them when the Policy A is carried out. The burden rate of health care benefit in the initial year, FY2004, is 8.05 percent. The actual health insurance premium for the enrollees of Government-managed Health Insurance (*Seikan Kenpo*) is 8.2 percent. We think that the simulated burden rate is roughly comparable with the actual burden. The simulated burden rate in FY2004 is 2 percent and the actual long-term care insurance premium paid by the enrollees of Government-managed Health Insurance is 1.11 percent. Since general tax revenues finance half of benefits, the simulation reproduces the actual burden well. The burden rate for health care keeps increasing until FY2059 when it amounts to 14.30 percent. The burden rate for long-term care will amount to 7.95 percent in FY2066. Although the paths of these two burden rates appears parallel in Figure 1, we should note that the burden rate for long-term care grows much more rapidly than that for health care, because the absolute level of the long-term care costs is low. The long-term care benefit concentrates on more aged population than the health care benefit. For the same reason, a peak of the burden rate for long-term care will follow a peak of that for health care. A total burden rate of both insurances reaches a peak that is 22.14 percent in FY2064. The ratio of total burden to GDP amounts to 12.5 percent.

Figure 1: The Burden Rates under Policy A (Balanced Budget)

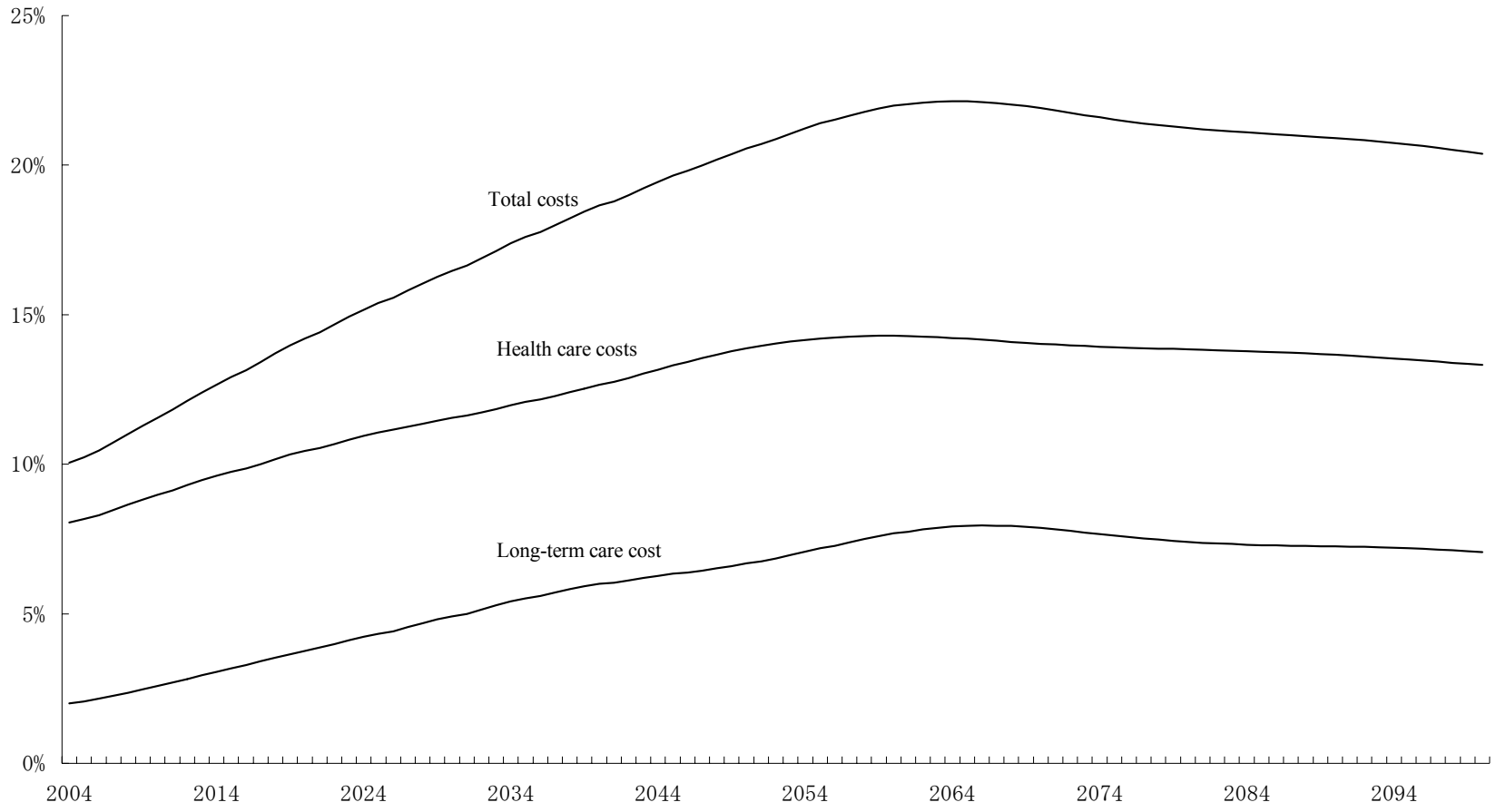
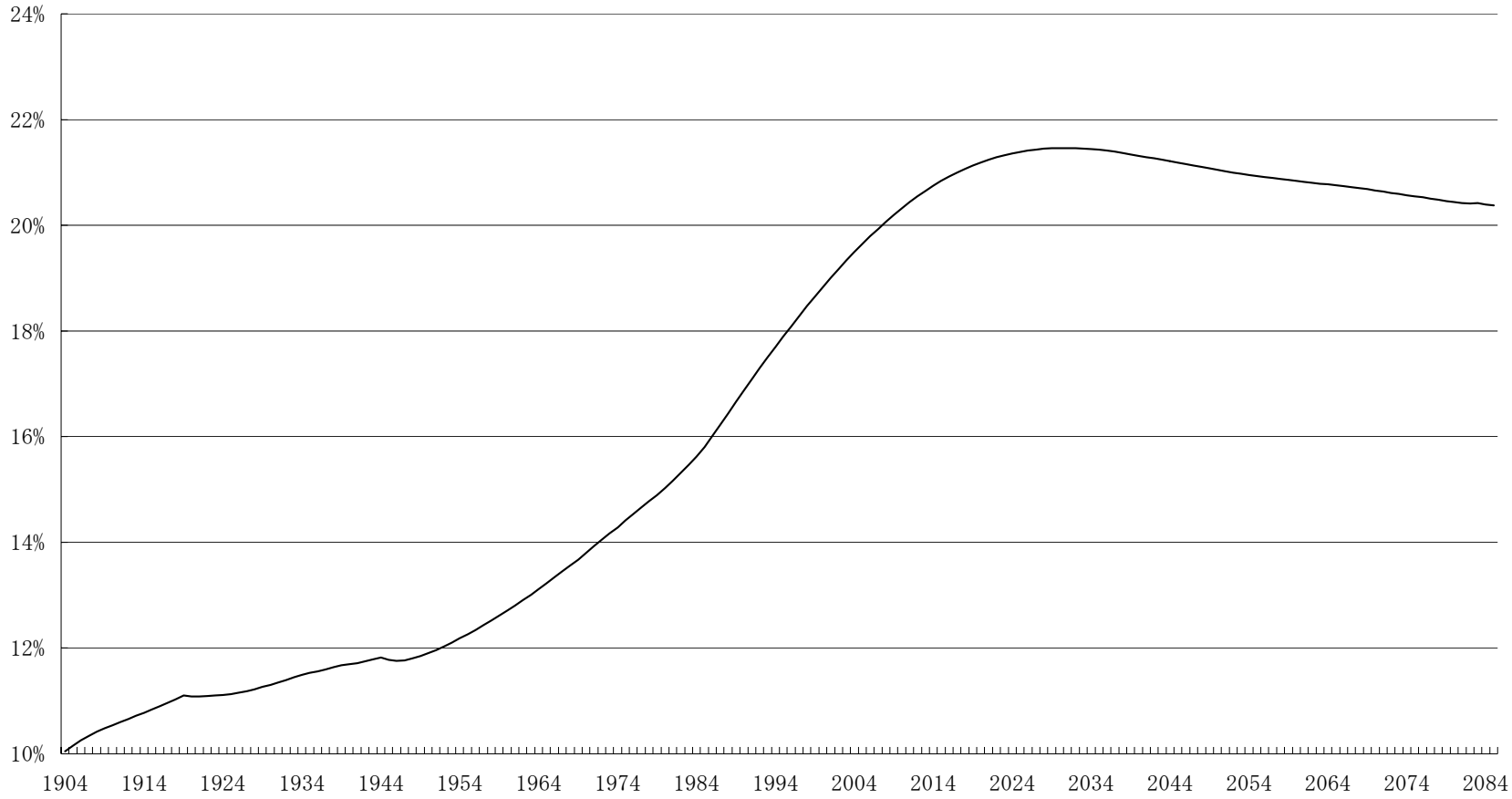


Figure 2 shows the lifetime burden rate of each generation. It is defined as the ratio of lifetime burden to lifetime income. The lifetime value covers the period from the initial point of the simulation to the terminal point, and is the sum of present discounted value of annual numbers. The age-wage profile was taken from published cross-tables of the 2003 Basic Survey on Wage Structure (*Chingin Kozo Kishon Chosa*, MHLW). For each age group, labor income is calculated as a product of the total wage per worker and our predicted labor force.

The horizontal axis of Figure 2 shows the birth year of each generation. The lifetime burden rates are not smooth in early generations, perhaps because our prospective calculation covers a short period for them. The burden rate will increase until that of those born in 2031 will be 21.46 percent. In the balanced budget case, a heavier burden on later generations brings a severe inequality among generations.

Figure 2: The Long-Term Burden Rate by Generation under Policy A (Balanced Budget)



4.3 Equalizing the burden by pre-funding policy

One possible way of avoiding the increasing burden of future generations depicted in Figure 2 is a policy that levies a constant burden rate over time. The policy intends to charge a high burden in advance so that it can accumulate enough funds to prepare for increasing costs in the future. Feldstein (1999) advocated the idea of prefunding the Medicare, which is the US public health insurance for the elderly.

As a scenario of pre-funding health and long-term care costs, we consider the following policy. For health insurance, a pre-funding part finances insurance-payments of health care costs for the elderly (age 65 and over). Workers who are age 15 and over pay premiums. The health care costs for the working age (age 64 and under) and government subsidies to the health care costs for the elderly are financed as a pay-as-you-go system. Long-term care insurance employs a pre-funding scheme, while government subsidies are financed as a pay-as-you-go system. Since enrollees of the current system are age 40 and over, we assume workers of this age group pay premiums.

Since the current health and long-term care insurance is a pay-as-you-go scheme, a transition to a funded system should be specified here. For the health care costs, we first calculate the contribution rate that is sufficient enough for the cohort born in FY2001 to finance their health care costs after 65 years old. This rate is 3.13 percent under our baseline case. If the cohorts born in FY2001 and later pay this premium rate, the total accumulated funds in FY2100 amount to 77.6 percent of GDP. The transition process is designed to achieve this level of funds with a constant premium rate during the transition. Since the existing generations did not pre-fund their health care costs, 3.13 percent of premium is not enough to hit the target in FY2100. It turns out that when the contribution rate of 5.84 percent will successfully accumulate the required funds.

The evolution of the funded system will be achieved in the following way. When health care costs (excluding government subsidies) is financed as a pay-as-you-go scheme in FY2004, the contribution rate for the health care costs for the age 64 and under is 3.58 percent, and that for the age 65 and over is 3.20 percent. When the transition to a pre-funding scheme starts in FY2005, the contribution rate for the elderly jumps up to 5.84 percent, and keeps its level until FY2100. After then, the contribution rate for the elderly will decrease to 3.13 percent. The contribution rate for health care

costs of age 64 and under is almost stable. It ranges between 3.39 percent and 3.64 percent.

The transition process of long-term care insurance is similarly designed. The contribution rate that is sufficient enough for the cohort born in FY2001 to finance their long-term care costs is 1.58 percent under our baseline case. If the cohorts born in FY2001 and later pay this premium rate, the total accumulated funds in FY2100 amount to 55.54 percent of GDP. This amount of funds will be accumulated by the contribution rate of 2.94 percent during the transition. When long-term care costs (excluding government subsidies) is financed as a pay-as-you-go scheme in FY2004, the contribution rate is 1.03 percent. When the transition to a pre-funding scheme starts in FY2005, the contribution rate jumps up to 2.94 percent, and keeps its level until FY2100. After then, the contribution rate will decrease to 1.58 percent.

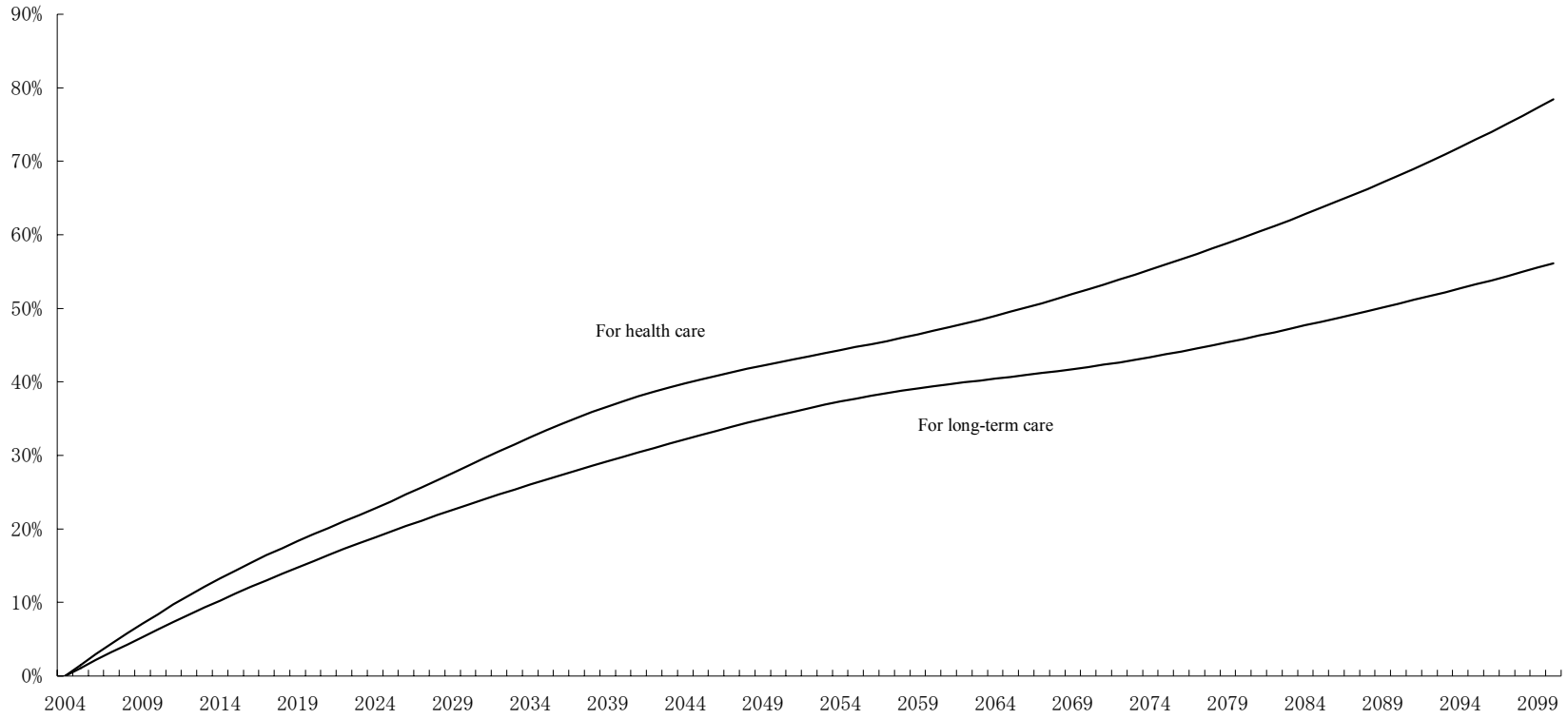
When the health care cost and long-term care cost are combined, the contribution rate should increase to 8.78 percent in FY2005. This is about 90 percent higher than the pay-as-you-go contribution rate in FY2004, 4.61 percent. The most serious problem in implementing the pre-funding scheme is whether people accept such a huge increase in burden.

Figure 3 shows the behavior of the ratio of the reserves to GDPs. Those values are transformed to be a ratio to annual GDP. Both reserves will steadily accumulate during the transition.

Suzuki (2000) conducted a similar calculation of the transition to the fully-funded health insurance system. While our calculation unites whole health insurance, his calculation was decomposed into insurance subsystems. The transition was assumed to start FY1995 and reach a fully-funded scheme in FY2100. For the Society-Managed Health Insurance for Employees (*Kumiai Kenpo*), the insurance rate will increase from 7.8 percent to 9.8 percent.

Under Suziki's specification, a fully-funded scheme finances individual's lifetime health care costs. Before individuals begin to work, their pre-funding account has to borrow money. The resulting aggregate funds are lower than in our scheme. This is one reason that we obtained a much larger hike of the contribution rate during the transition to the pre-funding scheme.

Figure 3: Transiton of the Ratio of Reserves to GDP under Policy B (Pre-Funding)



In the above simulation, a pre-funding scheme does not finance government subsidies. Since they will increase as the growth of health and long-term care costs, financing government subsidies are a serious issue regarding intergenerational inequity. We thus consider the policy that pre-fund not only social security benefits but also government subsidies. For health care cost, the contribution rate (including government subsidies) in FY2004 is 4.46 percent. The required contribution rate during the transition is calculated as 9.11 percent. The target fund level in FY2100 is 138.89 percent of GDP. After the scheme is fully-funded, the contribution rate will become 5.05 percent. For long-term care costs, the contribution rate in FY2004 is 2.0 percent. The required contribution rate during the transition is calculated as 5.88 percent. The target fund level in FY2100 is 111.08 percent of GDP. After the scheme is fully-funded, the contribution rate will become 3.16 percent.

The hike of contribution rate during the transition is obviously large. The government subsidies play a quite important role in financing the health and long-term care costs of the elderly. Pre-funding only social insurance benefit is not enough. Since the required fund is enormously large, implementing this kind of policy is a really tough challenge.

5. Aspect to Designing a Sustainable Social Security System

When one faces uncertainty of the future, it is not sufficient to design a policy based only on one projection. If we could identify the probability distribution of future events precisely, it would be possible to design the policy that maximizes the expected welfare. However, when such an attempt is impossible, we have to take a little primitive way. That is, we have to take account of several possible situations for designing the scheme. And policymakers have to show to the public what varieties of future social security benefits and burdens will happen under a variety of scenarios of risks. Moreover, the social security system can never avoid the future uncertainty. Therefore, who bears a burden due to an adverse shock should be made clear in advance. From this viewpoint, some important issues on a basic framework of social security system can be pointed out. In the following, we shall examine some detailed issues on designing the

systems of health care, long-term care, and public pension.

5.1 Health insurance and long-term care insurance[14]

The role of health insurance and long-term care insurance is different from the role of public pension program. The former is a benefit in kind and it provides a basic service. The latter is a benefit in cash and it ensures a certain living standard for the retired. The idea of benefit design is concerned with the difference.

If the costs for health care and long-term care increase, an additional burden will be required. An increase in the insurance premium is unavoidable. However, an unclear relation between the current premium and the risk of the insured causes a conflict. Although the elderly spend a large part of health and long-term care costs, their average income is low. It leads to an income transfer from the working generation to the elderly. Under such a structure, it will become more difficult for an additional increase in social insurance premium to be accepted by the working generation.

One of the issues in the reform of health insurance is establishment of a new health care system for the elderly. Since contributions from the elderly and government subsidies are not enough to pay benefits, a financial support from the young, which is called *social solidarity* premium by MHLW, is proposed. However, the government has not so far succeeded in convincing this idea of financial support.

If such a support from the young fails to be realized, there are two alternatives. One is to abandon the health care system for the elderly as a social insurance and substitute it by the system financed by general tax revenues. Since the working population pays a dominant part of taxes, however, this idea only makes the problem of intergenerational transfers implicit, thus keeping the essential problem unsettled.

The other idea is to collect actuarially fair premiums from the elderly. The elderly then have to save in advance when they are young. Pre-funding to prepare for health and long-term care costs is often doubted. The critiques are based on the reasons that the real value of asset will deteriorate due to inflation and economic growth, or that there is a possibility that costs necessary in the old age will exceeds the expected amount. However, these reasons never imply that *ex ante* saving is not necessary. At least, a predictable part of the future cost should be pre-funded.

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[14] A part of this subsection draws on Iwamoto (2002).

The social security system should also well respond to a realized risk. Spreading the risk is an important *ex post* measures to deal with the realized overflow of health and long-term care costs. The General Account of the central government is the first candidate for the sector that absorbs such a risk, because it can disperse the burden broadly by reallocating resources among various items of expenditures. When the funded health insurance and long-term care insurance system fail to finance all costs, the General Account will subsidize them. Under the pre-funded pension system, when the reserves cannot afford all health insurance premiums, the shortage will be paid from the General Account.[15]

Since the contributions of current elderly have not been pre-funded, there is no enough saving to finance the health and long-term care cost for them. At least, it is unavoidable for this part of shortage to be financed by income transfer from the actual generation. However, keeping such income transfers permanently does not seem sustainable.

5.2 Public pension program

The primary function of public pension is to force a person to save in order to finance consumption after retirement. Secondly, it covers the shortfall of saving which derived from unexpected adverse shocks with intergenerational transfer from the young. A compulsory funded pension scheme serves the first function and its management can be privatized. The latter function is served by pay-as-you-go pension scheme. As both functions are important, an adequate plan for sharing these functions with the current two tiers pension system is likely such that the earnings-related part is in charge of the former function and that the Basic Pension part performs the latter function.

Transformation of a current earnings-related part of benefits into a funded system is often proposed by advocates of privatization. For example, Iwamoto (1999) pointed out that the privatization of the earnings-related part was necessary for achieving the funded pension scheme, because the public pension has been giving priority to the interest of existing generations so that the burdens have been shifted to the future generations.

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[15] On the other hand, when the realized care costs falls short of the expected level, the surplus is funded in order to prepare for a case of an opposite prediction error.

The flat benefit part of public pension should be managed in a defined-contribution and pay-as-you-go scheme. Under a defined-contribution scheme, the declined growth of wages leads to a smaller benefit so that the minimum living standard may not be guaranteed. Since the benefit level below the public assistance level causes nonpayment of premiums and the dependence of the elderly on the public assistance program, the minimum benefit should be higher than the living standard supported by the public assistance. When the pension benefit falls short of the minimum guaranteed amount, the shortage should be financed by additional premiums levied on the working generation or by the transfer from the General Account. From the same reason, in the case of health care and long-term care, the General Account can play a key role in dispersing adverse shocks.

5.3 Feasibility of implementing a pre-funding scheme

Pre-funded health insurance and long-term care insurance can shrink a disparity of the burdens among generations. The biggest hurdle in implementing it is that it needs vary large pre-funding. In the maximum, it amounts to more than 90 percent of GDP (456 trillion yen by converting it by the FY2004 GDP). Especially, the maximal reserve for long-term care will go over 11 times as much as annual payment. It is not certain whether such a pre-funding scheme will be agreed or not. Moreover, the implementation of the scheme needs to raise the burden rate to 1.7 times as high as the current rate. Such an additional burden will not be easily accepted.

There are several ways to implement the pre-funding scheme. The first is to provide information that the current balanced-budget financing scheme for health and long-term care benefits will levy a heavy burden on future generations.

Even if people do not accept that the health insurance and the long-term care insurance hold reserves, there is the second way, which makes the insurance premiums reflect the increase in risk by ageing so as to reduce the disparity between generations. This is another version of pre-funding, because it is an ex ante compulsory saving of the future premiums. Utilizing of public pension is the most possible way. The health insurance premiums for the elderly are deducted from their pension benefits. The reserve preparing for a future increase in premium is funded in the public pension scheme. Since the purpose of public pension is to support a life after retirement, the idea

that the public pension benefit also covers health and long-term care costs for the elderly may be an easier solution than accumulating funds in health and long-term care insurances.

What is important is that the insurance premium is to be paid from a fully-funded pension program. If it were a pay-as-you go scheme, enough reserve could not be prepared. If the second tier of employees' pension is privatized, the funded pension could ensure the way of compulsory saving. In such a case, however, another problem would arise. That is, the scheme covers only employees and their family. The Basic Pension (*Kiso Nenkin*), the first-tier flat benefit, does not serve the purpose of *ex ante* saving ready for future health expenditure, since the government's subsidization to the basic pension benefit is planned to increase. The compulsory private saving plan or the Medical Saving Account may be an alternative.

The third is that we make efforts for preventing diseases and health promotion so that the required reserve can be reduced. Living healthy without spending for health care or long-term care service is, without doubt, the best choice. It may be able to reduce the costs, but is not likely to eliminate the need for pre-funding.

Thus we have to prepare for the future rising costs. One may object the idea of pre-funding by saying that an aggressive pre-funding is impossible. However, this idea is saying like "full is impossible, so nothing is better than little." It is wrong. Even little is better than nothing.

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