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Effect of Proposals for Pension Reform on the Income Distribution of the Elderly in Japan

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Abstract. The aging population in Japan is a serious problem, and the reform of the public pension system is a major political issue. Although the 2004 pension reform was enforced in Japan to ensure a sustainable pension system in an aging society, people remain apprehensive about the pension system. They believe that the current situation wherein a considerable number of people are not entitled to pension benefits or entitled to very low benefits is not expected to improve in the future. Moreover, they have a mistrust of the pension system caused by mismanaged pension records. Consequently, various sectors have created new proposals for pension reform to overcome these problems, and it has become a recent policy debate. The objective of this study is to prepare projections for the income distribution of households with elderly people using the Japanese microsimulation model, INAHSIM (Integrated Analytical Model for Household Projection), and to evaluate the effect of the proposals on the living standards of the elderly. According to the simulation results, the problem of very low benefits for the elderly does not appear to be growing. However, changes in family cohabitation of the elderly, such as the increase in the number of people living alone, may cause a decline in their standard of living. The author points out the problems of the proposed plans and proposes a new alternative to pension reform based on this perspective.

Keywords: Microsimulation, INAHSIM, Income distribution, Public pension

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1. Introduction

The advent of a super-aged society unparalleled in the world is also forecast for Japan in the near future due to the rapid progress of a declining birthrate and an aging population. According to an estimate of the National Institute of Population and Social Security Research ([1], [2]), the number of elderly people aged 65 years or older will increase from 25,760 thousand (20.2%) in 2005 to 36,670 thousand people (31.8%) in 2030. It is projected that there will be a great change to the cohabitation of families of elderly people such as those living alone (excluding those institutionalized), which is expected to increase from 3,870 thousand people to 7,170 thousand people.

At the same time, there are significant problems such as mismanaged pension records within the public pension scheme, which contain the main support for the living of those elderly people, resulting in a mistrust and causing a national debate of various issues such as changes in the financing method of the basic pension from a social insurance system to a total taxation system. The report of the Pension Committee of the Social Security Council [3] held on September 29, 2008 "Viewpoints of the investigation of problems remaining after the revision in 2004" shows 7 viewpoints and the first of these raises the issue of the "revision of pension benefits for the elderly with low pensions and low incomes." There were differences of opinion of whether or not to use a financing method of the basic pension of either a social insurance system or a total taxation system, but there was no disagreement as to the importance of the point regardless of each disputant's position on the solution.

Next, what is the current status of elderly people with low pensions and low incomes and will the number of these elderly people increase in the future? Unfortunately, few results of simulations published by the government remain on the several model cases of family finances presently or at a matured stage, and they do not show the results on future estimates such as the distribution of pension amounts. Regarding this point, the interim report of the National Council for Social Security [4] points out that "it is difficult to conceive of a great increase in the number of people without pension benefits in the future; rather if the current rate of non-payments for the National Pension continues, a fixed proportion (about 2%) of elderly people will be continually without a pension."

Microsimulation models are well known as a technique for future estimates of the distribution of such pension amounts and incomes. Many advanced countries such as those in Europe, North America, and Australia have developed their own unique models and performed these kinds of simulations. Also, there are many examples[1] of these microsimulation models being referred to

[1] For example, in Sweden, the Ministry of Finance developed a microsimulation model (SESIM) with the cooperation of researchers, and even the source code is published on their Website. Many models are being developed, such as DYNASIM in the US, and APPSIM in Australia. The website of the International Microsimulation Association <http://www.microsimulation.org/IMA/IMA.htm>

when making actual policy decisions. The concept of the microsimulation model[2] was first advocated by Orcutt [5] in 1957. It is a model intended to evaluate, at the micro level, what changes occur in social policies, such as in taxation schemes or pension schemes, or what behavior of each individual influences the income and lifestyle of each individual.

Microsimulation models have been developed and used widely since early 1990s. According to Harding and Gupta [6], the following three factors pertain to its recent development: (1) the availability of suitable micro data; (2) the growing demand of policy makers for the various types of analyses –for example, the distributional consequences of a social policy change– that only microsimulation models can provide; and (3) the vast and continuing improvements in computer hardware. In the midst of the growth of this development and its use, an international conference was first held in Vienna in commemoration of the 50th anniversary of Orcutt's proposal for a microsimulation model, and various types of microsimulation models and their research results from many countries were reported. The International Microsimulation Association was also established and the International Journal of Microsimulation [7] was published as a Web journal.

In Japan, INAHSIM (Integrated Analytical Model for Household Simulation) is the only general-purpose model, as far as the author knows. INAHSIM was initially developed in the first half of the 1980s, but at that time it went no further than estimating households (Aoi et al., [8]). Fukawa [9] added physical status to this household model; after that Inagaki [10] added several socioeconomic attributes such as employment status, earnings, and health status; and Inagaki and Kaneko [11] added attributes such as institutional households and pension income. This model does not have as many socioeconomic attributes when compared to the models of other countries, but it has the household model as its starting point and includes basic simulation functions related to families and households, such as life events unique to Japan including household movements when marrying or divorcing or living with elderly parents. Since the model has relatively fewer attributes, it can perform simulations very quickly, and it also has the special advantage of keeping simulation errors to a minimum by taking the average of 100 simulations instead of the usual single simulation.

To make future projections, it is necessary to assume various preconditions. In a microsimulation model, this corresponds to the transition probability that shows the behavior of each person regarding various life events such as getting married, getting a job, and living with one's parents. Details will be provided later, but this simulation basically assumes that the recent behavior of each individual will not change in the future. However, the behavior of each individual varies according to changes in social policies or in the people's consciousness. Thus, if the results of this simulation are to be used, it is necessary to take into deep consideration this precondition, and

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has details such as the development status and research papers of each country.

[2] The microsimulation model has both a static model for evaluating policies at a given point in time and a dynamic model for evaluating policies that include future estimates such as the effects over the lifetime of each individual, but this article only covers the dynamic model.

instead of seeing the results as definite results of a future forecast, instead, it is more appropriate that we see them as a benchmark for evaluating the effects on a future economic society that are caused by changes in social policies or individual behavior.

This article attempts to evaluate the income security function of the pension scheme for elderly people, by reviewing the simulation results related to the cohabitation families of elderly people and their income distribution obtained by Inagaki and Kaneko [11]. Chapter 2 mainly describes the simulation cycle, the initial population, and the transition probabilities, etc. of the microsimulation model. Chapter 3 first focuses on elderly women living alone and considers their families and the distribution of their pension amounts in the future. Next, expanding the range to all elderly people, by showing quantitatively a view of the elderly in the year 2030 –their families and household, and the distribution of their pension amounts and equivalent income– this chapter will make clear the problems. Chapter 4 analyzes the effects on the income distribution for the elderly by the public pension reform plans previously proposed and evaluates these effects from the viewpoint of elderly people receiving pensions. Furthermore, based on these quantitative evaluations, we propose a new reform plan. Chapter 5 provides a summary and points out issues and prospects for the microsimulation model.

2. Research method

2.1. Mechanism of INAHSIM

The microsimulation model is a modeling technique that operates at the level of individual units such as persons, families, and households. A miniature version (for example, a 1/1000th model of the Japanese population) of the actual society is constructed on a computer, and life events at the individual level are simulated into the future using the Monte Carlo method. Various social policies such as the social security system and the taxation system are built into the model, which is designed to estimate the effects of those social policies.

The behavior of individuals is shown in transition probabilities, for example, that the probability of being employed as a regular employee at the age of 18 is 20%, and, in accordance with those probabilities, simulations are performed on the behavior of each individual in that miniature society. The contents of social systems such as the social security system and the taxation system are built into the model beforehand and it has a mechanism to make the individuals behave in accordance with those systems. Since the simulation is performed at the level of individual units, this model can capture the socioeconomic situation, such as income distribution over several decades. The model can also evaluate the influence of changes in social policies or individual behavior, based

on those simulation results. This model can be the thought of as a tool for performing "social experiments" on a computer regarding changes in social policies.

The simulation cycle of INAHSIM is shown in Figure 1. The various life events take place in a 1-year cycle. The life events incorporated in this model are births, changes in health status, deaths, marriages, divorces, changes in employment status, estimation of earnings, young people leaving home, living with elderly people, awarding of pensions, and entering an institution, and they are assumed to occur once a year[3] in this order.

"Young people leaving home" shows the event whereby an unmarried young person separates from his/her parents for schooling or for employment; "living with elderly parents" shows the event whereby the child once again lives with his/her parent(s) after they become elderly; "entering an institution" shows the event whereby an elderly person enters an institution such as a nursing home for the aged. Also, for "Death" the awarding of the survivors' pension is simulated; for "Marriage" the choice of whether to live with the parents or make a separate household is simulated; and for "Divorce" the decision of parental custody and the choice of whether to return to the parental roof are simulated.

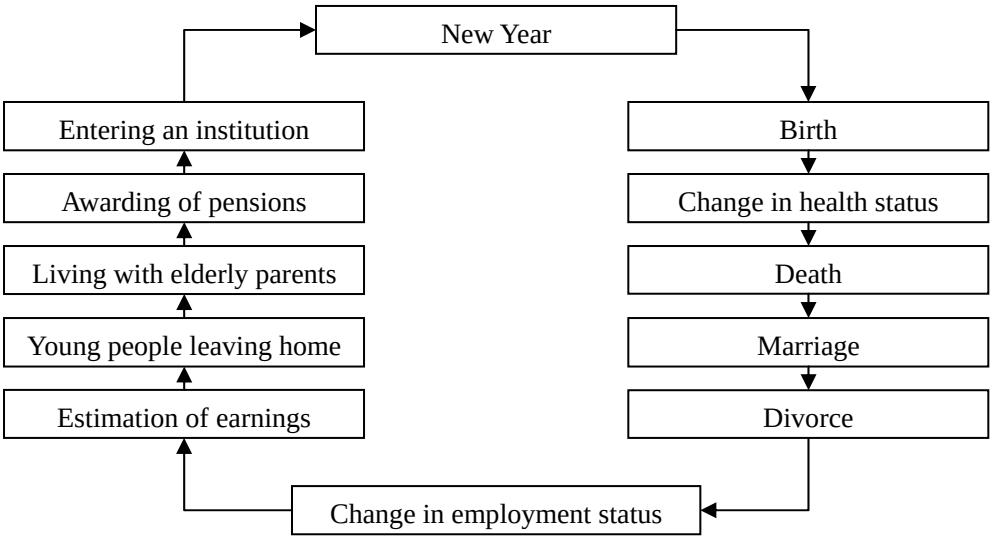

Figure 1. Simulation cycle of INAHSIM

Since the details of the structure of the model, the transition probabilities, and the initial population are described in Inagaki and Kaneko [11] and Inagaki [10], here we intend to focus on the

[3] Since life events occur once a year and if births, which are limited to married people, are initiated before the marriage, the births of such prenuptial pregnancies (more accurately, births occurring less than 6 months after the marriage) are reflected one year later in this model, following the simulation sequence.

transition probabilities and the attributes of each individual that are deeply related to the estimation of the distribution of pension amounts and incomes, which is the target of this article.

2.2. Attributes of individuals and the initial population for the simulation

The attributes for individuals included in the model regulate the functions of the model and are its most important parts. The more attributes there are, the more variations in the simulations become possible. Sufficient consideration should be given as to whether trustworthy initial data are provided and whether the transitions in the attributes of each individual can be regulated by the transition probability.

Besides the husband/wife relationships, parent/child relationships, and household relationships, the attributes of the individuals incorporated in this model are the distinction between private households and institutional households, health status, employment status, marital status, basic pension subscription category[4], z-score of earnings, earnings, equivalent income[5], public pension amounts (basic pension equivalent component and earning related component), and lifetime income. Furthermore, this model also specifically incorporates the attributes of employment status, marital status, pension subscription category, the status of living with parents, and the z-score of earnings at the age of 35.

Among these attributes, the employment status is divided into four categories –regular employee, part-time employee, self-employed, and unemployed– but they are graded on the basis of the pension subscription category, and not by the title used at their place of employment. Specifically, pension subscribers of the second category are treated as "regular employees," self-employed workers are treated as "self-employed," and all the other employed people are treated as "part-time employees." This is a classification that is cognizant of the old-age security standards of the public pension plan. Thus, it must be noted that what is called a "regular employee" in this article is slightly narrower than what is generally called a regular employee.

Also, the z-scores of earnings are thought to conform to a log-normal distribution of the earnings by sex, age group, and employment status, and are a standardization of the logarithm of the earnings of the individuals. Since this simulation presumes that this z-score does not change over the lifetime of the individuals, the income will remain relatively low throughout a lifetime if the

[4] The basic pension, which provides the flat rate pension of a universal coverage, has 3 subscription categories. The first category is for self-employed, farmers, students, etc.; the second category is for regular employees, and the third category is for spouses of the second category subscribers. The second category subscribers also participate in the employees' pension insurance or mutual aid associations, in which premiums and benefits are related to their earnings.

[5] An equivalent income is the value wherein the total income of household members is divided by the square root of the size of the household, and that equivalent income is widely used as an index showing an income level corrected for the household size.

earnings are low when the person starts his/her first job. Such a trend exists in actual society, but since this rule is not completely fixed, the possibility remains that future income disparities obtained in this simulation may be slightly larger than the real values.

The initial population, which is on a scale of 1/1000th of the population of Japan, was created from the micro data[6] of The Comprehensive Survey of the Living Conditions of People on Health and Welfare. Almost a hundred years of simulations, from 2004 to 2100, were executed 100 times and the average values of those 100 simulations were taken as the projected results. Thus, the sampling error derived from the Monte Carlo method is expected to be small, and it can be ignored. Of those simulation results, this article analyzes those until 2030.

2.3. Life events and transition probabilities

The transition probabilities are quantifications of the behavior of individuals at each life event. The transition probabilities used in this simulation were estimated from very recent actual data[7] and are assumed not to change in the future except for the death rate and the first marriage rate.

The transition probability specified for each life event is as follows. "Birth" is the birth rate for married women, by sex, parity, and age group; "Change in Health Status" is the worsening probability of health by sex and age; "Death" is the death rate by sex and age; "Marriage" is the marriage rate by sex, first marriage or remarriage, age, and employment status; "Divorce" is the divorce rate for wives by age; "Change in Employment Status" is the transition probability by sex, age, and marital status; "Young people leaving home" is the probability of young people leaving their parents' home by sex, age, and employment status; "Living with elderly parents" is the probability of adult children living with their elderly parent(s) by the parent's sex and age; and "Entering an institution" is the probability by sex, age, and marital status of entering an institution. The probability of living with either the groom's parents or the bride's parents at marriage, the probability of returning to the parents' home and the probability of child custody at divorce are presupposed. Of the above transition probabilities, a declining trend until 2050 for the death rate and a declining trend until 2012 for the first marriage rate are considered.

"Estimation of earnings" was made to conform to a log-normal distribution of earnings by sex, age group and employment status, and the yearly earnings are estimated on the basis of his/her z-score of earnings. However, wage growth and price increases are not incorporated, and the baseline of earnings by sex, age group, and employment status for the year 2004 is presumed to be

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[6] The data used in this study were made available to the author by the Ministry of Health, Labor, and Welfare of Japan, notice number No.1211006 dated 11th December 2007.

[7] The distribution of earnings and the amount of newly awarded pensions are estimated based on the actual data for the year 2004, and the other transition probabilities are estimated based on the actual data for the year 2001.

unchanging. Thus, future incomes can be considered as 2004 prices.

"Awarding of a pension" is a determination of pension amounts for pension subscribers who have reached their pensionable age. The early payments and the delayed payments have not been considered. The pension subscription category and the z-score of earnings at age 35 determine the pension amount, and it is presumed that the distribution of newly awarded pension amounts in the future will be the same as that distribution in the year 2004 and will not change. Also, indexations of pension amount by CPI and wage increase are not incorporated. Thus, pension amounts can be considered as 2004 prices, but since benefit containment provisions for the indexation, so-called “macroeconomic indexation,” are not incorporated, the pension amounts will be evaluated higher than the actual amounts. Other than old-age pensions, only the survivors’ employees’ pensions (including survivors’ mutual-aid pensions) have been considered. The survivors’ basic pension and the disability pensions have not been considered.

3. Simulation results and considerations

3.1. Trends of the family and the income of elderly women in the future

In discussions at the National Council for Social Security, elderly women living alone are considered to be low-pension and low-income persons. For that reason, for elderly women 65 years and older, we will discuss the future trends in the marital status, the cohabitation of family type, and the distribution of their pension amounts.

Table 1 shows the future trends in the elderly female population by marital status until the year 2030. It is expected that the elderly female population will grow 42% from 14,328 thousand in 2004 to 20,395 thousand in 2030. Also, it is expected that the ratio of those married women will decline from 48.1% to 42.2% while the ratio of never-married and divorced will increase, and in 2030, more than 10 million elderly women will be without a husband.

Table 1. Future trends in the elderly female population by marital status (per thousand people)

Year	Total	Married	Never-married	Divorced	Widowed
2004	14,328	6,888	496	409	6,535
	100.0%	48.1%	3.5%	2.9%	45.6%
2020	19,920	9,301	785	1,298	8,536
	100.0%	46.7%	3.9%	6.5%	42.8%
2030	20,395	8,601	1,179	1,819	8,795
	100.0%	42.2%	5.8%	8.9%	43.1%
Note: estimate by author using INAHSIM.					

The increasing rates of both never-marrying and divorcing at a mature age are the main contributing factors to the reduction in the married ratio of elderly women. The increasing rate of never-marrying is a phenomenon that has been recently pointed out and, after the year 2020, when those of this generation become elderly, the ratio of never-married will gradually increase. On the other hand, since widows were married when their husbands died, the decline in the ratio of widowed will be a little delayed behind the decline in the married ratio. In other words, if we look at the trends in the elderly female population by marital status until the year 2030, it is expected that the ratio of never married and divorced will increase while the ratio of married will decrease, and the ratio of widowed will change a little.

Table 2. Future trends in the elderly female population without a husband by family type (per thousand people)

Year	Total	Single / institution		Living with married children	Living with unmarried children	Others
			no children			
2004	7,440	3,354	1,198	2,349	1,371	366
	100.0%	45.1%	16.1%	31.6%	18.4%	4.9%
2020	10,619	5,798	2,032	2,042	2,240	539
	100.0%	54.6%	19.1%	19.2%	21.1%	5.1%
2030	11,794	6,579	2,480	2,009	2,595	612
	100.0%	55.8%	21.0%	17.0%	22.0%	5.2%
Note: estimate by author using INAHSIM. "Single or institution" are those women living alone or in an institution.						

Elderly women without a husband are not always living alone. Widows often live with their children. Table 2 shows the future trends in the family cohabitation type of these women. The elderly female population without a husband will increase by 58.5% from 7,440 thousand in the year 2004

to 11,794 thousand in the year 2030, but significantly, the increase in those living alone or in an institution will almost double from 3,354 thousand to 6,579 thousand. The reason for this significant increase seems to be the effect of a trend toward nuclear families after high economic growth in the 1960s. The increase in the ratio of never-married and the divorced have also contributed to the trend.

Furthermore, among these elderly women without husbands living alone or in an institution, those women who do not have any children (alone in the world, or only have siblings, nephews or nieces) are expected to total 2,480 thousand (21.0%) in the year 2030. Their source of incomes will be their own pensions and property income if any because they seldom expect financial support from their families or relatives.

Table 3 shows the distribution of the public pension amounts to elderly women without husbands. We have the impression that the number of those with low pensions or no pension will increase, but it is expected that that ratio will actually decrease. These results presume that the fruits of the pension reforms so far, in which reforms were targeted at pensions of all citizens in addition to women's pension rights, will appear. Another reason why the pension to elderly women will decrease is the increase in the number of widows entitled to survivors' pensions for their husbands who were employees. As previously described, however, since the increase in the number of people living alone or in an institution is significant, this does not always mean that the living standard of elderly women without a husband will be improved.

Table 3. Future trends in the distribution of pension amounts (per thousand yen) to elderly women without a husband (per thousand people)

Year	Total	0-499	500 - 999	1000-1499	1500-1999	2000+
2004	7,440	1,586	2,286	1,545	1,178	845
	100.0%	21.3%	30.7%	20.8%	15.8%	11.4%
2020	10,619	1,194	2,755	2,563	2,302	1,805
	100.0%	11.2%	25.9%	24.1%	21.7%	17.0%
2030	11,794	1,207	2,805	3,350	3,109	1,323
	100.0%	10.2%	23.8%	28.4%	26.4%	11.2%
Note: estimate by author using INAHSIM.						

Today's debates about revising the public pension scheme arose from the problem of delinquency in the National Pension premiums, and subsequently, the problem of low pensions and no pension were focused on. Actually, however, if we look at the future trends related to the distribution of pension amounts for elderly women, we can see that this problem does not appear to be growing. Furthermore, it is expected that the ratio of people with low pensions or no pension will decline not only for elderly women but also, as will be described later, will equally apply to all

elderly people. Conversely, higher pension amounts will be reduced more appropriately, and disparity in pension benefits will be less serious. In terms of the distribution of the pension amounts, we can consider the public pension scheme as being sufficiently reformed.

The problem of low-income as typified by elderly women will arise because of significant changes in the family type of the elderly women rather than in their pension amounts. The level of pension amounts will certainly be improved, but that improvement does not resolve the problem because the number of elderly living alone or in an institution will increase considerably. This is a problem not only for women, but also for all elderly.

3.2. Prospects for changes in family cohabitation and in income levels of the elderly (a view of the elderly in the year 2030)

To evaluate the income security function of the public pension scheme for elderly people, it is essential to make future estimates not only of the level of the public pension, but also of their socioeconomic situation like the economic support received from their children living together. Here, we are targeting the year 2030 in which the so-called baby-boomer generation is attaining the late-stage of old age and the number of late-stage elderly is reaching a level near a peak. We will examine whether we can expect the current pension scheme to fulfill a sufficient income security function in the future by showing the medium-term prospects of (1) the distribution of public pension amounts received by the elderly (public support), (2) the number of the elderly by cohabitation family type (private support), and (3) the distribution of equivalent income for the elderly (standard of living) divided into the groups of early-stage elderly (65-74 years old) and late-stage elderly (75 years and older).

Table 4 shows future trends in the distribution of pension amounts to the elderly for the case in which the current pension scheme is maintained. It is expected that by the year 2030 both the ratio and the number of the elderly[8] with low pension amounts of less than 0.5 million yen will decline due to the maturity of the public pension and the increase in the rate of subscription to the Employees' Pension Insurance. Another reason for the decline is that a part of the husband's employees' pension was transferred to the wife's name as basic pension for the establishment of women’s pension right by the amendment in 1985. In addition, for the late-stage elderly, wives with no pension in their own name or only a small amount of pension will receive a survivors’ pension when their husbands die. On the other hand, the ratio of people receiving 2 million yen or more is declining. This decline is thought to be caused by the reduction in the pension level for men due to the pension fairness adjustment and the transfer of a part of husband’s employees’ pension to the

[8] The pension amounts are presumed to be high because the effects of macroeconomic indexation, which reduces the real value of pension amounts, were not incorporated. Thus, the actual ratio of the elderly with low pensions is expected to be higher than the simulation results.

wife's name as basic pension by the amendment in 1985.

Table 4. Future trends in the distribution of pension amounts (per thousand yen) to early- and late-stage elderly (per thousand people)

(1) Early-stage elderly (65-74 years old)						
年次	Total	0-499	500-999	1000-1499	1500-1999	2000+
2004	13,778	2,136	4,131	2,430	1,517	3,564
	100.0%	15.5%	30.0%	17.6%	11.0%	25.9%
2020	16,895	1,831	5,671	2,833	4,038	2,521
	100.0%	10.8%	33.6%	16.8%	23.9%	14.9%
2030	13,869	1,820	4,492	2,353	3,345	1,859
	100.0%	13.1%	32.4%	17.0%	24.1%	13.4%
(2) Late-stage elderly (75 years and older)						
年次	Total	0-499	500-999	1000-1499	1500-1999	2000+
2004	11,109	2,549	3,134	1,784	1,316	2,326
	100.0%	22.9%	28.2%	16.1%	11.8%	20.9%
2020	17,791	2,545	4,650	3,102	3,029	4,465
	100.0%	14.3%	26.1%	17.4%	17.0%	25.1%
2030	21,056	2,187	5,782	4,054	5,236	3,797
	100.0%	10.4%	27.5%	19.3%	24.9%	18.0%
Note: estimate by author using INAHSIM						

Table 5 shows future trends in the cohabitation families of the elderly divided into household types of, besides those in an institution, those living alone, couple-only households, those living with married children, those living with unmarried children, and others. The increase in the number of those living alone for both early- and late-stage elderly is significant. Looking at the total of those living alone or in an institution, it is expected that the number of early-stage elderly will increase from 2,072 thousand (15.1%) in the year 2004 to 3,461 thousand (24.9%) in the year 2030 and the number of late-stage elderly will increase from 2,823 thousand (25.4%) in the year 2004 to 7,330 thousand (34.9%) in the year 2030. Among those living alone or in an institution, late-stage elderly without children will increase to 2,930 thousand (950 thousand in the year 2004). This means that there will be a considerable number of late-stage elderly who cannot help living alone or in an institution due to no children.

Table 5. Future trends in the number of early- and late-elderly by cohabitation family type (per thousand people)

(1) Early-stage elderly (65-74 years old)							
Year	Total	single	couple only	married children	unmarried children	others	institution
2004年	13,778	1,826	5,549	2,230	3,339	588	246
	100.0%	13.3%	40.3%	16.2%	24.2%	4.3%	1.8%
2020年	16,895	3,286	5,816	1,470	4,600	1,281	442
	100.0%	19.4%	34.4%	8.7%	27.2%	7.6%	2.6%
2030年	13,869	3,049	4,125	1,076	3,836	1,371	412
	100.0%	22.0%	29.7%	7.8%	27.7%	9.9%	3.0%
(2) Late-stage elderly (75 years and older)							
Year	Total	single	couple only	married children	unmarried children	others	institution
2004年	11,109	1,869	2,524	3,602	1,828	332	954
	100.0%	16.8%	22.7%	32.4%	16.5%	3.0%	8.6%
2020年	17,791	3,844	4,801	3,096	3,782	518	1,751
	100.0%	21.6%	27.0%	17.4%	21.3%	2.9%	9.8%
2030年	21,056	5,111	5,141	3,143	4,770	673	2,219
	100.0%	24.3%	24.4%	14.9%	22.7%	3.2%	10.5%
Note: estimate by author using INAHSIM. ″Married children″ are the elderly living with married children, and ″unmarried children″ are the elderly living with unmarried children.							

The number of elderly living with unmarried children is also increasing by a large margin. These "unmarried children" are a future case of today's "parasite singles[9]." This is a case of both parents becoming elderly while the children cannot become independent of the parental roof because the children do not have sufficient economic resources due to their unstable employment, and therefore, continue to live with their parents without getting married. Consequently, this family type of the elderly cannot expect sufficient economic support from the unmarried children they are living with.

In this way, changes in the cohabitation family of the elderly are significant. Also, when considering the future living standard of the elderly, it is insufficient only to look at the distribution of pension amounts. At this point, we must consider equivalent income, which reduces the total of the public pension of the elderly and the incomes of the family they are living with (including the earnings of the elderly person himself or herself) by the square root of the number of household members.

Table 6 shows future trends in the distribution of that equivalent income. For the early-stage

[9] A Japanese-English term for single adults who live with their parents and do not marry until their late twenties or thirties

elderly, the ratios for the bracket from 1.5 million yen to 2 million yen are increasing; the ratios for the high-income bracket above 2 million yen are declining, and the ratio of the low-income bracket is not changing much until the year 2030. Even though the public pension level will be increased for those with low pensions or no pension, no great change can be seen in the ratio of the low-income bracket. This may be due to the effect of offset with the reduction in private support from their cohabitation family as a result of the increase in the number of early-stage elderly living alone.

Table 6. Future trends in the distribution of equivalent income (per thousand yen) of early- and late-stage elderly (per thousand people)

(1) Eary-stage elderly (65-74 years old)

Year	Total	0-499	500-999	1000-1499	1500-1999	2000-2499	2500+
2004年	13,778	397	865	1,287	1,528	2,052	7,649
	100.0%	2.9%	6.3%	9.3%	11.1%	14.9%	55.5%
2020年	16,895	324	1,198	1,838	3,027	2,444	8,064
	100.0%	1.9%	7.1%	10.9%	17.9%	14.5%	47.7%
2030年	13,869	462	972	1,563	2,483	1,859	6,530
	100.0%	3.3%	7.0%	11.3%	17.9%	13.4%	47.1%

(2) Late-stage elderly (75 years and older)

Year	Total	0-499	500-999	1000-1499	1500-1999	2000-2499	2500+
2004年	11,109	538	1,227	1,279	1,295	1,242	5,528
	100.0%	4.8%	11.0%	11.5%	11.7%	11.2%	49.8%
2020年	17,791	732	1,798	2,212	2,700	2,715	7,633
	100.0%	4.1%	10.1%	12.4%	15.2%	15.3%	42.9%
2030年	21,056	762	2,273	2,962	4,342	3,114	7,604
	100.0%	3.6%	10.8%	14.1%	20.6%	14.8%	36.1%

Note: estimate by author using INAHSIM

The same trends can be seen in the equivalent income distribution of late-stage elderly as was found in the early-stage elderly. However, since the numbers of the late-stage elderly almost double from 11,109 thousand to 21,056 thousand, the number of people in the low-income bracket will increase greatly. Actually, the number of people in the bracket less then 0.5 million yen will grow from 538 thousand to 762 thousand, and those in the 0.5 to 1 million yen bracket will grow from 1,227 thousand to 2,273 thousand. In the midst of the decline in the Japanese population, the increase in the numbers in the low-income bracket causes concern because it will have a significant effect on Japanese society.

4. Evaluation of public pension reform plans from the viewpoint of the elderly in 2030.

4.1. Evaluation of public pension reform plans

As described previously, simulation results for the case in which the current public pension scheme is maintained show that the numbers of the low-income bracket for the early-stage elderly hardly increase, but there is a large margin increase for late-stage elderly. We tried an evaluation, using the microsimulation model, to see what kind of effects several pension reform plans previously proposed would have on this increase in the low-income bracket.

The pension reform plans[10] in this article are methods to provide a basic pension financed by taxes from the age of 65 with all plans having the same final form. However, there are differences in the treatment of the past premium payments where Plan A has a uniform pension payment that ignores the past premium payments, Plan B reduces pension amounts in accordance with the period of not paying premiums, and Plan C adds on to the pension amounts in accordance with the period of paying premiums. Thus, for current 20-year-old and older subscribers, all of these interim measures, except for Plan A, will remain until all die.

Table 7 is a comparison of the distribution of equivalent income for early- and late-stage elderly in the year 2030. For the current pension scheme, there are 1,434 thousand (10.3%) early-stage elderly in the low-income bracket of less than 1 million yen and 3,035 thousand (14.4%) late-stage elderly in the low-income bracket. This table shows how much of a decrease there is in this low-income bracket by the year 2030 for the pension reform plans. Since the year 2030 is only about 20 years from now, the differences in the interim measures of each pension reform plan will be largely reflected in the equivalent income distribution of the elderly.

First, looking at the early-stage elderly, the low-income bracket for equivalent income of less than 1 million yen declines for each plan with Plan A having 996 thousand people (7.2%), Plan B having 1,301 thousand people (9.4%), and Plan C having 308 thousand people (2.2%), but Plan B stops at a reduction of 0.9 points and the reform has little effect. Plan B regards insurance premiums for the National Pension as all paid after the year 2009, but it is not effective retroactively. This means that its effect of the raise in pension amounts is still small in the year 2030. Since Plan A and Plan C, on the other hand, provide the full amount of basic pension (about 0.8 million yen) to all the elderly 65 years and older, the low pensions or no pension issue is eliminated and the low-income bracket is reduced by a large margin. Notably, Plan C has a large effect on that reduction since it

[10] Plan A, Plan B, and Plan C are shown in interim report of the first subcommittee of the National Council for Social Security [12].

adds the extra benefit in accordance with past payment periods to the full amount of the basic pension.

Table 7. Distribution of equivalent income (per thousand yen) of early- and late-stage elderly by the pension reform plan in the year 2030 (per thousand people)

(1) Eary-stage elderly (65-74 years old)							
	Total	0-499	500-999	1000-1499	1500-1999	2000-2499	2500+
Current scheme	13,869	462	972	1,563	2,483	1,859	6,530
	100.0%	3.3%	7.0%	11.3%	17.9%	13.4%	47.1%
Plan A	13,869	7	989	1,133	2,287	2,298	7,156
	100.0%	0.1%	7.1%	8.2%	16.5%	16.6%	51.6%
Plan B	13,869	316	985	1,446	2,495	1,956	6,671
	100.0%	2.3%	7.1%	10.4%	18.0%	14.1%	48.1%
Plan C	13,869	1	307	894	1,228	1,898	9,542
	100.0%	0.0%	2.2%	6.4%	8.9%	13.7%	68.8%
(2) Late-stage elderly (75 years and older)							
	Total	0-499	500-999	1000-1499	1500-1999	2000-2499	2500+
Current scheme	21,056	762	2,273	2,962	4,342	3,114	7,604
	100.0%	3.6%	10.8%	14.1%	20.6%	14.8%	36.1%
Plan A	21,056	13	2,032	2,320	4,201	3,924	8,567
	100.0%	0.1%	9.7%	11.0%	20.0%	18.6%	40.7%
Plan B	21,056	722	2,263	2,921	4,350	3,146	7,654
	100.0%	3.4%	10.7%	13.9%	20.7%	14.9%	36.3%
Plan C	21,056	1	256	1,415	2,123	3,304	13,958
	100.0%	0.0%	1.2%	6.7%	10.1%	15.7%	66.3%
Note: estimate by author using INAHSIM.							

On the other hand, the number of early-stage elderly with an equivalent income of 2.5 million yen or more do not increase much under Plan A and Plan B, but in Plan C there is a major increase from the 6,530 thousand people (47.1%) under the current scheme to 9,542 thousand (68.8%). Since Plan C provides the full amount of basic pension in addition to current incomes, this implies that a new high-income bracket will be born. Thus, it can be thought that, in Plan C, there are many unnecessary benefits in terms of being a countermeasure for people with low pensions and low incomes.

Next, if we look at the late-stage elderly, the low-income bracket for the equivalent income of less than 1 million yen declines for each plan with Plan A having 2,045 thousand people (9.8%), Plan B having 2,985 thousand people (14.1%), and Plan C having 257 thousand people (1.2%). However, Plan B stops at a reduction of 0.3 points and the reform has very little effect because the effect of

Plan B will be delayed another 10 years after that for the early-stage elderly. Since neither Plan A nor Plan C have a delay like that of Plan B, their reform becomes effective immediately just as for the early-stage elderly.

When these pension reform plans are thought of as countermeasures for people with low pensions and low incomes, Plan B is seen to have very little reform effect by the year 2030. The additional cost for Plan C will be a significant issue because it provides benefits additionally even to the high-income bracket people. On the other hand, Plan A will be effective as a countermeasure for people with low pensions and low incomes if we only look at the distribution of equivalent income. However, since Plan A ignores the actual past payments of insurance premiums, and both those people who diligently paid their insurance premiums and those who did not pay them will receive the same amounts of pension for the rest of their lives, it is difficult to think of this plan as convincing from the point of view of fairness.

Thus, none of these pension reform plans suffice as countermeasures for people with low pensions and low incomes and cannot be thought to be especially advantageous compared with the current scheme. In other words, any reform plan that simply changes the current basic pension from a social insurance system to a total taxation system are not thought of as very practical even if they use ingenious interim measures.

4.2. A new pension reform plan

We evaluated the current pension scheme and the previously-proposed pension reform plans of a total taxation system using the projected results of the distribution of the future equivalent income of the elderly provided by the microsimulation model as a foundation from the viewpoint of income security for people with low pensions and low incomes. From this viewpoint, Plan A is preferable. However, since Plan A has problems such that fairness cannot be ensured for the people who diligently pay their insurance premiums, none of the previously-proposed reform plans can be judged to be superior to the current scheme. As mentioned earlier, however, we cannot avoid the problem where the number of elderly with a low-income level will increase due to significant changes in the cohabitation of families of the elderly despite the future increase in pension levels.

What measures can be appropriately taken for these elderly people with such a low-income level? One position suggests on-going Public Assistance (income assistance for the poor) rather than a pension scheme. The cost of the assistance for the elderly poor through this on-going public assistance scheme will be lower than that through any pension scheme because Public Assistance is a supplement to the person's best efforts and available resources. Still, various problems with the Public Assistance scheme have been pointed out, such as the problem of stigmas and the increase in administration burdens brought on by the growth of the number of the public assistance beneficiaries.

As pointed out at the beginning of this paper, 'the revision of pension benefits for the elderly with low pensions and low incomes' is an important issue and a resolution by means of a pension scheme is being aggressively studied. In the Pension Committee of the Social Security Council, countermeasures at the time of benefits and countermeasures at the time of contributions under the current social insurance system are being proposed, and their problems and effects are summarized.

One countermeasure at the time of benefits is an introduction of a minimum guaranteed pension system. But it is necessary to study whether guaranteeing a certain amount of pension regardless of the non-payment period is appropriate under the social insurance system. Currently, the majority of cases of the elderly with low pensions, excluding older women before the establishment of women's pension rights, have a long period of non-subscription or non-payment. Many of those who are close to the pensionable age are also part of such cases. Furthermore, the Employees' Pension Insurance for the second category subscribers already has a component of a fixed amount of benefit, which is regarded as a minimum guaranteed benefit. This new minimum guaranteed pension system carries a suggestion that provides benefits for non-subscription and non-payment periods.

Another countermeasure at the time of contributions reduces a part of the premium in accordance with the subscriber's income at the time of contribution and the reduced part of the premium is supported by a tax. Pension subscribers of the first category include not only self-employed people, but also many employees. Between these self-employed people and employees there is a strong feeling of unfairness regarding whether information on their incomes is being accurately captured, and that feeling of unfairness is a main reason why pension benefits proportional to incomes cannot be introduced for the pension subscribers of the first category. Given this kind of situation, it is essential to consider whether a fair system can be introduced in reality.

Thus, the revision of the pension benefits for the elderly with low pensions and low incomes is not an easy task from the viewpoint of fairness and its additional cost. However, according to the simulation results of the microsimulation model, the problem is especially serious for late-stage elderly among all elderly. The previously-proposed reform plans targeted all elderly people 65 years and older, but here we want to propose a revision of the pension benefits for the elderly with low pensions and low incomes implemented only for the late-stage elderly. By narrowing down the targeted people, we intend to resolve simultaneously various problems, for example, (1) interim measures for transitions, (2) fairness based on the actual premium payments, (3) the additional cost, and (4) a shift of the burden from an insurance premium to a tax.

In concrete terms, we want to apply the taxation system of Plan A to the basic pensions of the late-stage elderly while maintaining the framework of the current system for the basic pensions of the early-stage elderly. However, the basic pension for the early-stage elderly[11] is fully financed by

[11] Under the current system, the cost of the basic pension is financed by an insurance premium and a tax on halves.

an insurance premium (details in Inagaki [13]). This is a framework that avoids the shift from social insurance premiums to tax burdens by changing the funding system of the early-stage elderly and the late-stage elderly, making implementation immediate, with no interim measures, for the elderly with low pensions and low incomes. Since the social insurance system and the total taxation system under this reform plan are clearly distinguished, this should be an easy-to-understand framework.

First, interim measures are basically unnecessary. From the viewpoint of the beneficiary, the basic pension of the late-stage elderly will merely be revised to the full amount. The changes in financial planning can be accomplished by recalculation in the books, and special interim measures are not necessary.

Secondly, the problem of fairness for the actual payments of insurance premiums rarely occurs. This is because the past actual payments are reflected in the basic pension of the early-stage elderly. Actually, the basic pension benefits for 10 years from the age of 65 to 74 are 8 million yen, and that exceeds the total amount of 40 years of insurance premium contributions[12].

Thirdly, an enormous amount of additional burden is not necessary. Of course, some degree of additional burden is needed when supporting the full amount of basic pensions for the late-stage elderly, but that is much smaller than the scale needed when implementing Plan A.

Fourthly, for the time being, the problem of shifting the burden from social insurance premiums to taxes will not likely happen. The current tax burden is one-half of the basic pension benefit expense, but since the population of the early-stage elderly and the late-stage elderly is more or less half and half[13], there is no great change in the proportion of tax burden by this transfer of funding.

Finally, in this new reform plan the problem remains that no measures are taken for the low-pension and low-income people in the early-stage elderly. However, uniform benefits for the early-stage elderly are not always appropriate since there will be large individual differences until the age of about 75, such as one's health status or savings from one's working years. If uniform benefits financed by taxes are introduced to the early-stage elderly such as under Plan A, income tests and means tests are not avoided, and such tests will become a complicated system administratively. In addition, because it is difficult to figure out accurate incomes of self-employed people for the tests, it is not easy to devise a fair system. The current pension scheme based on the social insurance system seems to be more appropriate. Of course, there is the Public Assistance as a final safety net and, even if we look at the simulation results, the number of people does not increase in the low-income bracket of the early-stage elderly.

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[12] The National Pension premium in fiscal year 2009 is 14,660 yen a month, and in this case the total amount of the insurance premiums for 40 years will be about 7.04 million yen. Furthermore, since the insurance premiums in the past were lower than this, the total amount of past insurance premiums actually paid is less.

[13] Since the number of late-stage elderly greatly exceeds the number of early-stage elderly in the future, the ratio of the tax burden will rise gradually, but no rapid shift will occur.

5. Problems and prospects of the microsimulation model

The Japanese society cannot avoid rapid changes such as aging and a shift toward a depopulating society. In the midst of the increase in the elderly, the need for social security is increasing, and how to efficiently distribute into social security benefits the revenue pie that is feared to be shrinking, is an important policy issue. Still, macro future estimates such as the population projections or the actuarial review of pension schemes are prepared by the government while micro future estimates such as the income distribution are not prepared even though their importance is recognized.

The microsimulation model is a tool to make future estimates at a micro level. In section 2, we drew a view of the elderly in the future –the form of their families and households, the distribution of pension benefits, and the distribution of equivalent income– by using the Japanese microsimulation model INAHSIM.

Section 3 clarified the view of the elderly in the year 2030 if the current public pension scheme is maintained. The simulation results show that the number of late-stage elderly with a low equivalent income will increase by a large margin because of the changes in their families such as the increase in the number of elderly living alone although the level of their pension will be raised. Japan has already become a depopulating society, and we cannot avoid the rapid increase in the rate of a low-income population.

In section 4, simulations are performed for each of the previously-proposed pension reform plans. The simulation results show that the plans are not always practical as a countermeasure for low-pension and low-income people. Furthermore, focusing on the serious problem of the late-stage elderly in their living standard, section 4 proposes an alternative reform plan that limits to the late-stage elderly a countermeasure for low-pension and low-income people, and then confirms the effectiveness of this alternative.

As discussed, the microsimulation model is a beneficial analytical tool to evaluate social policies, and the models are already applied to social policy evaluations in many countries such as those in Europe, North America, and Australia. In this article, policy simulations related to pension reform plans in Japan were performed, and we evaluated the effect of proposals of pension reform on future income distributions. This model can equally be applied to evaluating the public health insurance, public assistance or other welfare policies, the taxation system, employment policies and so on. Problems left for INAHSIM include considering the disposable income covering savings, property income, and social security and tax burdens, and economic growth like the wage increase rate and inflation rate. International migration should be also considered. Hereafter, with the cooperation of experts in each field, this model can be improved and can be widely used. Using the improved microsimulation model and its simulation results, policy makers can enhance their function as policy workers and propose more suitable reform plans towards the depopulation and

super-aging society of Japan.

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