
The Scheduled Increase in the Pension Age and the Effect of Job Security Measures for the Elderly in Supporting Their Subsistence

Koji Hamada

The Japan Institute for Labour Policy and Training

This thesis looks into how elderly people in their early 60s pay their cost of living, through an analysis of how necessary it will be for them to earn incomes when the pension age is raised to 65 as scheduled, as well as examining the effect of job security measures for the elderly (raising the mandatory retirement age, continued employment¹ including re-employment and extension of the term of employment, and abolishing the mandatory retirement system). According to the results of the analysis, it is estimated that when the pension age is raised to 65, the incomes of a certain portion of elderly people will fall short of their cost of living, and they will need some support to make up for this shortage. If job security measures for the elderly are adopted more widely and the employment rate among elderly people rises accordingly, their earned income levels will increase, leading to a decrease in the number of elderly people who suffer a shortage of income. This positive effect is expected to be greater if, among those job security measures for the elderly, reforms to the retirement system, that is, raising the mandatory retirement age or abolishing the mandatory retirement system, become more common. Toward achieving this, it is necessary to ensure that all enterprises adopt job security measures for the elderly aged up to 65 and guarantee job opportunities for all applicants who wish to continue to work until the age of 65.

Relationship between This Thesis and the Study Group's Preceding Report

In Japan, amidst the advancement of the aging of population, baby boomers have reached the age of 60, which is the currently the ordinary age of mandatory retirement, while the public pension age has been raised by phases. Under such circumstances, how to secure employment for elderly people is now a material issue, calling for a system that allows them to exert their abilities effectively.

With this in mind, in FY2007, the Japan Institute for Labour Policy and Training (JILPT) set up a Study Group on Employment Promotion of the Elderly (chaired by Mr. Atsushi Seike, President of Keio University), and carried out their study with the help of in-house and outside researchers in this area. In its report released in June 2011, entitled *Study on the Current Status of Employment among the Elderly* (JILPT Research Report No. 137), the study group presented the following research results based on the analysis of the Survey on the Employment Status of the Elderly.

When the public pension age is raised, as is currently scheduled, a considerable por-

¹ The term "continued employment" means a system in which workers are employed continuously after the mandatory retirement age if they desire to continue working.

tion of elderly people in their early 60s will be unable to receive pension benefits, and will face difficulties in meeting their living expenses. To avoid this situation, one possible approach is to pay them reduced basic pension benefits in advance of the pension age. However, the detailed analysis indicates that among elderly people who actually use this advance payment system, those who are in poverty account for a relatively large proportion, which implies that this system is not necessarily conducive to their subsistence.

To support these elderly people, measures to secure their employment need to be implemented. In this context, the degree of satisfaction with work may be an influential factor. The analysis revealed that the degree of satisfaction with work is affected by workers' own assessment as to whether they are paid high enough wages for their work performance. This fact suggests that if the wage level offered to workers who are continually employed after their mandatory retirement is far below the wage level offered before retirement, they could become less satisfied with work and more inclined to leave their jobs. In this respect, finding the best wage system for the elderly is an important task.

Promoting employment among the elderly may also be related to human resource development. According to the analysis, inequality in terms of the human capital that workers held at the time they began to work, such as their academic backgrounds, have an influence on their access to education and training offered from the age of 55, and this factor has a positive correlation with earned income offered in the later stages of life. Therefore, it is also important to support workers in their own human capital formation by providing them with the constant and equal opportunity for education and training throughout the long-term span of their working lives, beginning from when they first start to work.

Institutionally, to help those elderly people who have difficulties in gaining employment, job security measures are provided for in the Act on Stabilization of Employment of Elderly Persons. In the study group's preceding report, I carried out my analysis in order to explore to what extent these job security measures will prove to be effective for supporting people in meeting their living expenses in the later stages of life when the pension age will be raised to 65 as scheduled (Hamada 2011). This thesis is an extended and revised version of my previous thesis (Hamada 2011).

I. Introduction

The employees' pension age is scheduled to be raised to 65 for the flat-rate benefits in FY2013, and then is also expected to be raised for the wage-proportional benefits, and through the phased system revision, workers will ultimately receive no pension benefits in their early 60s. In preparation for this, in the Basic Policy on Employment Security Measures for Older Persons, the government declared its target of ensuring that all enterprises adopt job security measures for the elderly in their early 60s by the end of FY2012.

Accordingly, this thesis inquires into how elderly people, especially those in their early 60s, pay their cost of living, through the analysis of how necessary it will be for them

to earn incomes when the pension age is raised to 65 as scheduled, as well as examining the effect of job security measures for the elderly (raising the mandatory retirement age, continued employment including re-employment and extension of the term of employment, and abolishing the mandatory retirement system). Sample data used in this analysis are individual data collected by JILPT in the Survey on the Employment Status of the Elderly conducted in August 2009, in relation to factors such as cost of living, income (including earned income, pension benefits, and other unearned income), and assets or net savings (savings minus borrowings).

This thesis studies the situation elderly people in their early 60 are facing in the following order. Section II explains the analysis method employed in this study, including data attributes and variables. Section III estimates how elderly people pay their cost of living and how short of income they will run when the pension age is raised to 65, and based on the cross tabulation analysis, regression analysis, and analysis by inequality measures, examines their need for employment and earned income as well as the effect of job security measures for the elderly. Section IV offers a conclusion to the study.

II. Analysis Method

Focusing on elderly people in their early 60s, a comparison is made between their income (including earned income, pension benefits, and other unearned income) and assets or net savings (savings minus borrowings), and their cost of living, to estimate how they pay their cost of living and how short of income they will run when the employees' pension age is raised to 65. Then, based on the cross tabulation analysis and analysis by inequality measures in relation to their access to the job security measures for the elderly and retirement system reforms, an examination is carried out as to how necessary it will be for elderly people to have employment and earned income when the employees' pension age is raised to 65 as scheduled, as well as the effect of job security measures for the elderly.

1. Data

Sample data used in this study are individual data collected by JILPT in the Survey on the Employment Status of the Elderly. The survey targeted 5,000 men and women aged 55 to 69 nationwide, who were picked up by a stratified two-stage sampling based on the basic residence registries. It was conducted during the period from August 20 to September 15, 2009, using a survey method wherein research personnel visited the targeted respondents and asked them to respond to the questionnaire, and then collected their responses on a later day. The number of valid responses was 3,602, and the response rate was 72.0%.

The subjects for the analysis were elderly people in their early 60s, and in order to see the relevance with job security measures for the elderly, the subjects were further narrowed down to those who had worked as regular employees of private businesses at the age of 55. The necessary data for the analysis in this study, such as the cost of living, income (includ-

ing earned income, pension benefits, and other unearned income), assets or net savings (savings minus borrowings), employment status, and implementation status of job security measures for the elderly, were available with regard to 265 of all the targeted samples.

2. Data Items

Data items set up for analysis are categorized into: (i) cost of living, limited to costs incurred by the respondent alone or with his/her spouse if he/she has a spouse; (ii) earned income, consisting of wages (other than bonuses) and expected annual bonuses; (iii) unearned income arising from sources other than work, in which pension benefits are specified by the amount of benefits; and (iv) assets or net savings, calculated as savings minus borrowings.

(1) Cost of Living

The monthly cost of living is based on costs incurred by the respondent alone or with his/her spouse. As this item was used to ask the respondents about the cost of living that they would need to live the life they wanted, the cost of living stated in their responses is likely to be relatively higher than the actual level that is needed. Therefore, when the result of converting the actual cost of living by the rate for the number of people in the household (2 [the respondent and his/her spouse] or 1 [the respondent alone] \div actual number of people in the household) fell below the stated amount of the cost of living, the lower number was used.²

Because of this arrangement, the cost of living used for this study more likely represents the minimum requisite.³

(2) Income

A. Earned Income

The monthly amount of earned income is calculated by combining income except for bonuses, with expected annual bonuses converted into a monthly rate (by dividing the total

² This approach is based on the concept that the cost of living in each household is divided by the respondent alone or with his/her spouse, and other household members. However, from the perspective of calculating the converted amount of living costs, the amount obtained may be smaller than the actual amount, as explained in footnote 2 below.

³ Household spending is not a mere total of individual spending by household members, but includes spending for the benefit of the household as a whole, and therefore, there are economies of scale with respect to consumption of a sort of public goods within the household. For instance, the efficiency at which a TV set, refrigerator, and other such appliances purchased for the joint use of all household members are used, increases as the number of people in the household increases, until the household becomes too crowded. Therefore, the cost of living incurred in the household does not decline in line with the decrease in the number of people in the household, and costs of living converted by means of the rate of the number of people in the household, as the one used in this study, may be smaller than the actual costs. In this respect as well, the cost of living used in this study more likely represents the minimum requisite.

by 12). The spouse's earned income is based on income from work.

B. Pension Benefits

The monthly amount of pension benefits is based on the amount of employees' pension benefits that the respondent receives. This includes not only the actual amount received but also the monthly amount of initial pension benefits before reduction due to employment.⁴

C. Unearned Income/Other Unearned Income

The monthly unearned income is based on income arising from sources other than work. If the amount of pension benefits, etc. exceeds the monthly amount of unearned income that is supposed to include the former, the amount of pension benefits, etc. is used as the monthly amount of unearned income for purposes of accuracy. Because of this arrangement, the amount of unearned income used in this study is estimated at a relatively high level.

The amount of other unearned income is calculated by subtracting the amount of pension benefits (B) from the amount of unearned income.

D. Household Income

The monthly household income is based on income gained by each household. If the total of the earned income (A) and the unearned income (C) exceeds the monthly amount of household income that is supposed to include this total, this total is used as the monthly amount of household income for purposes of accuracy. Because of this arrangement, the monthly amount of household income used in this study is estimated at a relatively high level.

As the monthly cost of living is limited to costs incurred by the respondent alone or with his/her spouse as mentioned in (1), the households subject to this study are also limited to those where household income consists only of income earned by the respondent or the sum of the income earned by the respondent and that earned by his/her spouse.

(3) Net Savings

The amount of net savings is calculated by subtracting borrowings from savings in the household. Housing loans are excluded from borrowings because a household that has such loans also has the corresponding housing assets. Because of this arrangement, the

⁴ Since the subjects were limited to people who worked as regular employees of private businesses at the age of 55, except for employees' pension benefits, the amount of pension benefits gained by the respondents is small. In addition, the responses on the amount of pension benefits before reduction due to employment were obtained only with regard to employees' pension benefits. For these reasons, this study only takes up employees' pension benefits, while including other kinds of pension benefits into the category of other unearned income.

amount of borrowings is estimated at a relatively low level, and consequently, the amount of net savings, calculated by subtracting borrowings from savings, is estimated at a relatively high level.

III. Analysis Results

1. Funds to Pay the Cost of Living and Need for Pension Benefits

Table 1 shows how elderly people in their early 60s pay their cost of living. On average, income exceeds the cost of living considerably, and there is also an income surplus even excluding employees' pension benefits. As for assets, savings exceed borrowings, making net savings positive.

However, for some 15% of these people, if they did not receive employees' pension benefits, their incomes would fall short of their cost of living, and they would not be able to make ends meet even by reaching into their net savings. Their monthly amount of shortage of income is 120,000 yen on average. As mentioned in Section II, the monetary amount given as the cost of living more likely represents the minimum requisite, whereas the amounts of income and net savings are estimated at a relatively high level. Thus, at least for these needy people, measures should be taken to support them when the pension age is raised to 65, as scheduled.

Comparing such people who cannot pay their cost of living without employees' pension benefits with the others (those who can pay their cost of living without employees' pension benefits by using income or reaching into their net savings), while there is not much difference in the amount of the cost of living between them, the income of the former group is significantly smaller than that of the latter group, by as much as 210,000 yen per month. By income item, people in the former group gain 70,000 yen more than those in the latter group as employees' pension benefits each month, but their earned income is smaller by as much as 160,000 yen, which exceeds that difference in the amount of pension benefits. This may be the biggest reason why those some 15% cannot pay their cost of living without employees' pension benefits.

2. Employment and Job Security Measures for the Elderly

(1) Employment Rate

One factor due to which those who cannot pay their cost of living without employees' pension benefits gained far less earned income than those who can pay their cost of living is their low employment rate. As indicated in Table 1, the employment rate among those who cannot pay their cost of living is 32%, far lower than the rate among those who can pay, at 75%.

One can presume this difference implies that those who cannot pay their cost of living receive more pension benefits than those who can pay, as indicated in Table 1, and such those who intend to increase their earned income when the pension age is raised to 65

Table 1. Funds to Pay the Cost of Living and Need for Pension Benefits

	Who cannot pay their cost of living without employees' pension benefits			Access to job security measures for the elderly			Applicability of retirement system reforms		
	15%	85%	Total	Have benefitted from such measures	Others	Have benefitted from such reforms	Others	Others	82%
Composition ratio (%)	15%	85%	100%	42%	58%	18%	58%	18%	82%
Net savings at the age of 65*	84.8	1980.5	1694.3	2037.0	1451.1	2861.4	1451.1	2861.4	1442.7
Without employees' pension benefits*	-667.8	1674.5	1321.0	1773.0	1000.2	2764.6	1000.2	2764.6	1009.7
Difference between income and cost of living**	0.3	22.5	19.1	26.9	13.6	37.8	13.6	37.8	15.1
Without employees' pension benefits**	-12.2	17.4	12.9	22.5	6.1	36.2	6.1	36.2	7.9
Cost of living**	20.2	19.0	19.2	20.8	18.0	23.2	18.0	23.2	18.3
Income**	20.6	41.5	38.3	47.7	31.6	61.0	31.6	61.0	33.4
Earned income**	2.8	18.9	16.4	26.9	9.0	38.4	9.0	38.4	11.7
Employees' pension benefits**	12.5	5.1	6.2	4.4	7.5	1.6	7.5	1.6	7.2
(Before reductions due to employment)**	13.0	6.2	7.3	5.9	8.2	2.1	8.2	2.1	8.4
Other unearned income**	2.6	6.8	6.2	5.2	6.9	6.0	6.9	6.0	6.2
Spouse's earned income**	1.4	6.7	5.9	8.4	4.1	12.0	4.1	12.0	4.6
Spouse's unearned income**	1.3	4.0	3.6	2.9	4.1	3.1	4.1	3.1	3.7
Employment rate (%)	32%	75%	68%	90%	53%	100%	53%	100%	61%
Part-time employment rate (%)	46%	20%	22%	17%	27%	11%	27%	11%	25%
Who have benefitted from job security measures (%)	27%	44%	42%	100%	0%	100%	0%	100%	29%
Who have benefitted from retirement system reforms (%)	3%	20%	18%	43%	0%	100%	0%	100%	0%
Rate of failure to gain continued employment (%)	20%	9%	11%	0%	19%	0%	19%	0%	13%

* (10,000 yen)

** (10,000 yen, monthly amount)

entitlement to more benefits may diminish their willingness to work. In the former group, account for 25%, higher than the level in the latter group of people who can pay their cost of living without employees' pension benefits, 18%.⁵ However, the difference shown here is smaller than the difference in terms of the employment rate mentioned above. This suggests that the low employment rate arises from not only individuals' unwillingness to work but also largely from external factors out of individuals' control, such as the employment environment.

As indicated in Table 1, the percentage of people who have benefitted from job security measures for the elderly was 27% in the group of people who cannot pay their cost of living without employees' pension benefits, which is lower than that in the group of people who can pay, at 44%. In contrast, the rate of those who wished to gain continued employment (re-employment or extension of the term of employment) but failed to do so or whose workplace did not have a continued employment system, in short, the rate of failure to gain continued employment, is 20% in the group of people who cannot pay their cost of living without employees' pension benefits, which is higher than that in the group of people who can pay, at 9%. The low employment rate in the former group may be attributed to such difference in the implementation status of job security measures for the elderly. In fact, as indicated in Table 1, the employment rate reached 90% among people who have benefitted from job security measures for the elderly, which is far higher than that among people who have not benefitted from them,⁶ 53%, and because of the high employment rate, the amount of earned income is higher by 180,000 yen and the total amount of income is also considerably higher among those who have benefitted from job security measures.

(2) Part-Time Employment Rate

In the group of people who cannot pay their cost of living without employees' pension benefits, the employment rate is low as mentioned in (1) above, and even among those who are employed, a large number are employed on a part-time basis. In this group, the part-time employment rate is 46%, which is far higher than that in the group of people who can pay their cost of living without employees' pension benefits, at 20%. This may be another factor that causes the amount of earned income of those who cannot pay their cost

⁵ Another factor that enables people who cannot pay their cost of living without employees' pension benefits to gain more pension benefits than those who can pay may be the old-age pension system for active employees under which, while the recipients of pension are in employment, the amount of pension benefits is reduced in proportion to the amount of wages, etc. that they receive. Because of this system, those who earn more wages receive less in pension benefits. Nevertheless, Table 1 shows that even on the basis of the initial amount of employees' pension benefits before such reduction, those who cannot pay their cost of living without pension benefits receive more benefits than those who can pay their cost of living without them.

⁶ Among people who have not benefitted from job security measures for the elderly, those who wished to but failed to gain continued employment account for 19%. This means that the remaining some 80% did not wish to use these measures. However, about half of these people were dissatisfied with their wages, positions, working hours, etc., and they did not really wish to retire.

of living without employees' pension benefits to fall below that of those who can pay. The average amount of earned income of part-time employees is about 140,000 yen, which is far lower than that of full-time employees, who earn about 270,000 yen, and this difference leads to a smaller amount of total income for part-time employees.

With regard to this phenomenon, the same background factors can be presumed as those mentioned in (1). Although the entitlement to higher pension benefits may diminish the willingness to work among people who cannot pay their cost of living without employees' pension benefits, their employment rate may be affected not only by individuals' unwillingness to work, but also significantly by external factors out of individuals' control, such as the employment environment.

As for the applicability of retirement system reforms, that is, the raising of the mandatory retirement age or abolishment of the mandatory retirement system, people who have benefited from such reforms accounted for only 3% of those who cannot pay their cost of living without employees' pension benefits, which falls far below the level among those who can pay, at 20%. The high part-time employment rate among those who cannot pay their cost of living without employees' pension benefits may be partly due to the difference in the implementation status of retirement system reforms. In fact, as indicated in Table 1, the part-time employment rate is 25% among people who have not benefited from retirement system reforms, which is higher than that among those who have benefited, at 11%.

3. Factor Analysis for Earned Income, and the Effect of Job Security Measures for the Elderly

As reviewed above, earned income will be crucial in allowing elderly people to pay their cost of living when the pension age is raised to 65 as scheduled, and the amount of earned income is connected with the accessibility of job security measures for the elderly. In relation to this, Table 2 indicates the results of linear regression analysis concerning the effect of job security measures for the elderly on the amount of earned income, which were obtained by controlling factors such as age, gender, academic backgrounds, etc.

In this table, the coefficient for job security measures for the elderly is significantly positive (significance level: 1%), and the coefficient for retirement system reforms (raising the mandatory retirement age or abolishing the mandatory retirement system) is also significantly positive (significance level: 1%).⁷ These results may reflect the fact that both the employment rate and the amount of earned income are high among people who have benefited from job security measures for the elderly (see 2 [1]), and that part-time employees, who make less earned income, constitute a small proportion of those who have benefited

⁷ The coefficient for failure to gain continued employment (elderly people who wished to but failed to gain continued employment [re-employment or extension of the term of employment] or whose workplace did not have a continued employment system) is negative as expected, but not significant.

Table 2. Factor Analysis for Earned Income

Variable	Coefficient	Standard error	t value	Significance probability
Constant term	63.65	59.57	1.07	0.286
Dummy for job security measures for the elderly	8.61	2.99	2.88	0.004
Dummy for retirement system reforms	17.15	3.81	4.50	0.000
Dummy for failure to gain continued employment	-2.51	3.86	-0.65	0.516
Employees' pension benefits (before reductions due to employment)*	-0.47	0.18	-2.57	0.011
Other unearned income*	0.07	0.12	0.53	0.598
Spouse's earned income*	-0.04	0.09	-0.38	0.702
Net savings**	0.00	0.00	0.45	0.651
Dummy for women	-7.61	2.97	-2.56	0.011
Age	-0.82	0.97	-0.84	0.402
Dummy for high school graduates	0.53	3.03	0.17	0.862
Dummy for junior college graduates	2.73	4.50	0.61	0.545
Dummy for university graduates	4.50	3.56	1.26	0.208

* (10,000 yen, monthly amount)

** (10,000 yen)

Coefficient for determination, degree of freedom adjusted 0.278

Sample size 265

Descriptive Statistic

Variable	Mean	Standard deviation
Earned income	16.4	21.7
Dummy for job security measures for the elderly	0.42	0.49
Dummy for retirement system reforms	0.18	0.38
Dummy for failure to gain continued employment	0.11	0.31
Employees' pension benefits (before reductions due to employment)	7.3	7.4
Other unearned income	6.2	9.8
Spouse's earned income	5.9	13.2
Net savings	937.3	1588.6
Dummy for women	0.23	0.42
Age	61.9	1.4
Dummy for high school graduates	0.45	0.50
Dummy for junior college graduates	0.10	0.30
Dummy for university graduates	0.22	0.42

from retirement system reforms (see 2 [2]).⁸

The coefficient for employees' pension benefits (before reductions due to employment) is significantly negative (significance level: 5%), which implies that being entitled to pension benefits may diminish elderly people's willingness to work, as mentioned in 2 (1). There is an interdependent (endogenous) relationship between working and pension entitlement in that the amount of pension benefits is reduced as they make more earned in-

⁸ Logistic regression analysis of the factors in the employment rate shows that the coefficient for job security measures for the elderly is significantly positive (significance level: 1%). On the other hand, logistic regression analysis of the factors in the part-time employment rate shows that the coefficient for reforms in the retirement system (raising the mandatory retirement age or abolishing the mandatory retirement system) is significantly negative, although the significance level is slightly low (about 10%).

Factor Analysis for the Employment Rate

Variable	Coefficient	Standard error	Significance probability
Constant term	-6.69	7.88	0.396
Dummy for job security measures for the elderly	2.00	0.39	0.000
Dummy for failure to gain continued employment	-0.15	0.44	0.738
Employees' pension benefits (before reductions due to employment)	-0.07	0.03	0.003
Other unearned income	-0.02	0.02	0.270
Spouse's earned income	0.03	0.02	0.074
Net savings	0.00	0.00	0.252
Dummy for women	-0.79	0.38	0.039
Age	0.12	0.13	0.341
Dummy for high school graduates	0.28	0.42	0.512
Dummy for junior college graduates	1.04	0.64	0.101
Dummy for university graduates	-0.38	0.48	0.422
Coefficient for determination, degree of freedom adjusted 0.309			
Sample size 265			

Factor Analysis for the Part-Time Employment Rate

Variable	Coefficient	Standard error	Significance probability
Constant term	-24.89	10.84	0.022
Dummy for retirement system reforms	-1.03	0.64	0.104
Dummy for continued employment	-0.72	0.50	0.149
Dummy for failure to gain continued employment	-0.29	0.74	0.699
Employees' pension benefits (before reductions due to employment)	0.00	0.03	0.901
Other unearned income	0.02	0.02	0.280
Spouse's earned income	-0.01	0.02	0.571
Net savings	0.00	0.00	0.153
Dummy for women	0.63	0.55	0.254
Age	0.41	0.18	0.022
Dummy for high school graduates	-1.18	0.48	0.014
Dummy for junior college graduates	-2.02	0.85	0.017
Dummy for university graduates	-2.80	0.89	0.002
Coefficient for determination, degree of freedom adjusted 0.248			
Sample size 181			

come while the amount of pension benefits that are received affects elderly people's choice of whether to work. To deal with this issue, instead of the actual amount received, the initial amount of pension benefits before reductions due to employment was applied as an explanatory variable.

As for other factors, the coefficients for dummy variables are negative for women, negative for age, and positive for academic background, as ordinarily expected, whereas the coefficients are not significant for age and academic background.

Thus, job security measures for the elderly, especially raising the mandatory retirement age and abolishing mandatory retirement systems, have the effect of increasing the earned income of people in their early 60s, and the impact of these measures is far greater than that of people's attributes such as the age, gender, academic background, etc.

4. Income Inequality and the Contribution of Pension and Employment to Eliminating It

(1) Inequality Measures

In Subsection 2, analysis was carried out with regard to elderly people who cannot pay their cost of living without employees' pension benefits, thereby reviewing the shortage of income that is expected to happen when the pension age is raised to 65 as scheduled, their need of employment and earned income, and the effect of job security measures for the elderly. However, this was a review of the average conditions for the elderly, and in reality, there is variation in their income and other areas.

Nevertheless, the number of samples available is not enough to assess the variance of the income brackets, etc. (there were only 40 samples of people who cannot pay their cost of living without employees' pension benefits). To overcome this constraint, inequality measures are used to measure income inequality. As the inequality measures may be zero for some factors such as earned income, pension benefits, and other unearned income, and the difference between income and the cost of living is negative in the case of a shortage of income, the inequality measures used for analysis should be one that can be defined for zero or negative values as well (in this respect, the Theil Index and Atkinson index are unsuitable for this analysis). In addition, in order to measure the degree of contribution of factors such as earned income and pension benefits to inequality (disparity) in income, etc., the inequality measures for income, etc. must be decomposable by these factor components. From this standpoint, the pseudo Gini coefficient (Appendix 1) and pseudo relative variance (pseudo squared coefficient of variation) (Appendix 2) are used as inequality measures. Furthermore, as pseudo relative variance allows decomposition by constituent groups such as the employed/unemployed, the degree to which inequality (disparity) between the employed and the unemployed contributes to inequality in income, etc. can also be ascertained.

(2) Inequality in Income, etc.

Table 3 shows the calculation of the degree of contribution of income factor components to income inequality, using the pseudo Gini coefficient and pseudo relative variance (pseudo squared coefficient of variation). The income factor components used here include earned income, employees' pension benefits (after reductions due to employment), and other unearned income. The degree of contribution of employees' pension benefits is negative both for the pseudo Gini coefficient (-0.014) and the pseudo relative variance (-0.023). This suggests that when the pension age is raised to 65 as scheduled, such negative contribution will disappear and income inequality will expand, in which case elderly people are highly likely to run short on income as funds to pay their cost of living. As shown in Table 5, the degree of contribution of employees' pension benefits is also negative for inequality in terms of the difference between income and cost of living (excess of income or shortage of income), which means raising the pension age to 65 has an effect of expanding inequality.

In order to prevent such expansion of income inequality, it is important to reduce inequality in earned income by taking measures to promote employment among the elderly. In this connection, looking at the impact of the employment situation on inequality in earned income based on the pseudo relative variance, inequality in earned income is 0.691, of which inequality between the employed and the unemployed accounts for 0.149, whereas among those who have benefitted from job security measures for the elderly, inequality between the employed and the unemployed is considerably small, at 0.038 (see Table 3). Then, the impact on income inequality is estimated based on the assumption that as a result of the spread of job security measures for the elderly, inequality in earned income between the employed and the unemployed would decline to the level of inequality between the employed and the unemployed who have benefitted from job security measures for the elderly. As indicated in Table 4, the degree of contribution to income inequality is -0.048 , which shows that such measures have an effect of reducing inequality and such effect is greater than the effect of the raising the pension age to 65 in expanding inequality, standing at 0.023. Although this estimation is made on the basis of the hypothesis that all enterprises will allow all applicants to continue to work until the age of 65, one can see that if job security measures for the elderly are adopted more widely, they will have a considerable effect in reducing income inequality. This is also valid for inequality in terms of the difference between income and the cost of living (see Table 6).⁹

Furthermore, in relation to inequality in earned income (0.691), inequality also exists within those who are employed, between part-time employees and full-time employees, as mentioned in 2 (2). This inequality, standing at 0.031 based on the pseudo relative variance (see Table 3), is considerably small among those who have benefitted from retirement system reforms (raising the mandatory retirement age or abolishing mandatory retirement

⁹ As more elderly people gain employment through job security measures for the elderly, income inequality might increase within those employed. However, such impact on inequality within the employed cannot be estimated and therefore is excluded from consideration in this analysis.

Table 3. Degree of Contribution to Income Inequality

	Degree of contribution	Pseudo Gini coefficient	Degree of contribution	Pseudo relative variance	Between the employed and the unemployed	Who have benefitted from job security measures	Between part-time employees and full-time employees	Who have benefitted from retirement system reforms	Composition ratio
Total income	0.330	0.330	0.507	0.507	0.048	0.013	0.013	0.005	1.000
Earned income	0.185	0.432	0.296	0.691	0.149	0.038	0.031	0.002	0.429
Employees' pension benefits after reduction	-0.014	-0.088	-0.023	-0.139	-0.069	-0.068	-0.022	0.006	0.162
Other unearned income	0.045	0.281	0.073	0.453	-0.031	-0.008	-0.004	0.002	0.162
Spouse's earned income	0.086	0.562	0.132	0.863	0.066	0.001	0.014	0.017	0.153
Spouse's unearned income	0.028	0.294	0.028	0.296	-0.106	-0.024	0.017	0.006	0.094

Note : Degree of contribution: pseudo Gini coefficient or pseudo relative variance multiplied by the composition ratio.

Table 4. Effect of Reducing Inequality in Earned Income through the Spread of Job Security Measures for the Elderly

	Degree of contribution	Pseudo relative variance
Reduction of inequality between the employed and the unemployed through the spread of job security measures	-0.048	-0.111
Reduction of inequality between part-time employees and full-time employees through the spread of retirement system reforms	-0.013	-0.030

Table 5. Degree of Contribution to Inequality in Terms of the Difference between Income and Cost of Living

	Degree of contribution	Pseudo Gini coefficient	Degree of contribution	Pseudo relative variance	Between the employed and the unemployed	Who have benefitted from job security measures	Between part-time employees and full-time employees	Who have benefitted from retirement system reforms	Composition ratio
Total income	0.588	0.294	1.641	0.819	0.095	0.026	0.016	0.003	2.003
Earned income	0.348	0.405	1.026	1.195	0.297	0.075	0.037	0.001	0.859
Employees' pension benefits after reduction	-0.032	-0.098	-0.080	-0.244	-0.137	-0.133	-0.026	0.003	0.325
Other unearned income	0.063	0.194	0.202	0.624	-0.062	-0.016	-0.004	0.001	0.324
Spouse's earned income	0.163	0.530	0.385	1.253	0.131	0.002	0.017	0.009	0.307
Spouse's unearned income	0.046	0.248	0.107	0.572	-0.211	-0.046	0.020	0.003	0.187
Difference between income and the cost of living	0.601	0.601	1.585	1.585	0.189	0.050	0.018	0.002	1.000

Note : Degree of contribution: pseudo Gini coefficient or pseudo relative variance multiplied by the composition ratio.

Table 6. Effect of Reducing Inequality in Earned Income through the Spread of Job Security Measures for the Elderly

	Degree of contribution	Pseudo relative variance
Reduction of inequality between the employed and the unemployed through the spread of job security measures	-0.191	-0.222
Reduction of inequality between part-time employees and full-time employees through the spread of retirement system reforms	-0.031	-0.036

systems), standing at 0.002. Then, the impact on income inequality is estimated based on the assumption that as a result of the spread of retirement system reforms, inequality in earned income between part-time employees and full-time employees would decline to the level of inequality between part-time employees and full-time employees who have benefited from retirement system reforms. As indicated in Table 4, the degree of contribution to income inequality is -0.013 , which shows that these measures have an effect of reducing inequality, and suggests that if retirement system reforms become more common, such reforms will have a considerable effect in reducing income inequality. This is also valid for inequality in terms of the difference between income and the cost of living (see Table 6).

Thus, raising the pension age to 65 has the effect of expanding income inequality, but if job security measures for the elderly are adopted more widely and the employment rate among elderly people rises accordingly, there is expected to be a considerable reduction in inequality as a result. Job security measures for the elderly are essential for stopping the expansion of income inequality and reducing the number of elderly people who run short on income as funds to pay their cost of living. Similarly, when retirement system reforms become more common, such reforms will also have the effect of reducing income inequality within the employed.

5. Spread of Job Security Measures for the Elderly

Table 7 shows data by age regarding how elderly people in their early 60s pay their cost of living. In all age groups, although income exceeds cost of living even excluding employees' pension benefits, the difference between income and cost of living is larger in the younger age groups, and the amount of net savings is also larger in the younger age groups. Reflecting such a tendency, the percentage of elderly people whose income would fall short of their cost of living, supposing they received no employees' pension benefits, and could not make ends meet even by reaching into their net savings is lower in the younger age groups, standing at 12% at the age of 60, 11% at the age of 61, 13% at the age of 62, 18% at the age of 63, and 26% at the age of 64.

These phenomena may show that the younger the age, the larger the amount of earned income, and accordingly, the larger the total amount of income.

One factor of this relationship is that the employment rate is higher in the younger age groups. Seeing that the amount of employees' pension benefits increases with age (Table 7),¹⁰ one can presume that the entitlement to pension benefits may diminish elderly people's willingness to work. However, the percentage of those who intend to increase their earned income when the pension age is raised to 65 as scheduled does not rise with age, standing at 18% at the age of 60, 11% at the age of 61, 25% at the age of 62, 34% at the age

¹⁰ At the time of the survey, those aged 63 or over were entitled to receive flat-rate benefits as well as wage-proportional benefits, and because of this, the amount of employees' pension benefits was larger from the age of 63.

Table 7. Funds to Pay the Cost of Living, by Age

	Age group					Total
	60	61	62	63	64	
Composition ratio (%)	19%	25%	23%	17%	16%	100%
Net savings at the age of 65*	2018.2	1908.2	1584.2	1314.9	1526.4	1694.3
Without employees' pension benefits*	1872.1	1638.8	1260.5	747.6	851.8	1321.0
Difference between income and cost of living**	22.3	19.9	19.9	16.9	15.5	19.1
Without employees' pension benefits**	19.9	15.4	14.5	7.4	4.3	12.9
Cost of living**	19.4	21.0	17.4	18.9	18.9	19.2
Income**	41.7	40.9	37.2	35.8	34.4	38.3
Earned income**	24.6	18.2	16.8	10.1	9.8	16.4
Employees' pension benefits**	2.4	4.5	5.4	9.5	11.2	6.2
(Before reductions due to employment)**	3.2	5.6	5.9	11.6	12.1	7.3
Other unearned income**	4.6	7.0	5.8	6.8	6.8	6.2
Spouse's earned income**	5.8	8.8	6.2	3.8	3.2	5.9
Spouse's unearned income**	4.2	2.5	3.0	5.6	3.3	3.6
Employment rate (%)	76%	73%	69%	59%	60%	68%
Part-time employment rate (%)	13%	12%	29%	24%	38%	22%
Who have benefitted from job security measures (%)	55%	47%	44%	30%	26%	42%
Who have benefitted from retirement system reforms (%)	35%	20%	18%	9%	2%	18%
Rate of failure to gain continued employment (%)	4%	8%	13%	18%	14%	11%

* (10,000 yen)

** (10,000 yen, monthly amount)

of 63, and 7% at the age of 64. This suggests that the difference in the employment rate by age may be attributed to external factors out of individuals' control, such as the employment environment.

The percentage of those who have benefitted from job security measures for the elderly is higher in the younger age groups, as indicated in Table 7. Conversely, the percentage of those who wished to gain continued employment (re-employment or extension of the term of employment) but failed to do so or whose workplace did not have a continued employment system, in short, the rate of failure to gain continued employment, is lower in the younger age groups. The tendency for the employment rate to be higher in the younger

age groups may be attributed to such difference in terms of the implementation status of job security measures for the elderly.

In addition, among those who are employed, the part-time employment rate is lower in the younger age groups. This may be another reason why younger people make more earned income. As indicated in Table 7, the percentage of those who have benefitted from retirement system reforms (raising the mandatory retirement age and abolishing the mandatory retirement system) is higher in the younger age groups. The tendency for the part-time employment rate to be lower in the younger age groups may be attributed to such difference in terms of the implementation status of retirement system reforms.

According to the regression analysis discussed in subsection 3, age has no significant effect in relation to the earned income of elderly people in their early 60s, whereas the implementation of job security measures for the elderly, and in particular, retirement system reforms, have the significant effect of increasing earned income of such people. Thus, the difference in terms of the implementation status of these measures has a greater impact than the age difference.

However, following the establishment of the obligation to take job security measures for the elderly in a phased manner pursuant to the revised Act on Stabilization of Employment of Elderly Persons (the target age for the obligation to take job security measures is 62 in FY2006, 63 in FY2007 to 2009, 64 in FY2010 to 2012, and 65 in FY2013 and thereafter), more enterprises now offer continued employment for elderly people. In view of such developments, the aforementioned difference in terms of the implementation status of job security measures can be regarded as arising from a difference by cohort (year of birth), rather than a difference by age. In the future, through the promotion of job security measures for the elderly up to the age of 65, the decline in earned income with age will become smaller. This positive effect is expected to be greater if more enterprises also reform their retirement systems by raising the mandatory retirement age or abolishing their mandatory retirement systems.

IV. Conclusion

This thesis inquired into how elderly people, especially those in their early 60s, pay their cost of living, through an analysis how necessary it will be for them to earn income when the pension age is raised to 65 as scheduled, as well as examining the effect of job security measures for the elderly (raising the mandatory retirement age, continued employment including re-employment and extension of the term of employment, and abolishing the mandatory retirement system). By using individual data collected by JILPT in the Survey on the Employment Status of the Elderly conducted in August 2009, cross tabulation analysis, regression analysis, and analysis by inequality measures were carried out in relation to their access to job security measures for the elderly and retirement system reforms.

According to the results of cross tabulation analysis, for some 15% of the targeted el-

derly people, their incomes fall short of their cost of living without employees' pension benefits, and as they will become unable to make ends meet even by reaching into their net savings, measures should be taken to support these people when the pension age is raised to 65 as scheduled. The biggest reason why they will not be able to pay their cost of living without employees' pension benefits may be their low earned incomes, which may be derived from a low employment rate and may be attributed to difference in terms of the implementation status of job security measures for the elderly. Also among those who are employed, the high part-time employment rate is considered to be the cause of the low earned income, which may also be attributed to difference in terms of the implementation status of retirement system reforms (raising the mandatory retirement age and abolishing the mandatory retirement system). Meanwhile, the results of regression analysis on the factors for earned income indicate that job security measures for the elderly, including retirement system reforms, have the effect of increasing the earned incomes of elderly people in their early 60s.

However, this was a review of the average conditions of those who cannot pay their cost of living without employees' pension benefits, and in reality, there is variation in their incomes and other conditions. Therefore, using the pseudo Gini coefficient and pseudo relative variance (pseudo squared coefficient of variation) as inequality measures, income inequality was calculated, as well as the degree of contribution of the relevant factor components (e.g. earned income, employees' pension benefits) to income inequality. According to the results of this analysis, raising the pension age to 65 has the effect of expanding income inequality, but if job security measures for the elderly are adopted more widely and the employment rate among elderly people rises accordingly, there is expected to be a considerably reduction in inequality as a result. Job security measures for the elderly are essential for stopping the expansion of income inequality and reducing the number of elderly people whose incomes fall short as funds to pay their cost of living. Similarly, when retirement system reforms become more common, they will also have the effect of reducing income inequality within the employed.

Thus, when the pension age is raised to 65 as scheduled, a certain portion of elderly people will see their incomes fall short of their cost of living, and will need some support to make up for that shortage. If job security measures for the elderly are adopted more widely and the employment rate among elderly people rises accordingly, their earned income levels will increase, leading to a decrease in the number of them who suffer a shortage of income. This positive effect is expected to be greater if, of those job security measures for the elderly, retirement system reforms become more common.

Job security measures for the elderly have become more accessible to the later generations along with the phased raising of the target age for such measures. This initiative must be further promoted so as to ensure that all enterprises will adopt job security measures for the elderly aged up to 65, and that they will guarantee job opportunities for all applicants who wish to continue to work until the age of 65. To this end, the existing criteria by enter-

prises for limiting the people who are eligible to continue employment must be abolished. Another task that should be achieved for the future is to raise the mandatory retirement age to 65 or over before the employees' pension age for wage-proportional benefits is completely raised to 65.

Appendix 1. Pseudo Gini Coefficient

The Gini coefficient (G) denotes the proportion of the area that lies between the Lorenz curve, which represents the order of inequality based on the weakest value judgment, and the line of perfect equality, to the total area under the line of perfect equality. Supposing that all households are indexed in increasing order of income, the Gini coefficient is as follows.

$$G = \left[1/2 - 1/(2n^2u) \left\{ A_1 + \sum_{j=1}^{n-1} \left(\sum_{i=1}^j A_i + \sum_{i=1}^{j+1} A_i \right) \right\} \right] / (1/2)$$

(A_i : income of i th household; u : mean for all households; n : number of households)

On the other hand, the pseudo Gini coefficient (G_m) is calculated in the same way, using income factor components, such as earned income and pension benefits, in increasing order of income ($m=1 \sim M$, in which M denotes the number of income factor components).

$$G_m = \left[1/2 - 1/(2n^2u_m) \left\{ A_{1m} + \sum_{j=1}^{n-1} \left(\sum_{i=1}^j A_{im} + \sum_{i=1}^{j+1} A_{im} \right) \right\} \right] / (1/2)$$

(A_{im} : value of income factor component m of i th household; u_m : mean for all households)

When the values calculated by multiplying the pseudo Gini coefficient (G_m) by the share of each income factor component in income (u_m/u) are added together, the total sum equals the Gini coefficient for income (G). Thus, as mentioned by Takayama (1980), the Gini coefficient can be decomposed by income factor components. Accordingly, $u_m/u \times G_m$ represents the degree of contribution of the relevant income factor component to income inequality, and the pseudo Gini coefficient (G_m) represents the degree of contribution of the unit share of the relevant income factor component to income inequality.

Appendix 2. Pseudo Relative Variance

The relative variance (squared coefficient of variation) denotes a square of the coefficient for variation:

$$V = 1 / n \sum_{i=1}^n (A_i - u)^2 / u^2$$

(A_i : income of i th household; u : mean for all households; n : number of households)

On the other hand, the pseudo relative variance (pseudo squared coefficient of variation) (V_m) is a mean of the rate of divergence between the value of each income factor component of each household and its mean for all households, which is weighted by the rate of divergence between income of each household and its mean for all households.

$$V_m = 1 / n \sum_{i=1}^n (A_{im} - u_m) (A_i - u) / (u_m u)$$

(A_{im} : value of income factor component m of i th household; u_m : mean for all households)

When the values calculated by multiplying the pseudo relative variance (V_m) by the share of each income factor component in income (u_m / u) are added together, the total sum equals the relative variance (V). Thus, the relative variance can be decomposed by income factor components. Accordingly, as mentioned by Shorrocks (1982), $u_m / u \times V_m$ represents the degree of contribution of the relevant income factor component to income inequality, and the pseudo relative variance (V_m) represents the degree of contribution of the unit share of the relevant income factor component to income inequality.

The pseudo relative variance (V_m) can also be decomposed by constituent groups, such as the employed and the unemployed. Supposing that all households are divided into K constituent groups, the pseudo relative variance within each constituent group (W_{km}) ($k=1 \sim K$) and the pseudo relative variance between the constituent groups (B_m) are represented as follows:

$$W_{km} = 1 / n_k \sum_{i=1}^{n_k} (A_{im} - u_{km}) (A_i - u_k) / (u_{km} u_k)$$

$$B_m = 1 / n \sum_{k=1}^K n_k (u_{km} - u_m) (u_k - u) / (u_m u)$$

(n_k : number of households in k th constituent group; u_{km} : mean of the income factor component m ; u_k : mean income)

Accordingly, when the values calculated by multiplying the pseudo relative variance within each constituent group (W_{km}) by the proportion of the mean for each constituent group to the mean for all households (u_{km} / u_m , u_k / u) and by the proportion in the number of households (n_k / n) are added together and the pseudo relative variance between the constituent groups (B_m) is added to the total sum, the result is as follows.

$$\begin{aligned}
 & \sum_{k=1}^K (n_k / n \times u_{km} / u_m \times u_k / u \times W_{km}) + B_m \\
 &= 1 / n \sum_{k=1}^K \sum_{i=1}^{n_k} \{(A_{im} - u_{km})(A_i - u_k) + (u_{km} - u_m)(u_k - u)\} / (u_m u) \\
 &= 1 / n \sum_{k=1}^K \sum_{i=1}^{n_k} \{(A_{im} A_i - u_{km} u_k) + (u_{km} u_k - u_m u)\} / (u_m u) \\
 &= 1 / n \sum_{k=1}^K \sum_{i=1}^{n_k} (A_{im} - u_m)(A_i - u) / (u_m u) \\
 &= V_m
 \end{aligned}$$

Thus, the pseudo relative variance (V_m) can be decomposed by constituent groups. Here, B_m represents the degree of contribution of inequality between the relevant constituent groups to income inequality.

As shown above, the pseudo relative variance can be decomposed by income factor components and by constituent groups.

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