Does Skill-Development Make Elderly Japanese More Marketable?*

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I. Introduction

Work incentives for the elderly Japanese male are much higher relative to those for the elderly in the other developed countries. The 2005 International Comparison of Old-Age Persons' Attitude about Life Finance [*Kōreisha no seikatsu to ishiki ni kansuru kokusai hikaku chōsa*], conducted by the Cabinet Office, asks the elderly male about a desirable retirement age regardless of his current working status. The results show that 32.7% of the Japanese, 4.6% of the French, only 2.4% of the German, and 14.4% of the Americans responded "70 years old."

However, many elderly Japanese workers would be faced with unemployed because most Japanese firms have a mandatory retirement system. According to the 2004 Survey on Employment Management, conducted by the Ministry of Health, Labour and Welfare (hereafter referred to as the MHLW), 100% of firms with more than 5,000 employees, 99.3% of firms with 1,000-4,999 employees, and 99.6% of firms with 300-999 employees adopt the mandatory retirement system in Japan. This is very different from the case in many other countries, including the U.S., where it is prohibited by law that employers retire their workers only because they reach a certain age. The Japanese firms with mandatory retirement systems are perfectly willing to employ workers one day but force them to retire the next. That is, most Japanese employees are unemployable after mandatory retirement age.

If mandatory retirees want to continue working after mandatory retirement, they would have to seek a new job. The 2004 Annual Report on the Labour

* This paper is based on Kajitani (2006), with substantial additions and revisions. We used micro data sets; the 1997 Survey on Elderly Employment and Life-style [*Teinen taishoku-sha tō no shūgyō to seikatsu jittai ni kansuru chōsa*] which are provided by the Japan Organization for Employment of the Elderly and Persons with Disabilities and the Information Center for Social Science Research on Japan, Institute of Social Science, University of Tokyo. We are partially supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Grant-in-Aid for 21st Century COE Program "Interfaces for Advanced Economic Analysis."

Force Survey, conducted by the Statistics Bureau, shows that 170 thousand out of 210 thousand unemployed persons seek a job due to mandatory retirement or the expiration of job contracts. In 2004 the unemployment rate for elderly Japanese males aged 60 to 64 was 7.1% and was higher than the rate for males aged 30 to 59 (approximately 4%). This may result from job searching by mandatory retirees.

Moreover, the unemployment rate for Japanese males aged 60 to 64 increased from 5.1% in 1990 to 10.4% in 2000. This is mainly because the outflow from unemployment has decreased while the inflow into unemployment has increased. As for the former, Machin and Manning (1999) show the positive correlation between the unemployment rate and long-term unemployment in OECD countries. Kohara (2004) calculates the ratio of long-term unemployment by age group except for the elderly (aged 60 to 64) using the Labour Force Survey et al., and indicates that the incidence of long-term unemployment is increasingly higher in the 1990's in Japan. This raises the question of: Is the incidence of long-term unemployment for elderly Japanese also increasingly higher?

If the longer unemployment period itself (e.g. the occupational skills of those unemployed become obsolete because of long-term unemployment) makes job searching difficult; that is, if there is a negative duration dependence, long-term unemployment becomes a serious matter. Note that skill development such as self development or job training would improve this matter. Skill development for elderly Japanese could be one of the ways to prevent them from long-term unemployment, on the condition that there is negative duration dependence in elderly unemployed people.

A causal relationship between job training and unemployment is ambiguous; however, there are many previous studies which have focused on it. For example, Ham and Lalonde (1996) examine the impact of training on female participants in the National Support Work (NSW) demonstration in the U.S., and show that there is no significant relationship between training in NSW and their unemployment duration. Lee and Lee (2005) point out that training for white-collar female workers shortens the unemployment duration in Korea, while training for Korean women increases their unemployment duration. Alba-Ramírez (1999) shows that unemployed men attending training programs or schools are less likely to become employed using the Spanish Active Population Survey. Aakvik (2001) reveals that employment rates are

higher for individuals who participate in Norwegian vocational rehabilitation programs using propensity score matching methods. These studies shed light on the effects of training on unemployment for not the elderly but middle-aged and young people.

Seike and Yamada (2004) point out that it is not appropriate to regard all mandatory retirees who desire to work as unemployed because not every elderly person immediately seeks a job after their mandatory retirement. However, elderly Japanese are more likely to desire to work after mandatory retirement. Skill development such as self development or job training for elderly Japanese could promote their employment after mandatory retirement.

This paper examines whether unemployment duration for elderly Japanese tends to be longer using macro data. It also examines whether there is negative duration dependence for the elderly who are in a non-working status except for those in full retirement, whether skill development shortens the non-working duration, and whether unemployment insurance benefits affect the non-working duration, using cross-sectional micro data sets for elderly Japanese who have desired to work after their mandatory retirement.

There are three major contributions of this paper. First, we focus on the non-working durations of mandatory retirees who want to work. There are a few academic discussions about the process by which mandatory retirees have been reemployed, while many of them are likely to desire to work after mandatory retirement. In addition, we can control an unobserved heterogeneity which depends on the circumstances leading to being out of employment by focusing on an exogenous event; mandatory retirement. Second, we discuss the effects of skill development for elderly Japanese on their reemployment after mandatory retirement. There is no empirical study that sheds light on the effects of skill development on reemployment for Japanese mandatory retirees. Moreover, there is even less evidence on what kind of skill development elderly Japanese engage in. Finally, we consider an endogenous problem between the labor supply decision and unemployment benefits to reveal the impact of unemployment insurance benefits on the non-working duration for elderly Japanese.

As a preview of the main findings of this paper, we show that (i) there seems to be prolonged periods of unemployment among males aged 55 to 64 in the 90s which does not become shorter in the 2000s. In the case of mandatory retirees, the share of long-term unemployment is around 20% in the 90s and

the 2000s. Using micro data sets, we further show that (ii) there is negative duration dependence in elderly non-working people, but (iii) skill development such as job training or self development shortens the non-working duration for the elderly, and (iv) unemployment insurance benefits prolong the periods of non-working for the elderly.

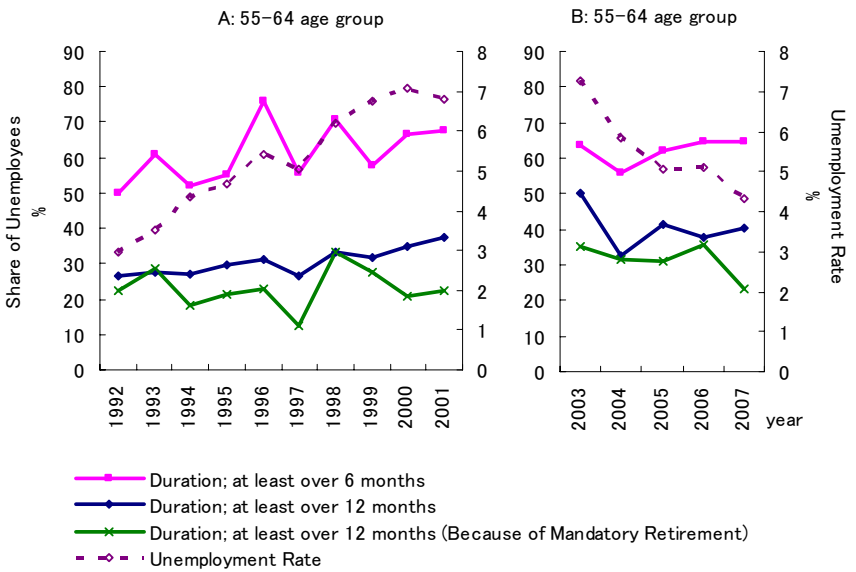
The organization of this paper is as follows: In the next section, we clarify the proportion of long-term unemployment in the total unemployment for the elderly. In Section III we explain the micro data sets and definitions of the variables; in Section IV we present the empirical framework; in Section V we present the estimation results; in Section VI we discuss the effects of skill development on employment for elderly Japanese; the last section concludes this paper.

II. Unemployment Duration for Elderly Japanese

The Report on the Special Survey of the Labour Force Survey (hereafter referred to as the RSLFS) and the Monthly Report on the Labour Force Survey (Detailed Tabulation) (hereafter referred to as the MRLFS), both are conducted by the Statistics Bureau, report the number of unemployed at the time by sex, age-group and duration of unemployment. Using these statistics, we calculate the ratio of long-term unemployment for elderly Japanese. As for details, we divide the number of unemployed, who have been out of work for more than 12 months in February of each year, by the total number of unemployed 12 months ago (that is, in February of the previous year). This ratio denotes "the share of people who have been unemployed for at least 12 months and over."

Figure 1-A illustrates the share of the long-term elderly unemployed (12 months and over, and 6 months and over, respectively) calculated in the above way, and the unemployment rate for the 55-64 age groups of males from 1992 to 2001. The share of long-term unemployment tends to increase during the 1992-2001 period. For example, the ratio of unemployment "at least 6 months and over" rises from 50% in 1992 to 67.4% in 2001 though it varies widely, and the ratio of unemployment "at least 12 months and over" increases from 26.3% in 1992 to 37.5% in 2001. In addition, we show the share of long-term elderly unemployed during the 2003-2007 periods in Figure 1-B. The percentage of long-term unemployment does not become shorter in the 2000s, although the unemployment rate becomes increasingly lower. The share of

Figure 1. Share of the elderly unemployed in Japan



Sources: *The Report on the Special Survey of Labour Force* and *The Monthly Report on the Labour Force Survey (Detailed Tabulation)*, conducted by the Statistics Bureau.

Note: Figure1-B shows the quarterly (January to March) average of the unemployment duration and unemployment rates, which are an arithmetic mean for three months. This is because *The Labour Force Special Survey* was merged into *The Labour Force Survey; a special questionnaire* in January 2002 and the results of the special questionnaire are released quarterly.

unemployment “at least 6 months and over” and “at least 12 months and over” in 2007 are 64.5% and 40.5% respectively.

The above share of long-term unemployment involves not only involuntary unemployment (e.g. mandatory retirees) but also voluntary unemployment. Is the ratio of long-term unemployed among the mandatory retirees higher during the 1991-2007 periods? Both the RSLFS and the MRLFS report the number of unemployed by duration of unemployment and reasons of seeking a job. We illustrate the number of long-term unemployed over the number of age-mandatory retired unemployed in Figure1-A and 1-B. In the case of mandatory retirees, the share of long-term unemployment is far from low, while the periods of unemployment do not become longer. The share of long-term unemployment (at least 12 months and over) in 1991 is 22.2%, and

is also 22.2% in 2001. Also, the share during the 2003-2006 periods is around 30% and 23.1% in 2007. Therefore, the probability that mandatory retirees are unemployed for long periods is not low, even though they desire to work after mandatory retirement.

III. Data Description: The 1997 Survey on Elderly Employment and Life-Style

In order to examine whether job training or self development shortens the non-working duration for Japanese mandatory retirees, we use cross-sectional micro data sets for elderly Japanese, the 1997 Survey on Elderly Employment and Life-Style [*Teinen taishoku-sha tō no shūgyō to seikatsu jittai ni kansuru chōsa*] (hereafter referred to as the SEEL) which are provided by the Japan Organization for Employment of the Elderly and Persons with Disabilities and the Information Center for Social Science Research on Japan, Institute of Social Science, University of Tokyo. The SEEL asks elderly Japanese about their employment/retirement decisions, career and life-style.

There are very few surveys that have asked about career jobs for elderly Japanese people and the duration of non-work from their mandatory retirement to their retirement.[1] The respondents mainly consist of: Group 1, people who reached mandatory retirement age in 1992 (40.7% of the respondents); Group 2, people aged 50 and over who left their job due to the reason except mandatory retirement in 1992 (17.2% of the respondents); Group 3 , people over the age of 50 who were on temporary transfer to another company (*shukkō*) in 1992 (11.6% of the respondents), and; Group 4, mandatory retirees who were reemployed by their *previous* companies as soon as they were retired at the mandatory age (*keizoku koyō*) in 1992 (16.2% of the respondents). We use the sample Group 1 excluded the people who were fully retired from labor markets in 1992 or who were rehired by other new companies as soon as they were retired at the mandatory age in 1992. This is because we focus on the probability of exit from non-working status for the elderly who want to work. Furthermore, there are few possibilities that the difference of time trends in macro-economic status (i.e. unemployment rate) affects the labor demand for the elderly as all of the respondents in the SEEL were retired in 1992. By

[1] The SEEL had 5,998 respondents (male; 5018, female; 835).

further restricting the sample size to 633, which is enough to answer the questions we need for estimation, we find that 403 people find a new job during the observable periods.

We compare the difference in distributions between the SEEL and large macro data to check if the sample we use has a distinct distribution. The ratio of large size firms to firms in which the elderly had been employed until mandatory retirement (we define these firms as "Company A") in the SEEL is higher than that in the 2002 Employment Status Survey (the ESS), which is conducted by the Statistics Bureau. However, the distribution of educational attainment in the SEEL sample is similar to that in the 2000 Population Census, which is conducted by the Statistics Bureau, and the average amount of income in the SEEL is also similar to that in the ESS.

Table 1 summarizes the details of the variables used in empirical analysis and shows the descriptive statistics. The SEEL asks the elderly respondents "How long did it take for you to find a new job after mandatory retirement?" We regard answers of the above question as "non-working duration." The SEEL is conducted 60 months after mandatory retirement. In case of the elderly who have been seeking a new job but have not completed their non-working period within 60 months, we stop following them in the sample beyond the 60th month; that is, when right-censoring occurs. Note that we assume that right-censoring occurs at the 36th month in the sample. It seems possible that the SEEL includes elderly people who have taken a break for a long time (i.e. 3 years and over) from job searching.[2] The average non-working duration is 21.8 months, but varies greatly (standard deviation is 12.24).

Table 1 shows that elderly Japanese are less likely to work on skill development. The percentage of elderly people who have attended job training or skill development training, or who have studied for themselves in order to

[2] We assume right-censoring occurs at the 36th month, even if there are elderly people who have been seeking a new job for a long time (i.e. 3 years and over). The White Paper on the Labour Economy 2002, conducted by the MHLW, regards the average unemployment duration for people whose length of unemployment is greater than 2 years as 36 months. There are few differences between the estimation result using the full sample and that using the sample excluding the elderly who find a new job during the 37th-60th periods. We are unable to separate the non-working duration correctly into the periods of *not seeking* a job and the periods of *seeking* a job in the sample.

Table 1. Definition of the variables and descriptive statistics

Variable	Definition	Mean	Std. Dev.	Min	Max
Non-working duration	Months between mandatory retirement day from Company A and rehirement day.	21.80	12.24	1	36
Skill development	Attending job training or skill development training, or studying for oneself before mandatory retirement in order to continue to work after Mandatory Retirement=1, Elsewhere=0	0.09	0.28	0	1
S.D. opportunities	Company A provided opportunities before mandatory retirement for study or training which would be useful for work in other companies after Mandatory Retirement=1, Elsewhere=0	0.21	0.41	0	1
Unemployment insurance[2]	We regard the length of service with Company A as the computation periods for unemployment benefits (*Santei Kiso Kikan*) and calculate the predetermined receivable periods of unemployment insurance benefits. We make a dummy variable which is a time-varying covariate: Within the Qualification Period=1, Beyond=0	0.43	0.49	0	1
Public pension[3]	The estimated full amount of public pension benefits (*Kōsei Nenkin*), which are based on the methods developed in Ogawa (1998) and Higuchi and Yamamoto (2002). (ten thousand yen)	21.37	6.93	0	30
Corporate pension	The amount of corporate pension benefits from Company A excluding the employees' pension fund. (ten thousand yen)	3.82	5.32	0	18
Private pension	The amount of private pension benefits. (ten thousand yen)	0.41	1.28	0	5
Male	Male=1, Female=0	0.94	0.24	0	1
Health status	Present health status: Good=1, Bad=0	0.85	0.35	0	1
Univ. graduate	Educational background: University graduate=1, Elsewhere=0	0.15	0.36	0	1
Three major metropolitan areas	Tokyo, Kanagawa, Chiba, Saitama, Aichi, Mie, Gifu, Osaka, Hyogo, Kyoto, Nara and Wakayama=1, Elsewhere=0	0.61	0.49	0	1
Spouse	With spouse=1, Without=0.	0.95	0.21	0	1
Dependents (children)	With dependent kids=1, Without=0	0.41	0.49	0	1
Householder before M. R.	Upon retirement from Company A, Owned a house=1, Elsewhere=0	0.92	0.27	0	1
Housing loan	Housing loan condition: With=1, Without=0	0.09	0.28	0	1
Retirement allowances	The amount of severance pay from Company A: 1) 0 yen, 2) less than 1 million yen, 3) 1 million-2.5 million yen, 4) 2.5 million-5 million yen, 5) 5 million-10 million yen, 6) 10 million-15 million yen, 7) 15 million-20 million yen, 8) 20 million-30 million yen, 9) 30 million-40 million yen, 10) 40 million-50 million yen. We take the middle point for each category except for the top.	1422.91	826.36	0	4500
Nonlabor income	Without income except labor income or pension income=1, Elsewhere=0.	0.36	0.48	0	1
Expected minimum income	Minimum income per month which the elderly people are willing to receive to live on. (ten thousand yen)	37.14	10.45	15	95
Primary industry	Category of industry for the Company A: Primary sector (Agricultural, Forestry, Fisheries or Metal mining)=1, Elsewhere=0	0.00	0.07	0	1

Table 1 (*Continued*)

Variable	Definition	Mean	Std. Dev.	Min	Max
Secondary industry	Category of industry for the Company A: Secondary sector (Construction or Manufacture)=1, Elsewhere=0	0.71	0.45	0	1
Firm size below 300 employees	Firm size for the Company A: Below 300 employees=1, Elsewhere=0	0.21	0.41	0	1
Firm size 300-999 employees	Firm size for the Company A: 300-999 employees=1, Elsewhere=0	0.72	0.45	0	1
Officer	Had an admin or executive position at Company A=1, Elsewhere=0	0.14	0.35	0	1
Professions	Main job in 50s: Professions=1, Elsewhere=0	0.14	0.35	0	1
Manager	Main job in 50s: Managerial work=1, Elsewhere=0	0.21	0.40	0	1
Clerical job	Main job in 50s: Clerical job=1, Elsewhere=0	0.10	0.30	0	1
Intended to work immediately after M.R.	The following answers to the question: "What did you think about your post-retirement plans?" 1) I intend to work immediately, 2) I intend not to work immediately, 3) I would retire completely, and 4) Elsewhere. We make a dummy variable (Yes=1, No=0) for each of the categories (bench mark=Elsewhere).	0.19	0.39	0	1
Intended not to work immediately after M.R.		0.68	0.47	0	1
Intended to retire completely		0.06	0.24	0	1

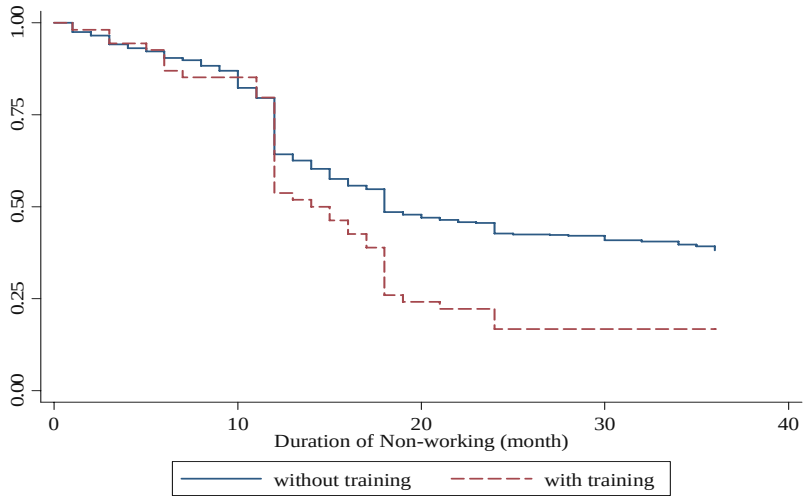
Notes: [1] "Company A" denotes a company which the elderly are retired from at the mandatory age.
[2] Mean and standard deviation of "predetermined qualification period for U.I. benefits" is 9.99 and 0.14 respectively.
[3] 1 US dollar ≒ 120 yen in 1997. (Research and Statistics Department, Bank of Japan)

work after mandatory retirement, is approximately 9% of the total. The Survey on Employment Conditions of Older Persons (2000) (the SECOP), conducted by the MHLW, also reports that 2.2% of the older males attend training programs provided by employers, while 4.8% of them do skill development using public vocational programs.[3] Not only elderly Japanese, but also the elderly in other countries are less likely to attend training. Ho et al. (2000) points out that older workers in Hong Kong are less likely to be promoted or selected for training.

Figure 2 shows the Kaplan-Meier estimates of the hazards from the non-working status by two groups; the persons with and without skill development. The hazard ratio for those with skill development is higher than that for those without skill development after 12th months, while there are few

[3] The percentage of elderly people with training shown by the SECOP is lower than that by the SEEL, because there are elderly people who are employed as soon as they have retired at the mandatory age in the SECOP sample.

Figure 2. Kaplan-Meier survival estimates



Source: *The SEEL*.

differences between the hazard ratio with skill development and the ratio without it before the 11th month. Mayer (1990) and Kohara (2004) show that the probability of leaving unemployment rises dramatically just prior to when unemployment insurance benefits lapse. It seems that elderly Japanese tend to find a new job after fully receiving the benefits, as the maximum predetermined receivable period of unemployment insurance benefits for the insured elderly in 1997 is 300 days (10 months).

Note that we have to interpret the causal relationship between skill development and employment with some caution. Previous studies that investigate the impact of training on the probability of leaving unemployment point out that if people who have higher motivation are more likely to be selected for training, an observed positive correlation between training and employment status would not represent a causal effect of training. That is, there may be a self-selection problem. However, the self-selection problem would not be serious in the case of examining a causal relationship between skill development and employment for the elderly.[4] The elderly with low

[4] There may be a motivation gap among elderly Japanese workers even if the elderly with less motivation are more likely to be retired from the labor market. We discuss

Table 2. Differences between with and without skill development; test for group mean-comparison

Variables	Mean of group: Skill development With	Mean of group: Skill development Without	t-value	Sample size: Skill development With	Sample size: Skill development Without
Same type of job	0.344	0.481	1.507	32	258
	(0.483)	(0.501)	[1.464]		
Univ. graduate	0.167	0.150	-0.308	54	579
	(0.358)	(0.358)	[-0.321]		
Officer	0.130	0.140	0.212	54	579
	(0.339)	(0.347)	[0.208]		
Retirement allowances	1547.22	1411.31	-1.428	54	579
	(650.85)	(840.38)	[-1.156]		
Health status	0.852	0.853	0.026	54	579
	(0.359)	(0.354)	[0.027]		
Degree of motivation for work					
It is natural for me to continue working	0.558	0.483	-1.022	52	575
	(0.502)	(0.500)	[-1.024]		
It is unfair to give the elderly no job regardless of their skill or spirit.	0.490	0.472	-0.246	51	572
	(0.505)		[-0.249]		

Note: Standard deviations are in parentheses and Welch t-values (Welch 1947) are in brackets respectively.

motivation will be retired from the labor market fully. Moreover, elderly people aged 60 and over can receive public pension benefits.

We check whether the mean of the "with skill development" sample is equal to the mean of the "without skill development" sample using the proxy variables for "motivation" or "ability." We make two dummy variables that represent motivation using the following questions in the SEEL; "Do you think it is natural for you to continue working?" and "Do you think it is unfair to give the elderly no job regardless of their skill or spirit?" Furthermore, we use the following variables; educational attainment, career status, the amount of retirement allowances and health status as the proxy index representing ability. We report the results of test for group mean-comparison in Table 2. We cannot reject a null hypothesis "the mean of the sample with skill development is equal to that of the sample without it" at the 10% significance level in these six variables. In the SEEL sample at least, we are unable to observe statistically

this issue in Section V.

any differences in motivation or ability between the elderly with skill development and those without skill development.

IV. Estimation Model

We examine how Japanese mandatory retirees are able to leave the non-working status by the Accelerated Failure Time (AFT) model, following Petersen (1986) and Lancaster (1990). The elderly person has been in a non-working status for T periods since he/she was retired at the mandatory age. T has some distribution in the population and t denotes a particular value of T. The cumulative distribution function of T is defined as $F(t)=\int_0^{\infty} f(s)ds = \Pr(T \le t)$, where $f(t)$ denotes probability density function. $\Pr(t \le T < t+\Delta t \mid T \ge t, \mathbf{X}(t+\Delta t))$, where $\mathbf{X}(t)$ represents observable vectors of the explanatory variables, is the probability of leaving the non-working status in the interval $[t, t+\Delta t)$ given survival up until time t.

The hazard function for T is defined as

$$\lambda(t \mid \mathbf{X}(t)) = \lim_{\Delta t \to 0} \frac{\Pr(t \le T < t+\Delta t \mid T \ge t, \mathbf{X}(t+\Delta t))}{\Delta t} \qquad (1)$$

Let $t_0 = 0$ and $t_0 < t_1 < \cdots < t_j < \cdots < t_k$. t_0 and t_k denote the time when the elderly person has been retired and the duration in the non-working status at the time when either he/she finds a new job or when right-censoring occurs, respectively. Assuming that $\mathbf{X}(t_j)$ is constant within an interval between t_{j-1} and t_j, the conditional probability of non-working beyond t_j given survival at t_{j-1} is $\Pr[T \ge t_j \mid T \ge t_{j-1}, \mathbf{X}(t_j)] = \exp\left[-\int_{t_{j-1}}^{t_j} \lambda(s \mid \mathbf{X}(t_j))ds\right]$. The density of T at $t = t_k$ is $f(t_k \mid \mathbf{X}(t_k)) = \lambda(t_k \mid \mathbf{X}(t_k))S(t_k \mid \mathbf{X}(t_k))$ and the survival

function is $S(t_k \mid \mathbf{X}(t_k)) = \exp\left[-\sum_{j=1}^{k}\int_{t_{j-1}}^{t_j}\lambda(s \mid \mathbf{X}(t_j))ds\right]$. In this way we can obtain the log likelihood function as follows:

$$\ln L = \sum_{i=1}^{n}\left\{d_i \ln\lambda(t_k \mid \mathbf{X}_i(t_k)) - \sum_{j=1}^{k}\int_{t_{j-1}}^{t_j}\lambda(s \mid \mathbf{X}_i(t_j))\right\} \qquad (2)$$

where $d_i = 1$ if the elderly i finds a job and $d_i = 0$ if right-censoring occurs.

It is important that we specify the type of distribution of T when using the parametric hazard model. Therefore, we estimate the Weibull, exponential, log-normal and log-logistic hazard functions respectively. Comparing the results from the Akaike information criterion (Akaike 1974) and figures on which we plot predicted cumulative hazard estimates against the Cox-Snell residuals, we select the log-normal hazard function model.

Assuming that T has a log-normal distribution, we have $\lambda(t \mid \mathbf{X}(t)) = \{\phi((\ln(t) - \mathbf{X}(t)\boldsymbol{\beta})/\sigma)/[1 - \Phi((\ln(t) - \mathbf{X}(t)\boldsymbol{\beta})/\sigma)]\}/\sigma t$, where $\boldsymbol{\beta}$ and σ denote a vector of coefficient and a scale parameter of duration dependence, respectively. We find a set of parameter estimates, say $\hat{\boldsymbol{\beta}}$ and $\hat{\sigma}$, such that equation (2) is maximized.

We include the dummy variable which represents whether he/she attended job training or skill development programs *before mandatory retirement from Company A* in $\mathbf{X}$. If training or self development impacts positively on the probability of finding a new job, skill development would encourage the elderly to be employed; that is, the expected sign of this variable is negative.

Moreover, we examine the effects of unemployment insurance (U.I.) benefits against the non-working duration. We make the variable which represents an exogenous predetermined receivable period of the U.I. benefits, in order to avoid an endogenous problem between the U.I. benefits and the labor supply decision for the elderly. This is a time-varying dummy variable; equal to 1 when the elderly is within the receivable periods, and equal to 0 when he/she is beyond the receivable periods. It satisfies a strictly exogenous condition Lancaster (1990) points out.

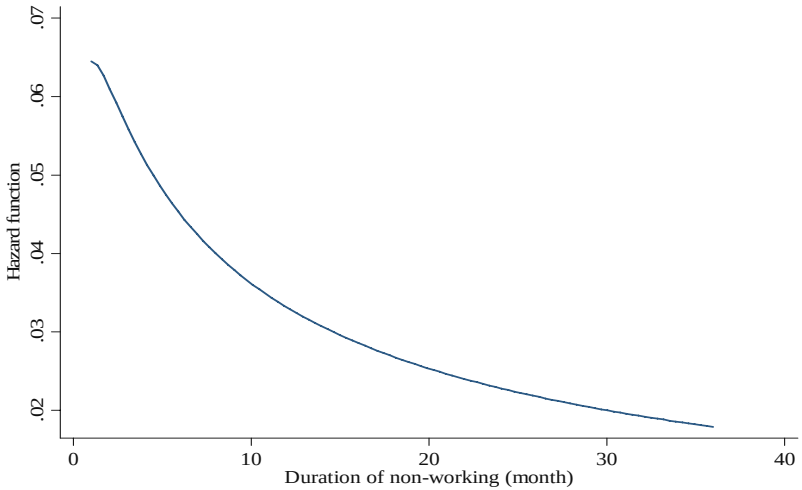
Note that we will have to control the effects of pension benefits on the probability of employment. When pension benefits reduce the elderly peoples' efforts in job searching, it would be hard for the elderly to seek new jobs and therefore the periods of non-working would increase. We control the full amount of public pension benefits, the amount of corporate pension benefits and private pension benefits and check whether pension benefits reduce the probability of employment.[5]

We use the variables related to household characteristics, such as whether the elderly person owned a house when he/she was retired at the mandatory age, whether or not there are any dependents (children), housing loan, and income other than from labor income and pension benefits, and personal characteristics in the estimation model. In addition, the SEEL asks the elderly "How much is the minimum income per month which you are willing to receive to live on?" We can regard the answer of this question as the reservation wage, as this answer includes labor income. If the elderly person's reservation wage is higher, he/she would continue to look for jobs paying higher wages and therefore the duration of non-working might be longer.

Yamada and Seike (2001) indicate the possibility that heterogeneity, such as differences in elderly peoples' working-style post mandatory retirement, would influence the degree of the effects of social security on the probability of employment. The estimation results could be changed by controlling this heterogeneity. We divide the SEEL sample into four subsamples using the following answers to the question "What did you think about your post-retirement plans?"; "I intend to work immediately" (Cluster A), "I intend not to work immediately" (Cluster B), "I would retire completely" (Cluster C), and "Elsewhere" (Cluster D). Then, we make three dummy variables to identify the four subsamples and estimate the model (i) using these dummy variables as additional explanatory variables, (ii) using the empirical model with unobservable heterogeneity (frailty), and (iii) using from the subsamples

[5] The SEEL asks the elderly respondents the *current* amount of public pension benefits. Therefore, we can observe not the full amount of public pension benefits but the reduced amount of pension benefits (*zaishoku rōrei nenkin*) for the elderly who have found a job and are working full-time, as the pension benefit is reduced if the pensioner is working full-time. We calculate the full amount of the pension benefit based on the method developed in Ogawa (1998) and Higuchi and Yamamoto (2002) using the reduced amount of pension benefits available from the SEEL.

Figure 3. Log-normal hazard distribution at mean value of all covariates



Source: *The SEEL.*

only Cluster A and Cluster B separately. When estimating the model using only subsamples; Cluster A, we may be able to regard the non-working duration as an unemployment duration, as the elderly who answer that they intend to work immediately are likely to maintain high motivation for seeking a job. The probability of leaving the non-working status is defined as $\lambda_l(t \mid \alpha_l, \mathbf{X}(t)) = \alpha_l \lambda_l(t \mid \mathbf{X}(t))$ in the estimation model with unobservable heterogeneity, where l and α_l correspond to each groups and the (unobserved) heterogeneity for the elderly varies by group, respectively. We assume α_l has gamma distribution within each groups.

V. Estimation Results

We discuss the distributional form of T before reporting the details of the estimation results. We choose log-normal distribution as the most appropriate distribution of T, as mentioned in Section IV. The parameter $\hat{\sigma}$ is statistically significant at the 1% significance level (Table 3), and the probability of leaving the non-working status is increasingly lower over time. This is shown by Figure 3, which implies that the longer the duration of non-working is, the lower the hazard ratio is, evaluating at the mean value of

characteristics of the elderly. That is, there is a negative duration dependence in elderly non-working people. Moreover, the parameter $\hat{\sigma}$, which is estimated using only the elderly who intend to work immediately after mandatory retirement (Cluster A), is also statistically significant at the 1% significance level; therefore, there is negative unemployment duration dependence.

Table 3 reports the estimation results for the log-normal hazard model. Column (1) shows the results without controlling for heterogeneity. The duration for the elderly with skill development is approximately 40 percent (1-exp(-0.50)) shorter than those without skill development at the 5% significance level, even controlling for the characteristics of Company A (e.g. firm size). In addition, there are few differences between the results in Column (1) and the results obtained by the estimation which we add the variable representing the motivation of the elderly, as mentioned in Table 2, to the explanatory variables in Column (1). Note, however, that the (unobserved) ability excluding the observable ability ("Univ. graduate," "Officer," "Retirement allowances," and "Health status"), which we have controlled, could be positively correlated with skill development. Supposing that the elderly with higher ability are likely to work more on skill development, the coefficient of the variable; "skill development" would be over-estimated as the disturbance includes the unobserved ability. Therefore, the impact of skill development on the non-working duration might be less than that shown in Column (1). On the other hand, if elderly people with lower ability are likely to try to further develop their skills, the impact of skill development on the non-working duration would be greater than the impact shown in Column (1); this is because the coefficient of that variable would be under-estimated.

There is also a large positive effect of U. I. benefits. The receivable periods of U. I. benefits significantly increase the non-working duration at the 1% significance level in Column (1). The sign of the public pension benefits variable, however, is positive but insignificant in Column (1). The elderly with less motivation for work would be retired completely from the labor market, while elderly Japanese who are looking for jobs would not reduce their job search efforts even if the amount of public pension benefits increase.

As for the other variables in Column (1), the non-working duration for the elderly without non-labor income is 36% (1-exp(-0.45)) less than that for the elderly with non-labor income at the 1% significance level. In addition, there is

Table 3. The effects on transitions out of the non-working status; estimation results

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Skill development	-0.5008 **	-0.4254 *	-0.4563 †			
	(0.2231)	(0.2237)	(0.2993)			
S.D. opportunities				-0.3709 *	-0.4001 *	-0.3939 *
				(0.2072)	(0.2060)	(0.2363)
Unemployment insurance	2.3063 ***	2.3473 ***	2.3189 ***	2.4359 ***	2.4583 ***	4.1403 ***
	(0.4481)	(0.4450)	(0.5030)	(0.4622)	(0.4556)	(1.5037)
Public pension	0.0020	0.0033	0.0025	0.0010	0.0027	0.0080
	(0.0140)	(0.0136)	(0.0138)	(0.0143)	(0.0139)	(0.0149)
Corporate pension	-0.0037	-0.0043	-0.0038	-0.0002	-0.0004	-0.0019
	(0.0183)	(0.0180)	(0.0174)	(0.0192)	(0.0189)	(0.0189)
Private pension	0.0798	0.0856	0.0786	0.0800	0.0885	0.0916
	(0.0680)	(0.0661)	(0.0718)	(0.0710)	(0.0690)	(0.0795)
Male	-0.3420	-0.1398	-0.1976	-0.3317	-0.1148	-0.0019
	(0.4717)	(0.4714)	(0.4474)	(0.4850)	(0.4835)	(0.5024)
Health status	-0.2614	-0.2021	-0.2177	-0.2557	-0.1909	-0.1376
	(0.2677)	(0.2639)	(0.2565)	(0.2728)	(0.2678)	(0.2893)
Univ. graduate	-0.2837	-0.2766	-0.3080	-0.2782	-0.2722	-0.2399
	(0.2890)	(0.2838)	(0.2745)	(0.2951)	(0.2891)	(0.3001)
Three major metropolitan areas	-0.3437 *	-0.2540	-0.2801	-0.3583 *	-0.2672	-0.4248 **
	(0.1804)	(0.1795)	(0.1844)	(0.1837)	(0.1823)	(0.2134)
Spouse	0.0021	-0.0344	0.0568	-0.0450	-0.0893	-0.1899
	(0.4490)	(0.4345)	(0.4458)	(0.4589)	(0.4433)	(0.5088)
Dependents (children)	-0.0242	-0.0093	-0.0108	-0.0063	0.0108	-0.0029
	(0.1709)	(0.1696)	(0.1738)	(0.1740)	(0.1726)	(0.1966)
Householder before M. R.	0.1953	0.3176	0.3053	0.2412	0.3673	0.4623
	(0.3313)	(0.3210)	(0.3271)	(0.3387)	(0.3276)	(0.3783)
Housing loan	-0.1771	-0.0853	-0.0968	-0.1696	-0.0791	0.2493
	(0.2614)	(0.2583)	(0.3174)	(0.2679)	(0.2625)	(0.4097)
Retirement allowances	0.0002	0.0001	0.0002	0.0002	0.0001	0.0002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Nonlabor income	-0.4515 ***	-0.4966 ***	-0.4875 ***	-0.4420 ***	-0.4900 ***	-0.3005
	(0.1677)	(0.1667)	(0.1825)	(0.1705)	(0.1689)	(0.2242)
Expected minimum wage	0.0019	0.0032	0.0026	0.0023	0.0039	0.0034
	(0.0087)	(0.0086)	(0.0091)	(0.0089)	(0.0088)	(0.0104)
Primary industry	0.8649	0.0797	0.5271	0.8414	0.0060	1.1261
	(1.6549)	(1.6797)	(1.6678)	(1.6868)	(1.6931)	(2.7513)
Secondary industry	-0.4995 **	-0.5453 **	-0.5362 **	-0.4690 **	-0.5136 **	-0.4840 **
	(0.2225)	(0.2187)	(0.2156)	(0.2264)	(0.2219)	(0.2383)
Firm size below 300 employees	-0.4387	-0.4339	-0.4230	-0.5102	-0.4997	-0.5780
	(0.4543)	(0.4491)	(0.4231)	(0.4644)	(0.4571)	(0.4759)
Firm size 300-999 employees	-0.5625	-0.5890	-0.5344	-0.6312	-0.6501	-0.5694
	(0.4284)	(0.4270)	(0.4112)	(0.4350)	(0.4314)	(0.4737)
Officer	-0.4582	-0.4319	-0.4650	-0.4982	-0.4704	-0.7532 **
	(0.3536)	(0.3419)	(0.3157)	(0.3598)	(0.3458)	(0.3366)

Table 3 (*Continued*)

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Professions	-0.5565 **	-0.5587 **	-0.5252 *	-0.6012 **	-0.5958 **	-0.8255 **
	(0.2772)	(0.2796)	(0.2766)	(0.2835)	(0.2854)	(0.3212)
Manager	-0.1435	-0.2022	-0.1689	-0.1556	-0.2130	-0.3323
	(0.2871)	(0.2791)	(0.2795)	(0.2907)	(0.2814)	(0.3156)
Clerical job	-0.1296	-0.1659	-0.1303	-0.1241	-0.1582	-0.2330
	(0.3002)	(0.3021)	(0.3014)	(0.3052)	(0.3065)	(0.3339)
Intend to work immediately after M.R.		-1.0759 **			-1.1031 ***	
		(0.4219)			(0.4274)	
Intend not to work immediately after M.R.		-0.9089 **			-0.9264 **	
		(0.3579)			(0.3638)	
Intended to retire completely		1.1993 **			1.2809 **	
		(0.5847)			(0.6061)	
Constant	3.2438 ***	3.7200 ***	2.9382 ***	3.2114 ***	3.6917 ***	-1.5351
	(0.7515)	(0.7812)	(0.9292)	(0.7715)	(0.7990)	(2.5995)
$\hat{\sigma}$	1.7171 ***	1.6868 ***	1.7246 ***	1.7458 ***	1.7090 ***	0.9201 ***
	(0.1142)	(0.1099)	(0.1805)	(0.1158)	(0.1111)	(0.3571)
Likelihood-ratio test of β (except Consant)=0	52.41 ***	62.58 ***		50.37 ***	60.54 ***	
Log likelihood	-774.03	-759.17		-773.91	-758.40	
θ			0.17			2.48
Likelihood-ratio test of θ=0			13.90 ***			16.98 ***

Notes: [1] Standard errors, adjusted for clustering at individual level, are in parentheses.
[2] †, *, ** and *** indicate statistical significance at the 15%, 10%, 5% and 1% levels respectively.
[3] Number of times at risk is 13,798, Number of persons is 633.

no significant causal relationship that impacts the expected minimum income of the non-working duration. Even if the reservation wage of the elderly is higher, it seems that the probability of leaving the non-working status does not change.

Column (2) in Table 3 shows the estimation results with three additional dummy variables, in order to consider the heterogeneity such as differences in work-style of the elderly post mandatory retirement. The non-working duration for people who intend "not to work immediately after mandatory retirement" is greater than the non-working duration for the elderly who intend "to work immediately after mandatory retirement. However, even when we control this heterogeneity, we can observe that statistically the non-working duration for the elderly with skill development is less than that for the elderly without skill development. Moreover, in Column (2) the receivable periods of U.I. benefits

also significantly extend the non-working duration at the 1% significance level.

Column (3) shows the estimation results with controlling other unobserved heterogeneity. Skill development significantly reduces the non-working duration by 37% (1-exp(-0.46)) at the 15% significance level. The Null hypothesis "there is not the heterogeneity (the variability of the frailty across group; $\theta = 0$)" is rejected at the 1% significance level. Skill development of the elderly for employment after mandatory retirement could shorten their non-working duration even if this heterogeneity includes their unobserved motivation or ability.

Furthermore, the SEEL asks the elderly whether the Company A had provided opportunities before mandatory retirement for skill development which would be useful for work in other firms. Using this information, we can make an exogenous variable in order to check the effect of skill development regardless of the self selection problem. Columns (4)-(6) in Table 3 report the estimation results using the "skill development (S.D.) opportunities" variable as the explanatory variable. The non-working duration for the elderly with S.D.opportunities is shorter than that for the elderly without S.D.opportunities. Controlling the unobserved heterogeneity, we can observe that skill development opportunities reduce the non-working duration by approximately 30% (1-exp(-0.39)) at the 10 % significance level (Column [6]).

Finally, we estimate the effects of skill development using the sample group Cluster A (intend to work immediately) and Cluster B (intend *not* to work immediately) separately. In the case of using only Cluster A, both the coefficients of "skill development" and that of "S.D. opportunities" are significantly negative at the 1% significance level. When we use only the samples whose non-work durations are longer relative to that of Cluster A, that is, Cluster B, both "skill development" and "S.D.opportunities" are negative but insignificant. It is possible that the obsolescence of skills, which results in a prolonged non-working duration, would weaken the effects of skill development in the probability of leaving the non-working status.

Thus, there is a negative duration dependence for the non-working elderly in Japan. However, skill development lessens the probability of leaving the non-working status for the elderly when controlling heterogeneity. Moreover, public unemployment insurance benefits prolong the non-working duration. In particular, the wages of the elderly who are reemployed after mandatory

retirement tend to be lower than the amount of U.I. benefits in Japan. Therefore, the elderly may have more incentives to receive these benefits for as long as possible.

VI. Discussion

If only the prolonged non-work duration *per se* causes difficulties in being reemployed after mandatory retirement, the mandatory retiree who desires to work should be able to leave the non-working status as soon as possible. The estimation results point out that there is a negative duration dependence, but skill development such as job training or self development shortens the periods of non-working for the elderly when controlling personal characteristics and heterogeneity.

We can classify the types of skill development for the elderly into (i) complementary skills to the existing job of the elderly, and (ii) alternative skills. The decision as to whether or not the elderly develop their occupational skills may depend on whether they want to develop complementary skills or alternative skills to their existing job. For example, the elderly who desire to find a similar-type job as their existing one are unlikely to attend a job training program or skill development program, because they don't think that they need to further develop their occupational skills. Therefore, we examine the relationship between skill development and a change in the type of occupation before and after mandatory retirement, using the information about the type of jobs before and after mandatory retirement for the elderly who have been employed after mandatory retirement in the SEEL sample. We make a dummy variable; equal to 1 if the elderly have found a similar job to their existing one, and equal to 0 if they have found a dissimilar job to their existing one. Row (1) in Table 2 shows the results of the group mean-comparison test for this dummy variable. The sample mean of "without skill development" is 0.481, while the sample mean of "with skill development" is 0.344. However, we cannot reject the null hypothesis, "the mean of sample with skill development is equal to that of sample without it," at the 10% significance level.

So, what kind of skills should elderly Japanese develop in order to find a new job after mandatory retirement? The 2006 Survey of Skill Development and Reemployment for Elderly Japanese [*Kōnenreisha no shokugyō kunren to sai-shūshoku ni kansuru ankēto chōsa*] (the SSDR), conducted by Associate

Professor Miki Kohara of Osaka University, asks public offices across the country (e.g. the Public Employment Security Office) the details of training and self development programs for elderly Japanese.[6]

The SSDR reports that the elderly tend to not only study for themselves by using textbooks or broadcasting, but also participate in workshops on writing curriculum vitae that can be utilized for job searching or on counseling on planning for their work life post mandatory retirement. Moreover, some people attend job training programs provided by public vocational training facilities in order to obtain certification such as a boiler operator and so on. In addition, approximately 60% of the SSDR respondents reply that the probability of being employed with these skill development programs is higher than that without these skill development programs.

Note that, however, it is important that the elderly look at their own previous career and develop skills which satisfy the needs of the labor market. The elderly with skill development which improves their previous expertise or with training related to jobs which are in relatively high demand can find a new job in a short time. For example, in Osaka prefecture 85 % of the elderly attending public job training courses in building management, which are relatively much in demand, have found employment each year. The elderly Japanese who desire to work after mandatory retirement should make plans as soon as possible for their work style post mandatory retirement.

VII. Conclusion

This paper examined (i) whether the unemployment duration for elderly Japanese was longer or not using macro data, (ii) whether there was a negative (unemployment) duration dependence for the elderly, (iii) whether skill development, such as job training or self-development programs, increased the probability of leaving the non-working status, and (iv) whether unemployment insurance affected the non-working duration, using cross-sectional micro data sets for elderly Japanese.

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[6] A questionnaire was sent out to 731 establishments which contained the Prefectural Vocational Ability Development Association, and the Employment and Human Resources Development Organization Prefectural Center, in addition to the Public Employment Security Office across the country. The number of responses obtained was 367.

Using the RSLFS and the MRLFS, we clarified that (i) there was a prolonged duration of unemployment among males aged 55-64 in the 90s and does not become shorter in the 2000s. The ratio of long-term unemployment for the mandatory retirees was around 20% in the 90s and the 2000s.

In addition, we used the SEEL's large micro data sets and focused on the exogenous event of mandatory retirement, which enabled us to control an unobserved heterogeneity that depends on the reason for leaving an existing job. We further revealed that (ii) skill development shortened the non-working duration for the elderly, although (iii) there was a negative duration dependence in the non-working elderly. Furthermore, we clarified that (iv) unemployment insurance benefits prolonged the periods of non-working for the elderly.

The labor force participation rate among elderly Japanese is very high. Many older people, however, are still out of work. The mechanisms of how to develop occupational skills and the system of unemployment insurance play a key role in whether elderly Japanese are reemployed as early as possible.

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