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Japan's Reemployment System and Work Incentives for the Elderly^{*}

Shinya Kajitani[†]

Abstract

This paper clarifies the features of the Japanese reemployment system. We examine the impact of this system on employees' incentive to continue to work for their current firms after mandatory retirement. Using two large microdata sets for Japanese firms and workers, this paper shows that: 1) for the firms with a reemployment system, the steeper the slope of the wage profile until mandatory retirement, the more wages decrease on reemployment, and 2) although a worker's wage on reemployment decreases, the wage reduction on reemployment does not necessarily make the workers in small/mid-size firms leave their current firm.

JEL classification: J14; J26; J33

Keywords: The labor supply of elderly workers; Mandatory retirement; Reemployment system; Wage reduction; Work incentive.

1 Introduction

The population is rapidly aging due to prolonged longevity in Japan. Ohashi (1998) discussed the theoretical relation between the worker's optimal retirement age and prolonged longevity, and recommended that the mandatory retirement age be extended in response to this longevity. Most firms set a mandatory retirement age in Japan. According to the "2004 Personnel Management Survey (*Kōyo Kanri Chōsa*)" conducted by the Ministry of Health, Labor and Welfare, 91.5% of firms with more than 30 employees have a mandatory retirement age. In the 2006 legislation, the Japanese government imposed job security for employees until the age of 65. However, most firms are not willing to extend the mandatory retirement age. The institutional obligation to extend the mandatory retirement age merely forces firms to add to the overall cost of hiring the elderly,

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because this cost causes “overpayment.” According to the well-known theory of Lazear (1979), the joint gains of a firm and workers from long-term contracts are maximized at mandatory retirement. The firms are no longer willing to pay the elderly their current wage. In addition, hiring the elderly can cost more simply because the productivity of workers may decrease as they get older. There are some psychological studies showing a negative correlation between performance and age. Mitchell (1988) found that older workers are more likely to get injured in an industrial accident.

One possibility for raising employment levels of the elderly without imposing a higher cost on firms is to allow the firms to recontract with lower pay their “first-time retirees,” who have worked for them until mandatory retirement age (Limsdaine and Mitchell (1999)). Note that Japanese firms can lower the wages of elderly workers once they have reached their mandatory retirement age. This is very different from the case in many other countries, including the U.S., where law and custom bar employers from cutting older workers’ pay and benefits when they reach a certain age.

A wage reduction on reemployment could, however, decrease the labor supply of elderly workers after mandatory retirement. Theoretically, the higher the wages being offered, the more likely the elderly will decide to work. Several studies show that labor income has a positive and significant effect on the decision to work (for the Japanese elderly, for example, see Tachibanaki and Shimono (1994), Higuchi and Yamamoto (2002)). Okunishi (2001) indicated that wage reduction reduces the number of the applicants for reemployment at their current firm. On the other hand, Oishi (2000) and Higuchi et al. (2006) reported that labor income does not have a significant effect on the decision to work for elderly Japanese people.

This paper examines the Japanese reemployment system *after* mandatory retirement, using two large cross-sectional microdata sets for Japanese firms and workers gathered in 1998. This paper also examines how such a reemployment system, particularly with respect to wage reduction, affects a worker’s incentive to continue to work at the current firm *after* mandatory retirement, controlling for nonwage characteristics of employers and employees.

To preview the main findings of this paper, we show that there is a considerable wage reduction for reemployees relative to the level in effect just before mandatory retirement. In addition, the steeper the slope of the wage profile until mandatory retirement, the greater will be the wage reduction on reemployment. We further find that the older workers in small and mid-size firms do not necessarily leave their current firm after mandatory retirement, even though their wages on reemployment dramatically decrease.

There are two major contributions of this paper. First, there has been no analysis of the relationship between the wage path before mandatory retirement and after mandatory retirement using a large microdata set for Japanese firms with a reemployment system. Although there have been many studies on employment schemes before mandatory retirement, few studies have analyzed employment schemes after mandatory retirement. Secondly, there have been no studies on the labor supply of elderly Japanese people, controlling for both the employers’ characteristics, which include wage changes before and after mandatory retirement, and the employees’ characteristics.

The organization of the paper is as follows: In the next section, we clarify the features of the Japanese reemployment system. In Section 3, we describe the estimation model of the elderly workers' decision on whether to work (hereafter, working decision) at their current firms, and the data source and the variables' definitions, and we present the obtained results in Section 4. The last section concludes the paper.

2 Japan's Reemployment System

Most Japanese firms have a reemployment system which offers their “first-time retirees” an employment opportunity after mandatory retirement.¹ The “Personnel Management Survey (*Kōyo Kanri Chōsa*)” (hereafter referred to as PMS) conducted in 2004 reported that 67.4% of Japanese firms have a reemployment system (77.5% of firms with more than 5,000 employees, 69.2% of those with 1,000–4,999 employees, 69.0% of those with 300–999 employees, and 70.8% of those with 100–299 employees reemploy their first-time retirees).

There are some distinctive features of the Japanese reemployment system. First, most Japanese firms reemploy their first-time retirees using short-term contracts. The PMS of 2003 surveyed firms that had a reemployment system to obtain details of the terms of their contracts with their first-time retirees. The results showed that 86.6% of firms with more than 5,000 employees, 78.8% of those with 1,000–4,999 employees, 78.1% of those with 300–999 employees, and 70.0% of those with 100–299 employees reemploy their first-time retirees using short-term (within one year) contracts. Second, Japanese firms *selectively* reemploy their first-time retirees. The PMS of 2003 showed that, while one-fourth of the small or mid-size firms that had a reemployment system hired applicants for reemployment without setting any conditions, the remaining three-fourths restricted the applicants according to some particular criteria.

To provide more details about the Japanese reemployment system, we used a large cross-sectional microdata set for Japanese firms, the “1998 Employer Survey on Continuing Employment of the Elderly (*Kō-nenrei Jūgyōin no Keizoku Koyō ni kansuru Kigyō Chōsa*)” (hereafter referred to as ESCEE–1), which was provided by the Japan Organization for Employment of the Elderly and Persons with Disabilities (*Kōrei Shōgai-sha Koyō Shien Kikō*) (hereafter referred to as JEED) and the Information Center for Social Science Research on Japan, Institute of Social Science, University of Tokyo (hereafter referred to as the SSJ Data Archive). The ESCEE–1 randomly surveyed 33,339 firms, each of which employed 100 or more employees in each prefecture and obtained 18,542 respondents. The ESCEE–1 includes items on the average rate of reduction in wages compared to the wage at age 55 and the work intensity on reemployment, which includes such parameters as the number of hours worked and the workers' responsibilities.

¹ Some firms implement an employment scheme called “employment extension.” However, many of the firms with this scheme change working conditions, including wages, after mandatory retirement. In this paper, we regard “employment extension” as reemployment.

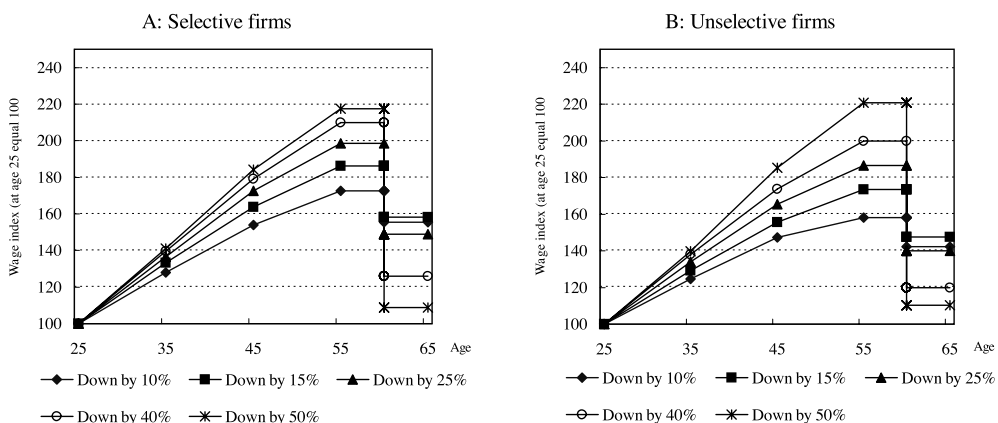
Table 1: The rate of wage change on reemployment by selective and unselective firms (in %)

	firm size	Up	Not change	Under 10% down	10-20% down	20-30% down	30-50% down	50+% down	otherwise
Selective firms	1,000+	2.7	5.5	2.4	14.3	26.2	23.5	8.5	16.8
	100-999	2.1	8.2	4.1	18.3	24.2	19.2	5.0	18.9
Unselective firms	1,000+	0.8	15.0	6.0	14.3	21.8	14.3	9.8	18.0
	100-999	2.0	17.4	7.0	21.9	19.7	11.8	2.6	17.6

Source: the ESCEE-1

Table 1 shows the wage change ratio after mandatory retirement. Of large firms, 16.7–20.3% with more than 1,000 employees cut the wage prior to mandatory retirement by 1–20%, 21.8–26.2% of them cut it by 20–30% and 24.1–32.0% of them cut it by more than 30%. As for small or mid-sized firms, 22.4–28.9% of them cut the wage by 1–20%, 19.7–24.2% of them cut it by 20–30% and 14.4–24.2% of them cut it by more than 30%. Large firms considerably reduce more workers' wages in the post-mandatory-retirement period than do small or mid-size firms. In addition, 5.5–8.2% of the firms with selective reemployment display no wage reduction, while 15.0–17.4% of the firms that are not selective pay the same wage as before mandatory retirement. The wage reduction rate of the selective firms is higher than that of the unselective firms. It could be that the selective firms wish to discourage employees from continuing to work after mandatory retirement, while paying lip service to their reemployment policy.

How does the wage path of the reemployed workers change throughout their lifetime of work at their current firms? Figure 1 shows the relationship between the slope of the wage profile up to mandatory retirement and the wage reduction rate on reemployment. The steeper the slope of the wage profile up to mandatory retirement, the more the wage on reemployment decreases. This is found to be true both for selective and unselective firms.



Source: the ESCEE-1

Figure 1: The slope of the wage profile by the reduction rate of wages after mandatory retirement (firm size total)

The slope of the wage profile before mandatory retirement differs considerably among industries. The ESCEE-1 shows that the slope of wage profile of the firms in the finance, insurance, and real estate sector is the steepest, while that of the firms in the transportation and telecommunication sector is the flattest. The relationship in Figure 1 suggests that the degree of wage reduction varies among industries. Table 2 shows the wage change ratio after mandatory retirement for four industries. 10.2–26.7% of the firms in the transportation and telecommunication sector have no wage reduction. In contrast, 45.0–48.4% of the firms in the finance, insurance, and real estate sector cut wages by more than 30%.

Table 2: The rate of wage change on reemployment by selective and unselective firms (by industries, firm-size total, in %)

	Industries	Up	Not change	Under 10% down	10-20% down	20-30% down	30-50% down	50+% down	otherwise
Selective firms	Construction	2.4	7.8	3.8	21.4	25.5	16.1	2.4	20.6
	Manufacturing	2.5	5.6	3.8	19.6	28.0	19.6	4.5	16.4
	Transportation and telecommunication	0.7	10.2	6.8	20.6	21.7	17.1	5.3	17.6
	Finance, insurance and real estate	1.6	3.2	0.3	9.1	18.2	32.2	16.2	19.2
Unselective firms	Construction	1.2	17.4	7.5	24.5	17.8	8.3	0.0	23.3
	Manufacturing	2.0	13.4	6.8	25.1	22.2	12.4	2.3	15.8
	Transportation and telecommunication	1.2	26.7	9.3	19.8	15.9	6.7	0.9	19.5
	Finance, insurance and real estate	0.0	2.5	2.5	15.0	17.5	25.0	20.0	17.5

Source: the ESCEE-1

There are several possible explanations for this finding. First, work responsibilities before and after mandatory retirement may differ among industries and occupations. For example, some employees – e.g., bank clerks – tend to take on increasing responsibilities when they are young (before mandatory retirement), but are assigned relatively light work when they are older (after mandatory retirement). Other workers – e.g., taxi drivers – have a constant level of responsibility irrespective of whether they are working before or after mandatory retirement. If the firms pay the employees in proportion to their responsibilities, we will see a positive relationship between a steep upward wage profile before mandatory retirement and the big reduction in wages thereafter, depending on the particular worker's responsibilities.

As an alternative explanation, the difficulty in monitoring the employees' work performance may differ among industries and occupations. As Lazear (1979) argued, the firms in which the costs of monitoring the employees' performance are higher would set a steeper upward wage profile and thereby provide a work incentive to the employees. This is possible under long-term contracts but not under short-term contracts. As already pointed out, most firms in Japan reemploy their first-time retirees under short-term contracts. Under the short-term contracts on reemployment, firms can offer workers light, less difficult work, for which the costs of performance monitoring would be lower. In this case, the firms also reduce wages in proportion to the workers' level of responsibility.

Table 3: The Changes in *Working-time* and *Responsibilities* on reemployment by the rate of wage change on reemployment (firm-size total, in %)

	Rate of wage change						
	Increase	Not change	Under 10% decrease	10–20% decrease	20–30% decrease	30–50% decrease	50+% decrease
A: Selective firms							
1: Working hours							
Not change	32.1	87.5	90.5	88.9	84.8	80.6	60.9
Shorten	67.9	11.8	8.5	8.9	12.8	16.7	35.4
2: Responsibilities							
Not change	96.6	94.7	70.3	59.0	47.7	38.3	28.5
Reduce the burden of jobs	2.5	4.5	24.9	35.1	42.6	48.9	47.8
Redeploy to other parts	0.0	0.1	2.1	2.5	5.2	7.2	13.7
B: Unselective firms							
1: Working hours							
Not change	41.3	92.7	91.3	89.6	88.3	78.4	55.6
Shorten	56.5	6.9	8.3	9.4	10.3	18.9	41.1
2: Responsibilities							
Not change	100	93.8	76.0	62.3	49.2	46.1	27.5
Reduce the burden of jobs	0.0	5.1	20.9	32.5	43.0	44.2	38.5
Redeploy to other parts	0.0	0.9	2.7	2.3	4.4	5.1	17.6

Source: the ESCEE-1

Table 3 shows the changes in working hours and responsibilities on reemployment by the rate of wage change on reemployment. A few firms reduce the number of hours worked, when they reduce wages on reemployment (see panel A–1 and B–1 in Table 3). In contrast, the greater the wage reduction on reemployment, the more the firms will reduce workers’ responsibilities on reemployment. This is found regardless of whether firms use selection criteria upon reemploying workers (see panel A–2 and B–2 in Table 3). Many reemployed elderly are required to work the same number of hours as before mandatory retirement, but are given fewer responsibilities.

3 Empirical Model and Data Description

3.1 The Estimation Model of the Elderly Workers’ Working Decisions

The previous section showed that many Japanese firms adopt a reemployment system, and most of them reduce the wages of the reemployed workers without reducing working hours. How does the wage reduction affect the workers’ working decisions? We examine the elderly workers’ incentive to work after mandatory retirement using two large microdata sets, which are described in the next subsection. The survey first asks the workers before mandatory retirement whether they want to work after mandatory retirement or retire completely. Then, those who want to work after mandatory retirement are asked whether they want to remain at their current firm after mandatory retirement or want to change jobs. We estimate their working decision by means of a recursive model following Van de Ven and Van Praag (1981).

We assume that there exists a latent variable y_i^* that measures the worker’s incentive to work for

his/her current firm after mandatory retirement and consider the following equation:

$$y_i^* = X_i\beta + u_{1i}, \quad (1)$$

such that we observe only the binary outcome y_i ,

$$y_i = 1 \quad \text{if} \quad y_i^* > 0, \quad \text{and} \quad y_i = 0 \quad \text{otherwise.}$$

The binary variable y_i corresponds to “would like to continue to work at the current firm (= 1)” and “would like to change jobs (= 0)”. The decision of continuing to work at the current firm is made only if $z_i^* > 0$, where z_i^* is taken from the following retirement incentive equation (selection equation):

$$z_i^* = W_i\alpha + u_{2i}. \quad (2)$$

The latent variable z_i^* is linked to the observed binary variable z_i indicating “would like to work after mandatory retirement (= 1)” and “would like to retire completely (= 0)”,

$$z_i = 1 \quad \text{if} \quad z_i^* > 0, \quad \text{and} \quad z_i = 0 \quad \text{otherwise.}$$

Thus, there are three types of observations in the sample: 1) would like to continue to work for his/her current firm, 2) would like to change jobs, and 3) would like to retire completely. The log likelihood is:

$$\sum_{\substack{i \in S \\ y_i=1}} \ln[\Phi_2(X_i\beta, W_i\alpha, \rho)] + \sum_{\substack{i \in S \\ y_i=0}} \ln[\Phi_2(-X_i\beta, W_i\alpha, -\rho)] + \sum_{i \notin S} \ln[1 - \Phi(W_i\alpha)], \quad (3)$$

where S is the set of observations that involve working after mandatory retirement, Φ_2 is the cumulative bivariate normal distribution function, Φ is the cumulative normal distribution function, ρ is a correlation coefficient and an unobserved error term: $u_{1i}, u_{0i} \sim BVN(0, 0, 1, 1, \rho)$.

X_i and W_i represent observable vectors of explanatory variables. The first important explanatory variable is the wage reduction after mandatory retirement. As explained in Section 1, the wage reduction can discourage the elderly to work for their current firms after mandatory retirement. This is because a larger wage reduction on reemployment will induce an increase in foregone income, even after controlling for other characteristics. Note, however, that the firms could reduce wages more in order for workers to receive subsidies or to avoid forfeiting employee's pension benefits.² Some firms may control a worker's wage after the age of 60 to maximize the sum of employment income and subsidies and the employee's pension benefits. In this case, the wage reduction will encourage the elderly to work for their current firms after mandatory retirement. We cannot control

² Workers reemployed after the age of 60 can receive subsidies called “benefits of employment extension for the elderly (*Kō-nenrei Koyō Keizoku Kyūfu*)” in situations when the wage after the age of 60 is less than 85% of the wage at the age of 60. In 1998, although employees' pension eligibility age was 60, the pension payment of elderly workers was reduced depending on their labor income from the age of 60 to the age of 65 (“Old-age Pension for Active Employees (*Zaishoku Rōrei Nen-kin*).”)

for this effect, since the information on subsidies and employee's pension benefits is not available. We must consider this point carefully when interpreting the estimation results.

Another important explanatory variable is the type of the reemployment system. If working hours or working days become short, the elderly workers might want to continue to work, and if their working responsibilities are reduced, the elderly workers may desire to remain at their current firm after mandatory retirement. If this pattern of work suits elderly workers' needs, the workers will want to work for their current firm after mandatory retirement.

We also control the variables related to the firm's other characteristics. Not only the wage after mandatory retirement but also the wage before mandatory retirement can affect the elderly workers' incentive to work. However, as mentioned in Section 2, the slope of the wage profile until mandatory retirement is correlated to the wage reduction on reemployment. If we include the slope of the wage profile until mandatory retirement as a control variable as well as the wage reduction, this variable is redundant, as it introduces a multicollinearity problem. Therefore, we include the wage at the age of 55 as a control variable to control the wage before mandatory retirement.

Moreover, the existence of an early retirement system can affect labor decisions. Some Japanese firms have preferential treatment for severance pay for early retirees (for example, premium severance pay). When the workers want to change jobs after mandatory retirement, they would leave the current firm if they receive a premium severance payment.

As previous studies suggest, we control the other variables related to workers' characteristics, such as health status, family needs, and pension. Particularly, as Abe (1998), Higuchi and Yamamoto (2002), and Higuchi et al. (2006) indicate, pension benefits reduce the probability of the Japanese elderly working. This is what Feldstein (1974) originally showed, i.e., that generous social benefits reduce the incentive to work. We control for whether a worker can receive a pension at mandatory retirement age, because the pensionable age for the flat-rate basic pension benefits is staggered from 60 to 65 years of age although many Japanese firms do not extend mandatory retirement age. For exclusion restrictions, which are included in W_i and excluded from X_i , we use dummy variables indicating retirement reasons: W_{1i} in W_i . These dummy variables affect the general work incentive rather than continuity of working at the current firm.³

3.2 The Data

We use two large cross-sectional microdata sets for Japanese firms and workers. One is the ESCEE-1, which is described in Section 2, and the other is the "1998 Employee Survey on Continuing Employment of the Elderly (*Kō-nenrei Jūgyōin no Keizoku Koyō ni kansuru Jyūgyōin Ishiki Chōsa*)" (hereafter referred to as ESCEE-2), which were provided by the JEED and the SSJ Data Archive.

The ESCEE-2 has the following advantages. The ESCEE-2 asks current workers (those who have not reached mandatory retirement age) about whether they want to work after mandatory

³ We regress y_i on X_i and W_{1i} using a probit model, in order to check whether W_{1i} in the selection equation are not contained in the outcome equation. Null hypothesis: "the parameters of W_{1i} are zero" is accepted.

retirement. There are very few surveys that have asked workers who are below the age of first retirement about their future incentive to work after the first retirement, although there have been a few surveys asking “after-the-first-retirement” workers about their current working status. If we use the elderly workers’ current working status, we cannot distinguish a worker’s incentive to work, which is a labor supply effect, from labor demand effects, since the current working status denotes the outcome of both effects. Using the worker’s incentive to work, we can examine the pure labor supply effects.

We merge the ESCEE–1 with the ESCEE–2 (the merged data is hereafter referred to as the ESCEE), utilizing the identification of the firm where the individual is working. We restrict the sample to individuals who work for firms that have a reemployment system after the mandatory retirement age, because we examine how the reemployment system affects the workers’ decisions to continue to work for their current firm after mandatory retirement. In addition, we restrict the sample to male workers. By further restricting the sample only to answers to the questions we need for the estimation, the sample size becomes 8,394.⁴

The dependent variable in the retirement incentive equation (equation (2)) is the *Incentive to work after mandatory retirement*. The ESCEE asks the worker: “Up to what age do you want to work?” If the worker’s age is over the mandatory retirement age, we can say that he wants to work after mandatory retirement. The question then arises of how many years the workers want to continue to work after mandatory retirement. The ESCEE shows that 23% of the workers want to work for up to five years and 34.4% of the workers want to continue to work long after mandatory retirement, though 30% of the employees want to retire at mandatory retirement. We set the variable as one to indicate that the worker desires to work after mandatory retirement, and zero otherwise. The dependent variable in the equation (1), is the *Incentive to work for the current firm after mandatory retirement*. The ESCEE asks “Do you want to continue to work for your current workplace after mandatory retirement?” We set the variable as one if the worker answers “yes,” and zero otherwise.

⁴ The ESCEE–2 first selects 1,146 firms according to size of the firms and industrial classifications and surveys 108,125 workers at 1,146 firms. Workers vary among age groups 40–44, 45–49, 50–54, and 55–59, between white- and blue-collar workers and among positions. The number of responses obtained was 74,253.

Table 4: Definition of the independent variables

Independent Variables	Definition
Changes before and after mandatory retirement	
Wage reduction after mandatory retirement (%)	The average wage reduction rate on reemployment, compared to the average wage at age 55 by six categories: no change, less than 10%, 10–20%, 20–30%, 30–50%, and 50+%. We take a middle point for each category except for the bottom and the first and second top. That is, 0%, 10%, 15%, 25%, 40% and 50%.
Decrease in working time after mandatory retirement	Decrease in working hours on reemployment compared to before mandatory retirement = 1, not = 0
Decrease in responsibilities after mandatory retirement	Decrease in responsibilities on reemployment compared to before mandatory retirement = 1, not = 0
Firm's other characteristics	
Wage at age 55 (ten thousand yen)	The average annual earnings at age 55 by firms, = [(the average monthly scheduled cash earnings at age 25) \times 12 + (the average annual bonus at age 25)] \times (wage index at age 55 / wage index at age 25).
The wage difference index at age 55	The average monthly scheduled cash earnings and the average annual bonus are from the "1998 Basic Survey on Wage Structure (<i>Chingin Kizō Kihon Tōkei Chōsa</i>)" conducted by the Ministry of Health, Labor and Welfare, by industry, education, and firm sizes.
Without selection criteria	The maximum wage - The minimum wage (considered the average wage of age 55 as 100)
The expected business performance in the next 5 years	Unselective firm = 1, selective firm = 0
Major cities	Up rapidly = 2, rather up = 1, constant = 0, rather down = -1, down rapidly = -2
Preferential treatment of severance pay for early retirees	Tokyo, Kanagawa, Chiba, Saitama, Aichi, Kyoto, Osaka or Hyogo = 1, elsewhere = 0 The firm has preferential treatment of severance pay for early retirees = 1, the firm does not = 0
Worker's characteristics	
Univ.-graduates	The worker's educational background: University graduate = 1, elsewhere = 0
Housing loan	The worker's housing loan condition: with = 1, without = 0
Awareness of health status	The worker is cautious of healthy management = 1, he/she is not = 0
Caregiver	The worker certainly or probably takes care of his family = 1, he/she does not = 0
Age	The worker's age
Tenure	The worker's tenure
Nonclerical worker	Nonclerical worker (clerical and related worker, sales worker, protective service worker, worker in transport and communication, and laborer, craftsman and construction worker) = 1, elsewhere = 0
Managerial position	The worker's marginal position: in a key position = 1, not = 0
Cannot receive a pension, when retiring at the mandatory retirement age	= 1 if the worker's pensionable age > his mandatory retirement age, = 0 elsewhere
Excluded variables (used in the selection equation)	The reasons why the worker desires to retire in the future. These are categorized into "Because I can live on property revenue" and "Because I can no longer apply my skills or knowledge". We make a dummy variable (yes = 1, no = 0) for each of the two reasons.

Table 4 summarizes the details of the variables used in the analysis. Note that we cannot observe from the ESCEE the wage of the individual worker, but we can see the average wage index at ages 25, 35, 45, and 55 in each firm. We calculate the expected wage at age 55 in each firm using the wage index and the “1998 Basic Survey on Wage Structure (*Chin-gin Kōzō Kihon Tōkei Chōsa*)” conducted by the Ministry of Health, Labor and Welfare. In addition, we include the wage difference index at age 55 (considering the average wage at age 55 as 100) as the independent variable to control wage variation among individuals in each firm.

Table 5 shows the descriptive statistics by firm sizes. In large firms, the ratio of workers who want to work after mandatory retirement is 67%, and 44% of workers desire to continue to work for their current firms. Among small or mid-size firms, 54% of the workers who want to work after mandatory retirement, which is 65% of the sample in small or mid-size firms, desire to be reemployed by their current firms.

Table 5: Descriptive statistics

Variables	Large firm		Small/mid size firm	
	Mean	Std. Dev.	Mean	Std. Dev.
Dependent Variable				
equation (1)				
<i>Incentive to work for the current firm after MR*</i>	0.44	0.50	0.54	0.50
equation (2)				
<i>Incentive to work after MR</i>	0.67	0.47	0.65	0.48
Independent Variables				
<i>Wage reduction after MR(%)</i>	29.54	12.71	26.51	14.77
<i>Decrease in working time after MR</i>	0.16	0.37	0.14	0.35
<i>Decrease in responsibilities after MR</i>	0.53	0.50	0.45	0.50
<i>Wage at age 55 (ten thousand yen) **</i>	1014.79	253.94	857.22	219.78
<i>The wage difference index at age 55</i>	51.68	30.93	33.76	27.42
<i>Without selection criteria</i>	0.15	0.36	0.22	0.42
<i>The expected business performance in the next 5 years</i>	-0.28	1.05	-0.24	0.99
<i>Major cities</i>	0.49	0.50	0.30	0.46
<i>Preferential treatment of severance pay for early retirees</i>	0.39	0.49	0.18	0.39
<i>Univ.-graduates</i>	0.38	0.49	0.31	0.46
<i>Housing loan</i>	0.18	0.38	0.19	0.39
<i>Awareness of health status</i>	0.64	0.48	0.64	0.48
<i>Caregiver</i>	0.40	0.49	0.43	0.50
<i>Age</i>	49.41	5.35	49.59	5.48
<i>Tenure</i>	23.55	9.71	21.49	10.30
<i>Nonclerical worker</i>	0.37	0.48	0.42	0.49
<i>Managerial position</i>	0.72	0.45	0.71	0.45
<i>Cannot receive a pension, when retiring at the MR age</i>	0.88	0.33	0.85	0.36
<i>Because I can live on property revenue</i>	0.03	0.18	0.03	0.18
<i>Because I can no longer apply my skills or knowledge</i>	0.25	0.43	0.26	0.44
The number of Observations	3064		5330	

Note:

1) * The number of observations in equation (1) are 2045 and 3468, respectively.

2) ** In 1998, 1 dollar = 130.91 yen on average.

4 Estimation Results

Because of the existence of large differentials in observed and unobserved firm characteristics, such as working environments and benefits packages between large and small/mid-size firms, we conduct the estimation separately for large and small/mid-size firms. Table 6 reports the marginal effects evaluated at the mean of other covariates.

Table 6: Estimation results (Dependent Variable: Incentive to work for the current firm after MR)

Independent Variables	(1) Large firm		(2) Small/mid-size firm	
	Marginal Eff.	Robust S.E.	Marginal Eff.	Robust S.E.
<i>Wage reduction after MR</i>	−0.0037***	0.0008	−0.0007	0.0006
<i>Decrease in working time after MR#</i>	0.0706***	0.0274	0.0167	0.0217
<i>Decrease in responsibilities after MR#</i>	−0.0068	0.0177	−0.0059	0.0151
<i>Wage at age 55</i>	0.0000	0.0000	−0.0001**	0.0000
<i>The wage difference index at age 55</i>	−0.0002	0.0003	0.0007***	0.0003
<i>Without selection criteria #</i>	0.0716**	0.0315	0.0854***	0.0172
<i>The expected business performance in the next 5 years</i>	−0.0038	0.0093	−0.0037	0.0070
<i>Major cities #</i>	−0.0059	0.0175	0.0816***	0.0156
<i>Preferential treatment of severance pay for early retirees #</i>	−0.0882***	0.0202	−0.0783***	0.0175
<i>Univ.-graduates #</i>	−0.0526***	0.0195	0.0004	0.0166
<i>Housing loan #</i>	0.1165***	0.0232	0.1177***	0.0178
<i>Awareness of health status #</i>	0.0298*	0.0178	0.0414***	0.0142
<i>Caregiver #</i>	−0.0268	0.0176	−0.0270*	0.0139
<i>Age</i>	0.0165***	0.0020	0.0159***	0.0015
<i>Tenure</i>	−0.0040***	0.0011	−0.0032***	0.0008
<i>Nonclerical worker #</i>	0.0379*	0.0208	0.0468***	0.0159
<i>Managerial position #</i>	0.0202	0.0222	−0.0535***	0.0176
<i>Cannot receive a pension, when retiring at the MR age #</i>	0.0851***	0.0257	0.1497***	0.0185
Number of observations	3064		5330	
Number of uncensored obs.	2045		3468	
Number of censored obs.	1019		1862	
Wald χ^2	152.12***		207.83***	
Log pseudo-likelihood	−3121.366		−5477.605	
Wald test $H_0 : \rho = 0$ (p-value)	0.95		0.58	
Predicted $\Pr(y_{1i} = 1, y_{0i} = 1)$	0.28		0.36	

Note:

1) *, ** and *** indicate statistical significance at 10%, 5% and 1% levels respectively.

2) # $\partial F/\partial x$ is for discrete change of dummy variable from 0 to 1.

As mentioned in Section 3.1, theoretically wage reduction has both negative and positive effects on labor supply. The negative signs of the *Wage reduction after mandatory retirement* variable in columns (1) and (2) show that the former effect exceeds the latter effect. The sign of the *Wage reduction after mandatory retirement* variable is significant at the 1% level in column (1) but insignificant in column (2). The workers do not wish to work at their current large firms after manda-

tory retirement, if these large firms reduce the wage on reemployment. However, wage reduction on reemployment does not necessarily make the workers in small/mid-size firms leave their current firm. There is less wage reduction on reemployment in small/mid-size firms rather than in large firms as we point out in Table 1. “First retirees” can receive unemployment insurance benefits that are 50–80% of their wage immediately before mandatory retirement in 1998. They could leave their current firms and receive the benefit, if the benefit is more than the wage on reemployment.

The sign of the *Decrease in working time after mandatory retirement* variable is insignificant in column (2), but significantly positive at the 1% level in column (1). The sign of the *Decrease in responsibilities after mandatory retirement* variable is insignificant in both columns (1) and (2). That is, workers do not react to the reduction in responsibilities or working time on reemployment, at least in small or mid-size firms.⁵

The *Preferential treatment of severance pay for early retirees* variable has a significantly negative effect in both columns (1) and (2). Workers who want to change jobs after mandatory retirement have an incentive to leave their current firm, before mandatory retirement, if the current firm offers premium severance pay. The *Nonclerical worker* variable has a positive effect at the 1–10% significance level in columns (1) and (2). The workers, who are salespersons, guards, taxi drivers, or craftspeople, etc., want to work at their current firms after mandatory retirement.

The sign of the *Cannot receive a pension, when retiring at the mandatory retirement age* variable is positive and significant at the 1% level in both columns (1) and (2). This is also significantly positive in the retirement incentive equation (equation (2)).⁶ The extended age for the pension provides not only an incentive to work for current firm after mandatory retirement but also incentive to work after mandatory retirement for the Japanese elderly.

Generally, the closer the workers are to the mandatory retirement age, the more new information they will gain about their living standards after mandatory retirement. We conduct the estimation by restricting the sample closer to mandatory retirement age (among workers whose remaining years to reach the mandatory retirement age is 1–5 years). The estimated results of the *Decrease in working time after mandatory retirement*, *Decrease in responsibilities after mandatory retirement* and *Wage reduction after mandatory retirement* variables are similar to the results using the full sample.

Many Japanese firms lower the wages of workers once they have reached their mandatory retirement age. This is a distinctive feature of Japan's reemployment system. The reemployment mechanism is able to prevent firms from “overpaying” the employees. However, a wage reduction on reemployment could decrease the incentive to continue to work in their current firms. If this is true, the Japanese reemployment system with a wage reduction may not be effective. This

⁵ As mentioned in Section 2, because the wage reduction is correlated to responsibilities on reemployment or with/without selection criteria, there may be a multicollinearity problem. We check the applicability of an additional specification: 1) excluding the *Decrease in responsibilities after mandatory retirement* variable and 2) excluding the *Without selection criteria* variable from the estimation equations in Table 6. There is little difference in the signs and levels of significance of the *Wage reduction after mandatory retirement* variable.

⁶ The estimation results of retirement incentive equation (equation (2)) are not reported. Marginal effects of *Cannot receive a pension, when retiring at the mandatory retirement age* variable in the equation (2) are 0.224 and 0.257, robust standard errors are 0.033 and 0.022 respectively.

is because a considerable wage reduction will make the employees with better work performance leave their current firms at mandatory retirement, i.e., the “first” retirement. The estimation results suggest that the wage reduction on reemployment does not necessarily make elderly workers in small and mid-size firms leave their current firm after mandatory retirement. That is, the Japanese reemployment system with a wage reduction could be effective for small and medium firms.

5 Concluding Remarks

This paper first summarizes the characteristics of Japan’s reemployment system. The most striking feature of Japan’s reemployment system is the wage reduction for reemployed workers compared with the wage immediately before mandatory retirement. Using a large microdata set on firms, we found that more than 60% of the firms with a reemployment system reduced wages in this situation, and that large firms reduce wages after mandatory retirement more than small or mid-sized firms do. Moreover, the steeper the slope of the wage path up to mandatory retirement, the more the wage on reemployment decreases. Japanese firms can thus prevent overpayment by reducing wages on reemployment.

However, this wage reduction could lower elderly workers’ incentive to work. According to the estimation results obtained in this paper, the Japanese older workers in large firms show a lower incentive to work as their wages are reduced. On the other hand, we find that the older workers in small and mid-size firms do not necessarily withdraw from their current firm after mandatory retirement when their wage on reemployment decreases. The Japanese reemployment system with a wage reduction could therefore be effective for small and medium firms.

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