each age. In addition, we apply Heckman's two-step estimation procedures to deal with the sample selection bias (the first step estimation results are not reported). Estimated parameters are summarized in Table 5. As clearly seen from this table, wage earnings decrease sharply after age 60 at which age many people retire and become eligible for pension benefits.

Based on this regression, we create each sample's earnings profile for the ages 55-69 using the reported current wage earnings as a benchmark. For those who have already been retired by the survey year, we predict their current wages based on their age and other characteristics and construct their earnings profile for the ages 55-69. The wage growth rate is thus set to be the same for each individual: it is calculated by taking the difference in parameters on the two subsequent age dummies. However, parameters of other dummies show individual fixed effects, which shift the earnings profile up and down for each individual. The timing of mandatory retirement, which is in most cases 60 years old, is important in projecting the earnings profile. In projecting future earnings for an individual younger than 60, we assume that he/she will face mandatory retirement at 60.

### 5.2 Backward projections

The survey shows only current wage earnings for those who are working, full-time or part-time, in the survey year. To construct earnings histories before age 55, we rely upon cohort-specific age-earnings profiles. For this purpose, we use wage data from the Wage Census, which is conducted and published every year by the Ministry of Labor.[7] The Wage Census provides average age-wage profiles by industry, firm size and educational background. We use only information about wage profiles by firm size (categorized into three groups: manufacturing firms with more than 1000 employees, 999-100, and 99-10) from this Wage Census. This is because: (1) wage profiles are determined largely by firm size in Japan, (2) wage data in industries other than manufacturing have problems in terms of continuity and availability, and (3) no information about educational background is available for samples of the survey.

We project wage earnings backwards using estimated earnings at 55 as a benchmark and the cohort-specific wage curve. But how do we know about the earnings history for an individual who has already been retired by the survey year? First, we have to estimate at which age he/she retired. The survey gives some information about an individual's working status after mandatory retirement if applicable: the survey asks, for instance, whether one has kept working at the same or another firm after mandatory retirement (but the survey does not ask for how long). Based on this information, we make a rough estimation of each sample's retirement age (see Section 7.1).

## 6. Incentive Variable Calculation

This section describes the construction of incentive measures and provides tabulations that illustrate them by age. These incentive measures are used to capture the impact of

social security programs on retirement decisions in the next section.

### 6.1 Definitions and methodology

We construct three incentive measures: benefit accrual, option value, and peak value, each of which assesses the impact of social security programs upon retirement decisions. The key concept from which these three measures are derived is *social security wealth* (SSW), which is the present discounted value of lifetime social security benefits. SSW is gross of wage taxation, but net of income taxation. It should be noted here that the income tax system is very generous to pensioners and other elderly people (especially those aged 65 and above); income tax levied on them is in most cases negligible due to lower tax rates and various tax exemptions.

The three incentive measures, the latter two of which are of "forward-looking" type, are defined as follows.

(1) *Benefit accrual* is the change in SSW at each age resulting from the postponement of retirement for one additional year. If the accrual is positive, an individual may want to postpone retirement since working for an additional year will raise SSW. If it is negative, social security will provide a disincentive to work. One problem with the accrual is that it does not take into account potential large accruals in the future.

(2) The *option value* is the (expected) gain from postponing retirement to the age when an individual's life-cycle utility is maximized (see Stock and Wise [1990]). If one retires at age r, the discount utility at the current age t is given by:

$$V_t(r) = \sum_{s=t}^{r-1} \beta^{s-t} Y_s^{\gamma} + \sum_{s=r}^{S} \beta^{s-t} (kB_s(r))^{\gamma},$$

where S is the maximum age, $Y_s$ is wage earnings at age s, $B_s(r)$ is SS benefits at age s (if retired at age r), and $\beta$ is the discount factor. Let $r^*(>r)$ denote the future retirement age yielding the highest value of utility; then the option value is given by:

$$G_t(r^*) = V_t(r^*) - V_t(t).$$

The individual retires if $G \le 0$; otherwise he postpones retirement. We assume that $\beta = 0.97$ (a three percent discount rate), $\gamma = 0.75$, and $k = 1.5$, rather than structurally estimating them.

(3) The *peak value* is defined as the difference between SSW today and SSW at its peak; that is, the sum of all accruals from today to the year when SSW is at its maximum. This is a simpler, less structural, alternative to the option value, with utility from wage earnings neglected. After the peak point, the peak value is equal to the annual accrual.

Calculations of these incentive measures have to incorporate the multiple policies reviewed in Section 2.3. Our construction of weighted average incentive measures neglects employer-provided pension (and lump-sum retirement) benefits. The possibility that these benefits affect people's retirement decisions cannot be ruled out, but in most cases they are paid by firms at the mandatory retirement age of 60 regardless of the employee's working/retirement status thereafter. On the other hand, there are some cases in which employment-provided pension benefits make it profitable to retire earlier 60 with a reduction in the discount value of benefits. This effect, however, will not be explicitly analyzed, due to limited data.

Hence, weighted average incentive measures reflect the following four programs: (a) KNH benefits, (b) *Zaishoku Pension* benefits, (c) WS, and (d) UI benefits. A KNH participant is eligible for KNH benefits at age 60, but he/she can choose to keep working with earnings-tested *Zaishoku Pension* benefits. WS is paid for those who keep working between 60 and 64. Beyond the age of 65, only KNH benefits apply. The construction of weighted average of incentive measures is based on the actual probability of receiving each measure at each age observed from the sample. Three points should be mentioned here in estimating social security incentives.

First, for those aged 60 to 64, UI benefits are 50-80 percent of the wage earnings at age 60 unless current wage earnings exceed them. This means that UI benefits are usually fixed for those aged 60 to 64 regardless of retirement age, because wage earnings tend to decline sharply after 60. For those aged 59 or younger, however, UI benefits usually replace 60 percent of the current age earnings and thus postponing retirement will affect the amount of UI benefits as well as SSW and its accrual. On the other hand, one cannot apply for UI benefits at age 65 and after. Hence, people tend to stop working between the ages of 60 and 64 and receive UI benefits.

Second, there appear to be many cases in which workers receive full KNH benefits probably due to an ineffective earnings test. Also, it is unclear whether or not the samples in the survey know their own type of pension benefits; some of those who respond that they are KNH beneficiaries might actually get *Zaishoku* (that is, earnings-tested KNH) benefits instead. In calculating social security incentives, we assume that public pension benefits that an individual gets while employed during the ages of 60 through 64 are earnings-tested *Zaishoku* rather than full KNH. While this assumption is "loyal" to the law, our calculations might more or less overestimate disincentives.

Third, WS is treated as a "negative" premium to social security, while it does not affect SSW in gross terms.

### 6.2 Summary of incentive measures

Based on the aforementioned methodology, we obtain Tables 6 and 7 which illustrate weighted average incentive measures. The results set out in Table 6 summarize SSW, its accrual, standard deviation, and the tax/subsidy rate by age for the median, $10^{th,}$ and $90^{th}$ percentiles, compared with a previous study by Yashiro and Oshio (1999). Table 7

provides similar calculations for the forward-looking incentive measures: peak and option values. Tables 6 and 7 include results for men and women. Among other things, the following results are most noteworthy.

First, SSW peaks at aged 59. This is consistent with the fact that the eligibility age for social security benefits is 60 and that most employees exit the labor force at that age. Accrual is positive until 59 and negative after that. Almost flat SSW and zero accrual beyond age 65 in most cases reflect the KNH formula, which allows full benefits with no earnings test beyond that age. For males in the $10^{th}$ percentile, small negative accruals beyond that age probably reflect negative accruals for spouses who are under 65.

Hence, we can conclude that social security generally works as an incentive to work until the age of 59, but turns into a disincentive at 60, and becomes neutral beyond 65. Our previous study, Yashiro and Oshio (1999), which assumed that all (male) employees get *Zaishoku* benefits if they keep working, neglects UI benefits, and assumed no wage growth. In the current paper we take into account the case of receiving no *Zaishoku* benefits and going directly onto SS, include UI benefits, and reflect a projected reduction in wage earnings based on the cross-sectional data. As a result, the implied tax rate during the ages of 60 through 64 is larger than found in our previous study.

Turning to forward-looking incentive measures, the option value declines by age, suggesting that a disincentive to work tends to increase by age. This probably can be attributed to both declining SSW and an increasing risk of lower wage earnings when postponing retirement. The option value continues to fall even beyond age 65, in contrast with SS accrual which is flat beyond 65; this is because SS accrual does not reflect a reduction in wage earnings beyond that age.

The pattern of a change in the peak value by age is also consistent with that of benefit accrual; it is positive until age 59 and then turns negative. In addition, it is confirmed from Tables 6 and 7 that the peak value is simply annual SS accrual after the year when SSW is at its maximum, consistent with its definition.

## 7. Empirical Framework for Regression Analysis

In this section, we describe the empirical framework for regression analysis on the impact of social security on retirement. However, we first have to estimate each sample's previous working/retirement status, since our survey tells us only whether each sample is retired or not in the survey year of 1996. Hence, we first explain how to build up the "quasi-longitudinal" data; then we address the reduced form models of retirement decisions.

### 7.1 Estimation of retirement age and changes in working status

To estimate models for incentive measures we select from the survey the individuals who are expected to have kept working until 1995, one year before the survey year, and we apply the probit model to them to explain their retirement decisions in 1996:

whether to keep working or to retire.[8] The main problem of our analysis is that we cannot exactly identify those who were working in 1995, due to a lack of longitudinal information. Hence, we first assume that those who were working in 1996 were working in 1995, too. And for those who were already retired, we only use those whose age of retirement can be identified from their reported answers about mandatory retirement and subsequent job experience.

Table 8 summarizes an estimated change in working/retirement status for those who are estimated to have been working in 1995. Out of the total sample, 2,629 men are estimated to have been working in 1995, and 2,296 of them kept working and 333 retired in 1996. As for women, 1,204 of 1,459 kept working and 295 retired. For men the hazard rate is very high for those aged 60 or 61 in 1995, roughly consistent with the actual trend of labor force participation.

### 7.2 Model specification

The dependent variable is a dummy for whether an individual (who is expected to have been working in 1995) retired in 1996, with retirement defined according to Definition I, which is described in Section 2.3. We choose Definition I, the broadest definition of retirement, largely because most of the self-employed probably have been retired from the firms and their income seem to at least partly rely on public pension benefits. Then, we estimate the retirement models by probit for three incentive measures: accrual, peak value, and option value. The central issue is which controls to include in the retirement models. In particular, age itself may be very important in Japan: most people are effectively *forced* to leave firms at age 60. Meanwhile, our preliminary regressions indicate that there is relatively little value added by showing the variation in results when demographic and earnings controls are and are not incorporates in the models.

Here we estimate two models: one model (M1) has all controls for earnings, demographics, sectors, and a linear age term; the other model (M2) has all these controls but replaces the linear age terms with age dummies. We estimate these two models for each incentive measure: accrual, peak value, and option value for men and women, separately. Each model includes SSW. Earnings controls consist of projected earnings for next year, average lifetime earnings, and the squares of each. Other controls include property income, dummies for health conditions, nine occupational dummies, dummies for four categories of firm size at age 55, and eight dummies for residential area.

## 8. Estimation Results

Table 9 shows the summary statistics for the sample, and Table 10a and 10b summarize estimation results for men and women, respectively. In Table 10a and 10b each incentive measure has two columns for M1 (with a linear age term) and M2 (with age dummies), with coefficients for controls other than earnings omitted to save space. The coefficient on each incentive measures is expected to be negative, since they should

reduce the probability of retirement. The following four findings are noteworthy in assessing the impact of each incentive measure.

First, coefficients on incentive measures are all negative and statistically significant for men, except for the M2 option value model. In the peak value M1 model, for example, one thousand dollar increase in the peak value would raise the hazard rate by 0.62 percent points. For women, only the M1 accrual and M1 peak value models show negative and significant coefficients on incentive measures. Men are more sensitive to incentive measures than women, probably because men's labor participation is much higher and their retirement decisions are much more linked with pension benefits.

Second, compared to M1 models, coefficients on incentive measures are smaller, less significant and/or have wrong signs in M2 models. This result suggests that M2 specification "overfits" the data, in that age dummies absorb much of retirement incentives. Indeed, Figures 2a and 2b illustrate, for men and women respectively, how the hazard rate at each age would rise when each age dummy is raised from zero to one, compared with the actual hazard rates. These figures show that for all cases of accrual, peak value, and option value models age dummies trace well the actual age pattern of hazard rates

Third, in terms of explanatory power, the peak value models look better than other models for men, while there is no big difference for women. While the fit is better in M2 models than in M1 models, coefficients on incentive measures tend to be smaller, less significant and/or have wrong signs in M2 as mentioned above. The explanatory power of the option value model looks relatively weak. This result seems plausible, judging by the fact that the option value monotonically declines as one gets older (as shown in Table 7)-- not consistent with the age pattern of hazard rates.

Finally, turning to other variables, SSW itself does not seem to be important in retirement decisions; its coefficient is not significant, especially in the case of men. The incentive effect of social security benefits works largely through dynamic incentive measures rather than SSW, and the "wealth effect" does not seem to be large. Also, supporting intuition about income and substitution effects, average lifetime earnings tend to increase disincentive to work, while projected earnings tend to decrease it. However, the value and significance differs substantially depending on model specifications.

All in all, the estimation results confirm that all dynamic incentive measures at least partially affect retirement decisions of the elderly, while the option value models show poorer performance than the others. The "true" impact of incentive measures is very difficult to assess, since their significance varies greatly when age dummies are in and out of the models. Thus we should present a range of predictions based on a variety of models, instead of searching for the single best model, to predict the impact of policy changes.

## 9. Policy Simulations

In this section of policy simulations, we quantitatively assess the responsiveness of retirement decisions to social security reform. We propose two simulations for reform plans, which are described in what follows.

**9.1 Two reform plans**

The first reform plan -- referred to as the "Plus Three Years" reform -- is to raise both the "early" and "normal" eligibility age for the social security program by three years. In Japan, those ages correspond to 60 and 65 years, respectively. (More specifically, age 60 is the eligibility age for full benefits, but benefits are earnings-tested if one remains employed; at the age of 65 and over, one can get full benefits with no earnings test.) The simulation raises these threshold ages to 63 and 68, respectively. The eligibility ages for *Zaishoku Pension* benefits and WS and the age pattern of receiving UI benefits also are also raised by three years. For this reform plan, we consider three different scenarios:

- S1: Increment the incentive and SSW measures and UI eligibility probabilities according to the policy changes, from the model without age dummies (M1);
- S2: Increment the incentive and SSW measures and UI eligibility probabilities from the model with age dummies (M2), with age dummies unchanged;
- S3: Increment the incentive and SSW measures, UI eligibility probabilities, *and* age dummies from the model with age dummies (M2).

It seems likely that simulations S2 and S3 will bound true responses to policy changes, with simulation S1 lying somewhere in between.

The second reform plan is to implement "Common Reform," which has the following features:

(1) an early eligibility age of 60;
(2) a normal retirement age of 65;
(3) a replacement rate of 60 percent (of earnings at the age of 59) at age 65;
(4) a six percent per year actuarial reduction for retirement before 65 and six percent actuarial increase for retirement after 65; and
(5) no other pathways to retirement.

While this simulation allows us to compare the impact on the common plan across countries, some comments should be made regarding each component of this reform plan in Japan's case;

(1) no change is necessary, because the early eligibility age is currently 60;
(2) no change is necessary, because the normal eligibility age is currently 65;
(3) the tax rate at age 65 is 92% for men and 66% for women as indicated in Table 6, suggesting that a replacement rate of 60% will lower the tax rate and disincentives to work at that age;

(4) the net effect of this actuarial adjustment is uncertain, since existing *Zaishoku* benefits are to be abolished;
(5) "no other pathways to retirement" means the abolishment of *Zaishoku*, WS, and UI benefits.

For this reform plan, we consider three different scenarios:

- S1: Calculate incentive and SSW measures according to the new policy from the model without age dummies (M1);
- S2: Calculate incentive and SSW measures according to the new policy from the model with age dummies (M2), with age dummies unchanged;
- S3: Calculate incentive and SSW measures according to the new policy from the model with age dummies (M2), and change the age dummies. The goal of this simulation would be to maintain the portion of an age dummy that reflects increasing desire for leisure as one ages, and to discard the component that reflects the effect of retirement programs (not captured by the incentive measures), with the exception of effects due to early retirement and to normal retirement eligibility.

We perform these simulations by taking the estimated retirement model, plugging in new incentive measures and possibly new retirement ages in place of the existing ones, and estimating for each individual a new probability of retirement. Then, we average the estimated probabilities at each age to the new age-specific retirement rates. Also, we estimate the cumulative hazard rate at each age as well as average retirement ages.

**9.2 Simulation results**

Figures 3 to 11 summarize the simulation results for men. Each figure has two graphs: the first graph (a) compares the baseline hazard rate and hazard rate under each of the two policies for each simulation/incentive combination; the second graph (b) shows cumulative hazard rates for the baseline and each of the two policies for the same combination.

The following findings should be mentioned. First, in the case of the "Plus Three Years" reform, S1 and S3 shift the spike of the hazard rate to age 63-64 from age 60-61 for the accrual and peak value models. By contrast, S2 does not show any clear shift in the spike, although it somewhat reduces the hazard rates. The policy impact in S3 is thus most probably due to a change in the age dummies, and S1 lies between the two extremes of S2 and S3. This result is also in line with the fact that the coefficient on the incentive measure is smaller if age dummies are included.

Second, the "Common Reform" moderates the hazard rates across ages. This is probably because the abolishment of *Zaishoku*, WS, and UI benefits -- together with actuarial adjustment of pension benefits -- moderates the age pattern of incentive measures. At the same time, this reform fails to postpone retirement substantially; in many cases, the hazard rate becomes higher until age 60. This is because the "Common Reform" makes social security benefits less linked to the number of

contribution years and reduces both the accrual and peak value below age 60, while the reform raises them during ages 60 and 64.

Third, as shown in Figures 9 and 10, the option value model tends to be insensitive to policy reform (with no change in age dummies). This is because the coefficient on the option value is all quite small, as reported in Table 10a. The option value model, which fails to trace the age pattern of retirement, is not good at assessing the impact on retirement from policy changes.

Table 11 shows what the model predicts will happen to average retirement ages. The current average retirement age for men is 60.8 for men. The "Plus Three Years" reform increases the average retirement age to 61.8 on average. By contrast, the "Common Reform" slightly *reduces* the average retirement age to 60.4, largely reflecting an increase in the hazard rate before the early retirement age of 60. Hence, the "Plus Three Years" reform is more effective than the "Common Reform" in Japan. In particular, this kind of reform, assuming the combination of the peak value and S3, would be most efficient in postponing retirement -- with the average retirement age raised by 2.4 years to 63.2.

The same kind of policy simulations can be conducted for women. The bottom part of Table 11 and Figures 12-14 summarize the results of the peak value model, which seems to work best for Japanese women in terms of significance and signs of coefficients on incentive measures. The "Plus Three Years" reform turn out to postpone retirement, but not as much as for men. This reform shifts the spike of the hazard rate by three years in the case of S3 (see Figure 14a), but it seems to be mostly due to a change in age dummies. The "Common Reform" shows no significant impact.

## 10. Concluding Remarks

This paper analyzes the economic impact of social security incentives on retirement decisions, based on the micro-data from the Survey on Labor Market Participation of Older Persons. Our estimations confirm that the incentive measures -- such as benefit accrual, the peak value, and option value – at least partially affect retirement decisions, although their impact is not easy to identify. In particular, individuals aged 60-65 face substantial disincentives to work due to public income support programs including public pension and unemployment insurance benefits.

In the face of a rapidly aging population, labor force participation of elderly people is crucial for growth potential and the fiscal position of the public pension scheme. Our policy simulations quantitatively capture the potential impact of pension reforms on retirement decisions through incentive measures. For example, an increase in the early and normal eligibility ages is most likely to reduce a disincentive to work for elderly people. A three year increment of those eligibility ages is expected to raise the average retirement age by about one year for men, while the impact varies greatly due to a choice of incentive measures and model specifications.

We also find that the proposed common reform fails to postpone retirement.

This is probably because the early and normal retirement ages are already 60 and 65, respectively, in Japan and proposed actuarial adjustment fail to offset the impact of eliminating the existing incentives to work. The 1999 Pension Reform Act may be more *aggressive* than the proposed common reform, in that the Act aims to completely raise the eligibility age to 65 and to reduce total pension benefits for employees.

Our analysis centers on the supply side of the labor market for the elderly, estimating the impact on their retirement decisions of social security reform. However, the demand side matters, too. In Japan, it is not easy for employees to find a full-time job after the "mandatory retirement" at age 60. If demand for elderly workers remains subdued due to institutional and other reasons, any social security reform that aims to increase incentives to work could just lower wage income for elderly workers. Future research should be directed at more comprehensively assessing impact on the labor market for the elderly of policy changes, taking account of potential changes in firms' behaviors under the population aging and policy measures to stimulate demand for elderly workers.

**Notes:**

1. The labor participation rate of people aged 60-64 rate was 81.5 % for men and 39.1 % for women in 1970. The rate for men declined to 71.1 in 1988 and then rose to 75.6 in 1993 reflecting the economic boom; since then, it has been on a downtrend.
2. See Takayama (1998) for more detailed and comprehensive information about Japan's pension system. Discussions in this section owe much to Chapter 2 of his book.
3. The flat tax and benefits per month were 11,700 yen and 65,000 yen, respectively, in 1995.
4. The eligibility age for sailors and miners is 55.
5. KNH recipients are currently eligible for full Basic Pension benefits (in addition to the earnings-related component) at age 60, while the eligibility age of Basic Pension benefits is 65 years for non-KNH recipients. A husband gets some additional spousal benefits (*Kakyu Nenkin*) until his dependent wife becomes 65 years old.
6. "Mandatory retirement" in this paper means the program in which at a certain age (60 years in most cases) an employee is forced to leave the firm where he/she has been working full-time for many years. This does not necessary mean that he/she must retire fully at that age and become a beneficiary of social security programs. On the contrary, a large proportion of those who have experienced "mandatory retirement" continue to work in a new firm, or even at the same firm with a new status such as a part-time employee.
7. The age classes are divided into five-year increments in the Wage Census. We thus collect data from the Census every five years and reconstruct them for each cohort and year with a linear interpolation.
8. It might be possible to take individuals who were working in 1996 out of the sample

and see whether or not they will retire in 1997, since we can construct a forward-looking panel using the reported answers as to when they wish to retire. We do not do this, however, because such answers do not appear reliable enough to use for estimating retirement age.

**References:**


Abe, Y. (1998), "Labor Supply of the Elderly Male and the Earnings-Tested Pension in the 1980s and 1890s" (in Japanese) *JCER Economic Journal*, no.36, pp.50-82.

Iwamoto, Y. (2000), "The Social Security Earnings Test and Labor Supply of the Elderly" (in Japanese), *The Quarterly of Social Security Research*, vol.35, no.4, pp.364-376.

Ogawa, H. (1998), "On the Impact of the Public Pension on Labor Supply of the Elderly" (in Japanese), *The Economic Review*, Hitotsubashi University, vol.49, no.3, pp.245-258.

Oishi, A and T. Oshio (2000), "Social Security Wealth and Retirement Decision" (in Japanese), *The Quarterly of Social Security Research*, vol.35, no.4, pp.405-419.

Oshio, T. (1997), "Pension and Employment Insurance Reforms and Pension Wealth" (in Japanese), *The Quarterly of Social Security Research*, vol.33, no.3, pp.286-297.

Seike, A. (1991) "Lifetime Pension Wealth and Retirement" (in Japanese), *The Economic Review*, Hitotsubashi University, vol.42, no. 1, pp.12-20.

_____ (1993), *Labor Market in the Aging Society* (in Japanese), Toyo-Keizai Simposha.

Stock, J.H. and D.A.Wise (1990), "Pensions, the Option Value of Work, and Retirement," *Econometrica*, vol.58, no.5, pp.1151-1180.

Takayama, N. et al. (1990a) "Estimation of Human Capital and Income Redistributional Effect of the Public Pension" (in Japanese), *Economic Analysis*, no.118, Economic Planning Agency.

_____ (1990b), "The Public Pension and Labor Supply of the Elderly Male" (in Japanese), *Economic Analysis*, no.121, Economic Planning Agency.

_____ (1998), *The Morning After in Japan: Its Declining Population, Too Generous Pensions and a Weakened Economy*, Maruzen Co., Ltd.

Yashiro, N. and K. Nikami (1996), "Employment Insurance Reform and Its Implications on the Employment of Older Persons" (in Japanese) *JCER Economic Journal*, no.33, pp.177-203.

_____ *et al.* (1997), "The Economics of Aging" (in Japanese), *Economic Analysis*, no. 151, Economic Planning Agency.

_____ and T. Oshio (1999), "Social security and retirement in Japan," in *Social Security and Retirement around the World*, eds. by J.Gruber and D.A.Wise, University of Chicago Press, pp. 239-267.

**Table 1: Labor Market and Benefit Program Participation in 1996**

| | Men | | | Women | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | 55-59 | 60-64 | 65-69 | 55-59 | 60-64 | 65-69 | 55-59 | 60-64 | 65-69 |
| Labor market participation | | | | | | | | | |
| Working | 92.8 | 70.1 | 54.2 | 59.7 | 41.9 | 29.1 | 75.5 | 55.8 | 41.2 |
| Executives | 13.1 | 10.2 | 6.7 | 3.1 | 2.0 | 1.7 | 7.9 | 6.0 | 4.1 |
| Employed, full-time | 59.6 | 29.5 | 14.2 | 23.7 | 9.6 | 3.8 | 40.8 | 19.4 | 8.8 |
| Employed, part-time | 2.0 | 6.8 | 8.1 | 11.3 | 7.5 | 4.7 | 6.9 | 7.2 | 6.3 |
| Self-employed, etc. | 18.1 | 23.6 | 25.1 | 21.6 | 22.8 | 18.9 | 19.9 | 23.2 | 21.9 |
| Not working | 6.9 | 29.6 | 45.6 | 40.1 | 57.7 | 70.8 | 24.2 | 43.9 | 58.7 |
| Unknown | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.1 | 0.3 | 0.3 | 0.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Benefit program participation | | | | | | | | | |
| KNH* (excl. Zaishoku) | 1.9 | 39.8 | 60.7 | 6.0 | 31.3 | 36.1 | 4.0 | 35.4 | 47.9 |
| Basic Pension* only | 1.0 | 7.4 | 20.9 | 1.6 | 15.4 | 46.4 | 1.4 | 11.5 | 34.1 |
| Zaishoku | 0.0 | 5.2 | 0.0 | 0.3 | 1.7 | 0.0 | 0.2 | 3.4 | 0.0 |
| Kyosai-Kumiai* | 1.5 | 11.1 | 11.0 | 0.9 | 4.3 | 5.8 | 1.2 | 7.6 | 8.3 |
| Wage subsidy | 0.0 | 3.5 | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 2.2 | 0.0 |
| Employer-provided pensio | 0.6 | 9.4 | 8.9 | 0.4 | 1.9 | 1.6 | 0.5 | 5.6 | 5.1 |
| UI benefits | 1.2 | 4.4 | 0.7 | 1.2 | 1.6 | 0.3 | 1.2 | 3.0 | 0.5 |

Notes: 1. KNH:Kosei Nenkin Hoken (Emploees' Pension) , Zaishoku: Earnings-tested KNH,
Kyosai-Kumiai (Mutual Aid Associations): special programs for national and local government employ
and UI: Unemployment Insurance.
2. * includes survivors' benefits.

Source: Authors' calculations from the SLMPOP.

**Table 2: Working Status and Public Pension Benefits**

Males

| Age | | 55-59 | | | 60-64 | | | 65-69 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Public pension benefits | | Receiving | Not Receiving | Total | Receiving | Not Receiving | Total | Receiving | Not Receiving | Total |
| Working | Executives | 0.3 | 12.8 | 13.1 | 2.9 | 7.3 | 10.2 | 5.9 | 0.8 | 6.7 |
| | Employed, full time | 1.6 | 58.2 | 59.8 | 15.7 | 14.0 | 29.6 | 12.8 | 1.5 | 14.3 |
| | Employed, part-time | 0.3 | 1.7 | 2.0 | 6.0 | 0.9 | 6.9 | 7.8 | 0.4 | 8.2 |
| | Self-employed, etc. | 0.7 | 17.5 | 18.2 | 13.6 | 10.1 | 23.7 | 22.9 | 2.2 | 25.2 |
| | Subtotal | 2.8 | 90.3 | 93.1 | 38.1 | 32.3 | 70.4 | 49.4 | 4.9 | 54.3 |
| Not working | Unable to find a job | 0.9 | 3.7 | 4.6 | 15.9 | 3.0 | 18.9 | 16.6 | 1.1 | 17.7 |
| | Not willing to work | 0.7 | 1.5 | 2.2 | 9.5 | 1.2 | 10.7 | 27.0 | 1.0 | 28.0 |
| | Subtotal | 1.6 | 5.2 | 6.9 | 25.4 | 4.2 | 29.6 | 43.6 | 2.1 | 45.7 |
| Total | | 4.5 | 95.5 | **100.0** | 63.5 | 36.5 | **100.0** | 93.0 | 7.0 | **100.0** |

Females

| Age | | 55-59 | | | 60-64 | | | 65-69 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Public pension benefits | | Receiving | Not Receiving | Total | Receiving | Not Receiving | Total | Receiving | Not Receiving | Total |
| Working | Executives | 0.1 | 3.0 | 3.1 | 0.6 | 1.4 | 2.0 | 1.5 | 0.2 | 1.7 |
| | Employed, full time | 2.1 | 21.7 | 23.7 | 5.1 | 4.6 | 9.7 | 3.0 | 0.8 | 3.8 |
| | Employed, part-time | 1.0 | 10.3 | 11.4 | 3.8 | 3.7 | 7.5 | 4.1 | 0.6 | 4.7 |
| | Self-employed, etc. | 1.0 | 20.7 | 21.7 | 10.9 | 12.0 | 22.9 | 17.0 | 1.9 | 19.0 |
| | Subtotal | 4.2 | 55.7 | 59.9 | 20.5 | 21.6 | 42.1 | 25.7 | 3.5 | 29.2 |
| Not working | Unable to find a job | 1.9 | 13.0 | 14.9 | 12.2 | 6.8 | 19.0 | 13.9 | 2.0 | 15.9 |
| | Not willing to work | 2.7 | 22.6 | 25.3 | 20.1 | 18.7 | 38.9 | 49.1 | 5.8 | 54.9 |
| | Subtotal | 4.6 | 35.5 | 40.1 | 32.3 | 25.6 | 57.9 | 63.0 | 7.8 | 70.8 |
| Total | | 8.8 | 91.2 | **100.0** | 52.8 | 47.2 | **100.0** | 88.7 | 11.3 | **100.0** |

Note: Calculations exclude samples whose working status is not known.
Source: Authors' calculations from the SLMPOP.

**Table 3: The Share of Retired by Different Definitions**

| | | 55-59 | 60-64 | 65-69 | Total |
|---|---|---|---|---|---|
| **Males** | | 100.0 | 100.0 | 100.0 | 100.0 |
| Definition I | Not employed* | 25.4 | 53.5 | 70.9 | 49.2 |
| Definition II | Def.I excl. Self-employed, etc. | 7.2 | 29.9 | 45.8 | 27.0 |
| Definition III | Def.II excl. jobseekers not receiving public pension benefits | 3.5 | 26.9 | 44.7 | 24.4 |
| **Females** | | 100.0 | 100.0 | 100.0 | 100.0 |
| Definition I | Not employed* | 61.9 | 80.9 | 89.9 | 77.0 |
| Definition II | Def.I excl. Self-employed, etc. | 40.3 | 58.1 | 70.9 | 55.8 |
| Definition III | Def.II excl. jobseekers not receiving public pension benefits | 27.4 | 51.2 | 69.0 | 48.4 |
| **Total** | | 100.0 | 100.0 | 100.0 | 100.0 |
| Definition I | Not employed* | 44.5 | 67.4 | 80.8 | 63.6 |
| Definition II | Def.I excl. Self-employed, etc. | 24.5 | 44.3 | 58.9 | 41.9 |
| Definition III | Def.II excl. jobseekers not receiving public pension benefits | 16.0 | 39.3 | 57.3 | 36.8 |

**Table 4: Retiree Categories and Pathways to Retirement**

| Pathway | Retiree Category | | | | | | |
|---|---|---|---|---|---|---|---|
| | Retirees (excl. Self-Employed) | | | Self-Employed | | | Total |
| | SS only | SS & Pension | No SS | SS only | SS & Pension | No SS | |
| Total | | | | | | | |
| Directly to SS | 30.37 | 3.11 | 0.22 | 1.47 | 0.01 | 0.15 | 35.34 |
| UI to SS | 33.58 | 3.44 | 0.25 | 0.92 | 0.01 | 0.09 | 38.28 |
| SS (wk) toSS | 8.35 | | | 1.11 | | | 9.46 |
| SS & Pension (wk) to SS | | 2.03 | | | 0.18 | | 2.21 |
| SS & WS (wk) to SS | 0.84 | | | 0.11 | | | 0.96 |
| SS & Pension & WS (wk) to SS | | 0.20 | | | 0.02 | | 0.22 |
| UI & SS (wk) to SS | 9.24 | | | 0.69 | | | 9.93 |
| UI & SS & Pension (wk) to SS | | 2.24 | | | 0.12 | | 2.36 |
| UI & SS & WS (wk) to SS | 0.93 | | | 0.07 | | | 1.00 |
| UI & SS & Pension & WS (wk) to SS | | 0.23 | | | 0.01 | | 0.24 |
| Total | 83.31 | 11.26 | 0.47 | 4.37 | 0.35 | 0.24 | 100.00 |
| Men | | | | | | | |
| Directly to SS | 25.00 | 3.68 | 0.13 | 2.73 | 0.04 | 0.20 | 31.78 |
| UI to SS | 32.33 | 4.76 | 0.17 | 1.95 | 0.03 | 0.14 | 39.39 |
| SS (wk) to SS | 7.20 | | | 1.85 | | | 9.05 |
| SS & Pension (wk) to SS | | 2.38 | | | 0.38 | | 2.76 |
| SS & WS (wk) to SS | 0.85 | | | 0.22 | | | 1.06 |
| SS & Pension & WS (wk) to SS | | 0.28 | | | 0.04 | | 0.32 |
| UI & SS (wk) to SS | 9.32 | | | 1.32 | | | 10.64 |
| UI & SS & Pension (wk) to SS | | 3.08 | | | 0.27 | | 3.35 |
| UI & SS & WS (wk) to SS | 1.09 | | | 0.15 | | | 1.25 |
| UI & SS & Pension & WS (wk) to SS | | 0.36 | | | 0.03 | | 0.39 |
| Total | 75.79 | 14.54 | 0.31 | 8.22 | 0.80 | 0.34 | 100.00 |
| Women | | | | | | | |
| Directly to SS | 39.82 | 1.93 | 0.40 | 0.12 | 0.00 | 0.02 | 42.29 |
| UI to SS | 34.32 | 1.67 | 0.34 | 0.06 | 0.00 | 0.01 | 36.40 |
| SS (wk) to SS | 9.97 | | | 0.11 | | | 10.08 |
| SS & Pension (wk) to SS | | 0.75 | | | 0.01 | | 0.76 |
| SS & WS (wk) to SS | 0.59 | | | 0.01 | | | 0.59 |
| SS & Pension & WS (wk) to SS | | 0.04 | | | 0.00 | | 0.04 |
| UI & SS (wk) to SS | 8.59 | | | 0.05 | | | 8.64 |
| UI & SS & Pension (wk) to SS | | 0.65 | | | 0.00 | | 0.65 |
| UI & SS & WS (wk) to SS | 0.51 | | | 0.00 | | | 0.51 |
| UI & SS & Pension & WS (wk) to SS | | 0.04 | | | 0.00 | | 0.04 |
| Total | 93.79 | 5.08 | 0.74 | 0.35 | 0.01 | 0.03 | 100.00 |

(Note) 1. "wk" means "paid during working."
2. "Pension" means employer-provided retirement benefits, which are mostly annuities and do not include lump-sum benefits.

**Table 5: Wage Functions**

| Independent variables (dummies) | | Men | | Women | |
|---|---|---|---|---|---|
| | | Coef. | Std. Err. | Coef. | Std. Err. |
| Age (Default: Age 55) | 56 | -0.020 | (0.025) | 0.056 | (0.050) |
| | 57 | -0.074 | (0.027) | 0.150 | (0.056) |
| | 58 | -0.087 | (0.028) | 0.126 | (0.060) |
| | 59 | -0.099 | (0.029) | 0.016 | (0.059) |
| | 60 | -0.160 | (0.037) | 0.073 | (0.075) |
| | 61 | -0.290 | (0.043) | -0.099 | (0.072) |
| | 62 | -0.400 | (0.045) | 0.059 | (0.088) |
| | 63 | -0.457 | (0.050) | 0.060 | (0.084) |
| | 64 | -0.470 | (0.048) | 0.007 | (0.106) |
| | 65 | -0.551 | (0.061) | 0.019 | (0.100) |
| | 66 | -0.579 | (0.061) | 0.142 | (0.123) |
| | 67 | -0.524 | (0.070) | 0.053 | (0.136) |
| | 68 | -0.597 | (0.073) | -0.185 | (0.149) |
| | 69 | -0.675 | (0.086) | -0.075 | (0.177) |
| Mandatory retirement | 55-59 | -0.183 | (0.035) | -0.291 | (0.091) |
| (Default: No experience of | 60-64 | -0.214 | (0.050) | 0.240 | (0.119) |
| mandatory retirement) | 65-69 | -0.230 | (0.066) | 0.113 | (0.141) |
| Occupation at age 55 | specialists | 0.151 | (0.043) | 0.138 | (0.076) |
| (Default: Clark) | managers | 0.304 | (0.037) | 0.405 | (0.091) |
| | salespersons | -0.061 | (0.044) | -0.297 | (0.050) |
| | service | -0.163 | (0.057) | -0.383 | (0.051) |
| | guards | -0.182 | (0.068) | -0.261 | (0.317) |
| | farmers | -0.171 | (0.063) | -0.581 | (0.099) |
| | trans. & com. | -0.229 | (0.041) | -0.304 | (0.154) |
| | blue color | -0.194 | (0.036) | -0.491 | (0.043) |
| | construction | -0.122 | (0.042) | -0.283 | (0.099) |
| Firm size at age 55 | 10-99 | 0.069 | (0.026) | 0.112 | (0.040) |
| (Default: Less than 10) | 100-299 | 0.082 | (0.031) | 0.245 | (0.043) |
| | 300-999 | 0.054 | (0.036) | 0.101 | (0.060) |
| | 1000+ | 0.181 | (0.028) | 0.146 | (0.053) |
| | public sector | 0.018 | (0.036) | 0.098 | (0.085) |
| Residential areas | Hokkaido | -0.180 | (0.043) | -0.035 | (0.081) |
| (Default: Tokyo | Tohoku | -0.404 | (0.034) | -0.070 | (0.055) |
| Metropolitan Area) | Kanto2 | -0.190 | (0.035) | -0.060 | (0.054) |
| | Hokuriku | -0.268 | (0.045) | 0.017 | (0.076) |
| | Tokai | -0.151 | (0.031) | 0.029 | (0.046) |
| | Kinki 1 | -0.039 | (0.028) | -0.018 | (0.054) |
| | Kinki 2 | -0.225 | (0.066) | -0.076 | (0.091) |
| | Chugoku | -0.300 | (0.043) | -0.053 | (0.061) |
| | Shikoku | -0.443 | (0.061) | -0.093 | (0.082) |
| | Northern Kyushu | -0.313 | (0.038) | 0.001 | (0.059) |
| | Southern Kyushu | -0.473 | (0.047) | -0.085 | (0.085) |
| Constant | | 3.809 | (0.040) | 2.765 | (0.056) |
| Inverse Mills' ratio | | -0.319 | (0.026) | -0.402 | (0.080) |
| Log likelihood | | -7268.9 | | -4144.4 | |
| Number of obs. | | 6,979 | | 3,710 | |

Notes: 1. The dependent variable is the logarithm of monthly earnings.
2. Wage function was estimated by means of the Heckman two-step selection corre
Additional variables that were included in the participation probit were health st
mortgage loans, public pension benefits, private pension benefits, property incon
family members' income.

**Table 6: Summary of Incentive Measures**

Men

(in 1998 U.S.dollars)

| | SSW | Accrual | | | | Tax/Subsidy Rate | |
|---|---|---|---|---|---|---|---|
| Age | Median | Median | 10th % | 90th % | Std Dev | Median | Y-O (1999) |
| 54 | 224,314 | ... | ... | ... | ... | ... | ... |
| 55 | 235,188 | 7,333 | 5,087 | 12,729 | 2,708 | -0.235 | -0.195 |
| 56 | 248,940 | 10,275 | 7,236 | 14,569 | 3,102 | -0.328 | -0.202 |
| 57 | 258,654 | 6,624 | 4,581 | 11,124 | 2,635 | -0.232 | -0.105 |
| 58 | 268,532 | 8,675 | 6,077 | 12,637 | 2,935 | -0.299 | -0.112 |
| 59 | 280,562 | 11,548 | 7,676 | 15,368 | 3,400 | -0.424 | -0.138 |
| 60 | 267,989 | -13,351 | -19,605 | -7,148 | 4,669 | 0.602 | 0.338 |
| 61 | 257,437 | -10,839 | -15,381 | -5,344 | 3,829 | 0.552 | 0.340 |
| 62 | 245,849 | -11,504 | -16,066 | -6,164 | 3,863 | 0.670 | 0.342 |
| 63 | 234,591 | -11,021 | -17,823 | -5,720 | 4,544 | 0.668 | 0.340 |
| 64 | 217,702 | -16,400 | -20,250 | -10,878 | 4,043 | 0.921 | 0.204 |
| 65 | 216,390 | 0 | -5,975 | 709 | 3,290 | 0 | 0 |
| 66 | 215,686 | 0 | -6,295 | 6 | 2,765 | 0 | 0 |
| 67 | 215,273 | 0 | -5,820 | 6 | 2,708 | 0 | 0 |
| 68 | 214,753 | 0 | -4,948 | 0 | 1,980 | 0 | 0 |
| 69 | 214,739 | 0 | -6 | 0 | 1,986 | 0 | 0 |

Women

(in 1998 U.S.dollars)

| | SSW | Accrual | | | | Tax/Subsidy Rate | |
|---|---|---|---|---|---|---|---|
| Age | Median | Median | 10th % | 90th % | Std Dev | Median | Y-O (1999) |
| 54 | 176,821 | ... | ... | ... | ... | ... | ... |
| 55 | 184,538 | 5,331 | -6,992 | 13,917 | 7,303 | -0.326 | ... |
| 56 | 195,111 | 6,583 | -7,208 | 16,036 | 8,037 | -0.369 | ... |
| 57 | 201,221 | 4,847 | -8,630 | 12,935 | 7,979 | -0.265 | ... |
| 58 | 208,762 | 5,402 | -8,981 | 12,542 | 8,351 | -0.328 | ... |
| 59 | 214,137 | 6,375 | -7,318 | 10,651 | 7,362 | -0.313 | ... |
| 60 | 206,211 | -5,645 | -19,489 | -4,948 | 6,920 | 0.501 | ... |
| 61 | 197,989 | -4,997 | -17,246 | -3,930 | 6,182 | 0.523 | ... |
| 62 | 189,860 | -6,164 | -15,476 | -5,486 | 4,287 | 0.550 | ... |
| 63 | 184,065 | -6,379 | -12,085 | -5,692 | 4,624 | 0.405 | ... |
| 64 | 182,874 | -7,702 | -14,681 | -5,576 | 4,319 | 0.655 | ... |
| 65 | 182,571 | 0 | -86 | 0 | 4,544 | 0 | ... |
| 66 | 180,962 | 0 | 0 | 0 | 1,827 | 0 | ... |
| 67 | 180,962 | 0 | 0 | 0 | 0 | 0 | ... |
| 68 | 180,962 | 0 | 0 | 0 | 0 | 0 | ... |
| 69 | 180,962 | 0 | 0 | 0 | 0 | 0 | ... |

**Table 7: Summary of Forward-Looking Incentive Measures**

Men (in 1998 U.S.dollars)

| Age | Option Value | | | | Peak Value | | | |
|---|---|---|---|---|---|---|---|---|
| | Median | 10th % | 90th % | Std Dev | Median | 10th % | 90th % | Std Dev |
| 55 | 98,159 | 58,659 | 174,423 | 50,837 | 34,527 | 23,883 | 51,475 | 12,074 |
| 56 | 85,850 | 54,364 | 162,567 | 40,166 | 29,025 | 21,275 | 48,437 | 10,186 |
| 57 | 70,414 | 38,429 | 127,216 | 33,609 | 21,129 | 14,808 | 33,855 | 7,365 |
| 58 | 59,819 | 30,435 | 102,082 | 29,047 | 14,951 | 11,073 | 23,593 | 5,521 |
| 59 | 36,815 | 14,881 | 80,452 | 26,847 | 11,548 | 7,676 | 15,368 | 3,400 |
| 60 | 34,991 | 9,769 | 73,357 | 26,817 | -13,351 | -19,605 | -7,148 | 4,669 |
| 61 | 34,160 | 8,019 | 66,012 | 22,320 | -10,839 | -15,381 | -5,344 | 3,968 |
| 62 | 32,158 | 6,688 | 63,352 | 20,685 | -11,504 | -16,066 | -6,164 | 3,863 |
| 63 | 33,786 | 10,787 | 66,021 | 20,873 | -11,021 | -17,823 | -5,720 | 4,544 |
| 64 | 34,165 | 11,635 | 65,569 | 20,765 | -16,400 | -20,250 | -10,515 | 5,170 |
| 65 | 37,283 | 21,610 | 62,258 | 17,004 | 0 | -5,975 | 709 | 4,691 |
| 66 | 29,757 | 15,268 | 49,844 | 14,770 | 0 | -6,295 | 6 | 2,767 |
| 67 | 21,821 | 10,162 | 38,727 | 12,594 | 0 | -5,820 | 6 | 3,531 |
| 68 | 15,262 | 7,109 | 26,446 | 7,942 | 0 | -4,948 | 5 | 2,190 |
| 69 | 7,169 | 2,462 | 16,191 | 5,710 | 0 | -6 | 0 | 1,986 |

Women (in 1998 U.S.dollars)

| Age | Option Value | | | | Peak Value | | | |
|---|---|---|---|---|---|---|---|---|
| | Median | 10th % | 90th % | Std Dev | Median | 10th % | 90th % | Std Dev |
| 55 | 97,410 | 57,318 | 175,919 | 48,550 | 25,274 | -6,992 | 47,980 | 18,850 |
| 56 | 89,592 | 49,213 | 169,527 | 45,347 | 20,100 | -5,833 | 37,130 | 16,100 |
| 57 | 81,684 | 42,410 | 136,370 | 41,965 | 14,821 | -8,247 | 30,816 | 14,377 |
| 58 | 69,357 | 35,179 | 122,228 | 44,534 | 10,420 | -8,981 | 20,705 | 11,770 |
| 59 | 60,662 | 27,029 | 110,406 | 34,426 | 6,375 | -7,318 | 10,651 | 7,389 |
| 60 | 38,592 | 16,679 | 90,373 | 31,509 | -5,645 | -19,489 | -4,948 | 6,923 |
| 61 | 36,448 | 16,013 | 86,467 | 28,853 | -4,997 | -17,246 | -3,930 | 6,218 |
| 62 | 29,199 | 13,705 | 78,554 | 27,158 | -6,164 | -15,476 | -5,486 | 4,327 |
| 63 | 42,238 | 17,204 | 80,978 | 28,416 | -6,379 | -12,085 | -5,692 | 4,624 |
| 64 | 31,242 | 12,581 | 70,477 | 25,036 | -7,702 | -14,681 | -5,576 | 4,319 |
| 65 | 39,971 | 19,841 | 71,221 | 28,657 | 0 | -86 | 0 | 4,948 |
| 66 | 24,595 | 14,802 | 60,220 | 18,043 | 0 | 0 | 0 | 1,899 |
| 67 | 11,909 | 2,303 | 36,714 | 11,076 | 0 | 0 | 0 | 0 |
| 68 | 12,403 | 7,468 | 24,307 | 9,402 | 0 | 0 | 0 | 0 |
| 69 | 4,709 | 3,377 | 11,448 | 4,836 | 0 | 0 | 0 | 0 |

**Table 8: Changes in Working Status of Employees (1995 to 1996)**

| | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| | | Working status in 1996 | | | | Working status in 1996 | | |
| Age in 1995 | Number of observations | Employed | Retired (Def.I) | (%) | Number of observations | Employed | Retired (Def.I) | (%) |
| 54 | 103 | 102 | 1 | 1.0 | 167 | 158 | 9 | 5.4 |
| 55 | 150 | 141 | 9 | 6.0 | 200 | 180 | 20 | 10.0 |
| 56 | 159 | 151 | 8 | 5.0 | 168 | 146 | 22 | 13.1 |
| 57 | 237 | 232 | 5 | 2.1 | 157 | 126 | 31 | 19.7 |
| 58 | 253 | 238 | 15 | 5.9 | 144 | 120 | 24 | 16.7 |
| 59 | 293 | 209 | 84 | 28.7 | 144 | 94 | 50 | 34.7 |
| 60 | 292 | 199 | 93 | 31.8 | 114 | 75 | 39 | 34.2 |
| 61 | 193 | 176 | 17 | 8.8 | 88 | 63 | 25 | 28.4 |
| 62 | 201 | 172 | 29 | 14.4 | 73 | 65 | 8 | 11.0 |
| 63 | 177 | 158 | 19 | 10.7 | 70 | 61 | 9 | 12.9 |
| 64 | 149 | 124 | 25 | 16.8 | 44 | 36 | 8 | 18.2 |
| 65 | 135 | 123 | 12 | 8.9 | 34 | 31 | 3 | 8.8 |
| 66 | 112 | 103 | 9 | 8.0 | 25 | 22 | 3 | 12.0 |
| 67 | 103 | 100 | 3 | 2.9 | 16 | 15 | 1 | 6.3 |
| 68 | 72 | 68 | 4 | 5.6 | 15 | 12 | 3 | 20.0 |
| Total | 2,629 | 2,296 | 333 | 12.7 | 1,459 | 1,204 | 255 | 17.5 |

Note: "Employed" includes executives.
Source: Authors' calculations from the SLMPOP.

**Table 9: Summary Statistics**

| | Males | | Females | |
|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. |
| Retired (Def.I) | 0.127 | 0.333 | 0.175 | 0.380 |
| SSW ( 10 thousand dollars) | 27.444 | 9.292 | 22.462 | 11.857 |
| SSA (10 thousand dollars) | -0.270 | 1.111 | -0.053 | 0.915 |
| Peak value (10 thousand dollars) | 0.134 | 1.721 | 0.499 | 1.675 |
| Option value (10 thousand dollars) | 5.166 | 4.044 | 7.253 | 5.099 |
| Property income (thousand dollars) | 0.160 | 1.057 | 0.069 | 0.306 |
| Health condition: not well | 0.151 | 0.358 | 0.154 | 0.361 |
| Health condition: bad or sick | 0.035 | 0.183 | 0.028 | 0.165 |
| Projected earnings (thousand dollars) | 2.424 | 1.548 | 1.391 | 0.843 |
| Average lifetime earnings (thousand dollars) | 2.792 | 1.821 | 1.467 | 0.964 |
| Square of PE | 8.272 | 11.858 | 2.645 | 4.641 |
| Square of ALE | 11.109 | 17.430 | 3.082 | 6.580 |
| Age in 1995 | 60.324 | 3.660 | 58.352 | 3.422 |
| Sample N | 2,629 | | 1,459 | |

Note: All dollar values are in 1998 US dollars ($1=¥131.02).