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2 Social Security Benefits and the Labor Supply of the Elderly in Japan

Atsushi Seike and Haruo Shimada

2.1 Issues

In 1984, with the aim of helping the pension system remain solvent, the Japanese Ministry of Welfare proposed a major revision of the Social Security system that included reducing future benefits and raising the minimum eligibility age from 60 to 65. This proposal triggered a debate about whether the financial status of the pension system should take precedence over the employment problems of elderly workers. In fact, the employment problems of elderly workers are closely related to the strain on the Social Security system caused by the rapidly aging population; such a plan would be likely to increase the labor supply of elderly workers, thus necessitating new government policies that would create more job opportunities for this labor pool. The Ministry of Welfare ultimately decided to postpone raising the minimum retirement age, although the remainder of the proposal was approved in 1985.

In an extraordinary Diet session in the fall of 1989, the Ministry of Welfare resubmitted a proposal to raise the minimum age of eligibility for receiving Social Security benefits from 60 to 65. Although the proposal was to raise the age of eligibility gradually over a period of twenty years, it was not accepted in the Diet. The decision obviously reflected the new political situation created shortly after the election of the House of Counselors, which was a landslide victory for the Japan Socialist Party (JSP) vis-à-vis the Liberal Democratic Party. The major reason why opposition parties, led by the JSP, were opposed to raising the minimum eligibility age was that there was no prevalent employment practice or institutional guarantee that workers older than age 60 would continue to be employed up to age 65.

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Taking this point seriously, the Ministry of Labor proposed a plan to the tripartite Employment Policy Council to be examined as a preliminary step toward formulating an actual bill. It proposed that employers should be required to keep elderly employees on the payroll up to the age of 65. This proposal met with strenuous opposition from employers. Employers assert that, since the proposal to raise the minimum eligibility age from 60 to 65 was rejected, there is no need to legislate that employers must employ elderly workers up to the age of 65. Moreover, they predict that, in the long run, they will have to employ more elderly workers in the face of an increasingly severe shortage in the young labor force. In other words, they are implying that the employment problems of elderly workers will, in the long run, be solved spontaneously by market forces. Whether employment opportunities will be redistributed adequately across different age classes through market forces, however, is certainly an interesting academic and serious policy question that has yet to be answered.

When one puts the current policy debate over modifying the Social Security system and policy interventions in employment practices into a broader and more analytic perspective, one should recognize that the debated issues should be located in a system of key variables that dictate the behavior of the relevant principal actors, namely, the labor suppliers, the employers, and the government.

The labor supply depends on the level of unearned income, on the one hand, and the availability of employment opportunities, on the other. To be more specific, the higher the level of pension benefits, the lower the likelihood of a person supplying labor, and the greater the employment opportunities in the labor market, the higher the willingness to supply labor.

Employers make employment decisions on the basis of the expected returns from employment. In other words, the employer employs a worker as long as he can expect to benefit in the form of productivity in excess of wages. The calculus of employment decisions is often based on the long term. That is, the benefit accruing from employment is calculated in terms of some sort of present value of the future stream of benefits.

In the Japanese labor market, employers display a systematic bias toward certain age classes, apparently preferring to employ young workers, not older. This bias seems to be clearly reflected in the differences among the job opening/applicant ratios compiled by the public employment service offices for different age classes.

Why are there such conspicuous differences? Is it because employers tend to avoid recruiting older workers? If so, is this because employers perceive that older workers cost more by receiving high wages but do not contribute as much in terms of productivity? Is it because employers do not expect to get as much return from their human investment in older workers as from their investment in younger workers? Or is it because of the effect of such institutional arrangements as the mandatory retirement system? Whether the distribution of em-

ployment opportunities across different age classes can be altered depends on the relative values of and relations among these economic and institutional variables.

Basically, the government has two categories of policy instrument that affect or control the demand-supply balance of elderly workers. One is public income-maintenance programs such as Social Security. Many studies of labor supply behavior suggest that, the higher the level of pension benefits, the lower the likelihood of an older person joining the labor supply. The other is what may be called an active employment policy. The Japanese government, for example, has been promoting this kind of employment policy in two ways: providing subsidies for employers who employ older workers and controlling or guiding the behavior of employers through laws or guidelines.

These two types of policy instrument—income-maintenance programs and active employment policies—are mutually dependent and closely related. For instance, the labor supply of older people depends on their perceived employment opportunities, on the one hand, and on the level of guaranteed income, on the other. The former is determined by a set of variables, as mentioned above, that dictates the behavior of employers and also by the government's employment policy. The latter is determined by the government's income-maintenance programs. The financial viability of such government programs depends on the degree to which old people work in the labor market and contribute to the funds of such programs.

When we evaluate the implications of these policy instruments, we also need to take into account dynamic changes in demand-supply balances over a long period of time. While logically we may be concerned with a likely relative excess supply of older people as a consequence of the recent revamping of the Social Security system, when put in the perspective of an increasingly diminishing supply of younger labor in the long run, that excess supply may be viewed positively, not negatively. Such an interpretation, however, would naturally depend on how flexibly the employment system and employment practices react and adapt to new external market conditions. We should also keep in mind the question of whether the distribution of employment opportunities can be justified on the grounds of securing minimum social needs for all.

Having acknowledged the issues surrounding these policy debates, we may now identify a few important and relevant research questions. One is what effect public income-maintenance programs such as the Social Security system have on the labor supply behavior of older workers. Another is whether employment opportunities for older workers will increase in the future as the result of a change in the behavior of employers. Still another question is whether, and to what extent the government's employment policy will actually create new jobs for the elderly or redistribute existing jobs among the workforce, targeting the elderly. In this paper, we confine ourselves to the question of the effect of public pension benefits on the labor supply behavior of the elderly.

One interesting observation lies in the apparent correlation between the de-

clining labor force participation by the Japanese elderly and the increasingly high benefit payments disbursed by the Social Security system (see fig. 2.1). The labor force participation rate of elderly Japanese workers declined from 57 percent in 1960 to 36 percent in 1990, a drop of 20 percentage points. By contrast, the average monthly Social Security benefit (in 1985 yen) rose substantially during the same period, from ¥16,000 in 1960 to ¥130,000 in 1990, and the ratio of the benefit to the average wage increased from 15 to 40 percent. This suggests that the progressive rise in pension benefits may have encouraged more workers to retire early, thereby reducing the supply of elderly workers. This contrast in time trends may, however, be coincidental. To determine what effect, if any, the rise in pension benefits has had on the labor force participation of elderly workers, we undertook a rigorous cross-sectional examination of the data.

2.2 The Social Security System in Japan

In this section, we briefly describe the Japanese Social Security insurance system and the changes that this system has undergone over the past two decades. Because we are mainly interested in determining what effect the Social Security system has had on the behavior of employed people, we will be discussing Social Security for employed people.

Social Security for employed people (*Kosei-Nenkin*) in Japan is the public pension system that covers all Japanese employees who work in private businesses that employ at least five persons. As of 1990, about 32 million workers were insured through the system, and 8 million beneficiaries were collecting retirement pensions.

To be eligible to collect a pension, a worker must fulfill three criteria: (1) he must have made at least 240 months' worth of accumulated contributions to the system (or 180 months' worth, accumulated after age 40);[1] (2) he must be at least 60 years of age; and (3) his earnings must be less than the ceiling level. The third condition warrants further explanation. First, in the context of the Social Security system, the term *retirement* signifies retirement from a job specifically covered by that system. Thus, workers not paying Social Security contributions from their earnings are considered to be retired. Accordingly, a person employed at a noncovered workplace after retirement from a covered job is regarded as a retiree.[2] Second, to collect pension benefits, workers are not required to retire completely from a covered job, as long as their earnings do not exceed a certain maximum amount specified by a schedule known as the earnings test. Those workers choosing to continue in the workforce are called

1. In some employment categories, there are exceptions to the number of months of contributions required; e.g., for coal miners, one month of contribution is counted as four-thirds of a month.

2. It is possible for people retired from the private sector to be government employees. This situation, however, is uncommon.

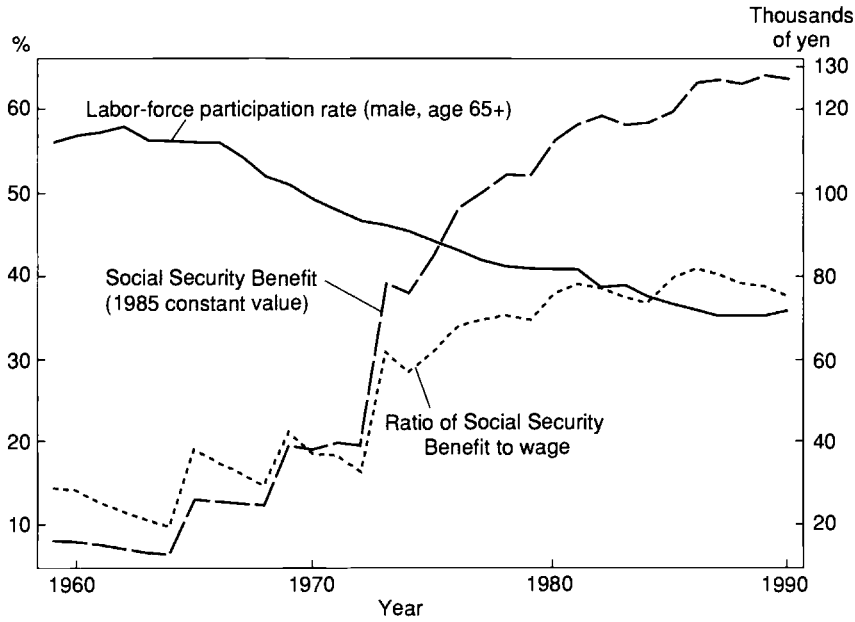

Fig. 2.1 Trends in the labor force participation rate and Social Security benefits

Table 2.1 Benefit Reductions According to Monthly Earnings

Age Group	Monthly Earnings (¥)	Rate of Benefit Reduction (%)
60–64	0	0
	1–94,999	20
	95,000–129,999	50
	130,000–154,999	80
	155,000+	100
65+	< 155,000	0
	155,000+	20

Source: Trends of Insurance and Pensions (Tokyo: Welfare Statistics Association, 1990).

working beneficiaries. Working beneficiaries collect only a specified percentage of their full pensions.

The ceiling level of the Social Security benefit is reduced according to the amount earned, as shown in table 2.1, with the rate of reduction varying according to the age group within which a worker falls. For workers between 60 and 64 years of age, for example, the rate of reduction can be as great as 100 percent, whereas, for workers aged 65 and older, the maximum reduction is 20

percent. This earnings test poses problems that will be discussed in greater detail below.

The dotted curve in figure 2.1 shows trends in Social Security benefits paid to beneficiaries (in 1985 yen). As a result of revisions in the pension formula, there were significant increases in benefit levels in 1965, 1969, and 1973. Of these increases, the 1973 jump was particularly noteworthy in that, after this time, pension benefits were indexed to adjust for inflation; accordingly, the real value of each benefit level increased to twice the previous value.[3] Since 1973, benefits have continued to rise steadily to compensate for the rate of inflation.

Another factor that we must examine in connection with the recent rise in pension benefits is the maturity of the Social Security pension system itself. In the past, very few workers were able to contribute to the pension system for a period sufficient to qualify them to collect regular benefits. In the late 1970s, however, the first group of workers who had contributed for the requisite number of months began to reach retirement age. Hence, the number of employee pension beneficiaries increased from 0.6 million in 1970 to 7.8 million in 1990, and the number of persons receiving the maximum benefit grew commensurately. As the benefit level rose, the ratio of the pension benefit amount to the average monthly wage also grew dramatically, increasing from 10 percent in the early 1960s to almost 40 percent in the 1980s (see fig. 2.1);[4] excluding bonus payments, which constitute as much as 30 percent of a worker's wages, the ratio is about 60 percent. The most recent major revision of the pension system, in 1985, was aimed at reducing future benefit levels in order to keep the current relative ratio constant. The Social Security benefit trend shown in figure 2.1 suggests that the Social Security system matured in the 1980s.

2.3 Analytic Framework

In this section, we discuss the empirical framework of our study. First, we estimate the standard labor supply model originally developed by Heckman (1979) and modified and expanded by others (see, e.g., the studies in Smith [1980]).

Suppose that W_r and W_m are the reservation wage and the market wage, respectively. The reservation wage is the minimum wage for which an individual will work, and the market wage is the wage offered by potential employers. We may then write the reservation wage and market wage functions as

3. The Employee Pension Insurance Law provides that benefits be indexed when consumer prices increase by more than 5 percent in any given year, but, as a result of political considerations, benefits have been indexed even in years when the inflation rate was less than 5 percent.

4. The Social Security system is based on the monthly wage, excluding bonuses. For example, the standard monthly wage on which the Social Security contribution is paid—and on which the benefit is calculated—is the average monthly wage for May, June, and July. Bonuses are generally paid in July and December.

$$W_r = \boldsymbol{\alpha X} + U_r, \tag{1}$$

$$W_m = \boldsymbol{\beta Y} + U_m, \tag{2}$$

where $\boldsymbol{X}$ is the vector of variables affecting an individual worker's reservation wage and includes the worker's income-leisure preference, income from nonlabor sources such as pension benefits, and some institutional factors affecting the labor supply decision;[5] $\boldsymbol{Y}$ is the vector of variables affecting market earning power and includes a worker's productivity and the factors of demand for this side of the labor market; $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ are vectors of parameters; and U_r and U_m are normally distributed random errors. Thus, the condition for participation in the labor market is

$$W_m - W_r > 0. \tag{3}$$

This equation means that a person will decide to participate in the labor market if the market wage offered exceeds his reservation wage.

In terms of labor supply expressed as hours worked, any person whose reservation wage exceeds his market wage has zero hours of work. Persons whose market wage is higher than their reservation wage supply a positive number of hours of work. The number of hours that a person supplies depends on the same variables in $\boldsymbol{X}$ above and on the market wage.[6] Thus, the hours-worked function is defined as

$$\begin{aligned} H &= \boldsymbol{\gamma X} + cW_m + U_h, && \text{if } W_m - W_r > 0, \\ H &= 0, && \text{if } W_m - W_r < 0, \end{aligned} \tag{4}$$

where $\boldsymbol{\gamma}$ and c are the vector of parameters and a parameter, respectively, and U_h is a normally distributed random error term.

Because from our data the number of hours worked and wages can be observed only for persons who are actually working, there is well-known problem of sample selectivity bias in estimating the labor supply and market wage functions, as elucidated by Heckman (1979). In order to cope with this problem, we estimate these functions using Heckman's two-stage estimation procedure.[7] In applying the estimation procedure, we first estimated the probit participation equation. The likelihood function has the form

$$\ln L = \sum_{1}^{N_w} \ln P_r(W_m - W_r > 0) + \sum_{N_{w+1}}^{N_T} \ln P_r(W_m - W_r < 0), \tag{5}$$

where N_w is the number in the working sample, and N_T is the number in the total sample. As a by-product of the participation probit estimation, we have

5. The participation cost is often included in the reservation wage. In this study, we did not include this factor because our data are inadequate for this purpose.

6. Because we do not include the participation cost, the reservation-wage vector is identical to that of the hours-worked function.

7. LIMDEP, a statistical software package, was used to correct for selectivity.

the lambda variable, which corrects for selectivity bias. The market wage and hours-worked equations incorporating the lambda variable are defined as:

$$\ln(W_m) = \boldsymbol{\beta} Y + b\boldsymbol{\lambda} + V_m, \tag{6}$$

$$H = \boldsymbol{\gamma} X + c \ln(W_m) + d\boldsymbol{\lambda} + V_h, \tag{7}$$

where $\boldsymbol{\beta}$ and $\boldsymbol{\lambda}$ are vectors of parameters; b, c, and d are parameters; and V_m and V_h are random terms. These equations are then estimated jointly.

In the context of the analytic framework set forth above, the Social Security benefit is one component of the vector X that is supposed to affect a person's labor supply behavior both when making the decision to participate and when determining the optimal number of hours to work. Therefore, the coefficients of the Social Security benefit in the parameter vectors $\boldsymbol{\alpha}$ and $\boldsymbol{\gamma}$ constitute the main targets of this paper.

In examining the magnitude of the effect of Social Security pensions on the labor supply, it is important that one check the stability of the parameters of the labor supply functions that reflect the effect of pension benefits. In order to do this, we make an inter-cross-sectional comparison by using micro data for 1980 and 1983. In this inter-cross-sectional comparison, we estimated only a reduced-form probit function for labor force participation in which the market wage rate is taken from an aggregate data source matched with the available individual characteristics of the micro data. We do this because the 1980 data lack information on working hours and wage rates. The probit function has the form

$$\text{prob(work/not work)} = f(W, X), \tag{8}$$

where W is the market wage rate taken from aggregate data.[8]

As shown in figure 2.2, the earnings test creates a kink in the beneficiary's budget constraint. Suppose that CJ is the original budget line for a person with the market earning power of wage rate W_m and OC of nonpension, nonearnings income. If this person has the right to receive CA of the Social Security benefit and there is no earnings test, the budget line shifts from CJ to AK. The earnings test, however, results in a kinked budget line like $ABDFGJ$ for those 60–64 years old. This budget-constraint kink is substantial for eligible workers between 60 and 64. The budget-constraint kink means that, for a given market wage rate, those supplying more labor must give up a greater proportion of their Social Security benefits.

This gives rise to the problem of a simultaneity bias in estimating the coefficient of Social Security benefits in the labor supply functions (i.e., the participation and hours-worked functions). The estimated coefficient of the Social Security benefit may have a negative bias because it reflects not only the effect

8. The studies of Boskin (1977) and Quinn (1977) estimate the same kinds of reduced-form logit functions derived from a simple individual equilibrium model.

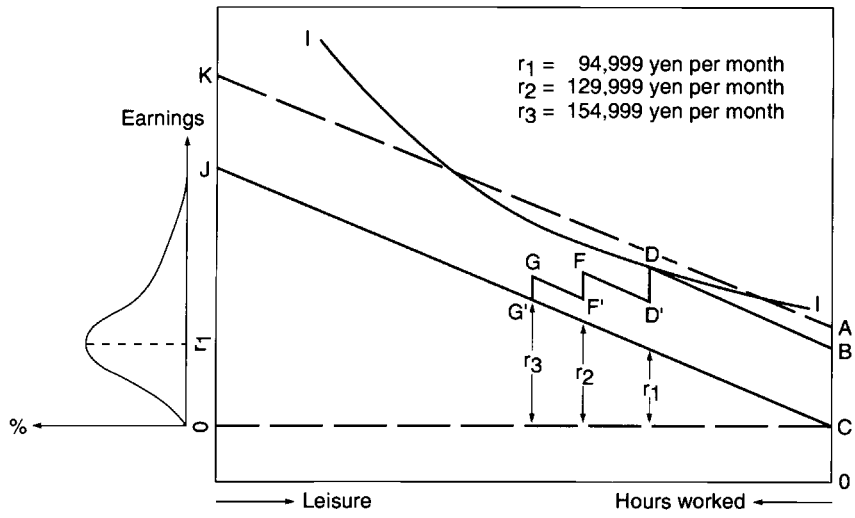

Fig. 2.2 The individual equilibrium at the kinked point of budget constraint and earnings distribution

of the pension benefit on the labor supply but also the effect of the quantity of labor on the benefit level.[9] In order to estimate the influence of the Social Security benefit on labor supply behavior without introducing this bias, we used a dummy variable for Social Security eligibility that should be independent of labor supply behavior.

In order to examine the effects of the earnings test on the distribution of earnings, we directly observe the distribution of earnings of workers who were and were not eligible for a pension. With the caveat noted above, we would expect working beneficiaries to select equilibrium points such as D in figure 2.2 so that their earnings are concentrated around the ¥94,999 ceiling.[10]

9. A rigorous investigation of the nonlinear effects of the Social Security earnings test on the labor supply would require the estimation of maximum likelihood models similar to those of Hausman (1980) and Zabalza, Pissarides, and Barton (1980). Unlike the U.S. or British cases in which the budget constraint is kinked, the Japanese earnings test creates notch-like budget lines similar to those illustrated in fig. 2.2. This difference arises because the Japanese earnings test takes the form of a lump-sum tax rather than a change in the marginal tax rate. Furthermore, this notched budget constraint makes possible the existence of dual equilibria; e.g., at one of the peak points (D) as well as at a point on $D'F$, the slope of the adjoining segment of the budget line depending on the level of benefits. Incorporating these features of the Japanese Social Security earnings test into a maximum likelihood model is complex and beyond the scope of this paper.

10. Although for eligible workers age 60–64 the ranges ABD and part of $G'J$ of the budget constraint could be the equilibrium points in the cases shown in fig. 2.2, part of $D'F$ and part of $F'G$ become possible equilibrium points if the benefit is small. The theoretically impossible range for the equilibrium is at the trough of the constraint line shown next to point D. According to our data, shown in sec. 2.6 below, people do in fact have earnings corresponding to this range, which suggests that workers do not have complete freedom to choose their working hours because of demand-side constraints.

2.4 Data and Variable Definitions Data

The data used in this analysis were extracted from the Employment Status Survey of the Elderly, which was conducted by the Japanese Ministry of Labor. The sample population surveyed was chosen to be representative of persons 55–69 years of age.

The most important feature of this data set is that it is the only collection of micro data in Japan that contains information on the employment status of elderly workers, including data with which to estimate labor supply and market wage functions for individual workers as well as input on past and current job experience. Also available are data on Social Security, including facts about those who were collecting benefits at the time of the report as well as those who were potentially eligible to do so.

Although surveys were conducted in both 1980 and 1983, the 1980 data set lacks details on hours worked and wage rates, and therefore it is used only for estimating the reduced-form probit function of equation (8). In estimating this equation, we used the Japanese Ministry of Labor's Basic Survey of Wage Structure (BSWS), which represents aggregate wage data as the outside information about wages. The BSWS, the most detailed aggregate wage survey published to date, covers all workers in business with more than ten employees, categorizing wage rates by both worker and employer characteristics.

Since we are particularly interested in the effect of Social Security on labor supply behavior, we selected a sample population consisting of males 60 years of age and older—the eligible age range for collecting Social Security benefits. We focused on the male sample because of its trend toward declining labor force participation and also because the number of female workers participating in the Social Security system is still limited.

2.4.1 Variables

The following explanatory variables affecting the reservation wage are the elements of the variable vector X of equations (1), (4), (7), and (8); for the market wage, they are the elements of the variable vector Y in equations (2) and (6).

Age. Age is an explanatory variable for both the reservation wage and the market wage. A person's preference for leisure may shift upward with age, and diminishing physical ability may curtail his market productivity, thus reducing his market wage.

Health. Health is also an explanatory variable for both the reservation wage and the market wage. If a person has health problems, his preference for leisure may increase, and his market productivity may decrease, thus reducing his market wage. We made the dummy variable HEALTHDMY equal to one if health problems exist and zero otherwise.

Mandatory retirement. Mandatory retirement is a widespread employment practice among Japanese firms. Although mandatory retirement from a primary job does not preclude a worker's participation in the labor force, it does constitute a potent institutional barrier. At the same time, those workers who have left their primary jobs through mandatory retirement have the opportunity to engage in other jobs that allow them to work fewer hours. Mandatory retirement may have a negative effect both on the decision to participate in the labor force and on hours worked; thus, it is an explanatory variable for the reservation wage. Moreover, in the Japanese wage system, wages increase with age and length of service up to the mandatory retirement age. After a worker mandatorily retires from his primary job, his wages drop dramatically if he chooses to remain in the labor force. Therefore, mandatory retirement may also have a negative effect on the market wage. To control for these effects, we introduced an indicator variable for mandatory retirement. We made the dummy variable MANDRETDMY equal to one if the worker has experienced mandatory retirement and zero otherwise.

Nonwage income. In general, individuals with higher nonwage incomes have higher reservation wages and hence tend to work less. In this study, we divided nonwage income sources into two categories: Social Security benefits and other nonwage income (NONPEN). We did so, not only because we are particularly interested in the effect of Social Security, but also because the earnings test affects Social Security and because, since only Social Security is indexed for inflation, it may therefore be a more reliable permanent income source than other pensions.[11] As discussed in section 2.3 above, we estimated the labor supply functions with this variable to confirm the effect of Social Security on labor supply behavior without the simultaneity bias. In order to avoid the bias, we introduced an indicator variable for Social Security eligibility that is completely independent of labor supply behavior (PENELGDMY). We made the dummy variable PENELGDMY equal to one if the worker is eligible to collect Social Security and zero otherwise. This includes all those who satisfy the months-of-contribution requirements.

Education. Education is an important explanatory variable for the market wage Y because highly employed workers are thought to be more productive in the labor market and hence more likely to receive higher wages. Educational attainment is measured by two categorical variables: (1) completion of high school and (2) graduation from a four-year college. The reference group (omitted) consists of those who have completed the minimum level of compulsory schooling. We made the dummy variable HIGHSCHL equal to one if the worker completed high school and zero otherwise and also made COLLEGE equal to one if the person received a college degree and zero otherwise.

11. On the other hand, most company pensions are not indexed and, rather than being annuities, are limited-term (usually ten-year) pensions.

Location. Because business activities are concentrated mainly in the Tokyo metropolitan area, there is a significant difference between labor demand conditions there and in the rest of Japan. For this reason, a Tokyo metropolitan area indicator variable was introduced to control for this labor demand factor. We made the dummy variable TOKYOMETDMY equal to one if the person was living in the Tokyo metropolitan area and zero otherwise.

2.5 Empirical Results

The results of estimating the probit participation function of equation (5) are shown in table 2.2. In order to look at the magnitude of the effect of each variable, we will show the ∂ prob/∂ var instead of the probit coefficients themselves.[12] As shown in table 2.2, all coefficients are statistically significant, and all parameter signs are consistent with those predicted.

The Social Security variables are negative and highly statistically significant. The highly significant negative coefficient of the dummy variable for Social Security eligibility (PENELGDMY), which is independent of the labor supply decision, confirms the negative effect of Social Security on the participation decision. The probit coefficient of PENELGDMY implies that eligibility for Social Security reduces the participation probability by 15 percent.

Table 2.3 shows the results of estimating the market wage function of equation (6). We estimated the wage equation for the working male sample population. These estimates were corrected for sample-selectivity bias using the lambda variable estimated from the participation function reported in table 2.2 above.

All coefficients are statistically significant, and all signs are theoretically consistent. The most significant coefficients are the indicator variables related to education. Having either a high school or a college education increases the market wage of an individual even when he is in his 60s. The statistical significance of lambda indicates the importance of correcting for selectivity in estimating a wage equation for the working sample.

The results of estimating the hours-worked function of equation (8) are presented in table 2.4 in conjunction with the results from estimating the market wage function. All estimated coefficients are statistically significant, and their signs are consistent with those predicted, although the significance level of the wage rate (LOGWFIT) is low.

The coefficients of the Social Security variables are significantly negative. The negative effect of Social Security on hours worked is confirmed by the coefficient of the Social Security eligibility dummy variable.

The above results definitely show that Social Security in Japan significantly reduces the labor supply of pension-eligible older people. How stable is this

12. Concerning the procedure of deriving ∂ prob/∂ var from probit coefficients, see Judge et al. (1980).

Table 2.2 **Empirical Results of the Participation Function (probit estimation)**

Variable	∂ Prob/∂ Var	Variable	∂ Prob/∂ Var
AGE	−.017092***	NONPEN	−.000223***
HEALTHDMY	−.331203***	MANDRETDMY	−.177402***
HIGHSCHLDMY	.036605***	TOKYOMETDMY	.056351***
COLLEGEDMY	.087208**	Log likelihood	−3,859.3
PENELGDMY	−.152729***	Sample size	7,014

**Statistically significant at the 5 percent level.

***Statistically significant at the 1 percent level.

Table 2.3 **Empirical Results for the Market Wage Function**

Variable	Specification 2 (with lambda from participation function with EP eligibility dummy [PENELGDMY])	Variable	Specification 2 (with lambda from participation function with EP eligibility dummy [PENELGDMY])
ONE	1.26281***	TOKYOMETDMY	.21099***
AGE	−.0280409***	MANDRETDMY	−.361453***
HEALTHDMY	−.281854***	LAMBDA	.543983***
HIGHSCHLDMY	.390829***	$\bar{R}^2$	.127
COLLEGEDMY	.699679***	Sample size	4,559

Note: EP = employee's pension.

***Statistically significant at the 1 percent level.

Table 2.4 **Empirical Results for the Hours-Worked Function**

Variable	**Specification 2 (with EP eligibility dummy [PENELGDMY])**	**Variable**	**Specification 2 (with EP eligibility dummy [PENELGDMY])**
ONE	446.642***	NONPEN	−.03992***
AGE	−4.08734***	LOGWFIT	9.40996*
HEALTHDMY	−51.2706***	LAMBDA	51.3899***
MANDRETDMY	−24.0737***	$\bar{R}^2$	.050
PENELGDMY	−11.9709**	Sample size	4,559

Note: EP = employee's pension.

*Statistically significant at the 10 percent level.

**Statistically significant at the 5 percent level.

***Statistically significant at the 1 percent level.

Social Security effect over time? Table 2.5 compares the 1980 and 1983 reduced-form participation functions of equation (8). We estimated the function using the Social Security benefit (PENEBENFT) because the 1980 data do not include information on Social Security eligibility.

To compare the magnitude of the effect of Social Security benefits on participation behavior, we divided the wage rate and pension variables from the 1983

data by the consumer price index to convert these variables to their 1980 constant-price values.

All parameters are statistically significant, and their signs are consistent with those predicted. The magnitude of the effect of a unit change in the Social Security benefit on the probability of participation (∂ prob/∂ var), or the effect of Social Security benefits on the probability of workforce participation, is very similar in both samples: −0.0025 and −0.0022, respectively. This suggests that the effect of Social Security benefits on the labor supply was stable during the early 1980s.

2.6 The Earnings Test and Its Effects

In section 2.3 above, we showed that the earnings test associated with Social Security benefits creates a kink in the budget line of an eligible worker in this age group. With this kinked budget line, the individual equilibrium points for working beneficiaries are likely to be located at the kink points, such as peak *D* of figure 2.2 above. To verify this, we examined the earnings distribution of working beneficiaries. If working beneficiaries put their equilibrium point at *D*, their earnings will tend to be concentrated at the ceiling of the earnings range, which is ¥94,999 (see fig. 2.2).

Figures 2.3 and 2.4 show the earnings distributions of eligible and noneligible workers. To control for all conditions except eligibility for Social Security benefits, we selected a sample of workers age 60–64, without health limitations, who were employed full-time at age 55 and had experienced mandatory retirement prior to taking their current jobs. The earnings distribution of eligible workers shown in figure 2.3 is unimodal, with the peak occurring

Table 2.5 **Results of Estimating the Reduced-Form Participation Function for 1980 and 1983**

	Coefficients of the Participation Function	
Variable	1980: ∂ Prob/∂ Var	1983: ∂ Prob/∂ Var
AGE	−.0206565***	−.0142349***
HEALTHDMY	−.3579931***	−.3318242***
WAGE[a]	.0634237*	.1509132***
PENBENEFT	−.0025636***	−.0022427***
NONPEN	−.0002293***	−.0003952***
MANDRETDMY	−.3306154***	−.1301065***
Log likelihood	−4,813.2	−3,749.2
Sample size	9,118	7,014

[a]WAGE is the market wage rate taken from the *Basic Survey of Wage Structure* (Tokyo: Ministry of Labor, annual).

*Statistically significant at the 10 percent level.

***Statistically significant at the 1 percent level.

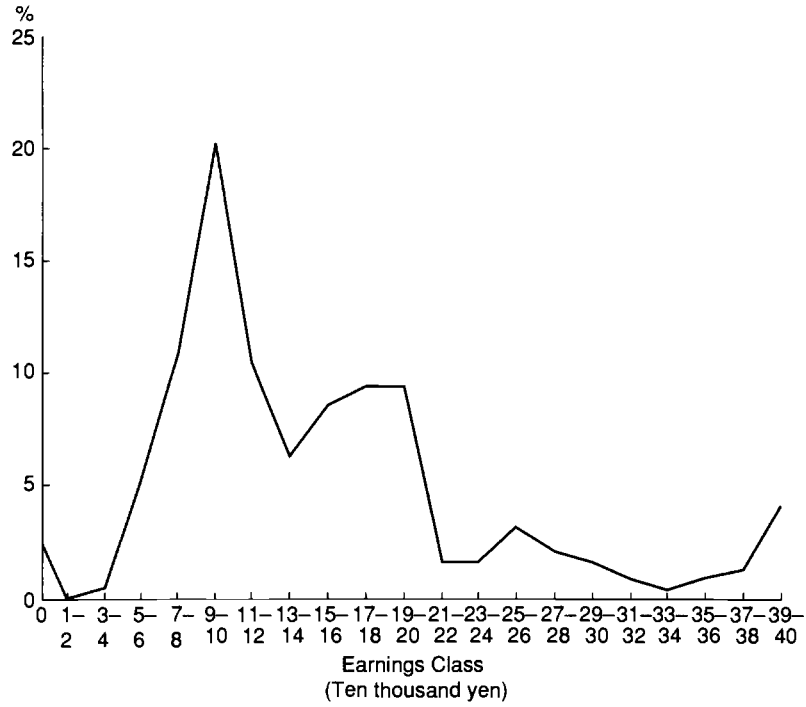

Fig. 2.3 Earnings distribution of pension-eligible workers

in the earnings class that includes the ceiling of the earnings range associated with the 20 percent reduction in benefits (less than ¥95,000). By contrast, the earnings distribution for noneligible workers (fig. 2.4) shows no such clear-cut tendency.

The observed differences in the earnings of the two groups were also subjected to statistical tests. We analyzed (1) the difference in the shape of the earnings distribution curves and (2) the relative frequency of the earnings class that includes ¥94,999 within the pension-eligible and -noneligible samples.

To test for statistical differences in the shape of the earnings distribution curve, we used a rank-order test.[13] In terms of the difference in the relative frequency of the earnings class including ¥94,999, we used the usual proportional difference test. The results of these tests, displayed in table 2.6, indicate that the shapes of the earnings distribution curves and the relative frequencies are significantly different; the chi-square test statistic exceeds the critical value in both cases. The earnings distribution of eligible workers, compared with that of noneligible workers, shows an equilibrium point at the kink in the budget line, a result that we attribute to the Social Security earnings test.

13. We followed the procedure presented in Takeuchi (1965).

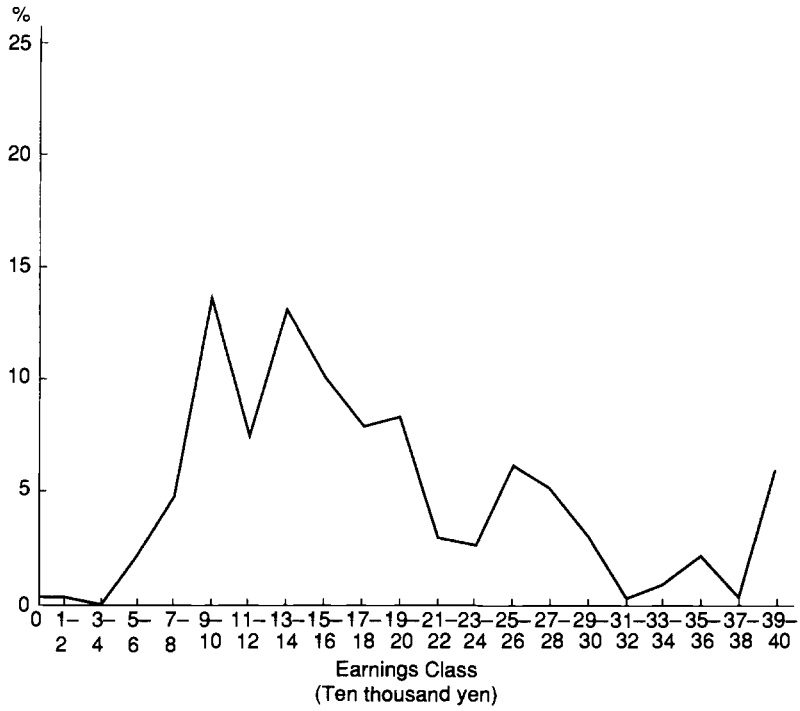

Fig. 2.4 Earnings distribution of workers not eligible for pension

2.7 Policy Implications

These findings from the above analysis may have significant implications for employment policy, particularly in connection with the recent restructuring of the Japanese Social Security system. Initially, the changes are likely to reduce, or at least curb, increases in benefit levels as the pension-eligible population grows. This may in turn cause a rapid surge in the number of elderly workers actively seeking jobs, and it may therefore be incumbent on Japanese society as a whole to provide a substantial number of job opportunities for persons in this group. As a result of the effect of the Social Security earnings test, part-time employment opportunities are likely to be especially important for elderly workers. Policymakers attempting to meet the needs of older workers should give these points serious consideration.[14]

This result of the foregoing analysis stimulates at least three policy-related questions: (1) What is the direction of ongoing policy efforts? Are they moving toward increasing the employment opportunities for elderly workers to meet

14. For a broader discussion of employment issues of the aging in Japan, see Seike and Shimada (1986).

the needs likely arising from the reforms proposed by the Japanese government? (2) What would be the long-term implications for the demand-supply balance of elderly workers? (3) What would be an appropriate and workable institutional arrangement for providing employment opportunities for the elderly, particularly in private corporations?

The answer to the first question is obviously yes. The government has been earnestly advocating (sometimes pressing private corporations by administrative guidance through employment service offices) that the age of mandatory retirement be raised in order to increase employment opportunities for the elderly. Partly as a result of this effort, and partly owing to social pressures, an increasing number of private corporations have moved back the age for mandatory retirement from 55 to 60 during the last decade. For example, while the share of corporations adopting the mandatory retirement age of 55 decreased from 39.5 percent in 1980 to 19.3 percent in 1990, those adopting the retirement age of 60 increased from 36.5 percent in 1980 to 60.1 percent in 1990.

Although the higher mandatory retirement age is meant to increase full-time employment opportunities for the elderly as opposed to part-time jobs, as suggested by the results of our analysis, this policy move will certainly more than offset short- or medium-term concerns of a shortage of employment opportunities for the elderly if the policy objectives are actually realized in the labor market.

This leads us to the second question regarding how the demand-supply balance of the labor market will be affected in the long run, particularly for the older portion of the workforce. Most long-term estimates suggest that the growth in the labor supply will be increasingly smaller in the future. (For example, the EPA [Economic Planning Agency] estimates that the average annual percentage increase in the labor force will be 0.9 percent for the period 1985–95, 0.2 percent for 1995–2000, and −0.1 percent for 2000–2010. The

Table 2.6 **Statistical Significance of the Differences in Earnings Distributions**

Type of Test	Chi Square	Critical Value
Test of differences in the shape of the earnings distributions:		
H_0: $F_p = F_{np}$	. . .	. . .
H_1: $F_p > F_{np}$	17.23	3.84
Test of differences in proportion of each sample in the earnings class ¥90,000–¥100,000:		
H_0: $P_p + P_{np}$		
H_1: $P_p > P_{np}$	.065	.052

Note: H_0 = null hypothesis; H_1 = alternative hypothesis; Fp = earnings distribution of the pension-eligible sample; F_{np} = earnings distribution of the noneligible sample; P_p = proportion of the eligible sample in the earnings class ¥90,000–¥100,000; P_{np} = proportion of noneligible sample in the earnings class ¥90,000–¥100,000.

estimates were prepared by the EPA Planning Bureau in 1989.) The expected increase in the supply of older labor may well be helpful in meeting the likely shortage of labor in the long-term future. In many areas of industry, a severe structural shortage in the labor force is already emerging. Industries such as construction, agriculture, and labor-intensive services (e.g., computer programming) are examples of this. What is needed is a reallocation of employment opportunities among different age classes of the workforce. Whether such objectives can be achieved will depend largely on the response and behavior of employers.

The third question therefore, is whether in the long run such a reallocation of employment opportunities can be effectively realized in the Japanese labor market. A critical question is whether Japanese employers will be prepared to provide good employment opportunities for elderly workers in such a way that they can both utilize their skills and experience effectively and earn a reasonable income. In most cases, the compulsory retirement system severs the relationship between the older worker and the company in which he was working. The retired worker who is still seeking other employment opportunities ends up with jobs in which he can neither utilize his skills and experience effectively nor earn a decent income. A sensible way to bridge this gap may be found in utilizing what might be termed the *quasi* or *extended* internal labor market.

This means that the worker does not stay in the company after the mandatory retirement age, but neither does he move to a totally unrelated job. The worker finds another employment opportunity in a company that is closely related to his old company so that he can utilize his skills and experience effectively and therefore has a better income than he would otherwise. In fact, utilization of the "quasi internal labor market" is increasing in the sense that an increasing number of older workers find their next jobs in companies within the same group or related groups, as networks of corporate groups develop for various reasons. If Japanese corporations will provide more jobs of this type for older workers, and if the workers in turn will be able to find more employment opportunities where they can utilize their talents effectively, then the proposed reform of Social Security may not have as disturbing an effect in distorting the demand-supply balance in the labor market over the long run as might at first be supposed. All this, however, would depend on effective government policies and the sensible adaptation of corporations to economic and social needs.

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