This PDF is a selection from a published volume from the National Bureau of Economic Research

Volume Title: Social Security Programs and Retirement around the World: The Relationship to Youth Employment

Volume Author/Editor: Jonathan Gruber and David A. Wise, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 978-0-226-30948-4; 0-226-30948-7

Volume URL: http://www.nber.org/books/grub08-1

Conference Date:

Publication Date: February 2010

Chapter Title: Does Social Security Induce Withdrawal of the Old from the Labor Force and Create Jobs for the Young? The Case of Japan

Chapter Author: Takashi Oshio, Satoshi Shimizutani, Akiko Sato Oishi

Chapter URL: http://www.nber.org/chapters/c8257

Chapter pages in book: (217 - 241)

7

Does Social Security Induce Withdrawal of the Old from the Labor Force and Create Jobs for the Young? The Case of Japan

Takashi Oshio, Satoshi Shimizutani, and Akiko Sato Oishi

7.1 Introduction

The current speed of aging in Japan is unprecedented and is far more rapid than in other developed countries. The proportion of the old, defined as those aged sixty-five and over, was 4.9 percent of the total population in 1950, increased to 12.5 percent in 1990, and further reached 22.1 percent in 2008, implying that one-fifth of the population is currently occupied by the old (National Institute of Population and Social Security Research [NIPSSR]).[1] Population aging will continue into the future and even accelerate. According to the latest population projection released by the NIPSSR in December 2006, the share of those aged sixty-five years and above is expected to reach 30.5 percent of the total population in 2025 and further increase to 39.6 percent in 2050.

The rapid pace of population aging has raised concerns about the sustainability of the current programs and stimulated a series of major pension reforms since the mid-1980s, which called for a rise of eligibility ages, a reduction of benefit levels, and a rise of contribution rates. The latest reform in 2004 is to extend the eligibility age from sixty to sixty-five by 2025 and has introduced an automatic adjustment of benefit levels due to demographic

Takashi Oshio is a professor at the Institute of Economic Research at Hitotsubashi University. Satoshi Shimizutani is a senior research fellow at the Institute for International Policy Studies. Akiko Sato Oishi is associate professor of law and economics at Chiba University.

The original version of this chapter was presented at the conference on the International Social Security Project (phase 5) organized by the National Bureau of Economic Research (NBER) in Lisbon, Portugal, on May 23 and 24, 2008.

1. The United Nations defines a society in which people aged sixty-five and above account for more than 7 percent as one that is aging and a society in which this age group shares more than 14 percent as one that is aged. It took only twenty-four years for Japan to move from being an aging society to an aged one, while it took more than fifty years for most Western countries.

and macroeconomic factors in order to cope with the expected increase of benefits and the deteriorating fiscal balances.

Naturally, these reforms are likely to have affected the labor supply of the elderly and possibly of the nonelderly. Thus, an interesting question is to quantify the effects of social security programs on labor market outcomes for both the old and the young: does a generous social security program provide jobs for the young by encouraging the old to exit the labor market? Does a rise in the eligibility age make the old stay longer in the workplace and crowd out the young? When addressing these issues, we have to keep in mind the possibility of the endogeneity of changes in social security programs with respect to the employment or unemployment of the young. Fortunately, it is unlikely that endogeneity is an issue in Japan, because the timings of reforms are exogenously determined, regardless of economic and demographic circumstances.

This chapter examines whether social security programs in Japan induce withdrawal of the elderly from the labor force and create jobs for the young. Our discussions proceed as follows. Section 7.2 provides a historical overview of social security reforms and employment policies toward the elderly. Section 7.3 presents the long-term employment and unemployment trends of both the old and the young and performs a regression analysis to examine the direct relationship between the employment of the young and that of the old. Section 7.4 examines whether changes in social security programs are associated with the employment of the young or the old, using measures for the inducement to retire. Section 7.5 concludes. The two appendices provide a detailed description of data construction and sources of the main variables used in this study.

7.2 Background

7.2.1 Social Security Reforms

This section provides historical information on social security reforms and employment policies for the elderly. We focus on what their main purposes have been and whether the prospect of creating jobs for the young has played a large role in the policy debate.

Table 7.1 overviews the directions of past social security reforms in terms of the benefits of the Employees' Pension Insurance (EPI, *Kosei Nenkin*) and National Pension Insurance (NPI, *Kokumin Nenkin*), which are at the core of the public pension scheme in Japan (see section 7.4 for more details).[2] Both EPI and NPI laws require benefit and contribution schemes to be reviewed

2. See Komamura (2007) for more details. The EPI and NPI cover 48.0 and 45.5 percent of the population insured by public pension programs. The Mutual Aid Insurance (*Kyosai Nenkin*) covers the remaining 6.5 percent, most of whom are employees in the public sector and private schools.

Table 7.1 Changes in social security benefits in key reforms

Social security reform	Employees' Pension Insurance: Wage-proportional benefit	Employees' Pension Insurance: Flat-rate benefit (annual, yen)		National Pension Insurance: Flat-rate benefit (annual, yen)	
	Benefit multiplier (/1,000)	Nominal	2005 prices	Nominal	2005 prices
1954	5	24,000	[127,292]	—	—
1959	6	24,000	[127,620]	42,000	[223,336]
1965	10	120,000	[473,412]	96,000	[378,730]
1969	10	192,000	[624,086]	153,600	[499,269]
1973	10	480,000	[1,185,185]	384,000	[948,148]
1976	10	624,000	[1,022,951]	624,000	[1,022,951]
1980	10	984,000	[1,279,584]	806,400	[1,048,635]
1985	7.5	600,000	[681,044]	600,000	[681,044]
1989	7.5	666,000	[729,463]	666,000	[729,463]
1994	7.5	780,000	[773,810]	780,000	[773,810]
2000	7.125	804,200	[786,888]	804,200	[786,888]
2004	7.125	804,200	[801,795]	804,200	[801,795]

Note: Flat-rate benefits have been applied to beneficiaries with forty-year contributions in the 1965 reform and after, while they were fixed regardless of years of contributions in the 1954 and 1959 reforms. National Pension Insurance started in 1959.

every five years (at least) from the viewpoint of financial balances and their sustainability, so the timing of social security reform is exogenously determined, regardless of economic, demographic, and other conditions.

Until the early 1970s, the main purpose of the major social security reforms had been consistently to raise benefits levels, aiming to improve income levels of elderly persons in line with the rising average standard of living under rapid economic growth. The government had continued to raise the benefit multiplier for the wage-proportional benefit and/or the benefit unit for its flat-rate benefit, and it also introduced wage and price indexation to the benefits in 1973.

However, slower economic growth from the mid-1970s and a rapid and continuous drop in the fertility rate raised concerns about the financial sustainability of social security programs. The 1985 reform was revolutionary in that it incorporated a reduction in the benefit multiplier and flat-rate benefit for the first time, aiming to hold down an increase in total pension benefits. Under rising concerns about demographic pressures, subsequent reforms have continued to seek to improve the financial balances of the programs by reducing the benefit multiplier, scaling down benefit indexations, and extending eligibility ages, as well as raising the premium rate.

Figures 7.1 and 7.2 depict the eligibility ages for EPI benefits: figure 7.1 applies to male beneficiaries and figure 7.2 to female beneficiaries. In the case of male pensioners, the eligibility age for both flat-rate and wage-proportional benefits was raised to sixty in 1973 from the previous fifty-five

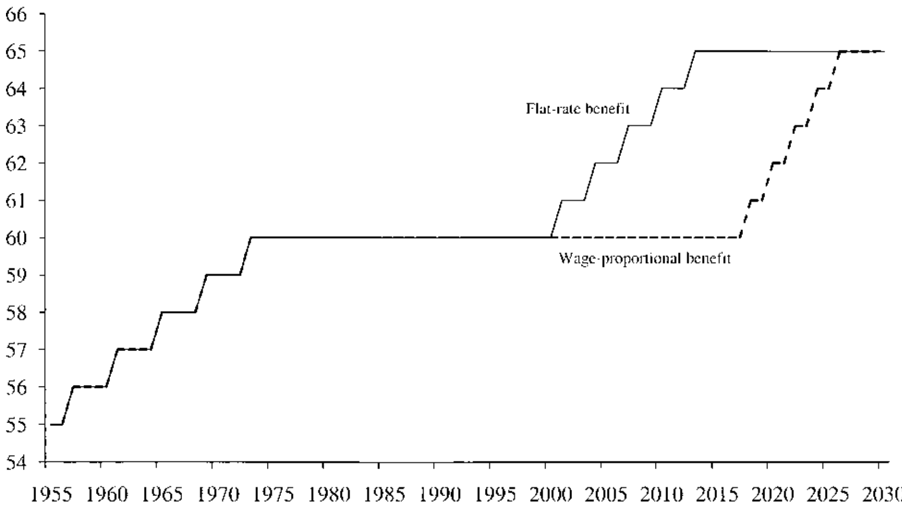

Fig. 7.1 Eligibility ages for EPI benefits: Males

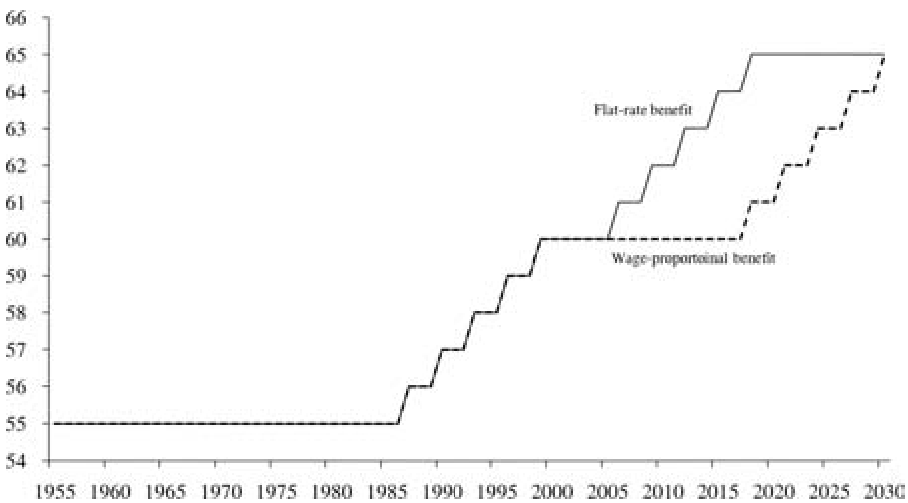

Fig. 7.2 Eligibility ages for EPI benefits: Females

and then stayed there until 2000. Since 2001, the eligibility age for the flat-rate component has been scheduled to increase by one year for every three years to sixty-five in 2013, while the eligibility age for the wage-proportional component will remain at sixty. In addition, the eligibility age for the wage-proportional component is scheduled to rise by one year every three years from 2013, reaching sixty-five in 2025. For female beneficiaries, the eligibility age had been fifty-five until 1985 and then was gradually raised to sixty in 1999 to catch up with men. Their eligibility ages are set to increase, albeit with a five-year lag for men: from 2006 for the flat-rate benefit and from 2018 for the wage-proportional benefit.

In Japan, there has been no eligibility age that is exactly equivalent to a so-called "early retirement" age widely observed in other advanced countries, and there has been no attempt to lower the eligibility age. However, there is a means-tested *Zaishoku* pension scheme for the EPI program, which is applied to those who stay in the labor force after the eligibility age. Some preceding research studies find disincentive effects of this scheme on the willingness of the elderly to work, but its impact on the overall labor force of the elderly remains mixed and is yet to be examined in detail.

7.2.2 Employment Policies for the Elderly

The employment policies for the elderly have been reformed in accordance with social security reforms, especially aiming to expand job opportunities for the elderly whose eligibility ages were extended. For example, the government revised the Employment Measures Law in 1973 to include a declaration clause on raising the mandatory retirement age and to introduce a subsidy paid to employers who extend the mandatory retirement age to sixty. In 1986, the Law Concerning Stabilization of Employment of Older Persons introduced a new endeavor clause on extending the mandatory retirement age to sixty or over and changed it as the obligatory target.

This trend of extending the mandatory retirement age continued. In response to a scheduled rise in the eligibility age for EPI benefits in the 1994 pension reform, the government established a new type of wage subsidy—the Continued Employment Benefit for Older Workers—to compensate for the reduced wages of older workers who continue to be employed after the mandatory retirement age. This wage subsidy is intended to encourage the old to continue working after retiring from their primary jobs rather than extending the mandatory retirement age. The government also revised the Employment Measures Law in 2000 and 2004, which includes an obligatory clause that requires firms to raise the mandatory retirement age to sixty-five or above by 2013 or to completely abolish it.

As a result, the distribution of mandatory retirement ages has been changing substantially over the past decades, as demonstrated in figure 7.3, which is based on the Survey on Employment Management (*Koyo Kanri Chosa*) compiled by the Ministry of Health, Labor, and Welfare (MHLW). The share of firms that had a mandatory retirement scheme was less than 50 percent until around 1980, and a significant portion of those firms set the retirement age at fifty-five. After that, the proportion of firms with mandatory retirement steadily increased to above 90 percent in the mid-1990s. The most dominant retirement age is now sixty, and some firms have started extending it further to sixty-five.[3]

3. It should be noted that this survey covers only firms employing thirty and more workers, and many smaller firms have no mandatory retirement age.

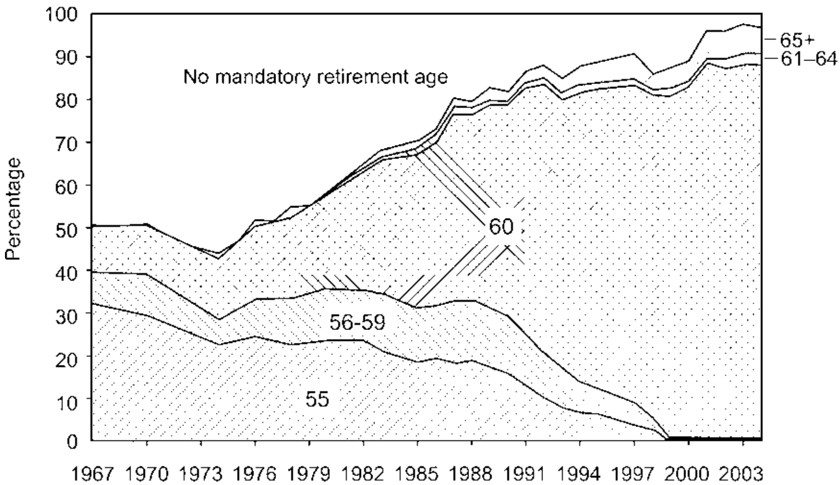

Fig. 7.3 Distribution of mandatory retirement ages set by firms

Source: Surveys on Employment Management, MHLW.

Notes: The "55" category includes a small number of firms with mandatory retirement age of fifty-four and younger. Figures are for firms with thirty or more employees.

7.2.3 Current Issues

As suggested by our brief overview on social security reforms and employment policies for the elderly, there has been virtually no policy intention among Japanese policymakers to link the employment of the old and young. Their main concern has consistently been how to encourage the old to stay longer in the labor market in accordance with a rise in the eligibility age for pension benefits. Contrary to some European countries, which observe active policy debates to use social security provisions to create jobs for the young, there seem to have been virtually no such arguments in Japan, both in the policy arena and in academia. This observation supports the view that changes to social security programs in Japan have not been endogenous with respect to the employment of the young and that any change in specific provisions has not been correlated with job creation for the young.

To be sure, unemployment among the young has been rising sharply since the early 1990s, reflecting the sluggish economy, which made firms more cautious about recruiting new graduates under strong cost-cutting pressures. The unemployment rate for those aged fifteen to twenty-four was around 5 percent in the early 1990s and tracked an upward trend during the decade, reaching 10.3 percent in 2003.[4] Similar to some European countries that suffer from a high unemployment rate among the young, the historically

4. The unemployment rate for those aged fifteen to twenty-four resumed its fall in 2004 but remained at around 8 percent, well above the average during the early 1990s.

high level of unemployment among the young captured a lot of political and social attention in Japan. Indeed, several policy measures have been proposed to increase job opportunities for the young, such as provision of job skills, expansion of temporary workers, and strengthening job matching for the young. However, the deteriorated labor market conditions for the young has not front-loaded social security reforms or induced the government to provide job opportunities through legislative changes on plan provisions.

We speculate that one of the important reasons for the absence of debate in Japan is that employment of the old and that of the young are not substitutes. The Japanese labor market is characterized by the prevalence of a long-term employment practice (called "lifetime employment"). A large volume of previous studies discusses how Japanese firms, especially larger ones, hire new school graduates, and most workers stay with the same firm for decades to gain firm-specific human capital that contributes to the productivity of the firm (see Aoki, Patrick, and Sheard [1994]). Shimizutani and Yokoyama (2009) show that the average years of tenure of Japanese workers became even longer after 1990 under the long recession. These arguments suggest that there is a large productivity gap between young and older workers and thus that they are not substitutes.

7.3 Long-Term Employment Trends

7.3.1 Three Age Groups

This section graphically overviews the long-term trends of employment and unemployment by age bracket in Japan since 1960. We present the employment trends of three age groups in terms of three employment measures (labor force participation [LFP], employment, and unemployment), pooling genders. The data construction and data sources of the main variables in this section are explained in appendix A.

In what follows, to examine if employment of the old "crowds out" employment of younger persons, we define three age groups: "young" (aged twenty to twenty-four), "prime age" (aged twenty-five to fifty-four), and "old" (aged fifty-five to sixty-nine).

- "Young" refers to people aged twenty to twenty-four. Of those graduating from high school, about half continue on to junior colleges and universities (51 percent in 2007). Most students complete undergraduate programs by the age of twenty-four. Unfortunately, there are no official data on the number of people enrolled in schools by age, so we tentatively assume that those who are out of the labor force at ages twenty to twenty-four are in school (colleges, graduate, and vocational schools).
- "Prime age" refers those aged twenty-five to fifty-four. They form the

core of the labor force in Japan. The mandatory retirement age had been fifty-five for 20 percent or more of total employed workers until the mid-1980s (see later).

- "Old" refers to those aged fifty-five to sixty-nine. The mandatory retirement age was extended from fifty-five to sixty in the 1990s and now is in a transition process to sixty-five, although adoption of the mandatory retirement age of sixty-five is optional, and the adoption rate varies by industry and firm size. We should also keep in mind that the mandatory retirement age means the age at which a person leaves his or her "prime work" in Japan. Retired workers are sometimes provided an opportunity to be employed by the same or affiliated firms with lower incomes but flexible working conditions.[5]

7.3.2 Long-Term Trends of Employment and Unemployment

Figure 7.4 presents long-term trends of the LFP of the old, as well as the LFP and unemployment of the young between 1965 and 2005, pooling genders. The LFP and unemployment are expressed as a percentage of the total population for each age group. The figure also shows the dates of key social security reforms with dotted lines for reference, which correspond to those in table 7.1.

We confirm the following facts. First, there is no relationship between the LFP or unemployment of the young and the dates of social security reforms, which have been exogenously determined by laws. This is also the case for the 1985 reform, which was the largest revision to the social security programs in Japan. Second, the LFP of the old and the LFP of the young have been moving in parallel over the medium term, although over the long term, the former shows an upward trend (probably due to extended mandatory retirement ages), and the latter shows a downward trend (probably due to increasing demand for higher educational attainment). Third, we find no clear correlation in the short-term movements of the old LFP and the unemployment of the young, while both of them have long-term upward trends.

Figure 7.5 compares the LFP of the old, the unemployment of the young, and the unemployment of the prime age group. If the LFP of the old and that of the younger age groups are substitutes, the LFP of the old and the unemployment of the younger age groups would have moved in the same directions. To be sure, such movements are observed around 1980 and during the 1990s. During the mid-1960s and the mid-1970s, however, a reduction in the LFP of the old was not accompanied by a fall in the unemployment of

5. Unfortunately, we cannot distinguish changes in the routes to retirement due to a lack of information available from published statistics. OECD (2004) shows that the effective retirement age, which is defined as the average age at which workers aged forty or above retire, is seventy and sixty-six years old for Japanese males and females, respectively, for 1997 to 2002. Shimizutani and Oshio (2009) discuss the transition from prime work to retirement in more detail.

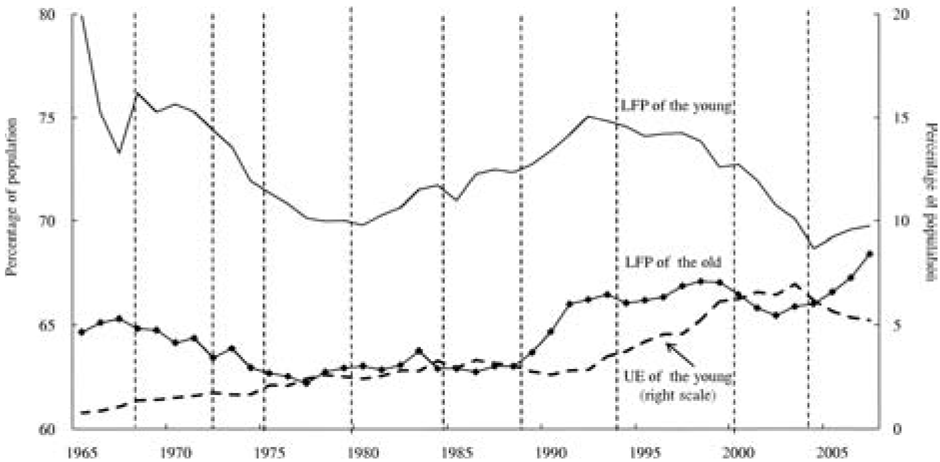

Fig. 7.4 LFP of the old and LFP and unemployment of the young
Note: Dotted lines indicate the dates of key social security reforms.

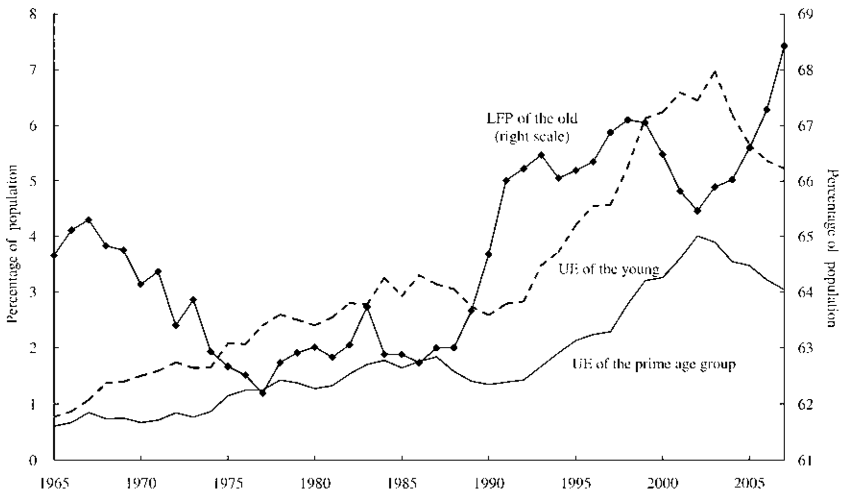

Fig. 7.5 LFP of the old and unemployment of the young and prime age groups

the younger age groups. Moreover, the LFP of the old and unemployment in the younger age groups have been moving clearly in opposite directions since around 2000. Such observations confirm that unemployment in the younger age groups has been uncorrelated with the LFP of the old.

Figure 7.6 compares long-term trends in the LFP of the old, young, and prime age groups. The LFP of the prime age group shows a moderate upward trend, while the LFP curves of the young and old show cyclical

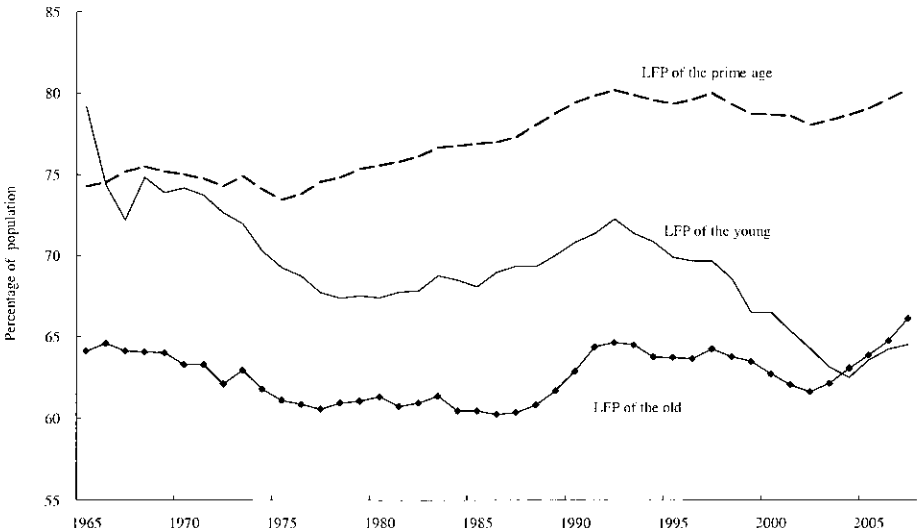

Fig. 7.6 LFP of the old, young, and prime age groups

movements. This fact suggests that employment adjustments by Japanese firms tend to concentrate on employment of the young and old, keeping the core labor force of the prime age group intact against cyclical fluctuations of business conditions.

In all, figures 7.4 to 7.6 do not support the view that jobs for the old crowd out jobs for the young. Rather, employment of the old and employment of the young tend to move in the same direction. This is presumably the main reason why Japanese policymakers have never considered early retirement policies to promote employment of the young.

7.3.4 Ordinary Least Squares (OLS) Regressions for the Direct Relationship

Next, we run several regressions to reveal the direct relationship between the LFP of the old and the employment/unemployment of the younger age groups. There are five dependent variables: unemployment (UE), employment (EMP), and in school (SCH) for the young, and unemployment (UE) and employment (EMP) for the prime age group. The key independent variable is the LFP or employment of the old. When using the LFP of the old in a regression, all labor force variables are measured as a rate of the total population of each age group, and men and women are combined. First, we use only the LFP or employment of the old as an explanatory variable with no controls; then, we add real gross domestic product (GDP) per capita, its growth, and the share of manufacturing in GDP as controls.

We consider four specifications for OLS regressions:

- Regress levels on levels.
- Regress the dependent variables on a three-year lag of elderly LFP or employment.
- Take the five-year differences for all the right- and left-hand-side variables.
- Take the log of all variables, and take five-year differences.

Table 7.2 summarizes the regression results when we take the LFP of the old as the key independent variable. Reported are the estimated coefficients on the LFP of the old. The upper and lower panels present the results with no controls and with controls, respectively. The following facts are noteworthy.

Regarding the unemployment of the young, the results are mixed: three of eight specifications show significant and positive coefficients, while others have all insignificant ones. Mixed results are also observed for un-

Table 7.2 Direct relationship between the elderly LFP and the employment and unemployment of young and prime age persons, men and women combined: 1965 to 2007

	Youth, 20 to 24			Prime age, 25 to 54	
Specification	Unemployment	Employment	School	Unemployment	Employment
		No controls			
Levels	0.638***	–0.406	–0.232	0.353***	0.958***
	(0.128)	(0.318)	(0.215)	(0.074)	(0.134)
Three-year lag on elderly employment	0.535***	–0.178	–0.357	0.313***	0.411***
	(0.150)	(0.343)	(0.224)	(0.085)	(0.203)
Five-year difference	–0.057	0.431	–0.374	–0.054	0.593***
	(0.072)	(0.281)	(0.261)	(0.045)	(0.078)
Five-year log difference	–2.136	0.425	–1.051	–2.254	0.508***
	(1.392)	(0.254)	(0.716)	(1.397)	(0.066)
		With controls			
Levels	0.108	0.887***	–0.996***	0.065	0.336***
	(0.066)	(0.207)	(0.193)	(0.044)	(0.072)
Three-year lag on elderly employment	0.194***	0.656***	–0.850***	0.114***	0.200***
	(0.052)	(0.199)	(0.178)	(0.036)	(0.074)
Five-year difference	–0.017	0.429*	–0.412	–0.026	0.541***
	(0.052)	(0.258)	(0.252)	(0.023)	(0.063)
Five-year log difference	–2.011	0.610**	–1.076	–4.517***	0.540***
	(1.389)	(0.261)	(0.764)	(1.026)	(0.064)

Notes: Reported is the coefficient on elderly LFP. Controls include real GDP per capita, growth in real GDP per capita, and the share of manufacturing in GDP. Levels regression means that we regress levels on levels. Three-year difference means that we regress the dependent variables on a three-year lag of elderly LFP. Five-year difference means that we take five-year differences for the right- and left-hand-side variables. Five-year log difference means that we take the log of each X and Y variable, then take five-year differences.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

employment in the prime age group. In addition to the three specifications, a significant *negative* coefficient is observed in the five-year log difference model. Hence, we cannot obtain definite results on the relationship between the LFP of the old and the unemployment of the younger age groups.

Turning to the employment of the young, we do not find any significant correlation with the LFP of the old if we include no controls. With controls, however, all specifications produce significant and positive coefficients. In the case of the employment of the prime age group, in all specifications, the coefficients are positive and significant, both with and without controls. These results indicate that the LFP of the old and employment of the younger age groups move in the same direction and contradict the view that employment of the old and employment of the younger age groups are substitutes. If we take the in-school rate as a dependent variable, we do not obtain any significant coefficients if we include no controls, but we have significant and negative coefficients in two specifications with controls. This negative correlation could be spurious, because a long-term uptrend of the in-school rate probably reflects a long-term increase of demand for higher education. In fact, there is no significant correlation within the difference specifications.

Table 7.3 reports the estimated coefficients when we replace the LFP of the old with their employment. While the basic picture remains the same as that shown in table 7.2, we find the following facts. First, the UE models tend to have negative and even significant coefficients for both the young and the prime age groups in more cases. This implies little possibility that the LFP of the old caused unemployment in the younger age groups. Second, when we regress the EMP of the young on the LFP of the old, we observe three significant, positive coefficients. These results also support the view that employment of the old and that of the younger age groups tend to move in the same direction.

7.4 Inducements to Retire and Labor Market Outcomes

7.4.1 Incentive Measures: Social Security Wealth (SSW) and Peak Value (PV)

In this section, we investigate the relationship between inducements for the old to exit the labor force and the employment and unemployment of the young. To facilitate this analysis, we construct a simple summary indicator of the inducement of the old to leave the labor force. The indicator should capture key aspects of inducements such as eligibility age, benefit level given eligibility, and change in the benefit if the receipt of benefits is delayed (essentially an actuarial adjustment when retirement is delayed).

The core for constructing the inducement indicator is EPI benefits. Most

Table 7.3 **Direct relationship between the elderly employment and the employment and unemployment of young and prime age persons, men and women combined: 1965 to 2007**

	Youth, 20 to 24			Prime age, 25 to 54	
Specification	Unemployment	Employment	School	Unemployment	Employment
		No controls			
Levels	0.129	0.566	–0.695***	0.069	0.599***
	(0.174)	(0.339)	(0.208)	(0.099)	(0.195)
Three-year lag on	–0.059	0.832***	–0.773***	–0.031	–0.175
elderly employment	(0.162)	(0.298)	(0.181)	(0.092)	(0.199)
Five-year difference	–0.159***	0.519**	–0.360	–0.110***	0.540***
	(0.057)	(0.234)	(0.222)	(0.036)	(0.060)
Five-year log	–3.385***	0.490**	–0.979	–3.813***	0.443***
difference	(1.064)	(0.204)	(0.590)	(1.036)	(0.051)
		With controls			
Levels	0.025	0.778***	–0.803***	0.018	0.275***
	(0.060)	(0.185)	(0.181)	(0.040)	(0.066)
Three-year lag on	0.115**	0.740***	–0.855***	0.053	0.210***
elderly employment	(0.052)	(0.166)	(0.150)	(0.035)	(0.065)
Five-year difference	–0.072	0.435*	–0.362	–0.046**	0.473***
	(0.046)	(0.230)	(0.228)	(0.020)	(0.060)
Five-year log	–2.976***	0.558***	–0.973	–4.566***	0.425***
difference	(1.027)	(0.203)	(0.603)	(0.677)	(0.052)

Notes: Reported is the coefficient on elderly employment. Controls include real GDP per capita, growth in real GDP per capita, and the share of manufacturing in GDP. Levels regression means that we regress levels on levels. Three-year difference means that we regress the dependent variables on a three-year lag of elderly LFP. Five-year difference means that we take five-year differences for the right- and left-hand-side variables. Five-year log difference means that we take the log of each X and Y variable, then take five-year differences.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

NPI members are self-employed, and their retirement decisions are not closely linked to social security benefits; flat-rate NPI benefits are not means tested and adjusted actuarially fairly if claimed at ages other than the normal eligibility age of sixty-five. Moreover, the Mutual Aid Insurance (MAI, *Kyosai Nenkin*) which covers employees in the public sector, has almost the same benefit scheme as the EPI, so we can reasonably treat MAI pensioners as if they were EPI members.[6]

The basic strategy for constructing inducement measures is as follows. First, we construct social security wealth, SSW (see appendix B, which explains in detail how to construct it). If one retires at age a and the eligibility age is a^*, social security benefit received at age a, $B(a)$, is calculated as:

6. Meanwhile, we are forced to ignore the impact of the means-tested *Zaishoku* benefits and wage subsidies on the elderly's decisions to retire due to a lack of data available from official statistics. A more comprehensive analysis, which takes into account multiple benefit schemes, should be an important topic for future research.

$$B(a) = C + k \times \text{CAMI}(a, m) \text{ if } a \geq a^*; = 0 \text{ if } a < a^*,$$

where C is a constant term corresponding to the basic pension benefit, k is a benefit multiplier, and CAMI(a, m) is the career average monthly income at age a and with months of service m. The values of a and m are estimated from published data. Then, (gross) SSW at age a, $W(a)$, is calculated as:

$$W(a) = \sum_{i=a}^{D} \pi(i)B(i),$$

where $\pi(a)$ is a cumulative discount factor that reflects both interest rate (which is assumed to be 3 percent) and mortality (which is available from official statistics). The variable D is the maximum age, which we set at one hundred.

At age a, one can expect social security benefit and SSW if he or she retires at age $a + j$ as

$$B(a + j) = C + k[m \times \text{CAMI}(a, m) + \text{wage}(a + j)]/(m + 12j),$$

$$W(a+j) = \sum_{i=a+j}^{D} \pi(i)B(i),$$

where wage is the projected wage based on cross-sectional data at the year when one is aged a. We then calculate the peak value for each age, PV(a), defined as

$$\text{PV}(a) = \max[W(a), W(a + 1), \ldots, W(D)].$$

That is, PV(a) is the maximum value of SSW, which is obtained by adjusting the timing of retirement. We take into account a change in C and k reflecting each social security reform when calculating SSW and PV. In actual estimations, we choose the cohort born in 1935 as the base cohort and use its fixed earnings trajectories to address possible endogeneity of earnings in response to social security reforms.

7.4.2 Inducement Measure

The next task is to construct the inducement measure utilizing SSW, PV, and labor force participation. Assume that at given age a and year y, SSW per capita, the proportion of people in the labor force, and the number of retirees are given as $W(a, y)$, LFP(a, y), and $P(a, y)$, respectively. Then, averaging $W(a, y)$ over different age groups—specifically, over fifty-five and sixty-nine—we have the annual average SSW, which is denoted by $\overline{W}(y)$, such that

$$(1) \quad \overline{W}(y) = \sum_{a=55}^{69} \left[\frac{P(a,y)}{\sum_{a=55}^{69} P(a,y)} \right] \left[\frac{\sum_{t=0}^{a-55} W(a,y) \times \text{LFP}(a-t, y-t-1)}{\sum_{t=0}^{a-55} \text{LFP}(a-t, y-t-1)} \right],$$

which gauges the overall generosity of social security benefits at each year.

It is reasonable to assume that an individual considers not only the level of SSW by itself but also potential gains from postponing retirement when deciding to continue working or to retire. Hence, we additionally consider $W(a, y) - \mathrm{PV}(a, y)$, which is the difference between the SSW an individual obtains by retiring at age a and the maximum SSW he or she can obtain by postponing retirement from that age. In Japan, the value of $W(a, y) - \mathrm{PV}(a, y)$ is expected to be negative before the eligibility age and zero beyond that. As in the case of SSW, we obtain the annual average of $W(a, y) - \mathrm{PV}(a, y)$:

$$(2)\qquad \overline{[W-\mathrm{PV}]}(y) = \sum_{a=55}^{69}\left[\frac{P(a,y)}{\sum_{a=55}^{69} P(a,y)}\right] \times \left[\frac{\sum_{t=0}^{a-55}[W(a,y)-\mathrm{PV}(a,y)]\times \mathrm{LFP}(a-t,y-t-1)}{\sum_{t=0}^{a-55}\mathrm{LFP}(a-t,y-t-1)}\right].$$

Finally, we combine SSW and its potential gain from postponing retirement to construct the inclusive incentive measure, which is defined as:

$$I(a, y) \equiv W(a, y) + \alpha[W(a, y) - \mathrm{PV}(a, y)],$$

where α is a nonnegative parameter. In addition, averaging $I(a, y)$ over age, we calculate its annual average as

$$(3)\qquad \bar{I}(y) = \overline{W}(y) + \alpha\overline{[W - \mathrm{PV}]}(y).$$

A higher value of SSW itself makes an individual more inclined to retire, but its disincentive effect is partly offset by potential gains from postponing retirement. Putting these two factors together, the inclusive incentive indicator captures the net effect of social security benefits. The value of the weight on $\overline{W-\mathrm{PV}}$, α, should be estimated empirically, as discussed in the next subsection.

It is useful to examine whether annual average incentives are consistent with the expected effects of past reforms. Figure 7.7 depicts the LFP-weighted averages of $\overline{W}$ at 2005 prices for males and females of the 1935 cohort. Because $\overline{W-\mathrm{PV}}$ is almost flat compared to $\overline{W}$, it suffices to look at $\overline{W}$ to capture the long-term trend of the inducement of retire.

The figure shows that the level of $\overline{W}$ continued to rise until the mid-1980s, then started to decline gradually, and has remained roughly stable since the late 1980s. This trend is consistent with the history of social security reforms, which is summarized in table 7.1. Until the mid-1980s, the government had continued to increase the generosity of the programs by increasing

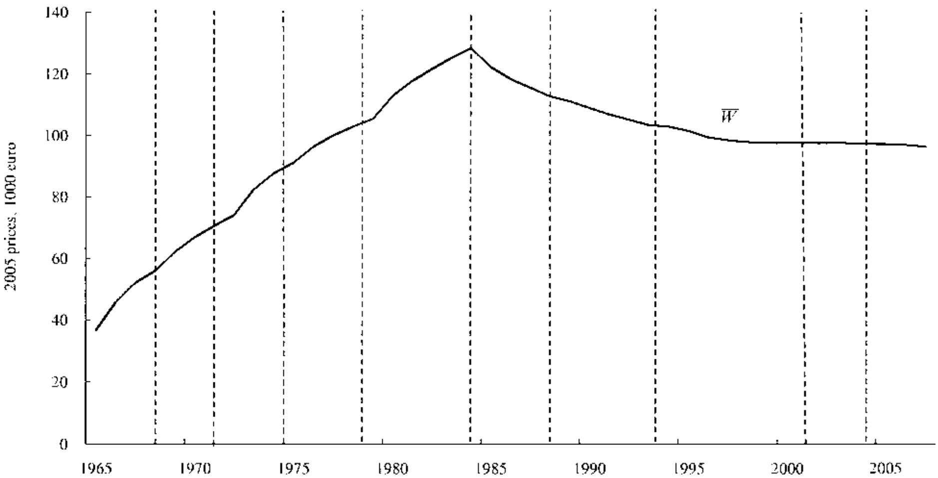

Fig. 7.7 Annual average SSW ($\overline{W}$)

Note: Weighted average of male and female figures. Dotted lines indicate the dates of key social security reforms.

the flat-rate benefit as well as the benefit multiplier for the wage-proportional benefit. The 1985 reform, however, decisively changed the policy direction by reducing the generosity of the benefit formulae. Since the 1985 reform, the government has been raising the flat-rate benefit but subduing the overall generosity of the program by reducing the benefit multiplier, postponing the eligibility age, and reducing the benefit indexation.

7.4.3 Estimation Methodologies

We now move to the relationship between the measure for inducement to retire and the employment and unemployment of younger age groups. Figure 7.8 compares the trends of unemployment and $\overline{W}$. There seems to have been a negative correlation between the two since the late 1980s, but a clear upward trend in the unemployment rate makes it difficult to interpret the relationship. Figure 7.9 replaces unemployment with employment and compares it with $\overline{W}$. We find that until the 1990s, employment of the young and $\overline{W}$ moved in opposite directions, while there seems to be no clear relationship between employment of the prime age group and $\overline{W}$. We have to control other factors that are likely to affect labor market outcomes, however, to precisely capture the impact of the inducement to retire on labor outcomes of the younger age groups.

In addition, we have to estimate the weight on $\overline{W - \text{PV}}$, α, in equation (2). We use two methods. The first method is the iteration procedure. The estimation model here is given by

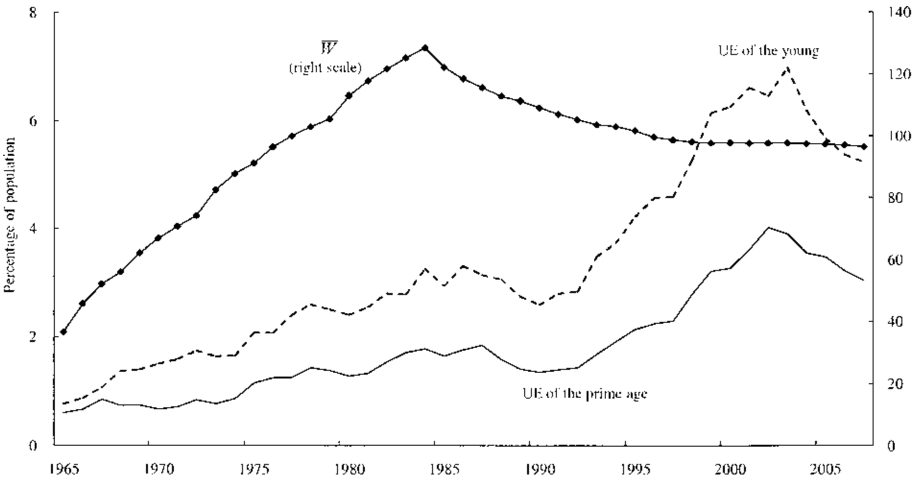

Fig. 7.8 Unemployment of the young and prime age groups and the inducement to retire

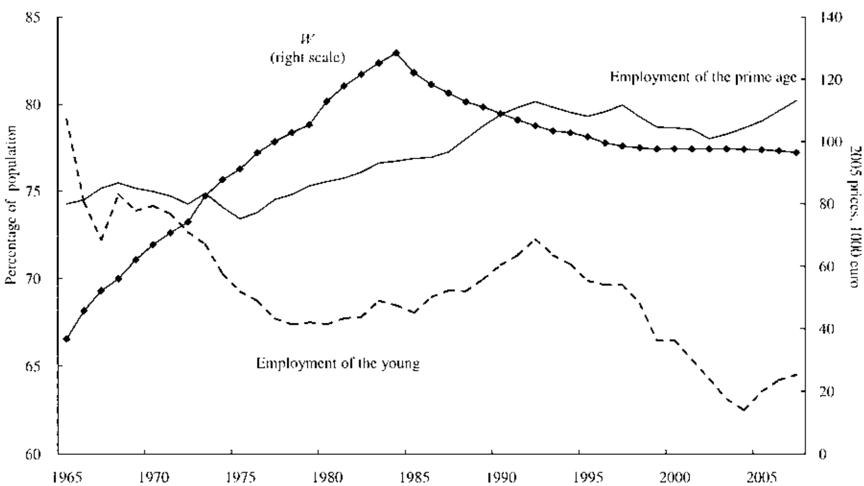

Fig. 7.9 Employment of young and prime age groups and the inducement to retire

$$\text{(4)} \qquad LFP_{OLD}(y) = \delta\bar{I}(y) + X_y\beta + e_y$$
$$= \delta\{\overline{W}(y) + \alpha[\overline{W - PV}](y)\} + X_y\beta + e_y,$$

where X_y is a vector of covariates. We iterate over α with 0.25 intervals, starting at zero, and regress LFP of the old on $\bar{I}$ and on covariates to search the value of α that gives the highest R^2; δ is expected to be negative.

The second is the regression procedure. The estimation model in this case is given by

$$\text{(5)} \qquad \text{LFP}_{\text{OLD}}(y) = \delta_1 \overline{W}(y) + \delta_2[\overline{W - \text{PV}}](y) + X_y\beta + e_y.$$

We regress LFP of the old on $\overline{W}$ and $\overline{W-\text{PV}}$ as well as covariates to estimate coefficients on $\overline{W}$ and $\overline{W-\text{PV}}$ separately—that is, δ_1 and δ_2. Then, we obtain the implied weight, α, by calculating δ_2/δ_1.

After estimating α based on either of these two methods, we regress labor market outcomes on the estimated $\bar{I}$—which is based on either of the two methods—and on the covariates. We conduct these two procedures using not only the levels for all variables in equations (4) and (5) but also their five-year differences, because most of the variables have strong time trends. In all estimation models, we use real GDP per capita, its growth rate, share of manufacturing in GDP, and one-year difference in the share of the elderly of total population. The estimation period is between 1975 and 2007 due to data limitations. As already implied by figures 7.8 and 7.9, regressions based on the levels might lead to a spurious relationship between the inducement measure and labor market outcomes.

7.4.4 Estimation Results

Table 7.4 presents estimation results using the level of each variable. The upper panel summarizes the estimated parameters of $\bar{I}$. The first method obtains 8.75 for the estimated value of α. The second method obtains –0.512 and –4.419 for the estimated values of δ_1 and δ_2, respectively, implying that α is equal to 8.63, which is very close to 8.75. These high estimated values of α suggest that a change in $\overline{W-\text{PV}}$ affects the elderly's retirement decisions much more than a change in $\overline{W}$ per se.[7] This means that the elderly are much more sensitive to potential gains from postponing retirement than to the level of social security wealth obtained by retiring at each age.

The lower panel shows the effects of the inducement to retire on outcomes for the old and the young. We regress the LFP of the old and unemployment, employment, and in-school of the young at the level of estimated $\bar{I}$ (based on estimated α) and covariates. In addition, we consider three cases: (a) using implied $\bar{I}$ weighing from the iteration procedure ($\bar{I} = \overline{W} + 8.75\,[\overline{W-\text{PV}}]$); (b) using implied $\bar{I}$ weighing from the regression procedure ($\bar{I} = \overline{W} + 8.63\,[\overline{W-\text{PV}}]$); and (c) using the estimated regression coefficients directly ($\bar{I} = 0.512\overline{W} + 4.419\,[\overline{W-\text{PV}}]$), which is expected to obtain –1 as the coefficient on $\bar{I}$.

The following findings are noteworthy. First, using the weights on $\overline{W}$

7. Actually, we compare two cases: the first assuming that each individual is completely liquidity constrained so that $W(a, y)$ is treated as zero before the (first) eligibility age and the second assuming that there is no liquidity constraint so that $W(a, y)$ is not treated as zero. We focus on the latter case, which makes a much better fit in the model and obtains reasonable coefficients.

Table 7.4 **Effect of inducement to retire on labor market outcomes (levels): 1975 to 2007**

Estimating the parameters of $\bar{I}$

	γ	α	α/γ	R^2	Implied $\bar{I}$ weighting
(1) Iterating over α with 0.25 intervals and regressing LFP of old on $\bar{I}$ and covariates	1	8.75	8.75	0.9410	$\overline{W} + 8.75(\overline{W - PV})$
(2) Time series regression of LFP of old on $\overline{W}$ and $(\overline{W - PV})$	–0.512***	–4.419**	8.63	0.9410	$-0.512\ \overline{W} - 4.419(\overline{W - PV})$
	(0.158)	(2.113)			or $\overline{W} + 8.63(\overline{W - PV})$

Estimating inducement to retire on outcomes for the old and the young, using $\bar{I}$ and covariates

	$\bar{I}$		
	Coefficient	Standard error	R^2
(1) Using implied $\bar{I}$ weighting from (1) above			
LFP of old	–0.511***	(0.143)	0.9410
Unemployment of young	0.324**	(0.143)	0.9385
Employment of young	0.855*	(0.437)	0.8006
In-school of young	–1.179***	(0.358)	0.7624
(2) Using implied $\bar{I}$ weighting from (2) above $\overline{W} + 8.63(\overline{W - PV})$			
LFP of old	–0.512***	(0.144)	0.9410
Unemployment of young	0.326**	(0.144)	0.9387
Employment of young	0.842*	(0.441)	0.7994
In-school of young	–1.168***	(0.362)	0.7596
(3) Using implied $\bar{I}$ weighting from (2) above $-0.512\ \overline{W} - 4.419(\overline{W - PV})$			
LFP of old	–1.000***	(0.282)	0.9410
Unemployment of young	0.637**	(0.280)	0.9387
Employment of young	1.646*	(0.863)	0.7994
In-school of young	–2.283***	(0.708)	0.7596

Notes: Covariates include real GDP per capita, growth in real GDP per capita, the share of manufacturing in GDP, and the one-year difference in the share of the elderly. All dependent variables are percent rates. Inducement measures are at 2005 prices in million euros.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

and $\overline{W - \text{PV}}$ determined by the iteration procedure (α = 8.75) or by the regression procedure (converted by the ratio translation to 1 and 8.75) yields essentially the same results. This fact is confirmed by comparing the results reported in the first two sections of the lower panel. Second, the implied $\bar{I}$ is very strongly related to the LFP of the old. The coefficient of implied $\bar{I}$ is very significant and stable across specifications, indicating that our measure of the inducement to retire successfully captures the impact on the elderly's decisions on retirement. Third, the coefficients on the implied $\bar{I}$ are significantly positive in the unemployment models. At the same time, however, we obtain positive and significant coefficients in the LFP models, suggesting that these level-on-level regressions capture spurious correlations between the inducement to retire for the elderly and the labor market outcome for the young. Finally, the coefficients on the old LFP in the in-school models are negative and significant, which is difficult to understand.

The estimation results based on five-year differences of all variables, which are summarized in table 7.5, help us to check the robustness of the results based on the levels. We again obtain a relatively high value of α, which is 9.5 in the iteration procedure and 9.51 in the regression procedure. This confirms that the elderly are more sensitive to potential gains from postponing retirement than to social security wealth. Regarding the impact on labor market outcomes, we obtain very significant and negative coefficients on the LFP of the old across models, as reported in table 7.4.

However, all the coefficients in the models of young unemployment, employment, and in-school turn insignificant in sharp contrast to the results reported in table 7.4. There is no coefficient on the inducement measure that is statistically significant except for the LFP of the old. This result indicates that the results from the level-on-level regressions are misleading and that inducements to retire for the elderly do not significantly affect the labor market outcome for the young.

7.5 Conclusion

In this chapter, we examined whether social security programs in Japan induce withdrawal of the elderly from the labor force and create jobs for the young. First, we provided a historical overview of past social security reforms and employment policies for the elderly. Following this overview, we investigated the direct relationship between employment/unemployment of the young and employment of the old. Second, we explored whether social security induces withdrawal of the old from the labor force and creates jobs for the young.

The key messages are summarized as follows. First, our historical overview suggests that young unemployment issues have not motivated social security reforms and that changes in provisions are not endogenous with respect to young employment/unemployment. Second, the employment of the young

Table 7.5 **Effect of inducement to retire on labor market outcomes (five-year differences): 1975 to 2007**

Estimating the parameters of $\bar{I}$

	γ	α	α/γ	R^2	Implied $\bar{I}$ weighting
(1) Iterating over α with 0.25 intervals and regressing LFP of old on $\bar{I}$ and covariates	1	9.5	9.5	0.5956	$\overline{W} + 9.5(\overline{W - PV})$
(2) Time series regression of LFP of old on $\overline{W}$ and $(\overline{W - PV})$	–0.608*** (0.174)	–5.781* (3.241)	9.51	0.5956	$-0.608\overline{W} - 5.781(\overline{W - PV})$ or $\overline{W} + 9.51(\overline{W - PV})$

Estimating inducement to retire on outcomes for the old and the young, using $\bar{I}$ and covariates

	$\bar{I}$		
	Coefficient	Standard error	R^2
(1) Using implied $\bar{I}$ weighting from (1) above			
LFP of old	–0.608***	(0.175)	0.5956
Unemployment of young	0.020	(0.100)	0.7606
Employment of young	0.169	(0.250)	0.7537
In-school of young	–0.189	(0.307)	0.5471
(2) Using implied $\bar{I}$ weighting from (2) above $\overline{W} + 9.51(\overline{W - PV})$			
LFP of old	–0.608***	(0.175)	0.5956
Unemployment of young	0.020	(0.100)	0.7606
Employment of young	0.170	(0.250)	0.7538
In-school of young	–0.190	(0.307)	0.5471
(3) Using implied $\bar{I}$ weighting from (3) above $-0.608\overline{W} - 5.781(\overline{W - PV})$			
LFP of old	–1.000***	(0.288)	0.5956
Unemployment of young	0.033	(0.164)	0.7606
Employment of young	0.280	(0.412)	0.7538
In-school of young	–0.313	(0.505)	0.5471

Notes: Covariates include real GDP per capita, growth in real GDP per capita, the share of manufacturing in GDP, and the one-year difference in the share of the elderly. All dependent variables are percent rates. Inducement measures are at 2005 prices in million euros.

***Significant at the 1 percent level.

*Significant at the 10 percent level.

tends to be positively, not negatively, associated with the LFP of the old. Third, the inducement to retire for the elderly does not significantly affect the labor market outcome for the young. These findings confirm that there is no serious trade-off between the old and the young in the labor force.

Appendix A
Data Description

This appendix summarizes the data construction and data sources for the main variables used in the figures and tables.

Labor Force, Employment, and Unemployment

The data on labor force, employment, and unemployment are available from the Labor Force Survey (*Rodoryoku Chosa*) compiled by the Ministry of Internal Affairs and Communications. This survey has the LFP and other employment data by five-year age brackets. We sum up the figures in published tables to make those data for the young, prime age, and old groups in each year.

GDP Per Capita

The annual GDP data in 2005 constant prices is available from the *Annual Report on National Accounts* (*Kokumin Keizai Keisan Nenpo*) published by the Economic and Social Research Institute, Cabinet Office. The population data for each year are available from the *Annual Report on Population Estimates* (*Jinko Suikei Nenpo*) compiled by the Ministry of Internal Affairs and Communications.

Real Wages (Monthly Salary in Real Terms)

The data on nominal regular monthly wage are taken from the Basic Survey on Wage Structure (*Chingin Kozo Kihon Tokei Chosa*), which is compiled by the Ministry of Health, Labor, and Welfare (MHLW). The survey contains the most comprehensive wage data in Japan and provides tabulations on the average and population weights by (mostly) five-year age brackets. Nominal wage is converted into real terms by the consumer price index.

Appendix B

Construction of Social Security Wealth (SSW)

This appendix provides a detailed description of data used to construct SSW, as well as the limitations of the data and calculations.

Data Descriptions and Sources

Eligibility Ages

First, we define the eligibility ages for receiving pension benefits. Information on eligibility age for each cohort is available from the MHLW. We consider the eligibility ages for both the flat-rate and wage-proportional pension benefits for the Employees' Pension Insurance program. See figures 7.1 and 7.2.

Months of Premium Contributions

Second, we collect the months of premium contributions. The *Annual Report of the Social Insurance Agency* (*Shakai Hoken Cho Jigyo Nenpo*) provides the average months of contributions for the retired who initially claim benefits. For simplicity, we assume that these figures are entirely for those who retired at the eligibility age, because most beneficiaries start to receive benefits at the eligibility age. Indeed, 79.3 percent of EPI beneficiaries initially claimed their benefit at age sixty (which was the first eligibility age) in 2005, according to the latest annual report.

There were no data before 1988 except averages of pooled genders for 1981 to 1985 and for 1971 (from the *Annual Report on Health and Welfare* published by the MHLW). Hence, we first interpolate data for pooled genders for 1986 and 1987 using the figures in 1985 and 1988. Second, we interpolate data for 1972 to 1980 and for 1960 to 1970 using the trend after 1971. Third, we estimate the data for males and females using information on the proportion of those for males to the total for 1988 to 1992 and then calculate the corresponding figures for females.

Career Average Monthly Income (CAMI)

Third, we compute the career average monthly income (CAMI) for males and females. The data are available from the *Annual Report of the Social Insurance Agency*. Similar to the months of contributions, there were no data before 1988 except averages of pooled genders for 1981 to 1985. Because the proportion of the CAMI for workers before retirement to that for those who began to receive pension benefits was stable, we estimate the CAMI for retirees for 1960 to 1980 by multiplying the CAMI for workers (taken from the annual report) by the proportion between the two for the 1988 to 1993 period for males and females.

Pension Benefit Formula and Insurance Premiums

The "Recalculation of Fiscal Conditions" provides a formula to compute benefit levels. We assume that each change in the formula is effective in the following calendar year and that the insurance premium rate is common for all generations in a given year. See table 7.1.

Wage Rates for the Old

We calculate wage rates (excluding bonus payments) for those aged fifty-five to sixty-nine in each age bracket by gender in each year. *The Basic Survey on Wage Structure* contains monthly nominal regular wages for five-year age brackets by gender but not a more disaggregated level for those aged sixty-five and over. To estimate the average wage for each age, we assume that (a) the regular wages for each age between fifty-five and fifty-nine is identical to the average of the age bracket; (b) the average for age sixty is equal to the average for the sixty to sixty-four bracket; and (c) the average for those aged sixty-eight and over is equal to the average for the sixty-five and over bracket. We obtain data for those aged sixty-one to sixty-seven from a linear interpolation using data on those aged sixty and sixty-eight. Further, we assume that nominal wage for each age corresponds to that paid one year from birthday, because most of the elderly are in the secondary labor market.

Mortality Rates

The mortality rate by each age and gender has been available annually since 1996 from the MHLW. Before 1996, published data were available for five-year age brackets only. We interpolate the death rate for each age using the age pattern in 1996. We assume that all persons die at age one hundred.

Computation of SSW

We next compute SSW by following the steps below. Unfortunately, we cannot create the incentive measure separately by marital status or deciles of earnings distribution due to data limitations. Moreover, we cannot consider the weight for each route to retirement due to data availability.

Estimation of Wages Received When Not Retired

We use the *Basic Survey on Wage Structure* to construct data on the monthly regular wages for each age fifty-five to eighty in a given year (ignoring bonus payments). We estimate earnings trajectories for the cohort born in 1935 and apply their earnings trajectories to other cohorts.

Estimation of Pension Benefits

We obtain the average months of contributions and the average CAMI in a given year for those who reach the eligible age in each year from the

Annual Report of the Social Insurance Agency. Hence, it is straightforward to estimate pension benefits if they start to receive them at the eligible age. Otherwise, we recalculate the months of contributions (for example, if a person extends a year to receive benefits, we add twelve months to months of contributions) and the CAMI (based on estimated wages; see the preceding subsection to obtain the pension benefits for each retired age.

Discount Rates

We compute cumulative discount rates based on the mortality and the interest rates. First, we calculate the probability of survival after fifty-five for each age by (1 – mortality rate) in a given year (assuming that the person survives at fifty-five) for males and females using data on the mortality rate for each age bracket in a given year. Second, we add a 3 percent interest rate to this probability of survival to obtain the aggregate discount rates.

Social Security Wealth (SSW)

Assuming that all pensioners continue to receive the same benefit as that initially claimed at retirement until age one hundred, we compute the gross SSW by multiplying benefits and cumulative discount rates obtained from the preceding subsection. No one is entitled to receive any benefits before the eligibility age. To compute net SSW, we consider insurance premiums to be paid during work until age sixty-five. The current value of premiums is calculated by multiplying monthly regular wages by half of the premium rate and discounted by the discount factor. We then compute the cumulative amount of present value of the premiums until retirement.

References

Aoki, M., H. Patrick, and P. Sheard. 1994. The Japanese main bank system: An introductory overview. In *The Japanese main bank system: Its relevance for developing and transforming economies,* ed. M. Aoki and H. Patrick, 3–51. Oxford: Clarendon Press.

Komamura, K. 2007. The 2004 pension reform and the impact of rapid aging in Japan. *Japanese Journal of Social Security Policy* 6 (1): 144–56.

National Institute of Population and Social Security Research. Selected demographic indicators for Japan. Available at: http://www.ipss.go.jp/index-e.html.

Organization for Economic Cooperation and Development (OECD). 2004. *Ageing and employment policies: Japan.* Paris: OECD.

Shimizutani, S., and T. Oshio. 2009. New evidence on initial transition from career job to retirement in Japan. Institute of Economic Research working paper, 430. Tokyo: Institute of Economic Research, Hitotsubashi University.

Shimizutani, S., and I. Yokoyama. 2009. Has Japan's long-term employment practice survived? New evidence emerging since the 1990s. *Industrial and Labor Relations Review* 62 (3): art. 3.