Appendix Table 2 Seasonality of Household Head Income and Consumption: With Control Group, FY1991-FY2001 vs. FY2002

		Household Head Income		Total Consumption		Consumption Excluding Durables		Durable Consumption		Semi-Durable Consumption		Non-Durable Consumption		Service Consumption	
January	a1	-1.176	(0.003) ***	-0.280	(0.007) ***	-0.262	(0.006) ***	-0.382	(0.078) ***	-0.493	(0.020) ***	-0.301	(0.004) ***	-0.153	(0.011) ***
February	a2	0.001	(0.003)	-0.068	(0.007) ***	-0.062	(0.006) ***	-0.001	(0.100)	-0.347	(0.021) ***	0.006	(0.004)	-0.091	(0.011) ***
March	a3	0.010	(0.003) ***	0.132	(0.008) ***	0.121	(0.007) ***	0.074	(0.104)	0.362	(0.023) ***	0.075	(0.005) ***	0.116	(0.012) ***
April	a4	0.007	(0.003) **	-0.055	(0.009) ***	-0.044	(0.008) ***	-0.058	(0.108)	-0.090	(0.025) ***	-0.067	(0.005) ***	0.014	(0.013)
May	a5	0.004	(0.004)	-0.024	(0.009) ***	-0.019	(0.008) **	-0.204	(0.118) *	-0.037	(0.026)	0.012	(0.005) **	-0.022	(0.014)
June	a6	1.180	(0.004) ***	0.017	(0.010) *	-0.006	(0.009)	0.417	(0.123) ***	0.156	(0.028) ***	-0.042	(0.006) ***	-0.042	(0.015) ***
July	a7	-1.166	(0.004) ***	0.045	(0.010) ***	0.048	(0.009) ***	0.000	(0.113)	0.026	(0.028)	0.037	(0.006) ***	0.068	(0.015) ***
August	a8	0.005	(0.004)	-0.100	(0.011) ***	-0.077	(0.009) ***	-0.368	(0.126) ***	-0.503	(0.030) ***	-0.039	(0.006) ***	-0.014	(0.016)
September	a9	0.003	(0.004)	-0.069	(0.010) ***	-0.073	(0.008) ***	0.075	(0.122)	-0.102	(0.027) ***	-0.049	(0.006) ***	-0.112	(0.015) ***
October	a10	0.008	(0.004) **	0.035	(0.009) ***	0.038	(0.008) ***	-0.051	(0.113)	0.267	(0.025) ***	0.009	(0.005) *	0.017	(0.014)
November	a11	-0.007	(0.003) **	-0.014	(0.008) *	-0.017	(0.007) **	0.129	(0.104)	-0.009	(0.023)	-0.026	(0.005) ***	-0.017	(0.013)
December	a12	1.175	(0.003) ***	0.273	(0.008) ***	0.256	(0.007) ***	0.465	(0.087) ***	0.548	(0.022) ***	0.294	(0.005) ***	0.118	(0.012) ***
January x Public	b1	-0.009	(0.004) **	-0.042	(0.011) ***	-0.039	(0.010) ***	-0.008	(0.122)	0.015	(0.032)	-0.027	(0.007) ***	-0.061	(0.017) ***
February x Public	b2	0.009	(0.005) *	0.007	(0.012)	0.002	(0.011)	0.024	(0.161)	-0.025	(0.034)	0.000	(0.007)	0.023	(0.019)
March x Public	b3	0.364	(0.005) ***	0.067	(0.013) ***	0.068	(0.011) ***	0.268	(0.162) *	0.143	(0.037) ***	0.023	(0.008) ***	0.088	(0.020) ***
April x Public	b4	-0.380	(0.005) ***	-0.035	(0.014) **	-0.031	(0.012) **	-0.291	(0.164) *	-0.037	(0.039)	0.007	(0.008)	-0.065	(0.021) ***
May x Public	b5	-0.008	(0.006)	-0.014	(0.014)	-0.019	(0.012)	0.297	(0.175) *	-0.018	(0.040)	-0.011	(0.008)	-0.031	(0.022)
June x Public	b6	-0.070	(0.006) ***	-0.034	(0.014) **	-0.019	(0.013)	-0.169	(0.179)	-0.165	(0.041) ***	-0.003	(0.009)	0.012	(0.022)
July x Public	b7	0.069	(0.006) ***	0.097	(0.014) ***	0.076	(0.012) ***	0.253	(0.162)	0.209	(0.040) ***	0.034	(0.008) ***	0.062	(0.022) ***
August x Public	b8	0.032	(0.006) ***	-0.006	(0.016)	-0.001	(0.014)	-0.066	(0.179)	0.063	(0.044)	0.015	(0.009)	-0.029	(0.024)
September x Public	b9	-0.042	(0.006) ***	-0.043	(0.014) ***	-0.035	(0.013) ***	0.076	(0.177)	-0.013	(0.041)	-0.018	(0.008) **	-0.049	(0.022) **
October x Public	b10	0.028	(0.005) ***	-0.001	(0.014)	0.001	(0.012)	0.185	(0.177)	-0.048	(0.038)	-0.004	(0.008)	0.026	(0.021)
November x Public	b11	0.003	(0.005)	0.003	(0.013)	-0.001	(0.012)	0.112	(0.167)	0.063	(0.038) *	0.008	(0.008)	-0.006	(0.020)
December x Public	b12	0.031	(0.005) ***	0.057	(0.013) ***	0.052	(0.012) ***	0.103	(0.138)	0.031	(0.037)	0.027	(0.008) ***	0.070	(0.020) ***
January x FY2002	c1	0.115	(0.011) ***	0.117	(0.028) ***	0.110	(0.024) ***	0.112	(0.277)	0.123	(0.078)	0.082	(0.016) ***	0.069	(0.043)
February x FY2002	c2	0.001	(0.012)	-0.028	(0.029)	-0.030	(0.026)	-0.241	(0.345)	-0.006	(0.083)	-0.051	(0.017) ***	-0.002	(0.045)
March x FY2002	c3	0.004	(0.012)	0.001	(0.031)	0.008	(0.027)	-0.588	(0.361)	0.000	(0.089)	0.015	(0.018)	0.004	(0.048)
April x FY2002	c4	0.012	(0.015)	0.054	(0.037)	0.069	(0.032) **	-0.269	(0.381)	0.096	(0.105)	0.012	(0.022)	0.098	(0.056) *
May x FY2002	c5	-0.021	(0.015)	0.006	(0.037)	0.014	(0.033)	-0.056	(0.473)	-0.103	(0.105)	0.037	(0.022) *	0.019	(0.057)
June x FY2002	c6	-0.086	(0.015) ***	-0.025	(0.039)	0.016	(0.034)	-0.834	(0.482) *	-0.102	(0.109)	0.040	(0.023) *	-0.023	(0.059)
July x FY2002	c7	0.089	(0.015) ***	0.037	(0.037)	0.015	(0.033)	0.157	(0.419)	0.069	(0.104)	-0.035	(0.022)	0.064	(0.057)
August x FY2002	c8	0.006	(0.016)	-0.027	(0.041)	0.003	(0.036)	-0.199	(0.418)	0.053	(0.117)	-0.011	(0.025)	-0.033	(0.064)
September x FY2002	c9	-0.016	(0.015)	-0.034	(0.037)	-0.036	(0.033)	-0.140	(0.417)	0.065	(0.106)	-0.024	(0.022)	-0.059	(0.058)
October x FY2002	c10	0.009	(0.014)	-0.005	(0.036)	-0.003	(0.031)	0.032	(0.431)	0.000	(0.101)	0.024	(0.021)	-0.005	(0.055)
November x FY2002	c11	-0.009	(0.013)	0.007	(0.033)	-0.017	(0.029)	-0.695	(0.372) *	-0.047	(0.093)	0.016	(0.019)	-0.027	(0.050)
December x FY2002	c12	-0.098	(0.012) ***	-0.046	(0.031)	-0.043	(0.027)	0.586	(0.281) **	-0.074	(0.087)	-0.025	(0.018)	0.016	(0.048)

January x Public x FY2002	d1	0.001	(0.019)		0.053	(0.049)		0.035	(0.043)		0.256	(0.508)		0.122	(0.139)		0.010	(0.029)		0.082	(0.075)	
February x Public x FY2002	d2	-0.001	(0.020)		-0.022	(0.051)		-0.015	(0.045)		-0.180	(0.600)		-0.085	(0.147)		-0.006	(0.030)		-0.041	(0.079)	
March x Public x FY2002	d3	-0.188	(0.022)	***	-0.053	(0.056)		0.014	(0.049)		0.589	(0.625)		0.037	(0.160)		0.031	(0.033)		-0.042	(0.086)	
April x Public x FY2002	d4	-0.029	(0.022)		-0.074	(0.056)		-0.087	(0.049)	*	0.971	(0.569)	*	-0.217	(0.158)		-0.039	(0.033)		-0.077	(0.086)	
May x Public x FY2002	d5	0.017	(0.022)		-0.031	(0.055)		-0.012	(0.048)		-0.273	(0.647)		0.062	(0.156)		-0.010	(0.033)		-0.024	(0.084)	
June x Public x FY2002	d6	0.020	(0.022)		0.067	(0.055)		0.029	(0.048)		0.746	(0.654)		0.294	(0.156)	*	-0.009	(0.033)		0.074	(0.084)	
July x Public x FY2002	d7	-0.049	(0.021)	**	-0.094	(0.052)	*	-0.080	(0.046)	*	-0.067	(0.554)		-0.169	(0.148)		-0.040	(0.031)		-0.099	(0.080)	
August x Public x fy2002	d8	-0.054	(0.023)	**	0.111	(0.058)	*	0.097	(0.051)	*	0.276	(0.572)		-0.001	(0.165)		0.081	(0.034)	**	0.135	(0.089)	
September x Public x FY2002	d9	0.060	(0.021)	***	0.036	(0.054)		0.048	(0.047)		0.086	(0.632)		-0.045	(0.152)		-0.001	(0.032)		0.108	(0.083)	
October x Public x FY2002	d10	0.018	(0.021)		-0.032	(0.052)		-0.025	(0.046)		-0.278	(0.678)		-0.138	(0.148)		-0.081	(0.031)	***	0.008	(0.080)	
November x Public x FY2002	d11	-0.027	(0.021)		0.100	(0.053)	*	0.072	(0.046)		1.365	(0.604)	**	0.245	(0.149)	*	0.018	(0.031)		0.096	(0.081)	
December x Public x FY2002	d12	-0.050	(0.021)	**	-0.138	(0.054)	**	-0.103	(0.047)	**	-1.693	(0.508)	***	-0.293	(0.153)	*	-0.025	(0.032)		-0.201	(0.083)	**
F test: ai=0 for all i		43780.1		***	297.9		***	334.4		***	6.8		***	192.1		***	873.0		***	47.7		***
F test: bi=0 for all i		867.6		***	10.9		***	10.7		***	1.2			5.6		***	5.4		***	6.2		***
F test: ci=0 for all i		20.7		***	2.2		**	2.6		***	1.3			0.6			4.0		***	0.7		
F test: di=0 for all i		8.5		***	2.0		**	1.6		*	1.9		**	1.3			1.5			1.3		
Adj. R-squared		0.941			0.107			0.118			0.013			0.066			0.240			0.023		
Root MSE		0.174			0.438			0.386			2.423			1.236			0.260			0.674		
Number of observations		57914			57914			57912			12294			56980			57914			57903		

3 . "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

1. Introduction

The current speed of aging in Japan is unprecedented and far more rapid than in other developed countries. The proportion of the old defined as those aged 65 and over was 4.9 percent of the total population in 1950, increased to 12.5 percent in 1990 and further enhanced to 20.2 percent in 2005, implying that a one-fifth of the population is currently occupied by the old (National Institute of Population and Social Security Research (NIPSSR), 2007)[1]. The population aging is expected to continue in the future and even accelerate. According to the latest population projection released by the NIPSSR in December 2006, the share of those aged 65 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, which called for a rise in the eligibility ages, a reduction in benefit levels, as well as a rise in the contribution rates, since the mid 1980s. The latest reform in 2004 has extended the eligibility age to 65 by 2025 and established the automatic adjustment of benefit levels to demographic and macro-economic factors, to cope with the expected increase in benefits and deteriorating fiscal balances.

However, an interesting question is how and to what extent social security programs affect the labor market outcomes for the non-elderly: Do they provide jobs

[1] The United Nations defines a society where people aged 65 and above account for more than seven percent as an aging one, and a society where this age group shares more than fourteen percent as an aged one. It took only twenty-four years for Japan to move from an aging society to aged one, while it took more than fifty years in most Western countries.

for the young by encouraging the old to exit from the labor market? Does a rise in the eligibility age make the old stay longer in work place and crowd out the young? In addressing these issues, we have to keep in mind a possibility of endogeneity of changes in social security programs with respect to the employment or unemployment of the young. If they are endogenous, we cannot simply use social security provisions as instruments for the employment of the old.

This paper aims to examine whether social security programs induce withdrawal of the elderly from the labor force and create jobs for the young in Japan, explicitly considering the possible endogeneity of the changes in social security programs. Our discussions proceed as follows. Section **2** provides a historical overview of social security reforms and the employment policies toward the elderly. Section **3** presents the long-term employment/unemployment trend for both the old and the young. Section **4** performs regression analysis to examine the direct relationship between the employment of the young and that of the old. Section **5** examines whether changes in social security programs are associated with employment of the young or the old using the measures of the inducement to retire. Section **6** concludes. The two appendices provide detailed description of the data construction and sources of the main variables used in this study.

2. Background

2.1 Social security reforms

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

Table 1 overviews the directions of the past social security reforms in terms of benefits of the Employees Pension Insurance (EPI), which is the main body of the

public pension scheme in Japan.[2] The Employees Pension Insurance Law requires EPI programs to be reviewed every (at least) five years from the viewpoint of financial balances and their sustainability, so the timing of 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 the level of benefits, aiming to improve income levels of the elderly in line with a rise in the average standard of living under the rapid economic growth. The government had kept raising the benefit multiplier for the earnings-related component and/or the benefit unit for its flat-rate component, and it also introduced wage and price indexation to the benefits in 1973 to adjust for higher inflation caused by the oil crisis.

However, a reduction in the pace of economic growth after 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 incorporated a reduction in the benefit multiplier for the first time, aiming to hold down an increase in total pension benefits. Under rising concerns about demographic pressures, the subsequent reforms have kept seeking to improve financial balances of the programs by reducing the benefit multiplier, scaling down indexations, extending the eligibility ages as well as raising the premium rate.

To our knowledge, social security reforms have never intended to encourage labor force participation of the young or to reduce their unemployment, which had been quite low by international standards at least until the early 1990s. To be sure, the unemployment of the young has been rising sharply since the early 1990s reflecting the weak economy, which made firms more cautious in recruiting new graduates under strong cost-cutting pressures. However, the deteriorated labor market conditions for the young has not front-load social security reforms (see **Figure 1**) or induce the government to provide job opportunities via legislative changes on plan provisions.

Instead, the government has consistently tried to encourage the old to stay longer

[2] See Komamura (2007) for more detail.

in the labor force. In fact, even before demographic pressures on social security programs were widely concerned, the government started to extend the eligibility age, while it kept raising the benefit levels to raise the average standard of living of the old (**Figure 2**). The 1954 Pension Reform called for a gradual increase in the eligibility age for EPI from 55 to 60 by 1973 for males. The government kept the eligibility at 60 for long since then, but it resumed raising it in the 1994 Reform in the face of a rapid pace of aging and declining fertility. Under the current scheme after the 2004 Pension Reform, the eligibility age is scheduled to 65 by 2025. In addition, the recent pension reforms have gradually reduced the disincentives of means-tested (*Zaishoku*) pension benefit for working.

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 guarantee job opportunities for the elderly whose eligibility ages were extended. For example, the government revised the Employment Measures Law in 1973, to include the declaration clause on a rise in the mandatory retirement ages and to introduce the subsidy paid to employers who extended the mandatory retirement age to 60. In 1986, the Law Concerning Stabilization of Employment of Older Persons introduced the new endeavor clause on the mandatory retirement age at or over 60, and revised Law upgraded it to the obligatory one.

This trend of extending the mandatory retirement age continued further. 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, Continued Employment Benefit for Older Workers, to compensate the reduced wages of older workers who were continued to be employed after the mandatory retirement age. The government also revised the Employment Measures Law in 2000 and 2004.The current Law includes the obligatory clause which requires firms to introduce continued employment scheme, to raise the mandatory retirement age to 65 or above by 2013, or to abolish it.

As a result, the distribution of mandatory retirement ages has been changing substantially over the past decades as demonstrated in **Figure 3**, which is based on the "Survey on Employment Management" (*Koyo Kanri Chosa*) complied by the Ministry of Health, Labour and Welfare (MHLW). The share of the firms which had the mandatory retirement scheme was less than 50 percent until around 1980 and a significant portion of those firms set the retirement age at 55. After that, the proportion of the firms with mandatory retirement steadily increased to above 90 percent in the mid 1990s. The most dominant retirement age is now 60, and there are signs that some firms have started extending it further to 65[3].

2.3 Current issues

As suggested by our brief overview about social security reforms and employment policies for the elderly, there has been virtually no policy intention in the Japanese policymakers to link the old employment and young employment. 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 youth, there seems to have been virtually no such arguments in Japan both in policy arena and in academics. This observation supports the view that changes in social security programs in Japan have not been endogenous with respect to the youth employment and that any change in specific provisions has not been correlated with job creation for the young.

We should keep in mind that this is also the case even after the 1990s when the unemployment rate for the youth increased under the decade-long severe recession, especially for those who initially enter the labor market after graduating schools. The unemployment rate for those aged 15-24 was around five percent in the early 1990s and has tracked an upward trend during the decade, reaching 10.3 percent in 2003. Similar to some European countries which suffer from a high unemployment rate for

[3] It should be noted that this Survey covers only firms which employ thirty and more workers, and many firms of smaller size have no mandatory retirement age.

the young, the historically high level of unemployment of the young caught much political and social attention in Japan. Indeed, several policy measures have been proposed to increase job opportunities for the young, like provision of job skills, expansion of temporary workers, strengthening job matching for the young. As far as we know, however, there has been virtually no argument to explicitly and directly link early retirement of the old to job creation for the young.

One of the important reasons for the absence of the debate in Japan, we speculate, is that the employment of the old and that of the young are not substitutes. The main characteristic of the Japanese labor market is a long-term employment (called "lifetime employment"). A large volume of previous studies discuss that Japanese firms hire new school graduates and that most of workers stay in the same firm for decades to gain firm-specific, rather than general, human capital to contribute productivity of the firm (see Hashimoto and Raisian, 1985, and Aoki, Patrick and Sheard, 1994). Shimizutani and Yokoyama (2006) show that the years of tenure for Japanese workers have become even longer than before around 2000 after the long recession. If those arguments properly describe what is taking place in the Japanese labor market, it is natural to assume that there is a large productivity gap between young and older workers and that thus they are not substitutes.

3. Long-term employment trends and social security reforms

3.1 Three age groups

This section graphically overviews a long-term employment/unemployment trend by age brackets and major social security reforms in Japan since 1960. We present the employment trends of three different age groups in terms of three different employment measures (labor force participation, employment and unemployment), without separating genders[4]. The data construction and data sources of the main variables in this section are explained in **Appendix 1**.

[4] Unfortunately, however, we cannot distinguish the changes in the routes to retirement, because the information is not fully available from published statistics.

In what follows, to consider potential "crowd-out" by employment of elderly persons, we define three age groups; youth ("in school" as a variant of the youth), "prime age" and "old." The first group, the "youth," includes those whose ages correspond to the earliest and the latest typical entries to the labor market. We define the range of ages for the youth as 15-24: the bottom age corresponds to graduation from the junior high schools and the top age to completion of undergraduate programs in most cases. Another reason to choose this age range is the data availability. Most of the official statistics for a long-term series in Japan reports employment data by five-year age brackets starting age 15-19 and do not provide any information by other age brackets. In addition, we form another group for those who are 15-24 years old and in education as "in school" to separate them from the youth to cancel out the impact of higher educational attainment on labor force participation.

The second group, "prime age," is defined as those who are 25-54 years old, given that the mandatory retirement age had been 55 for 20 percent or more of total employed workers until the mid 1980s (see Figure 3). This group captures workers who consist of the core of labor force in Japan.

The third group, "old," consists of those who are 55-69 years old. We should pick up the top and the bottom ages for the old so that employment within the old has the most "power" over time and capture the trend in the labor force participation for a longer period. We set the bottom age at 55. The main reason is, as stated, that the mandatory retirement age was in most cases 55 before the 1980s. Because the mandatory retirement age has been extended to 60 after the 1980s and now is in a transition process to 65—although the extension is not obligatory and the pace of transition depends on types of firm and industry—we show that there is a large variation in the labor force participation for those in the second half of 50s, which consists of the bottom range of the old.

At the same time, we set age 69 as the top age for this group. As stated, the prevailing retirement age is now 60 and is extending to 65 by 2013 for larger firms. We should also keep in mind that the mandatory retirement age is the age to leave a "prime work." In Japan, retired workers are sometimes provided an opportunity to be

employed in the same or affiliated firms with lower income but flexible working conditions[5]. In addition, most official surveys provide no employment data by five-year age brackets regarding those aged 70 and above. Therefore, we set the top age for the old as 69 and see a large variation in the labor force participation for those workers who are in the second half of 60s.

3.2 Long-term trends of employment and unemployment

Figure 4 reports a long-term trend of the labor force participation (LFP) of the old and unemployment for the youth and the prime age groups between 1960 and 2005 based on both genders combined. First, we observe a clear upward trend in the LFP of the old. Moreover, the speed of its increase has become faster since the 1980s, particularly in the second half of the 1980s under the "bubble" economy. The trend has two stagnant points at the beginning and the end of the 1990s, probably because of the start of the recession and the severe economic turndown caused by financial crisis. A rise of the LFP of the old accelerated after 2000, mainly reflecting the entry of the baby-boomers into this age group as well as the economic recovery. In the long run, a rise in the LFP of the old has been associated with the extension of mandatory retirement ages (see Figure 1), while it has been affected by economic fluctuations in the short run.

Figure 4 also shows that the unemployment of each of the young groups has been on a rising trend over the past few decades. At a glance, it seems that employment of the old has been associated with job losses of the younger groups over the long period. Looking the trends closely, however, we recognize the following two facts. First, a rise in the unemployment of the younger groups has been quite modest than a rise in the LFP of the old. Second, a *rise* in the LFP of the old and a *decline* in the unemployment of the younger groups (especially of the prime age) occurred simultaneously in the late 1980s and after 2000. Hence, it is natural to conclude that the unemployment of the young has been uncorrelated with the LFP of the old.

[5] Indeed, OECD (2004) shows that the effective retirement age, which is defined as the average age at which workers aged 40 or above retire, is 70 and 66 years old for Japanese males and females, respectively, for 1997-2002.

Finally, the trend of the unemployment of the youth, our main interest, is similar to that of the prime age. In the long-run, it has been on a rising trend but the rise is much more modest with little year to year variation. The unemployment of the youth began to rise slightly after the mid 1970s accompanied with the economic turndown. It declined once in the second half of the 1980s and it rose again after the 1990s under a long recession, reaching at a high level in the end of the decade. However, it declined after the severe recession starting the late 1990s.

Figure 5 depicts a long-term trend in the LFP of the old and the employment of the youth and the prime age groups between 1960 and 2005. The LFP of the old and the employment of the prime age have been both on an upward trend since the 1960s, although the employment of the prime age peaked around 2000. In contrast, the employment of the youth has been on a moderate downward trend, with two modest peaks at around the early 1970s and the early 1990. This reflects a secular fall in fertility, higher educational attainments as well as two peaks of entry into the labor force by the first and second baby-boomers, who were born in around 1947-1949 and 1971-74, respectively. However, it should be noted that about half of an increase in the LFP of the old has been offset by a decrease in the employment of the young over the past forty-five years. This fast implies a negative correlation between the young employment and old employment in the long run, even if the causality remains yet to be cleared.

3.3 Inducement to retire and employment

We now move to the relationship between the measure of inducement to retire and the unemployment/employment of the youth/prime age groups. We will explain the construction of the inducement measure in section 3, but we emphasize here that the measure captures the change in program eligibility ages as well as changes in benefit levels and the idea of the peak value[6]. Conceptually, the eligibility ages must reflect disability and special unemployment programs for older persons, but we did not consider those programs since the eligibility for those programs are very limited.

[6] For Figures 6 and 7, we tentatively assume: $\alpha = 100\%$ (see 5.2).

Figure 6 shows that the measure of the inducement to retire seems to be positively correlated with the unemployment of the youth and prime age groups. Also, **Figure 7** shows that the inducement measure and the employment of the prime age are positively correlated, while there is no clear correlation between the inducement measure and the employment of the youth.

These figures are difficult to interpret, however, because all the series (except for the employment of the youth) show a clear trend. We have to conduct regression analysis to identify the impact of the inducement to retire on the employment and unemployment for non-elderly, controlling other factors which are likely to affect the labor market outcomes.

4. Employment of the old and employment of the young

This section performs several regressions to confirm the direct relationship between the employment of the old and employment of the younger group. We begin with OLS regressions regarding labor market outcomes for the young age groups. There are five dependent variables; unemployment (U), employment (E) and in school (S) for the youth, and unemployment (U) and employment (E) for the prime age group. The independent variables include labor force participation (LFP) of the old.

We consider two versions of the regressions; in levels and in differences. In the difference specification, we calculate two versions of the lag structure; a rolling five-year lag specification (e.g. 1960-1964, 1961-1965, etc) and a rolling three-year specification. That is, we consider:

$$\ln U_{young,t} = \alpha + \beta \ln E_{old,t} + \delta \ln X_t + \varepsilon_t$$

and

$$\ln U_{young,t+1} - \ln U_{young,t} = \alpha + \beta(\ln E_{old,t+1} - \ln E_{old,t}) + \delta(\ln X_{t+1} - \ln X_t) + \varepsilon_{t+1} - \varepsilon_t$$

In addition to regressions without any other variables than the LFP of the old, we also perform the regressions by adding some covariates denoted by X. We tried five types of the vector of covariates—Sets A to E—so that:

-Set A includes the number of "in school" for the young only,

-Set B adds mean real monthly wage for each age group under study to Set A,

-Set C adds real minimum wage to Set B,

-Set D adds real GDP per capita to Set B,

-Set E adds real minimum wage and real GDP per capita to Set B.

We provide a detailed explanation of those variables in **Appendix 1**.

Table 2 summarizes the regression results. First, we look at the upper part which shows the results for the pooled sample. Our main interest is the impact of the LFP of the old on the employment and unemployment of the youth. We mainly look at the difference specification, which we believe is better than the level specification. We also focus on the five-year lag specification—which is better than the three-year one judging by the standard errors and R-squared—although they have almost the same patterns of results.

Regarding the youth, most of the coefficients are not significantly different from zero in the unemployment regressions, indicating that the unemployment of the youth is not correlated with the employment of the old. In contrast, we observe positive and significant coefficients for the employment. In addition, we do not see any clear impact of the employment of the old on the "in school" group. In the level specification most of coefficients are positive and significant, but this is likely a spurious correlation because both of the series have an upward trend, as showed in Figure 5.

Regarding the prime age group, we see negative and significant coefficients on the unemployment. Also, most of the coefficients in the employment of the prime age group are not significant. Again, the positive and significant coefficients in the level specification seem to be attributed to the spurious correlation. In the last column, most of the coefficients in the employment are not significant.

In sum, we find positive and significant coefficients in the employment of the youth group and negative and significant coefficients in the unemployment of the prime age group, although most of the coefficients in other regressions are not significant. We emphasize that we do not find any evidence that the LFP of the old deprives the young—both the youth and the prime age—of their jobs.

The middle and lower parts of Table 2 report the results by splitting the sample into genders. We focus on the results from the difference specifications. Regarding the youth, we first confirm that the coefficients are not statistically significant in unemployment regressions for both genders. Second, all of the coefficients in the employment regressions for male and most of those in the same specification for female are positive and significant, which is consistent with the results based on the pooled sample. Some coefficients in the in-school regressions are positive and significant for females, but most of them are insignificant for males. Regarding the prime age, the coefficients in the unemployment regressions are negative and mostly significant for males, and they have not clear trends for females. The coefficients in the employment regressions are positive and significant for females but this is not the case for males.

Those observations based on the spilt sample confirm what we found in the pooled sample. If we split the sample, we see a positive correlation between the LFP of the old and employment of the youth for males as well as between the employment of the old and employment of the prime age group for females. We should note that even after splitting the sample, we do not observe any significant impact of the LFP of older persons on the unemployment of the youth.

5. Inducement to retire and employment of the young

5.1 Incentive measure: SSW and PV

Our next task is to estimate the direct relationship between the inducement for the old to exit the labor force and the employment/unemployment of the young. In particular, we concentrate on the youth among the younger age groups. In order to facilitate this analysis, we construct a simple summary indicator of the inducement to leave the labor force. The indicator should capture the key aspects of the inducement like the eligibility age, the benefit level given eligibility and the change in the benefit if the receipt of benefits is delayed (essentially the actuarial adjustment if retirement is delayed). **Appendix 2** explains in detail how to construct incentive measures—social

security wealth and peak value—on which calculation of the inducement measure is based.

Before explaining the procedure to calculate the measure of inducement to retire, we briefly describe the Japanese public pension scheme, which consists of three components (Oshio and Shimizutani (2006))[7]. The first is the National Pension Insurance (NPI: *Kokumin Nenkin*) for self-employed workers, farmers, and other non-employed workers. The second is the Employees' Pension Insurance (EPI: *Kosei Nenkin*) for employed workers in the private sector. The third is the Mutual Aid Insurance (MAI: *Kyosai Nenkin*) for employed workers in the public sector. The NPI has only a flat component of benefits, while the EPI and MAI have the flat component which is identical to that in the NPI as well as earnings-related benefits. After the pension reform in 1986, the common flat component of the benefits for all the three program is called the "Basic pension benefit."

The NPI's eligibility age for the full benefits is 65. More than one-fourth of the insured, however, start to receive actuarially reduced benefits between the ages of 60 and 64 years, probably because the average household income of self-employed workers is relatively low. An actuarial addition to the benefits is also available for those who are aged between 65 and 70 years, though the number of application is very small. Under the current program, eligibility to receive NPI benefits requires a minimum of 25 years of contributions, and eligibility to receive full benefits (currently 66,000 yen) requires 40 years of contributions. The benefits are price-indexed to reflect changes in the CPI in the previous calendar year.

The EPI's benefits consist of a flat component (Basic Pension benefits) as the first tier and an earnings-related component as the second tier. Because the basic scheme of the MAI is quite similar to that of the EPI, we treat MAI pensioners as if they were EPI members. In principle, the eligibility age for the flat component was 65, but there had been a special legal provision allowing employees to receive full benefits from reaching at age 60. Since 2001, however, its eligibility age has been raised by one

[7] The explanation of the Japanese public pension scheme depends heavily on Oshio and Shimizutani (2006).

year for every three years, and it will eventually be raised to 65 in 2013.

The earning-related component of the EPI benefits is calculated by multiplying the career average monthly income (CAMI) by a certain accrual rate, which depends on the birth year. We will provide more detailed methodology to calculate the benefits of the EPI and MAI below. The CAMI is calculated over a worker's entire period of coverage, adjusted by increases in average wage rate. The eligibility age for earnings-related benefits is currently in transition from 60 to 65. Both flat and earnings-related benefits are CPI-indexed[8].

The basic strategy to construct the inducement measure is as follows. First, we construct SSW. The idea is straightforward. If one retires at age a and the eligibility age is a^*, social security benefit received at that age, $Ben(a)$ is calculated as:

$$Ben(a) = C + kACAMI(a, m) \text{ if } a \geq a^*; =0 \text{ if } a < a^*$$

where C is a constant term which corresponds 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 based on the published data. Then, (gross) SSW is calculated as:

$$SSW(a) = \sum_{i=a}^{D} \pi(i) Ben(i),$$

where $\pi(a)$ is a discount factor which reflects both interest rates and mortality, and D is the maximum age which we at 100.

At age a, one can expect SS Benefit and SSW if he/she retires at age $a+j$ as

$$Ben(a+j) = C + k[mCAMI(a, m) + wage(a+j)]/(m+12j),$$

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

where wage is the projected wage based on the cross-section data at the year when

[8] We make two remarks on the aspects which we are forced to ignore calculate the measure of inducement of retire due to data availability and complexity to calculate the generosity. One is the pension provided for incumbent workers (*Zaishoku Rorei Nenkin*). Upon reaching age 60, an individual who has not fully retired is entitled to receive reduced pension benefits with an earnings test under the Zaishoku pension program. The other is the benefits which non-working dependent wives of EPI beneficiaries are eligible to receive. They receive the Basic Pension benefits without any contributions and an old couple whose husband is an EPI beneficiary can receive earning-related benefits (of the husband) and two flat components (of both the husband and his wife).

one is aged a. We then calculate the peak value (PV) for each age as 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 in calculating benefits and inducement measures.

5.2 Inducement measure

The next job is to construct the inducement measure utilizing the SSW and labor force participation. As stated, we need to incorporate the three aspects, changes in benefit level, the first eligible age, and the PV to construct a single index to consider all the elements. We employ the following formula to create the index:

$$\bar{I}(y)=\sum_{a=55}^{64}\left[\frac{P(a,y)}{\sum_{a=55}^{64}P(a,y)}\right]\left[\frac{\sum_{t=0}^{a-55}I(a-t,y-t)}{\sum_{t=0}^{a-55}q(a-t,y-t-1)}\right],$$

where $\bar{I}(y)$ is the time series inducement measure and we weight the proportion of retired people that is age a in year t, denoted by $P(a,y)$ to get a weighted average over ages 55 and 64[9]. The weight $q(a, t)$ should reflect the proportion of those who retired at age a in year t who faced the $I(a, t)$ incentive. If we take this to the proportion of people in the labor force at age a in year t-1, we have:

$$q(a-t,y-t-1)=LFP(a-t,y-t-1).$$

The essential part in this formula is to compute $I(a, y)$:

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

where $W(a, y)$ and $PV(a, y)$ refer to the SSW and PV for age a in year t. The basic idea is summarized as follows. We begin at a given age and have information on the number of the retired $P(a, y)$ in year t. We have SSW weighted by the labor force participation at the previous year; $W(a, y)q(a, y)$. In addition, we know the PV of the social security wealth, which depends on each year and age in a given year because the earning histories are different for each cohorts. PV (a, y) refers the maximum

[9] Ideally, top age for calculations should be 69, which is the upper limit of the age range for the "old" in our analysis. However, we choose 64, because we want to obtain the as long time series data as possible under the limited data availability.

present value of $W(a, y)$ for ages greater than a. Moreover, we assume that each person is completely liquidity constrained so that the effect $W(a, y)$ is zero before the first eligible age.

By constructing $I(a, y)$, we adjust the difference in the ages and the PV incentive to retire or stay in the labor force once the first eligibility age has been reached. The remaining task is to incorporate benefits level. In order to do it, we assume the weighted sum of the value of SSW and discounted value of the difference between SSW and the PV because the PV will come at a future age. α is the weight given to the squared brackets (implicitly, we give a weight of one to the first term). Since the value of α is not determined a priori, we perform several cases of α taking 0, 10, 25, 50 and 100 percent[10]. Based on those preparations, we calculate both components, $W(a, y)$ and $W(a, y) - PV(a, y)$ for the same age for the same year. Then, we obtain time series data: $\bar{I}(y)$.

5.3 Estimation Results

Table 3 reports the results using $\bar{I}(y)$ as the measure of inducement to retire, instead of the employment of the old, to estimate its impact of the unemployment, employment, and school rates (not their levels) for the young (youth), based on the five different values of α. We set five types of the vector of covariates—Sets F to J—so that:

-Set F includes mean real monthly wage for each age group under study only,

-Set G adds real GDP per capita to Set F,

-Set H adds real minimum wage to Set F,

-Set I adds real GDP per capita and real minimum wage to Set F,

-Set J adds the share of those "in school" to Set I.

For difference specifications, we report only results with the five-year lag structure, because we find that the five-year specification has better performance than the three-year one and that there is no significant difference between the two specifications in terms of patterns of coefficients and their significance.

[10] We ignore the possibility of different routes to retirement due to data insufficiency.

Table 3a reports the results for the pooled samples. First, we see that no coefficient on the inducement measure is significant in the unemployment regressions, suggesting that the inducement measure does not induce job losses for the young. Second, most of the coefficients are negative and significant in the employment regressions. This finding indicates that more generous social security benefits discouraged employment of the young. We do not observe a clear tendency in the school rate regressions. In addition to the impact of the inducement measure on the employment and unemployment of the young, we confirm in the last column that more generous social security benefits induce retirement of the old from the labor force.

There is no significant difference in the fitness or the magnitude of the impact of the inducement measure on the employment of the young among the five different values of α. We find that 0 percent yields the best fitness, but its difference from those in other cases is quite limited. This reflects the fact that the level of $W(a, y) - PV(a, y)$ relative to $W(a, y)$ has been not high—in a range between 5 percent and 11 percent—which makes $I(y, a)$ and $\bar{I}(y)$ insensitive to the assumed value of α.

The remaining parts of Table 3a report the results by splitting the sample into each gender. We find little impact of the inducement measure on unemployment of the youth, like in the case of the pooled sample. The impact of employment of the youth is larger for females while it is not evident for males. Moreover, we see the larger impact of the inducement measure on the withdrawal of female old workers than male old workers. In other words, the inducement measure has the stronger impact on employment of the young females and exit of the elder females.

In sum, we find that more generous social security benefits induce both the old and the young to exit labor force but do not affect unemployment of the young, which is coincident with what we see in Table 2. The employment of the old or the inducement measure to retire is not associated with the unemployment of the youth.

6. Conclusion

We examined whether social security programs induce withdrawal of the elderly from the labor force and create jobs for the young in Japan, explicitly considering the possible endogeneity of the changes in social security programs. First, we made a historical overview of the past social security reforms and employment policies for the elderly. Following this overview, we investigated the direct relationship between the employment/unemployment of the young and the employment of the old. Second, we explored whether social security induced withdrawal of the old from the labor force and created jobs for the young.

The key messages are as follows. First, our historical overview suggests that youth employment issues have not motivated social security reforms, implying that changes in provisions are not endogenous. Second, an increase in the LFP of the elderly tends to create rather than crowd out the employment of the young. Third, an increase in the inducement to retire reduces both the LFP of the old and the employment of the young and does not affect the unemployment of the young. These findings, which suggest that there is no serious trade-off between the old and the young in the labor force, are consistent with the fact that there has been no argument to relate retirement of the old with job creation for the young in Japan.

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