Work Capacity of Older Adults in Japan*

By

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Abstract

This study examines the work capacity of older adults in Japan. First, we estimate the relationship between a variety of health indicators and work status. Work status is divided into full-time work, part-time work, and retired for those in their 50s who are not yet age-eligible for public pension benefits. Then, we simulate work capacity for those in their pension-eligible 60s and the first half of the 70s. The simulation results indicate a large work capacity. The health status of those in their 60s suggests that their labor force participation rate could be increased substantially by reforming social security programs.

JEL classification Codes: J26; I10; H55.

Keywords: Work capacity; health; retirement; simulation; JSTAR.

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1. Introduction

A combination of shrinking labor force and large fiscal deficits are urgent and common challenges among developed countries. The main driving force for these two serious concerns is the rapid speed of population aging; population aging dampens labor force participation with continuing lower fertility and expands fiscal deficits under a pay-as-you-go public pension program.

A natural and simultaneous solution for these two policy challenges is to encourage older adults to continue to work as late as possible in terms of age. Thus, the main visible target of recent pension reforms is to raise eligible pension ages, although pension reforms are often accompanied with revisions in a variety of aspects such as coverage, adequacy and sustainability, as well as work incentives (OECD, 2013). Indeed, many developed countries have implemented or will execute public pension reforms to extend the normal retirement (i.e., pensionable) age. Figure 1 illustrates the evolutions of the normal pensionable ages in major countries. While the ages were lowered up to the 1990s, they have been extended since the 2000s or will be extended in future.

Japan is also confronted with a declining labor force and enormous fiscal deficits, both of which are the most pronounced among OECD countries. Figure 2 depicts the long-term trend of the labor force participation (LFP) rate in Japan. The female LFP rate has been on a modest increasing trend, which is particularly the case for those aged 55–59. In contrast, the male LFP rate has been declining for those in the 60s, despite a slight recovery in recent years. Although the LFP rate in Japan is higher than in most other developed countries, there have been many policy debates on enhancing the normal eligibility of pensionable age.

Recently, Japan has been extending the eligible age for pension. For male pensioners, the eligibility age for the flat-rate component increased from the age of 60 since 2001 by one year for every three years to reach 65 years in 2013. Furthermore, the eligibility age for the wage-proportional component has been scheduled to rise from 2013 by one year for every three years to reach 65 years in 2025. For female pensioners, while keeping a five-year lag relative to that for men, the eligibility age for the flat-rate benefit was raised in 2006, and that for the wage-proportional benefit will be raised in 2018 in the same manner (Oshio, Oishi, and Shimizutani, 2011).

However, there is a possibility that a simple extension of eligible pensionable age may not work, because all older adults are not necessarily able to work even if they are willing to. In particular, one large possible constraint on working is health, either physical or mental, which may also be associated with declining cognitive function. If this is the case, a simple extension of eligible pension age, which stands at fiscal consolidation and ignores heterogeneity among older adults, may result in increasing inequality between healthy and unhealthy individuals and exacerbate the overall living standard of older adults.

This study simulates the spare work capacity of older individuals in Japan, which provides the first such evidence to the best of our knowledge. We share this spirit with Cutler, Meara, and Richands-Shubik (2012) (henceforth, the CMR model), a study that estimated the work capacity among the elderly in the United States. They simulated the work capacity of the age group entitled to receive social security benefits, based on the estimated association between work and health statuses of the age group just below the eligibility age. Based on simulation results, they concluded that the work capacity of the elderly is substantial; specifically, the health status of those aged 62–64 suggests that their LFPR has the potential for increasing for all groups, rising by over 15 percentage points among white males if avoiding access to early social security retirement benefits.

We apply the CMR model to micro-level data from the Japanese Study on Aging and Retirement (JSTAR) with detailed information on health and work status at the individual level. Unlike in the CMR model, we divided work status into full- and part-time work, considering the fact that a substantial portion of Japanese employees shift to part-time work after retiring from primary full-time work, rather than completely going out of the labor force.

The remainder of this paper is organized in the following manner. Section 2 explains our analytic strategy and Section 3 describes the data set. Section 4 illustrates the health trend of older adults and presents the empirical and simulation results. Section 5 presents alternative estimations and the results. Section 6 concludes.

2. Empirical strategy

We employ the CMR model in this study. The basic idea of the CMR model is to examine the relationship between health and work prior to the current eligible pensionable age (57–61 years in their study) and uses the observed association to gauge spare work capacity in ages eligible for public pension benefits (62–64 years old).The CMR model implicitly assumes that the relationship between health and work among groups prior to the eligibility age is stable and holds for the age group posterior to the age. Correspondingly, any decline in work given the same level of health status is attributable to factors other than health deterioration, particularly social security benefits. If this is the case, we can conclude that pension benefits discourage pension beneficiaries to work.

The CMR model originally includes three states of work—in the labor force, retired, and disabled—as dependent variables in a multinomial logit estimation. The health status is expressed by a variety of indicators: self-rated (subjective) health status, physical function limitations, instrumental activity of daily living (IADL) limitations, depression (CES-D), any incidence of diagnosed disease (heart disease, lung disease, stroke, psychiatric disorder, cancer, hypertension, arthritis, diabetes, back pain as well as body mass index (BMI) and smoking status). Moreover, demographic variables such as educational attainment, household composition including family size, and economic status are considered as covariates. These variables are collected in the same manner from the Health and Retirement Study (HRS), which the CMR model used, and its family surveys that include JSTAR, which is explained in the next section.

In order to simulate the work capacity of older adults in Japan, we need to modify the CMR model to fit Japan's case. While the average effective retirement age in Japan is one of the highest levels among OECD countries (OECD, 2014), all adults do not work on a full-time basis. Instead, the proportion of full-time workers in the labor force declines after the 60s and the labor force is dominated by are part-time workers with shorter working hours, which is more pronounced for males than females (Shimizutani, 2011).[1] Consistently, the Labor Force Survey shows that among workers, those working for 35

[1] OECD (2014) shows that the average effective age of retirement during 2007–2012 was 69.1 years for males, which is ranked fourth among 34 OECD countries and 66.7 years for female, which is ranked fifth.

hours or more constituted 77.7% and 41.9% of the labor force for males in the age groups 55–64 and 65 and above, respectively, and 44.4% and 37.7% of the labor force for females in the age groups 55–64 years and 65 and above, respectively, in 2013. Similarly, the Survey shows that the proportion of non-regular employees was 69.9% for those aged 65 years, and well above 32.5% for males aged 55–64. The difference was less remarkable for women (67.5% vs. 73.7%). These facts indicate that workers, particularly male ones, tend to reduce working hours in their late 60s. A choice between full- and part-time work, as well as its association with health, differs from that between work and retirement. Hence, it is reasonable to differentiate part-time workers from full-time ones to precisely gauge spare work capacity in Japan.

Another modification to the CMR model is related to disability pension benefits. The proportion of the recipients of such benefits is very small in Japan, which is in contrast to certain European countries (Oshio and Shimizutani, 2012). Hence, we do not consider the outcome of “disabled” as work status and merge it into “retired.” Overall, our work outcomes are categorized as three states; working on a full-time basis, working on a part-time basis, and retired.

Taking working on a full-time basis as reference, our specification is described as

$$\Pr(fulltime) = \frac{1}{1+\exp(X_i\beta_{parttime})+\exp(X_i\beta_{retired})},$$

$$\Pr(parttime) = \frac{\exp(X_i\beta_{parttime})}{1+\exp(X_i\beta_{parttime})+\exp(X_i\beta_{retired})}, \text{ and}$$

$$\Pr(retired) = \frac{\exp(X_i\beta_{retired})}{1+\exp(X_i\beta_{parttime})+\exp(X_i\beta_{retired})},$$

where *i* stands for individual *i* and *full-time* refers to state of working on a full-time basis, *part-time* to state of working on a part-time basis, and *retired* to state of being out of the labor force. X_i is the vector of health indicators, which were described above for individual *i*.

We make a reservation on the specification. We estimate the relationship between work and health statuses prior to reaching the pensionable age (i.e., in the 50s) and then use it to simulate work capacity after the age of 60. Thus, we implicitly assume that choice of work status in the 50s is affected by health status. However, choice of work status is also affected by other factors. For example, a woman in her 50s may choose work on a part-time basis not because her health condition is not good but because she needs to provide care for parents; however, she may work on a full-time basis in her 60s if she no longer needs to provide care after parents die. Thus, more precisely, our specification is based on an assumption that the relationship between work and health statuses does not change in the

50s and thereafter. In other words, we assume that non-health determinants of work status remain intact in 50s and thereafter, and focus entirely on how deteriorating work status is associated with work status. Here, we should be cautious in interpreting the estimation results, especially for women, whose work status is more likely affected by non-health factors than for men.

3. Data description

We use individual-level data from JSTAR. JSTAR is a family survey like that in other countries such as the HRS in the United States; English Longitudinal Survey on Ageing (ELSA) in the United Kingdom; Survey on Health, Aging, and Retirement in Europe (SHARE) in continental Europe; Chinese Health and Retirement Longitudinal Study (CHARLS) in China; Korean Longitudinal Study of Aging (KLoSA) in South Korea; and Longitudinal Aging Study in India (LASI) in India. These surveys innately retain common features that make international comparison feasible in terms of longitudinal structure (survey the same person every two years) and a rich variety of variables to capture living aspects in terms of economic status, health, family, as well as social and work status.

In 2007, JSTAR conducted the first wave data collection on the baseline from five municipalities (Takikawa city in Hokkaido Prefecture, Sendai city in Miyagi Prefecture, Adachi ward in Tokyo, Shirakawa town in Gifu Prefecture, and Kanazawa city in Ishikawa Prefecture). Then, in 2009, JSTAR conducted the second wave data collection; this involved re-interviewing respondents in the first wave in the five municipalities and beginning to collect the baseline data from two new municipalities (Naha city in Okinawa Prefecture and Tosu city in Saga Prefecture). Thereafter, JSTAR implemented the third wave to collect data from the third interview with respondents in the second round in the initial five municipalities, the second interview for the respondents in the first round in two municipalities, and the baseline interview for new samples in three new municipalities (Chofu city in Tokyo Prefecture, Tondabayashi city in Osaka Prefecture, and Hiroshima city in Hiroshima Prefecture).

The sample at the baseline in each municipality is males and females aged 50 to 74 years, who were randomly chosen from household registration. The sample size at the baseline in each municipality is approximately 8,000 and the average response rate at the baseline is approximately 60 percent. We pool all the observations from the first to third waves in the estimation.[2]

Table A1 presents the summary statistics of the main variables used in the estimation;

[2] As of the timing of the submission, the data from the fourth wave is not available to researchers.

Panel (A) and Panel (B) presents statistics for males and females, respectively. For males, the proportion of full-time workers declines sharply after the age group 60–64 years and shifts to part-time workers or retired. Self-assessed health and other health measures gradually deteriorate as age increases, but the changes over ages are much more limited compared to those in work status, as discussed subsequently in greater detail. A similar pattern is observed for females, but the proportion of full-time workers is much lower in all age groups as compared to that for males.

4. Health trends and empirical and simulation results

In this section, we conduct three sets of empirical analyses, based on JSTAR data. First, we describe the health trend in the 50s through the 70s. Second, we estimate the relationship between work outcome and health status. Third, we simulate spare work capacity in the 60s based on their observed relationship.

First, Figure 3 depicts the evolution of the share of respondents who assess their health as good, very good, or excellent for ages between the 50s and 70s. We observe that health status deteriorates very gradually until the age of 70 for both males and females. For males, the total share of respondents who assess their health as good, very good, or excellent declined from 90.1% in the age group 51–54 years to 84.2% in the age group 65–69 years, and then drops to 77.1% in the age group 70–74 years. The drop of the share from the age group 51–54 years to the age group 65–69 years is 0.059% point, which is lesser than 0.071% point from the age group 65–69 years to the age group 70–74 years. The same pattern is observed for females as well, although the share of those with high self-assessed health is somewhat lower in all age groups compared to males. These findings indicate that health status remains relatively stable until the age of 70, thereby supporting the relevance of the methodology of the CMR model, which assumes stable associations between health and work statuses, as long as the model is applied to those aged below 70.

Now, we estimate the relationship between work status and health indicators. We chose the sample of those in their 50s to estimate the association, because the age of 60 is the earliest age for claiming public pension benefits. Table 1 reports the results of multinomial logit models of reporting the relative risk ratios (RRRs) of reporting retired or part-time work relative to full-time work. Panels (A) and (B) present the results for men and women, respectively. We conducted a Hausman test that supports that the odds are independent of other alternatives.

In line with expectations, lower health statuses are positively associated with the possibilities of retirement and part-time work. This is particularly true of the males' choice of retirement. While the associations with health variables differed somewhat between men and women, psychiatric disorders had the highest RRR for retirement for both sexes. It should be noted that the observed associations do not imply a one-way causality from health to work; it cannot be ruled out that retirement makes individuals more depressed and more nervous regarding health, or that keeping working contributes to sustained good health. Our simulation assumes that the associations between work and health statuses observed in the 50s remained intact thereafter, rather than assuming any one-way causality between them.

With regard to the simulation analysis, Table 2 presents the results for males (top panel) and females (bottom). The third to fifth columns report the actual proportions of retired, part-time workers, and full-time workers, while the sixth to eleventh columns present simulations results based on the estimated associations for those aged 50–59.

For males, the actual proportion of the retired increases from 20.5% in the age group 60–64 years to 67.4% in the age group 70–74 years. While the proportion of part-time workers increases from 17.6% in the age group 60–64 years to 22.0% in the age group 65–69 years and then declines to 15.3% in the age group 70–74 years. The proportion of full-time workers declined from 62.0% in the age group 60–64 years to 17.3% in the age group 70–74 years.

In comparison, the predicted proportions of the retired in the labor force are 4.7%, 6.6%, and 10.1% in the age groups 60–64, 65–69, and 70–74 years, respectively. The reductions in their proportions in response to increase in age are much smaller compared to the actual ones reduction, presumably reflecting limited changes in health status. Correspondingly, the work capacity, which is defined as the gap between the predicted and the actual proportion of the retired is 15.8% in the age group 60–64 years, which jumps to 42.1% in the age group 65–69 years and 57.3% in the age group 70–74 years. These figures are interpreted as "spare" work capacity, which represents the proportion of those who are able to shift from retirement to work.

In contrast, the predicted proportions of male part-time workers are 7.0%–10.1%, which are lower than the actual ones, thereby indicating that there are *excess* part-time workers among elderly Japanese males. Meanwhile, the predicted proportion of full-time workers is 79.7%–88.2%, which is much higher than the actual ones. These results suggest that a substantial shift from full-time workers to retirement or part-time workers after the late 60s is not entirely attributable to changes in health status, which was relatively limited, as suggested by Figure 3.

Based on these simulation results, it is reasonable to argue that social security benefits, which people become eligible for in the late 60s, discourage male workers to remain full-time workers in the labor market, even if they are not much less healthy as they were in their 50s. However, in reality, a substantial proportion of them move to part-time work after they retire from their primary work, rather than completely leaving the labor force (Shimizutani and Oshio, 2010).

The simulations for females provided almost similar results, but the magnitude of work capacity is somewhat smaller than that for males, thereby presumably reflecting their more diversified lifestyle. A higher proportion of females retired in their 50s and is working on a part-time basis. The most remarkable difference from the results for males is that there is work space for part-time work as well. This result highlights excess part-time workers among elderly males.

Further, we perform two additional simulations. First, we decompose the simulation results by educational levels using the estimation result reported in Table 1. We divide educational attainment into (1) high school graduates or lower and (2) college or higher. Table 3 reports the results for males in the upper panel and females in the lower. For males, the proportion of the retired is slightly smaller for college graduates, except those aged 65–69, and that of part-time workers is larger for high school graduates in their 60s. The proportion of full-time workers is higher for higher educated males in the age group 60–64 years, but lower in those in the age group 65–69 years. The predicted proportion of the retired increases along with age and the size and age gradient are larger for high school graduates or less. The estimated proportion of part-time workers is also higher for high school graduates, while it levels off after the age of 65 for college graduates; the proportion of full-time workers is larger for higher educated groups. Consequently, the estimated "spare" capacity is larger for college graduates, which is particularly the case for those in the age group 60–64 years. We also see *excess* part-timers for all age groups, which is highest for high school graduates, and spare capacity of full-timers, which is larger for college graduates in the age groups 65–69 and 70–74 years.

For females, we observe a similar pattern by educational attainment in work capacity. The spare capacity for the retired is greater for those with higher education in the age groups 65–69 years and 70–74 years; this is the case for all age groups for full-time workers. The difference between females and males is found in part-time workers. While the size is smaller than full-time workers, there is spare work capacity for part-time workers, except that among women with higher education in the age group 60–64 years, thereby implying excess part-time workers in this age group.

Another simulation is to estimate a multinomial probit model, including a linear age trend as an additional covariate and then use the relationship to simulate work capacity. The rationale to include age trend is to control for taste shift along with age, since older adults may prefer spending their time at home, not at work. As discussed in Section 2, we conducted the regression analysis assuming that the relationship between work status and non-health factors is not altered between those in their 50s and subsequent ages, and the age trend is designed to capture the change in non-health factors.

Table 4 reports the simulation results, which correspond to Table 3.[3] We observe that the predicted work capacity is generally smaller if including an age trend as a covariate. For males, the work capacity (the actual proportion of the retired minus the predicted proportion) is smaller in older age groups. The work capacity for males in the age group 65–69 years (70–74) is 42.1% (57.3%) in Table 2, which is now 16.9% (9.6%) in Table 4. This is also the case for females: the work capacity in the age group 65–69 years (70–74) is 32.3% (43.4%) in Table 2, which is now 15.1% (20.4%) in Table 4. While the part-time capacity is not much different between Tables 2 and 4, the full-time capacity is much smaller in Table 5: 26.3% (55.1%) in males in the age group 60–64 years (65-69) in Table 4, contrasting to 17.0% (29.2%) in Table 2. The largest difference is found for males in the age group 70–74 years. These patterns are also found for females and the full-time capacity is much smaller in Table 4.

These additional simulations show that the work capacity may vary with educational

[3] To save space, we do not present the estimated coefficients here, including age trend, which is similar to those in Table 1. The results are available upon request from the authors.

attainment and that the estimated size may be smaller once an age trend is controlled. However, the estimated spare work capacity is still large, which is particularly the case for those in their 60s.

5. Conclusion

In this study, we examined the work capacity of older adults in Japan based on micro-level data from JSTAR. Large work capacity predicted by our simulations offers reasons to be cautiously optimistic regarding the ability of many Japanese elderly people to continue working beyond current retirement ages. The results suggest that the key constraint on their work is not deteriorating health status but institutional factors, particularly social security programs.

There are a number of limitations to the current study and certain future research issues to be addressed. First, we must tackle endogeneity issues. We assumed that the associations between health and work statuses observed among those in their 50s remain intact in later life, but work is likely to affect health in both positive and negative ways. Second, we can extend the methodology of the CMR model. We included a variety of health variables as explanatory variables but did not include other aspects of health such as cognitive functions and grip, which can be objectively measured. Third, it is of great interest to compare work capacity between elderly with different attributes. Cutler, Meara, and Richards-Shubik (2012) divided individuals by race and educational background as well as sex. In addition, the elderly with highly specialized skills may have a different work space than others.

Despite the abovementioned issues that remain to be addressed, our results have clear policy implications. Considering that the elderly enjoy good health throughout their 60s, social security reforms, including raising eligibility ages, may both reduce the costs of the public pension program and enhance growth potential.

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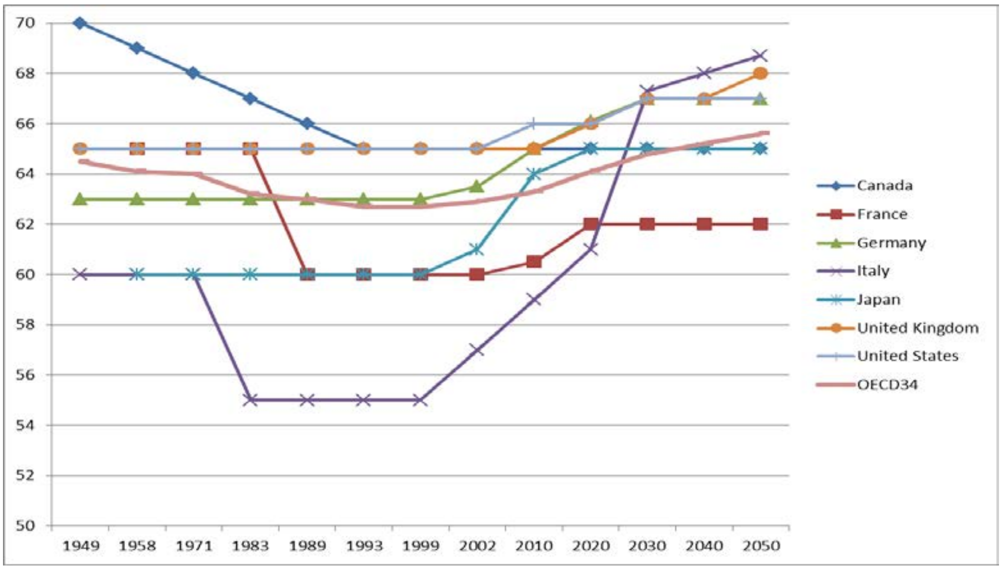
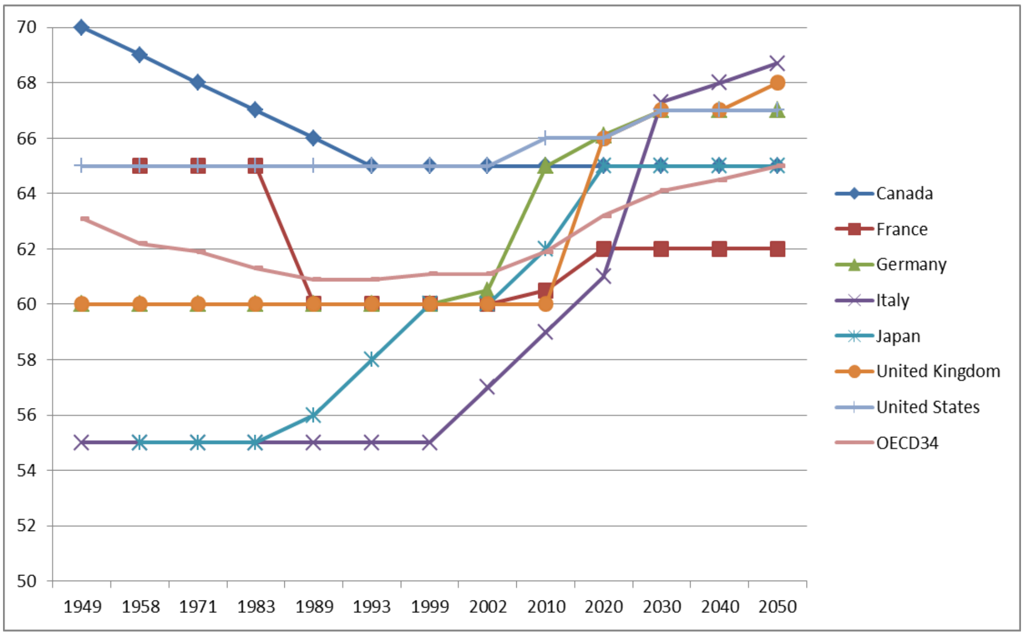
Figure 1. Normal pensionable age in developed countries

(A) Males



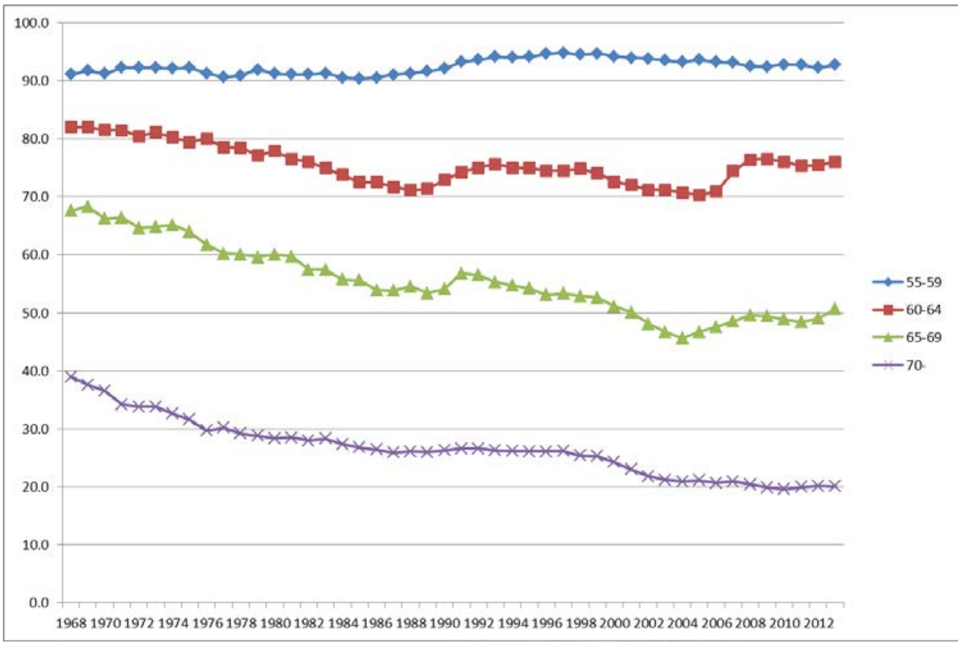
(B) Females



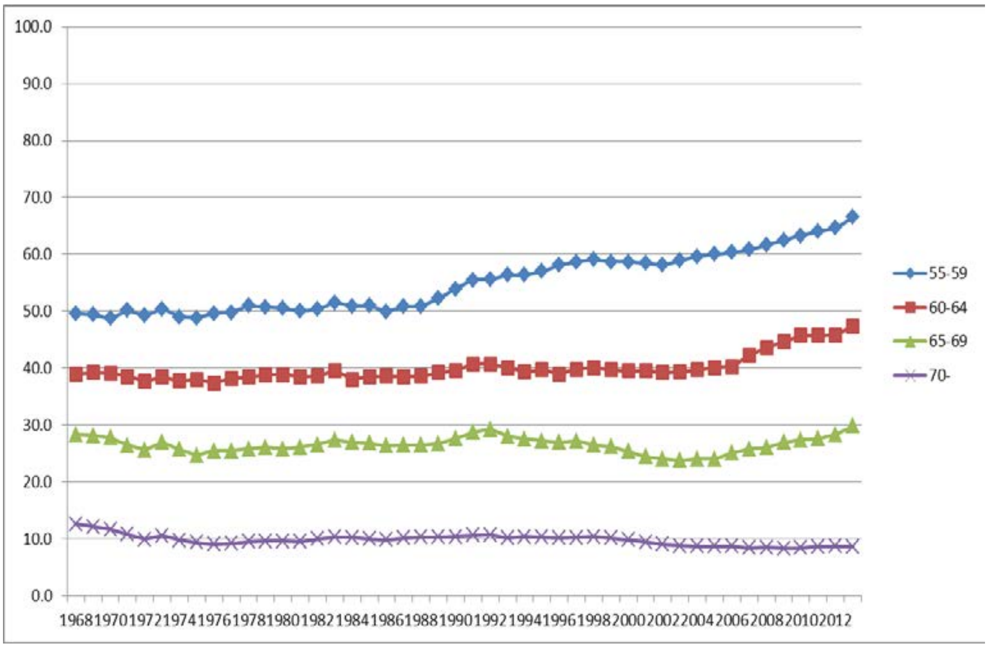
(Source) OECD Pensions Outlook, 2012.

Figure 2. Long-term trend of the labor force participation rate in Japan

(A) Males



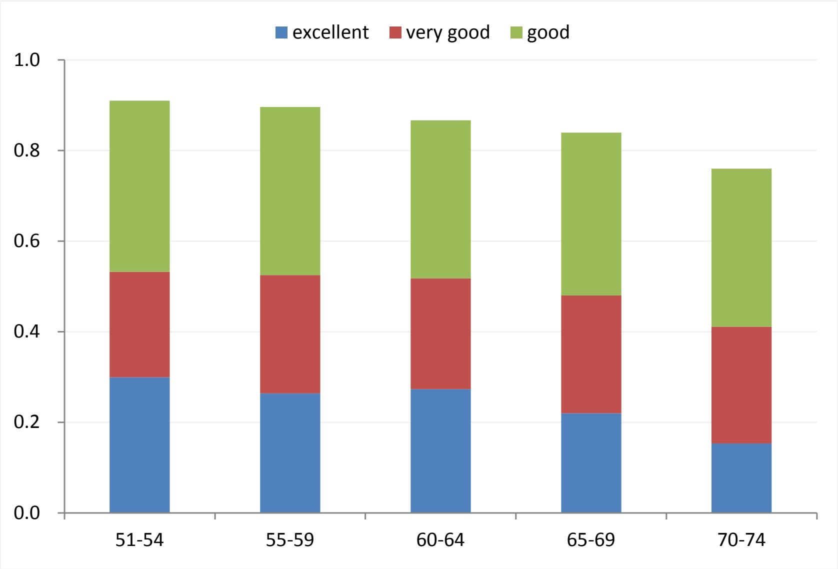
(B) Females



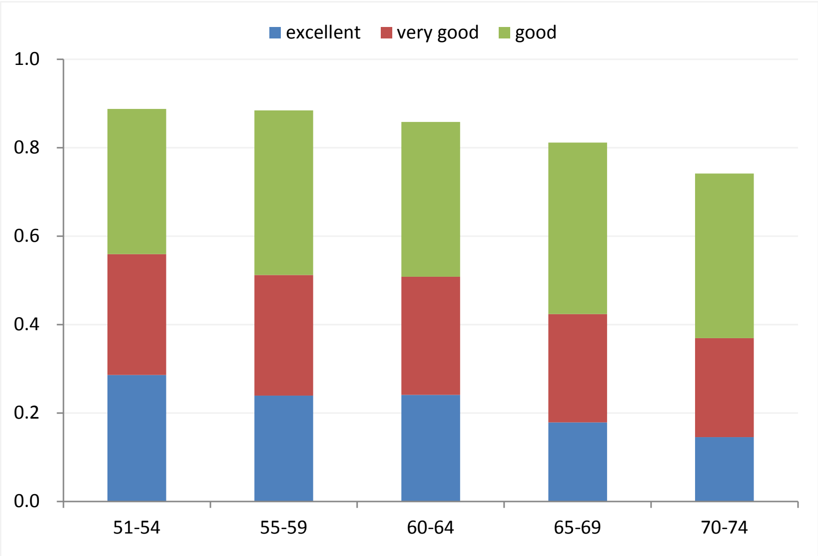
(Source) Labor Force Survey, various years.

Figure 3. Health status by age

(A) Males



(B) Females



(Source) Authors' calculations based on JSTAR.

Table 1. Results of multinomial probit regressions

(A) Males (Age group 50–59 years)

Variable	Men 50–59			
	Retired		Part-time	
	RRR	SE	RRR	SE
Self-assessed health: very good	7.765	8.230 *	1.317	0.379
Self-assessed health: good	10.501	11.090 **	0.922	0.274
Self-assessed health: fair or poor	15.990	16.247 ***	2.379	0.876 **
Physical functional limitation: 1	6.769	3.737 ***	1.153	0.629
Physical functional limitation: 2+	18.323	8.218 ***	1.842	1.102
Any ADL limitations	4.396	1.854 ***	1.507	0.915
Any IADL limitations	0.040	0.054 **	0.089	0.147
CES-D	1.036	0.075	1.089	0.070
CES-D: missing	4.194	3.840	5.179	4.538 *
Heart disease	3.183	1.811 **	2.291	0.860 **
Lung disease	3.903	3.260	0.980	0.912
Stroke	2.632	2.943	4.449	2.419 ***
Psychiatric disorder	22.056	14.106 ***	0.998	0.773
Cancer	3.712	2.751 *	0.989	0.828
Hypertension	0.972	0.435	0.592	0.167 *
Arthritis	0.427	0.484	0.394	0.416
Diabetes	2.315	1.185	1.064	0.332
Illness:missing	1.267	0.739	0.742	0.225
Underweight	2.113	1.092	1.158	0.847
Overweight	0.664	0.284	0.783	0.204
Obese	2.400	2.787	3.158	1.493 **
Weight: missing	0.981	1.238	0.000	0.000 ***
Former smoker	0.874	0.458	0.753	0.215
Current smoker	1.197	0.686	0.774	0.224
Smoker: missing	6.275	7.068	1.676	1.757
Below high school	0.522	0.272	1.247	0.402
Some college	0.279	0.210 *	1.702	0.564
College	0.448	0.203 *	0.719	0.210
Education: missing	0.875	0.549	3.017	3.483
Married	0.255	0.114 ***	0.469	0.138 ***
Marital status: missing	0.399	0.283	0.294	0.332
Blue collar	0.360	0.244	0.531	0.152 **
Low-skilled services	0.591	0.587	0.280	0.192 *
Covered by a pension	0.810	0.386	0.640	0.180
Year 2007	0.539	0.298	1.999	0.877
Year 2009	0.687	0.380	2.050	0.855 *
Constant	0.012	0.011 ***	0.125	0.076 ***
# Obs			1,701	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

(B) Females (Age group 50–59 years)

Variable	Women 50–59			
	Retired		Part-time	
	RRR	SE	RRR	SE
Self-assessed health: very good	1.366	0.263	1.146	0.200
Self-assessed health: good	1.487	0.276 **	1.406	0.234 **
Self-assessed health: fair or poor	3.094	0.873 ***	1.745	0.495 **
Physical functional limitation: 1	1.345	0.364	0.874	0.262
Physical functional limitation: 2+	3.195	1.071 ***	0.789	0.304
Any ADL limitations	4.063	2.619 **	2.280	1.513
Any IADL limitations	0.655	0.596	0.345	0.265
CES-D	0.985	0.040	1.076	0.039 **
CES-D: missing	1.096	0.900	3.522	2.183 **
Heart disease	1.960	0.789 *	1.393	0.611
Lung disease	4.577	5.979	4.487	5.445
Stroke	3.153	4.362	1.501	2.022
Psychiatric disorder	8.628	6.125 ***	3.096	1.839 *
Cancer	1.240	0.628	0.660	0.340
Hypertension	1.498	0.331 *	1.907	0.407 ***
Arthritis	2.406	0.788 ***	1.213	0.413
Diabetes	0.845	0.332	0.530	0.230
Illness:missing	1.360	0.224 *	1.409	0.221 **
Underweight	0.956	0.280	1.628	0.436 *
Overweight	0.814	0.179	0.905	0.189
Obese	2.092	1.155	1.845	1.115
Weight: missing	0.378	0.286	0.738	0.533
Former smoker	0.723	0.206	1.422	0.379
Current smoker	0.757	0.191	1.030	0.222
Smoker: missing	1.001	0.494	0.863	0.387
Below high school	1.864	0.504 **	1.239	0.322
Some college	0.992	0.194	0.772	0.139
College	0.580	0.167 *	0.820	0.215
Education: missing	7.594	6.277 **	5.106	4.034 **
Married	3.990	0.910 ***	2.500	0.474 ***
Marital status: missing	0.247	0.204 *	0.391	0.308
Blue collar	0.251	0.096 ***	1.187	0.299
Low-skilled services	0.352	0.148 **	1.692	0.455 *
Covered by a pension	1.188	0.223	1.049	0.183
Year 2007	0.511	0.096 ***	0.986	0.182
Year 2009	0.604	0.109 ***	1.069	0.190
Constant	0.218	0.073 ***	0.208	0.062 ***
# Obs			1,697	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 2. Simulation of work capacity

Age Group	# Obs	Actual % Retired	Actual % Part-time	Actual % Full-time	Base age group 50–59					
					Predicted % Retired	Work Capacity	Predicted % Part-time	Part-time Capacity	Predicted % Full-time	Full-time Capacity
(A) Men										
60–64	1,225	20.5%	17.6%	62.0%	4.7%	15.8%	7.0%	-10.5%	88.2%	26.3%
65–69	1,243	48.7%	22.0%	29.3%	6.6%	42.1%	9.0%	-13.0%	84.4%	55.1%
70–74	1,248	67.4%	15.3%	17.3%	10.1%	57.3%	10.1%	-5.2%	79.7%	62.4%
(B) Women										
60–64	1,289	51.9%	27.2%	20.9%	34.6%	17.3%	29.5%	2.2%	36.0%	15.1%
65–69	1,283	70.3%	18.8%	10.9%	38.0%	32.3%	29.1%	10.3%	32.9%	21.9%
70–74	1,356	84.1%	9.9%	6.0%	40.6%	43.4%	28.2%	18.3%	31.1%	25.1%

(Source) Authors' calculations based on JSTAR.

Table 3. Simulation of work capacity by educational attainment

(A) Males

Age Group	# Obs	Actual % Retired	Actual % Part-time	Actual % Full-time	Base age group 50–59 Predicted % Retired	Work Capacity	Predicted % Part-time	Part-time Capacity	Predicted % Full-time	Full-time Capacity
(A) Men, High school or less										
60–64	799	20.3%	18.3%	58.9%	0.052	15.1%	0.075	-10.8%	0.873	28.4%
65–69	886	46.8%	22.9%	30.2%	0.071	39.7%	0.092	-13.7%	0.837	53.4%
70–74	935	67.2%	15.6%	17.2%	0.101	57.1%	0.107	-5.0%	0.792	62.0%
(B) Men, Some college or more										
60–64	358	19.6%	15.9%	64.5%	0.022	17.3%	0.056	-10.3%	0.922	27.6%
65–69	260	55.4%	17.3%	27.3%	0.047	50.7%	0.087	-8.6%	0.866	59.3%
70–74	205	66.3%	15.1%	18.5%	0.057	60.6%	0.085	-6.6%	0.857	67.2%

(B) Females

Age Group	# Obs	Actual % Retired	Actual % Part-time	Actual % Full-time	Base age group 50–59 Predicted % Retired	Work Capacity	Predicted % Part-time	Part-time Capacity	Predicted % Full-time	Full-time Capacity
(A) Women, High school or less										
60–64	894	52.6%	27.3%	20.1%	0.347	17.9%	0.309	3.6%	0.344	14.3%
65–69	988	69.8%	19.0%	11.1%	0.387	31.2%	0.296	10.6%	0.317	20.6%
70–74	1,075	83.4%	9.9%	6.7%	0.408	42.6%	0.289	19.1%	0.303	23.6%
(B) Women, Some college or more										
60–64	275	50.5%	26.2%	23.3%	0.350	15.6%	0.253	-0.9%	0.397	16.4%
65–69	194	71.6%	19.6%	8.8%	0.367	35.0%	0.263	6.8%	0.370	28.2%
70–74	162	87.7%	9.9%	2.5%	0.402	47.5%	0.239	14.0%	0.360	33.5%

(Source) Authors' calculations based on JSTAR.

Table 4. Simulation of work capacity with age trend

Age Group	# Obs	Actual % Retired	Actual % Part-time	Actual % Full-time	Base age group 50–59 Predicted % Retired	Work Capacity	Predicted % Part-time	Part-time Capacity	Predicted % Full-time	Full-time Capacity
(A) Men										
60–64	1,225	20.5%	17.6%	62.0%	12.6%	7.9%	8.4%	-9.1%	78.9%	17.0%
65–69	1,243	48.7%	22.0%	29.3%	31.8%	16.9%	9.8%	-12.3%	58.5%	29.2%
70–74	1,248	67.4%	15.3%	17.3%	57.8%	9.6%	7.9%	-7.4%	34.3%	17.0%
(B) Women										
60–64	1,289	51.9%	27.2%	20.9%	44.8%	7.1%	30.3%	3.1%	24.8%	4.0%
65–69	1,283	70.3%	18.8%	10.9%	55.2%	15.1%	28.8%	10.1%	16.0%	5.1%
70–74	1,356	84.1%	9.9%	6.0%	63.7%	20.4%	25.9%	16.0%	10.4%	4.4%

(Source) Authors' calculations based on JSTAR.

Appendix

Table A1. Summary statistics

(A) Males

Variable	Age Group				
	50–54	55–59	60–64	65–69	70–74
Retired	0.015	0.042	0.205	0.487	0.674
Part-time worker	0.053	0.074	0.176	0.220	0.153
Full-time worker	0.932	0.883	0.620	0.293	0.173
Self-assessed health: excellent	0.299	0.264	0.273	0.220	0.153
Self-assessed health: very good	0.233	0.261	0.244	0.260	0.258
Self-assessed health: good	0.378	0.371	0.349	0.360	0.349
Self-assessed health: fair	0.078	0.087	0.112	0.129	0.187
Self-assessed health: poor	0.012	0.016	0.021	0.031	0.053
Physical functional limitation: 1	0.014	0.032	0.047	0.057	0.085
Physical functional limitation: 2+	0.022	0.029	0.055	0.102	0.160
Any ADL limitations	0.019	0.023	0.042	0.057	0.082
Any IADL limitations	0.073	0.061	0.047	0.053	0.062
CES-D	1.049	0.990	0.978	0.891	1.059
CES-D: missing	0.080	0.065	0.062	0.071	0.095
Heart disease	0.044	0.062	0.078	0.105	0.173
Lung disease	0.005	0.007	0.014	0.019	0.023
Stroke	0.009	0.011	0.027	0.064	0.071
Psychiatric disorder	0.014	0.015	0.005	0.008	0.010
Cancer	0.017	0.014	0.034	0.045	0.052
Hypertension	0.223	0.239	0.336	0.363	0.421
Arthritis	0.022	0.013	0.016	0.033	0.037
Diabetes	0.090	0.111	0.118	0.179	0.181
Illness:missing	0.362	0.219	0.160	0.139	0.086
Underweight	0.022	0.021	0.017	0.024	0.034
Overweight	0.299	0.266	0.291	0.278	0.268
Obese	0.048	0.048	0.038	0.028	0.031
Weight: missing	0.007	0.013	0.011	0.011	0.015
Former smoker	0.332	0.381	0.391	0.458	0.494
Current smoker	0.381	0.360	0.338	0.255	0.174
Smoker: missing	0.077	0.072	0.055	0.071	0.074
Below high school	0.099	0.164	0.223	0.319	0.391
High school	0.340	0.417	0.413	0.393	0.358
Some college	0.107	0.100	0.059	0.039	0.043
College	0.384	0.249	0.233	0.170	0.121
Education: missing	0.070	0.069	0.072	0.078	0.087
Married	0.789	0.806	0.820	0.834	0.829
Marital status: missing	0.063	0.072	0.073	0.088	0.091
Blue collar	0.303	0.245	0.207	0.293	0.317
Low-skilled services	0.054	0.042	0.038	0.031	0.038
Covered by a pension	0.800	0.688	0.599	0.294	0.234
# Obs	588	1156	1225	1243	1248

(B) Females

Variable	Age Group				
	50–54	55–59	60–64	65–69	70–74
Retired	0.250	0.343	0.519	0.703	0.841
Part-time worker	0.317	0.310	0.272	0.188	0.099
Full-time worker	0.433	0.347	0.209	0.109	0.060
Self-assessed health: excellent	0.286	0.239	0.241	0.179	0.145
Self-assessed health: very good	0.273	0.273	0.267	0.245	0.224
Self-assessed health: good	0.328	0.373	0.350	0.388	0.372
Self-assessed health: fair	0.089	0.098	0.121	0.152	0.208
Self-assessed health: poor	0.023	0.017	0.020	0.036	0.050
Physical functional limitation: 1	0.039	0.055	0.068	0.092	0.108
Physical functional limitation: 2+	0.055	0.062	0.079	0.161	0.263
Any ADL limitations	0.018	0.026	0.031	0.049	0.079
Any IADL limitations	0.050	0.056	0.045	0.056	0.049
CES-D	1.340	1.452	1.213	1.189	1.258
CES-D: missing	0.055	0.065	0.058	0.077	0.086
Heart disease	0.031	0.040	0.049	0.094	0.123
Lung disease	0.007	0.004	0.010	0.013	0.010
Stroke	0.002	0.008	0.019	0.027	0.038
Psychiatric disorder	0.018	0.026	0.021	0.027	0.028
Cancer	0.028	0.023	0.036	0.037	0.029
Hypertension	0.154	0.195	0.266	0.348	0.420
Arthritis	0.057	0.057	0.058	0.082	0.105
Diabetes	0.031	0.050	0.072	0.088	0.104
Illness:missing	0.424	0.270	0.188	0.143	0.114
Underweight	0.083	0.074	0.078	0.069	0.049
Overweight	0.207	0.203	0.235	0.260	0.265
Obese	0.062	0.045	0.038	0.047	0.063
Weight: missing	0.026	0.016	0.018	0.012	0.025
Former smoker	0.089	0.082	0.081	0.071	0.065
Current smoker	0.153	0.116	0.088	0.049	0.046
Smoker: missing	0.059	0.073	0.064	0.077	0.080
Below high school	0.078	0.116	0.223	0.359	0.451
High school	0.418	0.451	0.470	0.411	0.342
Some college	0.299	0.256	0.169	0.118	0.100
College	0.150	0.088	0.044	0.034	0.020
Education: missing	0.055	0.089	0.093	0.079	0.088
Married	0.769	0.738	0.712	0.712	0.631
Marital status: missing	0.059	0.086	0.104	0.081	0.097
Blue collar	0.106	0.081	0.100	0.136	0.162
Low-skilled services	0.085	0.063	0.042	0.050	0.066
Covered by a pension	0.816	0.698	0.667	0.286	0.238
# Obs	615	1120	1289	1283	1356