Does retirement affect the mental and general health of the older Japanese workforce? A four waves follow-up using the Japanese Study of Ageing and Retirement (JSTAR-RIETI).

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Abstract

This research paper uses data from the Japanese Study of Ageing and Retirement (JSTAR-RIETI) to assess the association between retirement transition and change in general health (self-perceived health) and mental health of the older workforce aged 50 and over in Japan. The scientific literature provides mixed evidence of the impact of late career transitions on health and highlights the need to account for the heterogeneity of the older workforce. The case of Japan is particularly relevant to assess as it is among the OCDE countries where the effective age of retirement is the highest. Though, little is known about the older Japanese workforce. The article uses longitudinal data from the Japanese Study of Ageing and Retirement (JSTAR-RIETI) that contains four waves (2007, 2009, 2011, 2013). Only the population working at the baseline is selected. Two health indicators are selected for this study: the self-perceived health (SPH) and a post-calculated mental health index (MHI). A latent growth modeling (LGM) is used to assess the short-term association between employment status and health at the baseline (intercept) and the evolution of health over time (slope), after controlling for fixed and time-varying covariates. Maximum likelihood estimations are calculated to control for attrition. Results show that, compared with respondents remaining in employment, those who stop working and do not benefit from pension or disability benefits have a poorer SPH and MHI at the baseline. However, the slope of the LGM indicates that, compared with those who remain in work, their health tends to improve over time. Direct post-retirement health outcomes tend to be negative but there is a health adjustment mechanism so that health outcomes improve over time. The study estimates that a two-waves period (i.e. four years) is enough to recover from the initial fall down. The paper concludes that one must consider the long-term effects of employment transitions rather than short-term, as they raise some causation problems.

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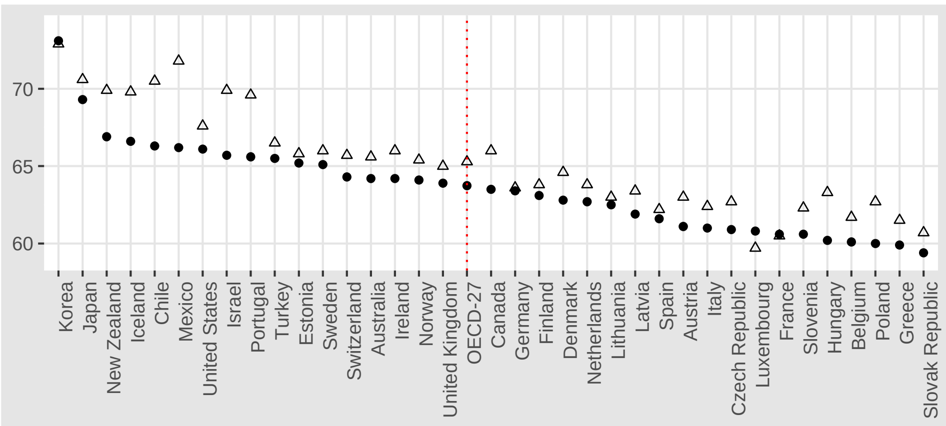
Summary

Introduction

The sustainability of the State Pension System is a major concern in the context of an ageing population and declining birth rate in most industrialized countries. In Japan, the International Monetary Fund has underlined the benefits of raising the eligibility age to the basic pension scheme to 69 by 2030 (Kashiwase et al. 2012) and the Japanese Government is paving the way to raise pension age to 70, but discussions are also about reducing the replacement rate (Kitao 2017). To give a few well-known figures about the demographic challenge Japan faces, the share of the dependent population calculated by the OCDE (i.e. the ratio between the population aged 65+ and the population aged 15-64) was 5.3 per cent in 1955, 10.3 per cent in 1985 and 25.1 per cent in 2013. Even though the share of the population aged 65 and more has increased in most OECD countries, Japan is the only country in which an exponential curve can be observed. As a political consequence, most advanced economies have reformed their pension systems to make them sustainable under current forecast. Even though pension reforms are not always efficient in retaining the older workforce, the older workers' effective age of retirement has nevertheless increased (Wels 2016), raising questions about the well-being of the ageing workforce and the health impact of late career transitions. To give some recent figures, figure 1 exhibits the effective age of retirement as calculated by the OECD (for a critical approach of these estimates, plese read: Wels 2016). It can be clearly observed that, compared to other OECD members, Japan has one of the highest effective age of retirement, both for men (70.6 years of age) and women (69.3 years of age), just after Korea.

Figure 1 Effective age of retirement in 2017 in OECD countries.



Legend: ● = women; Δ = men

Source : OCDE & LSE, using methods described in Keese (n.d.).

The current demographic context together with the recent development of longitudinal datasets have led to an increasing – but still sparse – number of studies focusing on the association between employment trajectories, extension of the working life and older workers' health. (One should note that this issue is relatively new: pensions systems have not been initially implemented to prevent health deterioration over the life course. The increasing length of the working life has consequences that goes beyond the access to social rights).

Using longitudinal data from the Japanese Study of Ageing and Retirement (JSTAR-RIETI), this working paper discusses to what extent late career transitions have an impact on older workers' self-perceived and mental health. The working paper is divided in three sections. The first section aims to present the main recent findings on this matter. The second section presents the methodological features of the study and describes the dataset. Results are presented in the third section of the paper. Finally, we briefly describe the limitations of the research and summarize the main findings flowing from this study.

1. Occupational health and late career transitions

1.1. Accounting for the heterogeneity of the older workforce

The impact of late career transitions on health is subject to a considerable – but still relatively new – amount of research using longitudinal methods. Among the different possible transitions, many studies have focused on the impact of the transition from work to retirement, unemployment and inactivity on health (Graetz 1993; Calvo 2006; Waddell and Burton 2006; Rice et al. 2011; Burton-jeangros et al. 2015) but also on work or family care histories (Corna and Sacker 2013; Wahrendorf 2014; Benson et al. 2017). So far, results vary from one study to another. Some research has found a negative association between retirement transitions and post-retirement health while some other studies have demonstrated the health benefits of retiring.

For instance, Di Gessa and Grundy (2014) have demonstrated that engagement in paid work contributes to maintain health in later life compared to people leaving the labour market. Similarly, using cross-sectional data Siegrist and Wahrendorf (2014) have shown that continued participation in socially productive activities improves prospective quality of life in early old age and Alavinia and Burdof (2008) have demonstrated that poor health, chronic diseases, and lifestyle factors are associated with being out of the labor market. Similarly, looking at full-time workers aged 50 and over, Moon et al. (2012) show that retirement is associated with elevated odds of having cardiovascular disease. Using the Health and Retirement Survey, Voss et al. (2018) found that late-career unemployment has no significant effect on self-reported physical health but is associated with lower levels of mental health. Similarly, taking a life-course perspective, Wahrendorf et al. (2018) have shown, for France, that adverse employment histories and years out of work are associated with poor health at the old age. Conversely, a certain number of studies have underlined the positive impact of retiring, particularly for those working in poor work environment. Using the French GASEL dataset, Westerlund et al. (2009) have shown that workers' self-perceived health is substantially relieved by retirement for all groups of workers (apart from those with ideal working conditions). Similarly, focusing on sleep disturbance, Vahtera et al. (2009) provide strong evidence for a substantial and sustained post-retirement decrease in sleep disturbances. Using Belgian data from the SHARE, I found that respondents moving to retirement are more likely to present a better self-perceived health, depression level and quality of life compared to people increasing or keeping the same working-time level, after controlling for the age and other socio-economic variables (Wels 2018a).

As a matter of fact, the association between retirement transitions and health needs to be nuanced and to account for factors that affect the retirement decision. For instance, Schuring et al. (2015) show that the level of education plays a role in explaining both early retirement decision and post-retirement health. While the health of low-educated workers partly prompts early retirement and economic inactivity, these exit routes prevent further deterioration of their health. The opposite relation is observed for high educated workers as early retirement has an adverse effect on self-reported health. Slightly different finding was reported by König et al. (2018) using Swedish data: as lower educated retirees are more likely to stop working for physical reasons, this leads to poor post-retirement health. The same kind of result is observed when looking at the occupational class (see, for instance, Virtanen et al., 2017). But other factors can be taken into consideration. For instance, the generosity of the Welfare State plays a role in explaining the change in health following work exit. Comparing 16 European countries, Richardson et al. (2018) found that national expenditure on in-kind benefits is associated with more favourable wellbeing change outcomes after leaving the labour market. The nature of the transition, whether voluntary or involuntary, also affects health. Using the Swedish Longitudinal Occupational Survey of Health, Hyde et al. (2015) show that, compared to voluntary employment exit, involuntary exit is associated with a higher risk of reporting major depression and becoming newly prescribed anti-depressant medication. Finally, collective bargaining and trade union membership may also play a role in explaining older workers' health variations. Using the Health and Retirement Study for the United States, I have shown that unionized workers are less likely than non-unionized workers to experience a negative change in self-perceived health and depression level during the different types of late career transitions (Wels 2018b). Unionized workers are also more likely to retire earlier compared with non-unionized workers. In essence, it can be assumed that working life prolongation may have both adverse and beneficial effects.

1.2. Late career transitions specificities in Japan

Studies looking specifically at Japan are few in number. Looking at the case of post-retirement health of older Japanese men using the National Survey of Japanese Elderly, Okamoto et al. (2018) find – after controlling for economic, sociodemographic and health data – that remaining in employment (versus not being employed) has positive effect on life expectancy, reduces cognitive decline and reduces the risk of early diabetes and stroke. They also find that self-employed workers tend to have longer life expectancies compared with employed workers. Similarly, using data from the Japan Gerontological Evaluation Study, Shiba et al. (2017) look at the association between retirement and mental health and the impact of social participation. They find that respondents who transitioned to retirement experience increased depressive symptoms. Men who were continuously retired report increased depressive symptoms whereas moving back to work is associated with reduced depressive symptoms. Using the same dataset, Amemiya et al. (2019) particularly focus on the impact of the socioeconomic status on improvement in functional ability among people aged 60 and over. Their study finds that a high level of education (13 years or more) is associated with functional ability improvement, both for men and women. Interestingly, the number of years of education is the only statistically significant predictor: neither income nor the type of occupation have a statistically significant impact. Using the *Komo-Ise* study (a prospective cohort of community-dwelling residents aged 44–77 years living in two areas in Gunma prefecture), (Miyawaki et al. 2019) analyse the association between information caregiving and mortality. Even though informal caregiving activities are seen as linked to high stress levels, the study does not find any statistically significant association with increased risk of death (all causes) except for female caregivers from the lowest-income group.

But a consensual view on this matter has not been reached. Using the JSTAR-RIETI dataset, Hashimoto (2015) analyses to what extent leaving paid work may affect health, functions, and Lifestyle Behaviour. He finds limited impact of transitioning from paid work to retirement and underlines the need to account for the heterogeneity of the population. The study shows a limited impact on cognitive function, mobility, smoking behaviour, body mass index, psychological distress, hypertension, fruit intake and social participation to voluntary services. Though, some particular segments of the population are more vulnerable than others. That is particularly the case of former while-collar male workers or older women with unsecured jobs.

He concludes that “the heterogeneity of the population at retirement age should be considered to specify causal pathways and policy implications of health impacts after leaving paid work more effectively” (p.1).

Late career transitions have some specificities in Japan that one should particularly account for.

Firstly, **mandatory retirement ages** fixed by the employers raise some issues. Under Japanese law, the mandatory retirement age cannot be under 60 years old (in comparison, most liberal countries such as the United Kingdom, the United States or New Zealand do not have mandatory retirement ages anymore, or just in some very particular sectors of activity (Lain 2017)) and, if the mandatory retirement age is under 65, the employer is required to provide continuous employment up to age 65 (Hamaguchi 2017). Since. 2013, ‘re-employed’ workers could work until 65 if they want to do so under a status of ‘skilled partner’. In 2015, the mandatory retirement age was set to 60 years old by 81.8 per cent of the corporations (Kodama 2015, p. 7). Hence, rather than extending mandatory retirement age, most companies make use of the re-employment system. One major problem caused by re-employment is that workers might work under more precarious status than prior retirement such as non-regular employment and contract work.

Secondly, there is an important **gender divide** within the labour market, that also affects the old age. Many Japanese women interrupts their career following childbirth. This does not apply to a minority: 74 per cent of female university graduates experience period away from work (Zhou 2015). Though, flexible work arrangements are not widespread and job interruption could lead to some situations in which it is hard for women to go back in the labour market. This contrasts with women’s expectations. 60 per cent of women in childrearing think it would be ideal to work after childbirth but there is a gap between women’s expectations and the reality (Zhou 2015). Consequently, post-50 female employment rates are lower than male employment rates (this study finds a 25-percentage points difference between men and women aged 50 and over).

Thirdly, **flexible work arrangements** are not very popular in Japan. However, late career transitions have something to do with working time modulations. Comparing Japan and the United States, Usui et al. (2016) observe that Japanese men aged 60-74 tend to adjust their working time after beginning to receive a public pension: “Men who were employees at 54 gradually move to part-time work or retire after beginning to receive pension benefits; those who continue working tend to be underemployed”. Self-employed men however do not reduce working time, do not retirement and tend to be overemployed. Similarly, Kajitani (2011) finds that Japanese elderly males prefer to work for relatively few hours as they grow older and that working time reduction can maintain older workers' health.

2. Data and methods

2.1. JSTAR-RIETI

JSTAR is a longitudinal dataset that currently contains four waves released every two years (currently: 2007, 2009, 2011, 2013). One of the specificities of the JSTAR dataset is that the baseline sample (2007) contains respondents aged 50 to 75 living in five municipalities in eastern area of Japan (Hidehiko et al. 2009): Takikawa in Hokkaido, Sendai in the Tohoku area, Adachi Ward within Tokyo, Kanazawa in Hokuriki and Shirakawa in the Chubu area. The baseline survey contains 4,200 individuals. One should assume, however, that JSTAR does not contain information about rural Japan, which may cause problems when comparing estimates with results obtained using other international surveys. (One should carefully pay attention to this specificity when carrying cross-national comparisons involving the JSTAR dataset). However, some efforts have been made to increase the number of cities. The 2011 wave includes two additional cities (Tosu and Naha) and there are ten cities in the 2013 wave (Chofu, Hiroshima and Tondabayashi).

Table 1 Sample Attrition in the original RIETI-JSTAR sample

Wave *Year*	1st wave *2007*	2d wave *2009*	3rd wave *2011*	4th wave *2013*	4th / 1st
Adachi (足立区)	868	590	430	363	41.8
Kanazawa (金沢市)	1,011	723	549	486	48.1
Sendai (仙台市)	908	611	475	384	42.3
Takikawa (滝川市)	570	456	386	344	60.4
Shirakawa (白川村)	806	711	638	576	71.5
Total	4,163	3,091	2,478	2,153	51.7
Attrition (as percentage of previous wave)		25.8	19.8	13.1	

The original sample was composed of 4,163 respondents. The attrition rate was 25.8 per cent between wave 1 and wave 2, 19.8 per cent between wave 2 and wave 3 and 13.1 per cent between wave 3 and wave 4. Interestingly, the highest sample attrition between the baseline and wave 4 is in Shirakawa and the lowest attrition is in Adachi. JSTAR-RIETI provides a country-level sample weight that is based on census data and accounts for age and household composition, the type of employment and regional attributes (information about the municipality level are not publicly available).

2.2. Dependent variables

Health is measured using two variables: the self-perceived health (SPH) and a mental health index (MHI). Both variables are used as numeric (see table 1), which facilitates the interpretation of the coefficients. The MHI is post calculated based on the answer to twenty questions (Felt unusual in some way, Had no appetite, Felt depressed and could not be consoled by family or friends, Felt I could do anything a normal person could do, Could not concentrate on what I was doing, Felt depressed, Something that is normally effortless was difficult to do, Felt the future was bright, Felt that my life so far has been a failure, Felt frightened, Could not sleep well, Felt happy, Felt more taciturn than usual, Felt lonely, People around me seemed cold to me, Felt happy, Cried or felt like crying, Felt sad, Felt that people around me disliked me, Didn't feel like doing anything) measuring mental health problems frequencies on a Likert scale (Not at all, 1~2 days a week, 3~4 days a week, 4~5 days or more) coded from 1 to 4. The IMH sums up the answers to these questions and provides an index coded from 0 (very good) to 80 (very poor). SPH simply uses the variable “Overall, how is your current health?” and is coded from (1) ‘good’ to (5) ‘not good’.

2.3. Variables of interest

As this study looks at retirement as a process, the paper distinguishes several employment statuses based on both self-declared information and whether or not respondents receive pension benefits, and the nature of these benefits. Four categories are distinguished: (a) respondents who are working and do not receive any kind of social benefits, (b) respondents who are working but receive state pension benefits, (c) respondents who are not working, and (d) respondents who are not working and receive disability benefits.

2.4. Covariates

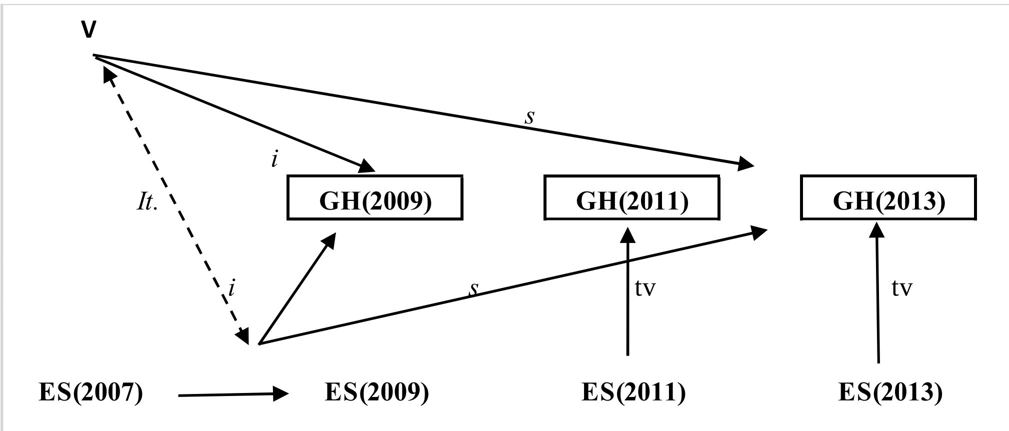
The paper controls for several fixed covariates (information collected in wave 2007): a quadratic function of the age at the baseline, the highest level of education achieved (Elementary to middle school, High School, Junior college, Vocational school, University, Master, PhD), the seniority (i.e. the number of years since the current position started), the martial status (married or common law spouse, not married and no common law spouse), the number of children, the type of business (18 types), the type of employment (Full-time employee, Part-time employee, Temporary worker, contract worker, own or dependent business, Helping in dependent business, side job at home, or other) and the post calculated working time and incomes per week. The study also controls for an index of job dissatisfaction that sums up information collected on a Likert scale ((1) strongly agree, (2) somewhat agree, (3) don't really agree, (4) strongly disagree) on whether or not the job includes physical labor, workload and time pressure, job discretion, colleagues support, appropriate evaluation by manager and pay satisfaction. The natural logarithm of the index is used to ensure that the variable is normally distributed. Finally, two dummy variables are included to control for the exact year when respondents retired (2008 versus 2007, and 2009 versus 2007).

2.5.Models specification

We use a latent growth curve (latent growth modeling - LGM) to examine the association between SPH and MHI and employment status. This is a multivariate approach (Masyn et al. 2013) in which intra individual change is captured by the measurement model for the growth factors, and interindividual differences are captured by the structural model (i.e. the mean and variance/covariance structure of the growth factors). The linear latent growth curve contains two latent factors, an intercept and a slope. The dependent variable (Y_{ti}) is the observed outcome *Y* for individual *i* (from 1 to n) at time *t* (*T* is the number of waves). The intercept (random intercept factor) is the expected outcome on *y* for respondent *i* at time score 0 (i.e. the first wave). The slope (random linear slope factor) is the change in the expected outcome on the dependent variable for respondent *i* for one-unit increase in time so that the slope can be interpreted as the linear rate of change in the dependent variable. In this study, we select only the population in employment in wave 2007 (N= 2,129) and pick up wave 2009 as the baseline to assess for the change in employment status between 2007 and 2009. The model controls for covariates at the baseline and time-changing covariates in order to control for change in employment status in waves 2011 and 2013. For each health indicator, three models are tested. The first model only includes the change in employment status in wave 2009 and does not control for fixed nor time-varying covariates. The second money includes fixed covariates. Finally, the third model controls both for fixed and time-varying covariates. Attrition is controlled using maximum likelihood methods.

The general feature of the model is shown in figure 2 where ‘ES’ is the employment status, ‘GR’ is the general health and ‘V’ is the set of covariates. ‘i’ is the random intercept factor and ‘s’ is the random linear slope

Figure 2 Latent growth curve model including a time-varying predictor



The model is performed using the R-package Lavaan. Attrition and missing data are controlled using likelihood estimations.

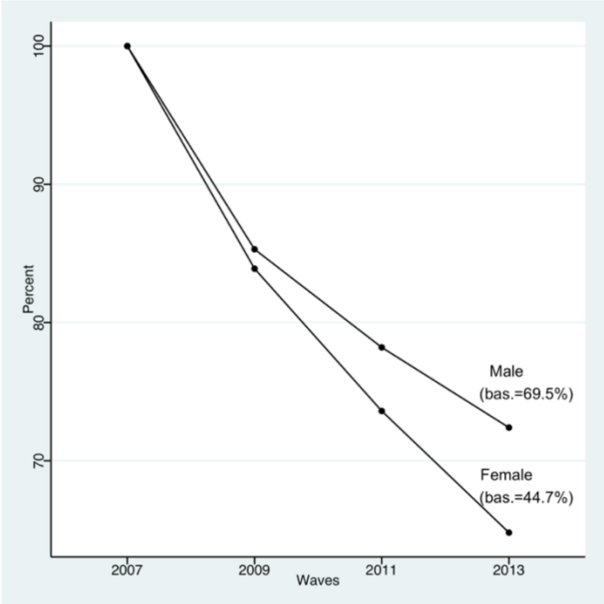
3. Results

The results section is divided in three subsections. The first subsection presents some descriptive statistics about the variables of interest. The second subsection shows the results of an OLS and an Ordered logit regression for the baseline only (2007), not using longitudinal data. Finally, the third subsection shows the results of the LGM.

3.1. Descriptive statistics

The ageing workforce is characterized by an important gender divide. Figure 2 exhibits the change in employment participation across waves. Only respondents in employment were selected at the baseline (in 2007), so the employment participation is 100 per cent. The employment participation at baseline was 69.5 per cent for men and 44.7 per cent for women. From wave 2007 to wave 2009, the employment participation decreased by 14.7 percentage points for men and 16.1 percentage points for women. It decreased respectively by 7.1 and 10.3 percentage points from 2009 to 2011 and by 5.8 and 8.8 percentage points between 2011 and 2013.

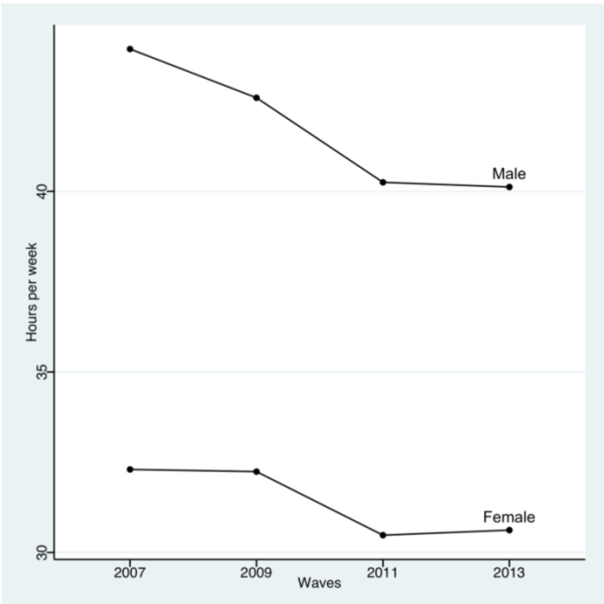
Figure 3 Employment participation in waves 2007, 2009, 2010 and 2013 per gender, in percent.



Source: JSTAR-RIETI, waves2007-13, author's calculation. Excluding missing data.

Looking only at respondents remaining in employment in waves 2009, 2011 and 2013, figure 3 shows the evolution of the average working time for men and women separately. As for the employment participation, the average working time at baseline is higher for men (43.9 hours a week) than for women (32.3 hours). In both cases, the average working time declines from one wave to another. In 2013, the male average working time was 40.1 hours (an average reduction of 3.8 hours a week) and the female average working time was 30.6 (a reduction by 1.7 hours).

Figure 4 Average working time in waves 2007, 2009, 2010 and 2013 per gender, in hours per week.



Source: JSTAR-RIETI, waves2007-13, author's calculation. Excluding missing data.

Table 2 calculates the association between general health in wave 2007 and twelve health conditions that were diagnosed or for which the respondent was advised to seek care in waves 2007, 2009, 2011 and 2013 using an ordered logit regression (not controlling for other factors). The table also shows the prevalence of these conditions. Not surprisingly, high blood pressure concerns 26.4 per cent of the original sample (workers, aged 50 to 75). Respectively 10.8, 8.8; 8.3 and 7.4 per cent of the sample was affected by hyperlipidemia, ulcer and stomach conditions, diabetes and heart problems. Only a small share (0.9 per cent) of the population was diagnosed with depression, which might indicate an under-diagnosis of depressive symptoms. The association between general health – which is self-rated on a Likert scale – and health conditions – that can be considered as some objective measurements of health conditions (but could be subject to under- or overdiagnosis) – show positive estimates when looking at wave 2007. In other words, there is a strong and statistically significant relationship between both variables. That is particularly true for diabetes, stroke or lung conditions.

Table 2 Association between general health at baseline and health conditions for which respondents have been diagnosed or advised to seek care in waves 2007, 2009, 2011 and 2013. Ordered logit model (estimates are in log odds, including 95% CI).

Condition	*Per cent*	2007	2009	2011	2013
Blood pressure	*26.4*	0.60***	0.49***	0.25**	0.31***
		(0.43, 0.78)	(0.29, 0.69)	(0.03, 0.48)	(0.08, 0.55)
Hyperlipidaemia	*10.8*	0.54***	0.42***	-0.01	0.29*
		(0.29, 0.78)	(0.14, 0.71)	(-0.32, 0.30)	(-0.04, 0.62)
Ulcer	*8.8*	0.25*	-0.002	0.003	-0.09
		(-0.03, 0.53)	(-0.33, 0.33)	(-0.36, 0.37)	(-0.46, 0.29)
Diabetes	*8.3*	1.19***	0.70***	0.49***	0.44**
		(0.89, 1.48)	(0.36, 1.04)	(0.12, 0.85)	(0.05, 0.82)
Heart	*7.4*	1.06***	0.37**	0.43**	0.58***
		(0.76, 1.36)	(0.02, 0.73)	(0.05, 0.82)	(0.17, 0.99)
Liver	*3.6*	0.71***	0.03	0.02	0.65**
		(0.27, 1.15)	(-0.46, 0.53)	(-0.51, 0.55)	(0.09, 1.22)
Joint	*3.1*	0.86***	0.31	0.36	0.70**
		(0.40, 1.32)	(-0.23, 0.86)	(-0.22, 0.95)	(0.10, 1.30)
Cancer	*2.8*	0.67***	0.19	0.37	0.14
		(0.20, 1.15)	(-0.37, 0.76)	(-0.25, 0.99)	(-0.50, 0.77)
Bladder	*2.6*	0.94***	0.40	0.69**	0.50
		(0.45, 1.43)	(-0.16, 0.95)	(0.08, 1.29)	(-0.13, 1.13)
Stroke	*1.6*	1.79***	0.58*	0.44	0.26
		(1.12, 2.46)	(-0.11, 1.27)	(-0.28, 1.15)	(-0.44, 0.97)
Depression	*0.9*	0.80*	0.12	0.04	0.79
		(-0.05, 1.66)	(-0.83, 1.07)	(-1.03, 1.12)	(-0.70, 2.29)
Lung	*0.9*	1.43***	0.30	0.38	1.10**
		(0.54, 2.32)	(-0.56, 1.17)	(-0.67, 1.42)	(0.01, 2.18)

Note: General health is coded from ‘1.Good’ to ‘5.Not Good’. Health issues are coded 0 when no health issue was diagnosed and 1 when the health issue has been diagnosed. Thus, positive log odds (>0) indicate that there is a positive association between the specified health issue and the level of general health (the health issue is associated with lower general health). The model does not apply longitudinal weights and does not control for non-response and attrition. Significance levels: ‘***’: 0.001; ‘**’: 0.05; ‘*’: 0.1, ‘·’:>0.1.

3.2. OLS and Logit in wave 2007 (baseline)

First, we perform an ordered probit regression and an ordered least square regression using data from the first wave (2007). This is a synchronic approach that looks at the association between the type of professional status (working, temporarily not working or not working) and the general health. The model controls for age (a quadratic function of age), level of education, gender, number of children and marital status. Data are weighted using the 2007 JSTAR weights.

Table 3 Association between general health and employment status in wave 2007. Ordered logit and ordinary least square weighted regressions.

	Ordered Logit	OLS
Age	-0.05	0.03
	(-1.06, 0.96)	(-0.09, 0.14)
Age_square	0.001	-0.0001
	(-0.02, 0.02)	(-0.001, 0.001)
Gender : Male	-0.01	-0.02
	(-9.55, 9.53)	(-0.10, 0.07)
Educ : Elementary to middle school	-3.69	-1.08
	(-9.72, 2.35)	(-5.38, 3.22)
Educ : High School	-3.73	-1.15
	(-11.61, 4.15)	(-5.45, 3.15)
Educ : Junior college	-3.93^{***}	-1.35
	(-5.44, -2.42)	(-5.65, 2.96)
Educ : Master	-3.92^{***}	-1.20
	(-4.08, -3.77)	(-5.52, 3.13)
Educ : Other	-3.43^{***}	-0.56
	(-3.44, -3.42)	(-5.05, 3.94)
Educ : PhD	-4.63^{***}	-1.70
	(-4.64, -4.61)	(-6.22, 2.83)
Educ : University	-3.75^{***}	-1.16
	(-6.08, -1.42)	(-5.47, 3.14)
Educ : Vocationalschool	-4.11^{***}	-1.53
	(-5.21, -3.02)	(-5.84, 2.77)
Number of children	-0.06	-0.07^{***}
	(-5.59, 5.47)	(-0.10, -0.03)
Marstat : Not Married	0.49	0.51^{***}
	(-3.80, 4.79)	(0.43, 0.60)
Empl : Temporarily not working	-0.46^{***}	-0.41
	(-0.55, -0.37)	(-0.91, 0.09)
Empl : In employment	-0.72	-0.75^{***}
	(-3.10, 1.65)	(-0.84, -0.67)

General health is a categorical variable containing five answer modalities: 1. good, 2. Fairly good, 3. average, 4. not very good, 5. not good. It can be treated as an ordered variable or as a numeric variable. Table 3 shows the results from an ordered logit regression (using general health as an ordered variable) and from an ordinary least square regression (using general health as a numeric variable). The variable of interest is the employment status for which the reference category is ‘not working’ (i.e. retired).

Interestingly, similar trends are observed in the OLS and Ordered Logit models, but significance levels are different. The odds of having a poor general health are 0.46 units lower for those who are temporarily not working compared to respondents who are permanently not working in the ordered model. When looking at the OLS regression, those who are temporarily not working have, on average, a lower general health, by 0.41 units. These coefficients are pretty similar, but the confidence levels are not: the coefficient is significant at 99 per cent in the ordered logit model and is not significant at 90 per cent in the OLS model. By comparison, the coefficients that are observed for the association between being in employment (versus being permanently out of the labor market) and general health are -0.72 (not significant) in the ordered model and -0.75 (significant at 99 per cent) in the OLS model.

In fact, the benefits of using an ordered version of the outcome variable (general health) instead of keeping it as a numeric variable are unclear. Everything seems to indicate that general health could be used as a numeric outcome.

Tables 4 and 5 exhibits some descriptive results about health and employment variables. It can be clearly observed, looking at the Kurtosis, Skewness and Shapiro test, that SPH and MHI are normally distributed. For both SPH and MHI, the mean is slightly higher than the median, indicating the presence of some extreme values. Looking at the employment status, one observes that the baseline sample is composed of 62 per cent of respondents that were working and 38 per cent of respondents combining work and pension. From 2007 to 2009, 15.2 per cent of the sample left the labor market (0.2 per cent moved to a disability scheme) – that is the population this study is analyzing.

Table 4 Descriptive statistics for self-perceived health (SPH) and mental health index (MHI)

	SPH			MHI		
	2009	2011	2013	2009	2011	2013
Mean	2.35	2.43	2.41	6.36	7.22	6.91
Median	2	3	2	4	6	6
Kurtosis	-0.72	-0.51	-0.56	4.80	3.36	7.61
Skewness	0.10	0.08	0.19	1.75	1.38	2.01
Shapiro	0.87^{***}	0.88^{***}	0.89^{***}	0.84^{***}	0.89^{***}	0.84^{***}

Table 5 Distribution of employment statuses from wave 2007 (baseline) to wave 2013, in percentage of the total population at the baseline.

Empl.	(2007)	2009	2011	2013
Work	(62.0)	70.3	33.4	4.7
Work and pension	(38.0)	14.4	42.7	57.6
Not working	(–)	15.2	23.5	37.4
Disability	(–)	0.2	0.4	0.3

3.3. Latent Growth Curve

Table 6 shows the results flowing from LGM. Only a selected number of variables is shown in the table to keep it tidy. The top of the table shows the results for the random intercept factors and the bottom shows the random linear slopes.

The random intercept factor for those who were not working in wave 2009, compared with those who kept working (reference category) clearly indicates that there is a direct association between leaving the labor market and health. The SPH of those who retired is higher by 0.33 units in models 2 and 3 (statistically significant at 99 per cent), compared with those who did not. In other words, retirement is associated with an increase on the SPH scale (that is coded from 'good' to 'not good'). Model 1 shows the same type of coefficient but is not statistically significant. Same conclusion can be made when looking at the MHI. In model 3 (that controls for fixed and time-varying covariates) the MHI of those who retired is, on average, higher of 1.06 units (significant at 90 per cent). As for SPH, there is a direct detrimental effect of retiring on mental health.

What is interesting is that the opposite association can be observed when looking at the random linear slopes. The slope for SPH is negative by 0.15 units (statistically significant at 99 per cent) for those who left the labor market in 2009. Put in another way, compared with those who stayed within the labor market, those who retired tend to have a positive change in SPH over time. One unit increase in time (i.e. two years, in this case) is associated with a lower SPH, by 0.15. Therefore, two units increase in time (i.e. four years) equals -0.30. Similarly, the slope for MHI is negative by -0.72 (significant at 90 per cent) which means that two units increase in time is associated with a lower MHI of about -1.4 units for those who retired compared with those who kept working.

These results indicate two things. On the one hand, retiring is associated with higher SPH and MHI values (SPH and MHI are more likely to be negative for those who retire) when looking at the short-term change in employment status. On the other hand, the long-term effects that are observed with the latent curve in waves 2011 and 2013 indicate that, compared with those who remain within the labor market, those who retire have more positive SPH and MHI slopes.

Table 6 Latent Growth Modelling

		SPH		
		Model 1	Model 2	Model 3
Intercept	Not working	0.365	0.333***	0.331***
	Working and pension	0.011	0.030	0.033
	Disability	1.009*	0.743	0.789
	Age	–	-0.124*	-0.130*
	Age^square	–	0.001*	0.001*
	Wage (baseline)	–	-0.067	-0.083
	Job dissatisfaction	–	1.091***	1.107***
	Gender (female)	–	-0.101	-0.094
Slope	Not working	-0.075	-0.088	-0.151***
	Working and pension	0.026	0.001	-0.015
	Disability	-0.657**	-0.451	-0.764
	Age	–	0.070	0.059
	Age^square	–	-0.001	-0.001
	Wage (baseline)	–	-0.046	-0.046
	Job dissatisfaction	–	-0.283**	-0.274**
	Gender (female)	–	0.013	0.005

		MHI		
		Model 1	Model 1	Model 1
Intercept	Not working	0.460	0.984*	1.057*
	Working and pension	-0.264	0.064	0.048
	Disability	-1.017	-1.032	-1.705
	Age	–	-0.536	-0.634
	Age^square	–	0.004	0.005
	Wage (baseline)	–	0.046	0.341
	Job dissatisfaction	–	3.739***	3.504**
	Gender (female)	–	1.758***	1.758***
Slope	Not working	-0.244	-0.407	-0.717*
	Working and pension	0.294	0.300	0.187
	Disability	0.662	0.250	4.315
	Age	–	-0.149	-0.423
	Age^square	–	0.001	0.003
	Wage (baseline)	–	-3.415*	-3.276*
	Job dissatisfaction	–	0.677	0.689
	Gender (female)	–	-0.211	-0.227

Note: LGM assessing the impact of the change in employment status from wave 2007 to wave 2009. 2009 is selected as the baseline. Slopes are calculated for waves 2011 and 2013. The reference category for employment statuses is 'working'. Model 1 only controls for the employment status. Model 2 controls for the variable of interest and fixed covariates. Model 3 controls for the variable of interest, fixed and time-varying covariates. Data are weighted using 2007 JSTAR weights and attrition and missing values is controlled using maximum likelihood estimations. Results are produced using the R-package *Lavaan*. Source: the Japanese Study of Aging and Retirement (JSTAR-RIETI).

Unfortunately, no significant result is observed for the other employment status (except for those who moved to a disability scheme in SPH, model 1 – which is consistent with what could have been expected). Two covariates are of particular interest. First, job dissatisfaction is highly associated with negative SPH and MHI at the baseline. The random linear slopes do not compensate such a negative effect. Second, female respondents are much more likely to have a worst MHI than men at the baseline (significant at 99 per cent). But what is particularly relevant is the intensity of the coefficients: gender and job dissatisfaction have a much higher impact on workers' health than employment transitions and this also indicates some policy needs.

Limitations

This study has some important limitations.

First, JSTAR does not contain information about rural Japan and this could have an impact on the overall results as labor markets, income levels and quality of life might be expected to be different in part of Japan that are not covered by the study.

Second, given the small sample size, it is not possible to disaggregate the different types of pension benefits that can be received after the retirement age. The role of private pensions, occupational pensions and widow pensions remain to be investigated.

Third, JSTAR will soon provide retrospective data about labor market participation which will enlighten the gender gap and allow an in-depth comparison of the impact of late career transitions for female workers. Finally, the LGM estimates flowing from this study could be improved using more waves – this will be done when new JSTAR waves will be released.

Conclusion

The study shows the need to consider potential health adjustments when looking at late career transitions. The notion of heath adjustment may refer to two perspectives. On the one hand, the longitudinal methods that are used for assessing the association between employment transitions and change in health struggle to deal with causation issues. It is difficult to know whether the change in health following the retirement transition is due to the end of the professional activity or whether that is the health that explains retirement. Looking at short- and long-term variations is a way to tackle such an issue. On the other hand, health adjustment can refer to the change in health that is observed at individual level. A hypothesis flowing from this study could be that there are negative effects of retirement on health when looking at a short time period but that these effects fade away over time.

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Tables and figures

Figures

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