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Health Capacity to Work and Its Long-term Trend among the Japanese Elderly*

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Abstract

This study examines the elderly health-based capacity to work—that is, how much longer the elderly can work judging by their health—and the long-term trend between 1986 and 2016 by using microdata obtained from the nation-wide, population-based survey, “Comprehensive Survey of the Living Conditions,” which was conducted and released by the Ministry of Health, Labour and Welfare of the Japanese Government. Based on the estimated relationship between health and work statuses among individuals in their 50s, this study simulated their capacity to continue working in their 60s and early 70s. The simulation results revealed a large additional work capacity among the elderly, as well as the possibility of some shift from part-time to full-time jobs among elderly males. This study further observed that this additional work capacity has increased over the past 30 years along with the improvement of health, although health conditions still prevent some individuals from working. Results underscore the need for policy measures that can allow for the utilization of the unexploited work capacity of the elderly.

Keywords: Elderly; Employment; Health status; Work capacity.

JEL Classification Codes: I1, J1, J2

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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 behind these two serious concerns is the rapid pace of population aging, which dampens labor force participation (LFP) with continued low fertility and expands fiscal deficits under a pay-as-you-go public pension program. A natural and simultaneous solution to these two policy challenges is to encourage the elderly to continue working as late as possible in terms of age. Thus, the main visible target of recent pension reforms has been to raise the pensionable age, although pension reforms are often accompanied by revisions in various aspects, such as coverage, adequacy, and sustainability, as well as work incentives (OECD, 2017). In fact, many developed countries have implemented or will execute public pension reforms to extend the pensionable age.

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 (Oshio et al., 2018). Recently, Japan has been extending the pensionable age. For male pensioners, the eligibility age for the flat-rate benefit of the Employees' Pension Insurance (EPI) program has increased by one year every three years, rising from 60 years in 2001 to 65 years in 2013. Furthermore, the eligibility age for the EPI wage-proportional benefit was scheduled to increase by one year every three years from 2013 to 2025, in order to reach 65 years at the end of this period. 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 et al., 2011).

However, it is possible that a simple extension of the pensionable age may not work, because not all older adults are able to work regardless of whether they are willing to do so. In particular, a major constraint on working is health, either physical or mental, which may also be associated with a decline in cognitive functions. In this context, a simple extension of the

pensionable age, which ignores heterogeneity among the elderly, may result in increased inequality between healthy and unhealthy individuals and exacerbate the overall living standard of the elderly. Hence, one of the major concerns to be addressed is whether elderly workers are healthy enough to work longer.

This study aims to estimate the additional health capacity of the elderly to work in Japan and its long-term trend over the past 30 years (i.e., between 1986 and 2016), which provides the first such evidence to the best of our knowledge. This study relies on Cutler et al.'s (2012) model (referred to as the CMR model hereafter), a study that estimated the work capacity of the elderly in the United States. Questioning how it would be if people with a given level of health worked as long as they could, the CMR model simulates the work capacity of the age group entitled to receive social security benefits based on the estimated association between the health and work statuses of the age group immediately below the eligibility age.

Based on simulation results, Cutler et al. (2012) conclude that the elderly's work capacity is substantial. The CMR model implicitly assumes that the relationship between the health and work statuses of age groups below the eligibility age is stable and holds for the age group above the eligibility age. Correspondingly, any simulated decline in work given the same level of health status is attributable to factors other than health deterioration, particularly to social security benefits. Using this model commonly, the NBER International Social Security Project found substantial slack of work capacity among the elderly in 12 developed countries (Wise, 2017), including Japan (Usui et al., 2017).¹

In this study, we apply the CMR model to individual-level data obtained from the nationwide, population-based survey "Comprehensive Survey of the Living Conditions" (CSLC), which was conducted and released by the Ministry of Health, Labour and Welfare

¹ Matsukura et al. (2017) applied the CMR model to compute an untapped work capacity using JSTAR and simulate the impact of the use of the untapped work capacity upon potential economic growth using the National Transfer Account framework. They insist that the augmented effect of the economic support ratio upon potential economic growth is substantial in the long term, generating a sizable "silver dividend" in Japan.

(MHLW) of the Japanese Government. This study uses data collected from the household and health datasets of the 2016 CSLC, along with its 1986 and 2001 surveys.

This study differs from previous ones in three aspects. First, when applying the CMR model, this study considers the characteristics of the elderly LFP in Japan. As a benchmark analysis for assessing overall work capacity, this study first divides work status into “work” and “no work,” and focuses on the elderly’s decision to choose between these two options. Then, this study expands the analysis by dividing work into “full-time” and “part-time,” a division motivated by the fact that a substantial portion of Japanese male employees shift to part-time work after retiring from their primary full-time work, rather than completely abandoning the labor force (Shimizutani, 2011; Shimizutani and Oshio, 2010).

Second, this study examines the long-term trend of the health capacity to work over the past 30 years, using data from the CSLC conducted in 1986, 2001, and 2016. Considering the improving trend of the elderly health together with a wider coverage of public pension programs, it is reasonable to hypothesize that the additional work capacity has increased over the past 30 years.

Lastly, this study examines the distribution of work capacity among the elderly. Even if verified, a high health capacity to work among the elderly would not directly underscore an increase in the age of mandatory retirement or eligibility for pension benefits. As there may be a portion of people who are not able to work due to health conditions, policies should address heterogeneity among the elderly. This study thus examines the distribution of the expected probabilities of work and computes the proportion of those who are unable to work due to health conditions.

The remainder of this paper is organized as follows. Section 2 describes the data, Section 3 explains the analytic strategy, Section 4 presents the estimation results, and Section 5 presents a conclusion.

2. Data

Study sample

Conducted by the MHLW, the CSLC started in 1986; its household survey has been conducted every year since then, while its health and income/savings surveys have been conducted every three years. This study mainly used individual-level data obtained from the 2016 CSLC, which was conducted in early June 2016. Samples of the CSLC were collected nationwide through a two-stage random sampling procedure. First, about 5,400 districts were randomly selected from about 940,000 national census districts. Second, about 290,000 households were randomly selected from each selected district, according to its population size. All members of each selected household were asked to complete the questionnaires.

A total of 224,641 households and their members (568,425 individuals) responded to the survey. The response rate was 77.6% at the household level. By restricting the study sample to individuals aged between 50 and 74 years and excluding respondents who did not have essential variables, this study was then limited to the use of data of 197,004 individuals (94,083 men and 102,921 women). The key results were then compared with those obtained from the 1986 and 2001 CSLCs, which contain data of 213,826 individuals (99,282 men and 114,544 women) and 234,139 individuals (111,805 men and 122,334 women), respectively.

Variables

Work

Work status was divided into “work” and “no work” based on the participants’ answers to the question whether they did any paid work in May. Work was further divided into “full-time” and “part-time” based on whether the reported hours worked in the week of mid-May were 35 hours or longer (full-time) or not (part-time).

Health

The following health variables were considered: (i) self-rated health, (ii) diagnosed diseases,

(iii) functional disabilities, (iv) psychological distress, (v) hospitalization, and (v) smoking.

Variables (i) to (iv) were addressed as follows:

(i) Self-rated health: Respondents were asked about their current health conditions according to a five-point scale (good, somewhat good, average, somewhat poor, and poor). Six binary variables were established for each scale, as well as for unanswered questions.

(ii) Diagnosed diseases: Respondents were also asked whether they had each of the 41 diagnosed diseases (such as diabetes, obesity, and hyperlipidemia). Binary variables were established for each of them, as well as for unknown and unanswered.

(iii) Functional disabilities: Respondents were asked whether they had any difficulty in a) everyday activities, b) going out, c) work, housekeeping, and study, d) exercise and sports, e) other(s). Binary variables were established for each of these difficulty items, as well as for unanswered.

(iv) Psychological distress: The participants' assessments on this item were obtained through the following six-item questionnaire rated on a 5-point scale (0 = *not at all* to 4 = *all the time*):

“During the past 30 days, approximately how often have you felt a) nervous, b) hopeless, c) restless or fidgety, d) so depressed that nothing could cheer you up, e) that everything required effort, and f) worthless?” The sum of the reported scores were calculated (range: 0–24) and defined as the Kessler 6 (K6) score (Kessler et al., 2002; Kessler et al., 2010).

Higher K6 scores reflect higher levels of psychological distress. Two binary variables of psychological distress were then determined, to which we allocated “1” to $5 \leq K6 \leq 12$ and $K6 \geq 13$, respectively. $K6 \geq 5$ and ≥ 13 indicate a mood/anxiety disorder and severe mental illness in a Japanese sample, as established by Sakurai et al. (2011).

In addition to (i) to (iv), this study considered whether the respondents were currently hospitalized and whether they were current smokers.

Along with these individual-level health variables, we consider life expectancy, which indicates how many additional years individuals are expected to live on average at each age, as

a proxy of general health status for those at that age. Life expectancy was included as an explanatory variable in regression models as the estimates that use information only about self-reported, individual-level health status tend to fail to capture full health dimensions and therefore overstate the ability to work at more advanced ages. Data on life expectancy was collected from the Life Tables of each year released by the MHLW.²

3. Analytic strategy

3.1 Estimation of the health capacity to work

Following the procedure incorporated in the CMR model, this study first estimated the linear probability model (referred to as Model 1 hereafter) to explain the binary variable of the “no work” status by a full set of health variables for individuals aged 50 to 59 years. Next, the potential work capacity was calculated for those aged 60 to 64, 65 to 69, and 70 to 74 years, respectively, using the estimated regression parameters obtained from the regression model and a set of actual values of health variables in each age group. The gap between the potential work capacity and the actual employment rate was defined as the additional work capacity. The actual employment rate and potential/additional work capacities are presented in terms of the proportion out of the total number of respondents in each age group. These calculations were conducted separately for men and women.

Poterba et al. (2013) propose an alternative regression model, in which the full set of individual-level health variables is replaced by a single health index value. To this end, the authors first obtain the first principal component of the individual-level health variables. Then, they use the coefficients estimated from this analysis to predict a percentile score for each

² Marital status, family relationships, or other socio-demographic/economic variables were not included as covariates, because their inclusion will make it difficult to distinguish the impact of the change in health status on work status from that of other factors. Educational attainment, which is a fixed attribute for the elderly, is available in the 2016 CSLC. However, we do not use it either, because it is not included in the 1986 or 2001 CSLC, which makes it difficult to consistently compare the results across three years. We also find that the estimation results remain almost intact after including educational attainment as a covariate using the 2016 survey.

respondent, referred to as the composite health index. They demonstrate that this index is strongly related to mortality and future health events, such as strokes and diabetes onsets. This study thus estimated Poterba et al.'s alternative model (referred to as Model 2 hereafter) to verify the robustness of the Model 1 results.

Then, this study expanded the CMR model analyses to capture three types of work status: full-time work, part-time work, and no work. Taking full-time work as a reference category, the multinomial logistic model was estimated in order to explain part-time work and no work for individuals in their 50s. Based on the estimated parameters and actual values of each health variables, the potential and, correspondingly, additional capacities for part-time and full-time work were projected for each age group beyond 60 years of age. This analysis focused on the estimation results obtained according to a full set of health variables, as the use of the composite health index lead to much similar results.

To examine how health capacity has changed over the past 30 years, the estimations were repeated with dichotomized work status ("work" and "no work"), using the data of the 1986 and 2001 CSLCs. It should be noted that the health variables used in the regression analysis are somewhat different from those used in the 2016 survey; selected diagnosed diseases were slightly different across the three surveys, K6 scores were not collected in the 1986 and 2001 surveys, and the "smoking" variable was not included in the 1986 survey. Therefore, caution should be exercised in comparing the estimation results of the three surveys.

Based on the estimation results of the three surveys, the change in the additional capacity over the past 30 years was decomposed. The change in the additional health capacity to work between two years is equal to the difference between the change in the potential capacity and the change in the actual employment rate, given its definition. By applying the so-called Blinder-Oaxaca decomposition technique, the change in the potential health capacity was further decomposed into two components: (i) the component due to the change in the mean health status in each age group and (ii) the component due to the change in the mean behavior of

those aged 50 to 59 years.³ This decomposition used Model 2 results, as this model focuses on two health variables (the composite health index and life expectancy), which were commonly used in regression models in the three surveys.⁴

3.2 Key assumptions

This analytic strategy is based on some key assumptions. First, while focusing exclusively on the relationship between the health and work statuses, the choice of work status is also likely to be affected by other factors. Notably, the women's LFP must be affected by their duties regarding housekeeping and care of parents, children, or grandchildren. In addition, lump-sum retirement allowances and private (corporate and/or personal) pension benefits, as well as accumulated financial assets, can encourage retirement. The CRM model, which assumes that non-health determinants of work status remain intact, ignores any impact of these factors.

Second, the CRM model also assumes that the relationship between health and work statuses remains intact in the 50s and beyond. The possibility that the elderly's decision to work may become more or less sensitive to health status with age should not be ruled out.

Considering that simulations are based on estimation using the data of those aged 50 to 59 years, more caution should be taken in interpreting the simulation results for those aged 70 to 74 years than the results for those aged 60 to 64 and 65 to 69 years.

Third, the institutional settings for those aged 50 to 59 years are different across the three surveys. Notably, the Act on Stabilization of Employment of Elderly Persons forced companies to raise the mandatory retirement age to 60 years as of 1998, meaning that the LFP of respondents of the 1986 survey may have been affected by mandatory retirement. For women,

³ In the Blinder-Oaxaca decomposition, this study allocated the interaction effects of two components into these components by taking an average of the mean of the health variable (\bar{X}) and regression coefficient (β) between two points in time (0 and 1). Hence, the decomposition is calculated as (i) $(\beta_1 + \beta_0)/2 \times (\bar{X}_1 - \bar{X}_0)$ and (ii) $(\bar{X}_0 + \bar{X}_1)/2 \times (\beta_1 - \beta_0)$.

⁴ The Blinder-Oaxaca decomposition cannot be applied to Model 1 as this model comprises different sets of health variables across the three surveys.

the eligibility age to claim public pension benefits (both flat-rate and wage-proportional benefits) was below 60 years for a substantial portion of female respondents aged 50 to 59 years in the 1986 and 2001 surveys. Finally, the proportion of self-employed elderly has substantially declined over the past three decades⁵. It is likely that this change in the labor force has made the elderly's decision on work more sensitive to mandatory retirement and eligibility for public pension benefits.

However, it should be noted that we assume that when calculating the potential and additional capacities in each year any non-health factor remained unchanged from the 50s. This study exclusively examined how individuals aged 50 to 59 years would behave if their health statuses were replaced by those of older individuals with other characteristics in common. The benchmark for calculating the potential and additional capacities is the actual employment rate for those aged 50 to 59 years in each year. Therefore, the abovementioned institutional settings do not matter seriously in interpreting the estimated values of the potential additional capacities. In addition, using data of those aged 50 to 59 years as a common benchmark is helpful to compare of the results across the three surveys.

4. Results

4.1 Changes in health and work statuses over the past 30 years

Table 1 summarizes the proportions of respondents who were working (on paid jobs), having poor SRH (self-rating health as poor or somewhat poor), and having at least one functional disability, as well as the average life expectancy in each age group of each survey. As shown in this table, for both men and women, there have been clear trends of improvement in all health variables among those aged 65 to 69 and 70 to 74 years. The improvement trend has been more

⁵ The proportion of the self-employed from the total population, for those aged 50 to 59 years in the sample used in this study in 1986, 2001, and 2016, is 31.1%, 21.7%, and 13.4%, respectively, for men and 7.2%, 6.0%, and 4.7%, respectively, for women.

mixed among younger age groups, who faced a modest deterioration after 2001. In addition, the proportion of those working presents different directions between men and women. While the female employment rate has been consistently increasing among all age groups, men show mixed trends; although men aged 50 to 54, 55 to 59, and 70 to 74 years show consistent downtrends, men aged 60 to 64 and 65 to 69 years show some recoveries after 2001.⁶

4.2 Health capacity to work in 2016

To calculate the health capacity to work, this study applied the CMR model analysis to the 2016 CSLC data. As the first step, two types of linear probability models were estimated (Models 1 and 2) to explain the binary variable of “no work” according to a set of health variables.

Appendix table 1 presents the results of these models for both men and women. Model 1 results show that lower health statuses, including poorer SRH, functional disabilities, psychological distress (only for men), and some diagnosed diseases tend to be positively associated with the probability of no work. However, the presence of some diagnosed diseases, such as hypertension and smoking (only for men), have negative associations with no work. Meanwhile, higher life expectancy, which indicates better overall health status, is negatively associated with no work. The Model 2 results revealed that both the composite health index and life expectancy are negatively associated with work.

Based on these regression results, Table 2 summarizes the simulation results of the potential and additional work capacities in each age group for men and women. Figure 1 graphically presents the Model 1 results. For men, the Model 1 results show that the potential capacity has declined modestly to 84.1% for those aged 70 to 74 years, compared to the actual employment rate of 90.2% for those aged 50 to 59 years, reflecting a relatively limited deterioration in health status. Meanwhile, the actual employment rate has declined more substantially between these

⁶ Oshio et al. (2018) reveals a U-shaped recovery of elderly males' LFP in the 2000s in Japan, somewhat later than in the 1990s, as observed in many other advanced countries.

two age groups, reaching 32.7%. As a result, the potential capacity rose to 12.4%, 33.7%, and 51.3% for those aged 60 to 64, 65 to 69 and 70 to 74 years, respectively. Model 2, which replaces a set of health variables with the composite health index, obtained almost similar results. Compared to men, women's potential capacity has declined more rapidly with age, to 72.4% for those aged 70 to 74 years. This is probably because women's work status in their 50s was more sensitive to health status reflecting their more diversified lifestyles, making their potential capacity drop more rapidly in response to a decline in health status with age. Correspondingly, an increase in the additional capacity was relatively limited to 28.2%, according to the Model 1 results. Meanwhile, there is virtually no difference in the results between Models 1 and 2, as with men.

4.3 Part-time work vs. full-time work

This study then estimated the multinomial logistic models to predict no work and part-time work—with full-time work as a base outcome—through a set of health variables, using the 2016 CSLC data. The regression results for men and women are shown in Appendix table 2. The results are presented in terms of the relative risk ratio (RRR), along with its 95% CI, of no work and part-time work relative to full-time work. Hausman tests were conducted as they support the null hypothesis that the odds are independent of other alternatives for both men and women. As seen in this table, lower health statuses tend to be positively associated with the probabilities of retirement and part-time work. The levels of estimated RRRs, if significantly above one, tend to be higher for no work than for part-time, a result consistent with intuition.

Regarding the simulation analysis based on the regression results, Table 3 summarizes the estimated potential and additional capacities to full-time and part-time works, respectively, for men and women. For men, the proportion of full-time workers declined sharply from 83.5% for those aged 50 to 59 years to 58.5% for those aged 60 to 64 years, and remained in decline thereafter. Meanwhile, the potential capacity declined relatively modestly for full-time work,

resulting in a substantial increase of the additional capacity to 41.0% and 47.9% for those aged 65 to 69 and 70 to 74 years, respectively. Meanwhile, an actual increase in the proportion of part-time work exceeded an increase in its potential capacity. This causes the additional capacity to be negative, indicating excess of part-time work judging by health status. More women work on a part-time basis than men, and the additional full-time work capacity after 60 years of age was much smaller compared to that of men. For part-time work, the actual employment rate and potential capacity were relatively close.

4.4 Long-term changes in health capacity to work

Potential and additional work capacity was estimated using the data of the 1986 and 2001 CSLC surveys and the results were compared with those of the 2016 survey, focusing on the dichotomized work statuses (work and no work). The results are summarized in Table 4.⁷

For men, the actual employment rate declined with age in all surveys, and its level in each age group showed no substantial changes over the past 30 years. Meanwhile, a reduction of the potential capacity with age became more limited in recent years and, correspondingly, the additional work capacity of the older age groups became larger. In particular, Model 1 shows that the potential capacity for men aged 70 to 74 years remained high, at 84.1% in 2016 and 83.9% in 2001, compared to 68.4% in 1986. With a modest reduction in the actual employment rate throughout the past 30 years, the additional capacity of those aged 70 to 74 years rose from 28.7% in 1986 to 45.9% in 2001 and to 51.3% in 2016. This pattern is also observed regarding those aged 65 to 69 years as well. In contrast, the additional capacity for those aged 60 to 64 years declined somewhat from 2001 to 2016, after rising during 1986 to 2001. This occurred because an increase in the actual employment rate dominated an increase in the potential capacity.

⁷ The estimation results are based on the Models 1 and 2 results in each survey year. The entire set of these results are not reported to conserve space, but are available upon request.

For women, the actual employment rate rose for each age group from 1986 to 2016. In response to a consistent increase in the actual employment rate for those aged 50 to 59 years, the levels of potential work capacity for the older age groups became higher in recent years. Together with improvement in health status, this raised the additional work capacity, especially compared to the results of 1986, when the additional capacity was quite limited. Moreover, as with men again, the additional capacity for those aged 60 to 64 years declined somewhat according to the 2001 and 2016 results.

4.5 Decomposition of the change in additional health capacity to work

Based on the Model 2 results, the change in additional health capacity to work was decomposed, as shown in Table 5. First, the bottom panel presents the entire change over the past 30 years. For men, a substantial portion of the increases in the additional capacity for those aged 65 to 69 and 70 to 74 years over that period (11.2 and 20.9 percentage points) was accounted for by an increase in the potential capacity (10.1 and 14.0 percentage points). In addition, regarding the increases in the potential capacity, the contributions from the improving health status were relatively stable (3.7–4.5 percentage points) across the three age groups, while that from the behavioral changes rose with age (0.9 to 10.3 percentage points). Another noticeable finding is that enhanced LFP reduced the additional capacity for those aged 60 to 64 years (minus 2.8 percentage points); this change occurred largely in 2001 and 2016.

The contribution from an increase in the potential capacity was more substantial for women than for men. Improvement in health status made large and stable contributions (9.5–10.8 percentage points) across the three age groups, while their magnitudes were exceeded by those of the contributions from the behavioral changes (16.2–23.2 percentage points). In addition, an increase in the actual employment rate, especially among those aged 60 to 64 years, consistently contained an increase in the additional capacity.

4.6 Distribution of estimated probabilities of work

Lastly, this study examined the distribution of estimated probabilities of work, based on the Model 1 results, considering that the estimated work capacity ignores the heterogeneity among the elderly. Table 6 summarizes the results. As seen in Table 6, a larger proportion of individuals tended to have higher probabilities of work in recent years. About 90% or more of the elderly men were expected to work with a probability of 75% or more in 2001 and 2016, while the proportion of those with a probability of 25% or below has become negligible in recent years. However, a non-negligible portion (6.7% for those aged 50 to 59 years to 13.6% for those aged 70 to 74 years) of men were expected to work with a probability between 25% and 75% even in 2016. The same applies in large part to women, although their probabilities of work have been distributed in a much smaller range compared to men, probably reflecting their more important role in family life. Their probability of work has consistently increased over the past 30 years, but a dominant proportion of elderly women was expected to work with a probability below 75%, even in 2016.

5. Discussions

This study examined the health capacity to work of the elderly—that is, how much longer the elderly can work judging by their health status—by applying the CMR model to data collected from the CSLC. The key findings and their implications are summarized as follows.

First, a substantial slack of work capacity was observed among the Japanese elderly. Assuming that the relationship between the health and work statuses of those aged 50 to 59 years remains intact over 60 years of age, this study's simulation results using the data from the 2016 CSLC suggest that additional 33.7% of men and 22.1% of women in their late 60s can work. The additional work capacity for the elderly in their early 70s is even larger: 51.3% of men and 28.2% of women. Taking these estimation results together, the additional capacity for

those aged 60 to 74 are estimated to be approximately 6,650,000, roughly equivalent to 10% of total labor force in 2016, suggesting a potentially substantial impact of enhancing the elderly' LFP.

Such a large additional work capacity is explained by a substantial reduction in the actual employment rate regarding people beyond 60 years of age, compared to a much more limited deterioration in health status. The former change seems to be largely due to public pension benefits, to which individuals become eligible to claim after the age of 60, as well as mandatory retirement. This reasoning is in line with many previous studies that have demonstrated the negative impact of public pension benefits on the elderly's labor supply (e.g., Gruber and Wise, 1999).

As mentioned at the end of the Analytic Strategy section, however, it should be noted that this CRM model ignores the potential impact of non-health factors on an individual's decision to work. In addition, the model assumes that the relationship between the health and work statuses remains intact in the 50s and thereafter. Therefore, caution should be exercised in interpreting the simulation results, especially regarding those aged 70 to 74 years. It should be also noted that this study disregards the potential impact of labor productivity among the elderly; its improvement would effectively add to labor supply even without an actual increase in the elderly LFP.

Second, this study's simulation results about the three types of work statuses suggest that there is some room for a shift to full-time work not only from retirement but also from part-time work. Additional capacity to part-time work is considered negative for men in all age groups, indicating that there is an *excess* of part-time workers among elderly men, judging by their health status. Meanwhile, there is a substantial slack of full-time work among the elderly. One of the most plausible reasons for this difference is again the public pension programs. The earnings-tested pension benefits program (*Zaishoku Rorei Nenkin*) may induce pensioners to work on a part-time basis and keep their income low enough to prevent their pension benefits

from reducing (Shimizutani and Oshio, 2013), regardless of their health status. A reduction or abolishment of the earnings-tested pension benefits programs is expected to encourage a shift from part-time and no work to full-time work, which in general is likely to reduce the overall additional capacity.

Third, when comparing the simulation results of the 1989, 2001, and 2016 surveys, an increasing trend of the additional work capacity for both men and women was observed, even recognizing that caution should be taken in interpreting the results of different surveys. The labor supply of elderly men has been reducing (albeit modest recovery in most recent years) despite an increase in the potential capacity, and the labor supply of elderly women has not been increasing as fast as the potential capacity.

An increase in the potential capacity is attributable to two factors, as indicated by the results of the Blinder-Oaxaca decomposition analysis. The first is a general trend of improvement in health status, which has been consistently reducing health-related constraints on work. The second is behavioral changes in the age of 50. The elderly's decisions on work have become less sensitive to health status in recent years. This change is more notable among women, probably because the long-term uptrend in the women's LFP have been reducing the negative age gradient of the employment rate and, correspondingly, reducing a negative association between the work and health statuses.

Other factors explaining the increase in the additional work capacity over the past 30 years are the reduction in the actual employment rate among men and the slower increase in relative potential capacity among women. These changes are probably related to a wider coverage of public pension programs and their increasing benefits. In particular, an increase in EPI beneficiaries, which covers those who have been working as private sector employees, has been strengthening the link between work status and eligibility to claim pension benefits. This trend was probably amplified by a structural change in the labor market, away from self-employment.

It should be noted, however, that the actual employment rate among men aged 60 to 64

years has been accelerating since 2001, and the pace of increase among women in the same age group has been well above the older groups since that year. A gradual increase in the eligibility age for public pension benefits, as well as an increase in the mandatory retirement age, seems to have begun to encourage workers to stay in the labor market, eventually leading to a reduction in the additional capacity since 2001 among both men and women aged 60 to 64 years.

Finally, caution should be exercised in interpreting the results from the viewpoint of social policies for the elderly. It is worth recalling that this study addressed the work capacity of the elderly overall, not that of specific individuals. Even if the overall health of the population is improving, there will always be individuals that are too sick to work. Indeed, our analysis of the distribution of the estimated probabilities of work reveals that a non-negligible proportion of men are expected to work only with a probability between 25% and 75%, probably due to health status, even in 2016.

6. Conclusions

This study has posed the following question: if older individuals with a given health status worked as much as their younger counterparts, how longer could they work? After evaluating the capacity to work solely on the basis of health, our simulation results revealed that the employment rates of men and women in their late 60s could be more than 30 and 20 percentage points higher, respectively. This study also found that there is some room for the male elderly to shift from part-time work to full-time work, suggesting there is an excess of part-time work according to a health-based evaluation. This study further observed that the elderly's additional work capacity has increased over the past 30 years, along with the improvement of health status, although health conditions still prevent some individuals from working.

Although this study does not address that aspects other than health status may affect the elderly's ability to work longer, we believe that our simulation results provide new insights into

the policy debates about public pension reform. The exact values estimated for potential increases in employment rates are less important than the overall conclusion that the elderly are healthy enough, at least on average, to work longer. The results also underscore that policy measures can utilize the extra work capacity, a part of which seems to have been created by public pension programs and other institutional factors.

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Table 1. Summary statistics of working and health statuses in 1986, 2001, and 2016

Age group	Year	Work (%)	Life expectancy (years)	Poor self-rated health (%)	Functional disabilities (%)	N
Men						
50-54	1986	95.7	26.3	13.0	N/A	26332
	2001	95.3	28.4	10.2	8.3	30779
	2016	91.1	30.7	12.6	11.2	16795
55-59	1986	88.5	22.2	14.5	N/A	24609
	2001	92.4	24.1	12.1	10.4	22188
	2016	89.2	26.2	14.3	13.4	17278
60-64	1986	67.4	18.3	16.6	N/A	18626
	2001	69.6	20.2	13.0	13.1	21026
	2016	75.5	21.9	14.2	14.2	19460
65-69	1986	53.6	14.5	19.6	N/A	13155
	2001	51.9	16.3	15.8	16.5	20393
	2016	52.5	18.0	15.1	15.5	24165
70-74	1986	39.7	11.2	24.6	22.4	11124
	2001	38.0	12.9	19.0	20.0	17419
	2016	32.7	14.2	18.2	19.3	16385
Women						
50-54	1986	56.3	30.9	16.5	N/A	28094
	2001	66.8	34.4	13.0	9.8	31343
	2016	75.9	36.3	11.9	11.3	17946
55-59	1986	44.4	26.3	16.6	N/A	26293
	2001	56.9	29.7	13.3	10.9	23022
	2016	69.0	31.7	13.0	13.0	18468
60-64	1986	31.9	22.0	18.7	N/A	22906
	2001	36.3	25.4	14.3	13.1	23375
	2016	50.7	27.0	13.2	14.2	21114
65-69	1986	22.3	17.8	22.3	N/A	18150
	2001	25.3	21.0	17.1	16.1	23520
	2016	32.2	22.6	13.6	14.3	26301
70-74	1986	13.4	13.7	27.0	N/A	15162
	2001	17.6	16.9	20.7	21.0	21074
	2016	19.1	18.1	16.0	16.7	19092

Note: ^a The proportion of respondents who reported poor and somewhat poor self-rated health.

^b The proportion of respondents who reported at least one functional disability.

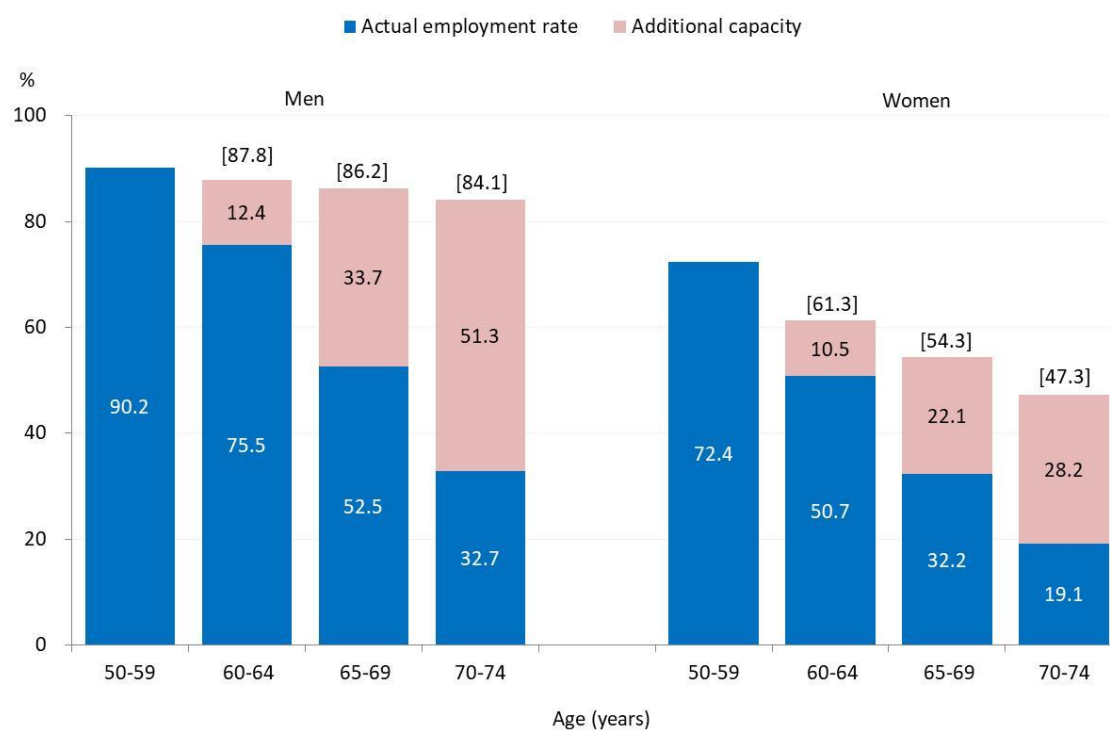
Table 2. Estimated potential and additional capacities to work in 2016

(% of total respondents in each age group)

Age group	50-59	60-64	65-69	70-74
Men				
Actual employment rate	90.2	75.5	52.5	32.7
Potential capacity				
Model 1	90.2	87.8	86.2	84.1
Model 2	90.2	87.5	85.8	84.0
Additional capacity				
Model 1	-	12.4	33.7	51.3
Model 2	-	12.0	33.3	51.3
<i>N</i>	34073	19460	24165	16385
Women				
Actual employment rate	72.4	50.7	32.2	19.1
Potential capacity				
Model 1	72.4	61.3	54.3	47.3
Model 2	72.4	61.4	54.4	47.2
Additional capacity				
Model 1	-	10.5	22.1	28.2
Model 2	-	10.6	22.1	28.1
<i>N</i>	36414	21114	26301	19092

Note: Based on the estimation results reported in Appendix table 1.

Figure 1. Estimated potential and additional capacities to work in 2016, based on Model 1 results



Note: The numbers in [] indicate the potential capacity to work.

Table 3. Estimated capacity to full- and part-time work in 2016: multinomial logistic models

Type of work	(% of total respondents in each age group)							
	Full-time				Part-time			
Age group	50–59	60–64	65–69	70–74	50–59	60–64	65–69	70–74
Men (<i>N</i> = 34073)								
Actual employment rate	83.5	58.5	30.5	16.0	6.6	16.9	22.0	16.7
Potential capacity	83.5	78.6	74.7	69.5	6.6	9.1	11.0	13.5
Additional capacity	-	18.6	41.0	47.9	-	-7.4	-10.0	-1.7
Women (<i>N</i> = 36414)								
Actual employment rate	42.5	23.4	12.3	7.7	29.9	27.3	20.0	11.4
Potential capacity	42.5	34.5	29.2	23.9	29.9	25.7	22.4	19.0
Additional capacity	-	11.1	16.9	16.2	-	-1.7	2.5	7.6

Note: Based on the estimation results reported in Appendix table 2.

Table 4. Estimated capacity to work in 1986, 2001, and 2016^a

Age group	Men				Women			
	50-59	60-64	65-69	70-74	50-59	60-64	65-69	70-74
1986								
Actual employment rate	92.2	67.4	53.6	39.7	50.5	31.9	22.3	13.4
Potential capacity								
Model 1	92.2	82.2	75.1	68.4	50.5	34.2	23.7	13.2
Model 2	92.2	82.2	75.7	70.1	50.5	34.4	24.1	14.4
Additional capacity								
Model 1	-	14.9	21.5	28.7	-	2.4	1.4	-0.1
Model 2	-	14.8	22.1	30.4	-	2.5	1.8	1.1
<i>N</i>	54387	22906	18150	15162	54387	22906	18150	15162
2001								
Actual employment rate	94.1	69.6	51.9	38.0	62.6	36.3	25.3	17.6
Potential capacity								
Model 1	94.1	89.8	86.8	83.9	62.6	48.0	38.6	29.5
Model 2	94.1	90.1	87.7	85.5	62.6	48.2	39.2	30.7
Additional capacity								
Model 1	-	20.2	34.9	45.9	-	11.7	13.3	11.9
Model 2	-	20.5	35.8	47.6	-	11.9	13.9	13.1
<i>N</i>	54365	23375	23520	21074	54365	23375	23520	21074
2016								
Actual employment rate	90.2	75.5	52.5	32.7	72.4	50.7	32.2	19.1
Potential capacity								
Model 1	90.2	87.8	86.2	84.1	72.4	61.3	54.3	47.3
Model 2	90.2	87.5	85.8	84.0	72.4	61.4	54.4	47.2
Additional capacity								
Model 1	-	12.4	33.7	51.3	-	10.5	22.1	28.2
Model 2	-	12.0	33.3	51.3	-	10.6	22.1	28.1
<i>N</i>	36414	21114	26301	19092	36414	21114	26301	19092

Note. ^a Figures in the table indicate the proportion (%) of the total number of respondents in each age group.

Table 5. Decomposition of the change in the additional capacity, based on Models 2 results

Age group	Men			Women		
	60–64	65–69	70–74	60–64	65–69	70–74
Additional capacity (%)						
1986	14.8	22.1	30.4	2.5	1.8	1.1
2001	20.5	35.8	47.6	11.9	13.9	13.1
2016	12.0	33.3	51.3	10.6	22.1	28.1
Change from 1986 to 2001 (% point)	5.7	13.6	17.1	9.4	12.1	12.0
Due to:						
(+) Increase in the potential capacity	7.9	12.0	15.5	13.8	15.1	16.3
Due to the change in the mean health status	2.6	2.4	2.2	8.0	7.5	7.1
Due to the change in the mean behaviors in those aged 50–59 years	5.4	9.6	13.3	5.9	7.6	9.2
(–) Increase in the actual employment rate	2.2	–1.7	–1.7	4.4	3.0	4.2
Change from 2001 to 2016 (% point)	–8.5	–2.5	3.7	–1.3	8.2	15.0
Due to:						
(+) Increase in the potential capacity	–2.6	–1.9	–1.5	13.1	15.1	16.5
Due to the change in the mean health status	1.0	1.1	0.9	3.3	3.3	2.8
Due to the change in the mean behavior in those aged 50–59 years	–3.6	–3.0	–2.4	9.9	11.8	13.7
(–) Increase in the actual employment rate	5.9	0.6	–5.2	14.4	6.9	1.5
Change from 1986 to 2016 (% point)	–2.8	11.2	20.9	8.1	20.3	27.0
Due to:						
(+) Increase in potential capacity	5.4	10.1	14.0	27.0	30.2	32.7
Due to the change in the mean health status	4.5	4.3	3.7	10.8	10.5	9.5
Due to the change in the mean behaviors in those aged 50–59 years	0.9	5.8	10.3	16.2	19.7	23.2
(–) Increase in the actual employment rate	8.1	–1.1	–6.9	18.9	9.9	5.7

Table 6. Distribution of the estimated probabilities of work, based on Models 1 results

(%)

Year	Probability (%)	Men				Women			
		50- 59	60- 64	65- 69	70- 74	50- 59	60- 64	65- 69	70- 74
1986	75-100	94.8	88.7	72.2	32.5	0.0	0.0	0.0	0.0
	50-75	4.8	8.6	21.5	55.4	57.0	0.0	0.0	0.0
	25-50	0.4	2.6	5.9	11.7	41.6	90.2	49.9	3.3
	0-25	0.0	0.1	0.5	0.5	1.4	9.8	50.1	96.7
2001	75-100	98.2	96.1	92.9	88.5	1.1	0.0	0.0	0.0
	50-75	1.6	3.5	6.4	10.2	93.3	47.4	1.5	0.0
	25-50	0.2	0.4	0.6	1.2	5.1	50.1	92.0	80.0
	0-25	0.0	0.0	0.0	0.1	0.5	2.4	6.6	20.0
2016	75-100	93.3	91.8	90.5	86.4	37.4	0.2	0.0	0.0
	50-75	6.5	7.9	9.2	12.9	61.2	94.9	84.2	35.5
	25-50	0.2	0.3	0.3	0.6	1.3	4.7	15.3	63.0
	0-25	0.0	0.0	0.0	0.0	0.0	0.2	0.4	1.4

Appendix table 1. Regression results of Models 1 and 2 for those aged 50–59 years in 2016

Dependent variable = No work

	Men (<i>N</i> = 34073)		Women (<i>N</i> = 36414)	
	Coef.	(SE)	Coef.	(SE)
Model 1				
Self-rated health (ref = 1 [good])				
2 (somewhat good)	-0.005	(0.005)	-0.017 *	(0.008)
3 (average)	0.004	(0.005)	-0.002	(0.007)
4 (somewhat poor)	0.032 ***	(0.007)	0.013	(0.010)
5 (poor)	0.127 ***	(0.014)	0.062 **	(0.023)
Unanswered	0.003	(0.055)	-0.012	(0.036)
Diagnosed diseases				
Diabetes	0.007	(0.006)	0.059 ***	(0.014)
Obesity	0.038 *	(0.018)	0.007	(0.038)
Hyperlipidemia	-0.014 *	(0.007)	-0.001	(0.011)
Thyroid gland	-0.009	(0.018)	0.001	(0.018)
Psychological distress	0.161 ***	(0.012)	0.182 ***	(0.016)
Dementia	-0.030	(0.023)	-0.066 *	(0.029)
Parkinson's disease	-0.084	(0.044)	-0.051	(0.062)
Other neurotic diseases	0.070 ***	(0.019)	0.126 ***	(0.028)
Eye diseases	0.017 *	(0.008)	-0.011	(0.012)
Ear diseases	-0.027	(0.017)	-0.002	(0.027)
Hypertension	-0.012 **	(0.004)	-0.028 ***	(0.008)
Stroke	0.079 ***	(0.014)	0.061 *	(0.028)
Angina pectoris	0.013	(0.011)	-0.027	(0.026)
Other cardiovascular diseases	0.034 **	(0.012)	-0.023	(0.023)
Cold	0.020	(0.036)	-0.038	(0.046)
Allergic rhinitis	-0.012	(0.013)	0.013	(0.016)
COPD	0.093 *	(0.044)	0.131	(0.112)
Asthma	0.014	(0.016)	-0.004	(0.023)
Other respiratory diseases	-0.017	(0.015)	0.007	(0.030)
Gastroduodenal diseases	-0.007	(0.012)	0.016	(0.020)
Liver and gall bladder diseases	0.038 *	(0.015)	0.027	(0.027)

Other digestive diseases	0.022		(0.014)	0.025		(0.022)
Dental diseases	-0.009		(0.007)	0.013		(0.011)
Atopic dermatitis	0.003		(0.024)	-0.018		(0.024)
Other skin diseases	-0.012		(0.013)	-0.009		(0.018)
Gout	-0.016		(0.010)	0.010		(0.046)
Rheumatoid arthritis	-0.007		(0.022)	0.066	**	(0.025)
Arthropathy	0.015		(0.012)	-0.023		(0.016)
Stiff shoulder	0.007		(0.011)	-0.040	**	(0.014)
Backache	-0.006		(0.008)	-0.032	**	(0.013)
Osteoporosis	0.121	***	(0.015)	-0.054	**	(0.019)
Kidney diseases	0.058	***	(0.015)	0.073	*	(0.030)
Benign prostatic hyperplasia	-0.057	***	(0.017)			
Menopausal disorders				0.029		(0.025)
Fracture	0.017		(0.021)	0.000		(0.030)
Other injuries	-0.054	*	(0.022)	-0.026		(0.029)
Blood diseases	0.063	**	(0.023)	-0.030		(0.030)
Cancer	0.005		(0.019)	0.061	**	(0.023)
Pregnancy				0.047		(0.255)
Infertility				0.270		(0.313)
Other	0.014		(0.011)	0.028	*	(0.014)
Unknown	0.102	*	(0.043)	-0.080		(0.066)
Unanswered	0.076	**	(0.025)	-0.007		(0.042)
Functional disabilities						
Activities of daily living	0.043	***	(0.009)	0.009		(0.013)
Going out	0.094	***	(0.010)	0.071	***	(0.015)
Work, housekeeping, and study	0.047	***	(0.008)	0.013		(0.012)
Exercise and sports	-0.001		(0.009)	0.038	**	(0.014)
Other	0.091	***	(0.013)	0.050	**	(0.018)
Unanswered	0.135	**	(0.053)	0.038		(0.084)
Psychological distress (ref = K6 score 0-4)						
K6 score 5-12	0.010	*	(0.004)	0.002		(0.006)
K6 score 13-24	0.052	***	(0.009)	0.022		(0.012)
In hospital	0.188	***	(0.055)	0.086	*	(0.038)
Smoking	-0.023	***	(0.005)	-0.004		(0.012)

Life expectancy	-0.004 ***	(0.001)	-0.016 ***	(0.001)
Adjusted R^2		0.0592		0.0222
Model 2				
Composite health index	-0.094 ***	(0.006)	-0.054 ***	(0.008)
Life expectancy (year/100)	-0.365 ***	(0.063)	-1.564 ***	(0.087)
Adjusted R^2		0.0088		0.0101

*** $p < 0.001$, ** $p < 0.01$, * $p < 0$

Appendix table 2. Regression results of multinomial logistic models for individuals aged 50–59 years in 2016

Base outcome = Work

Dependent variable	Men (N = 34073)				Women (N = 36414)			
	No work		Part-time work		No work		Part-time work	
	RRR	(SE)	RRR	(SE)	RRR	(SE)	RRR	(SE)
Self-rated health (ref = 1 [good])								
2 (somewhat good)	0.93	(0.07)	0.86	(0.07)	0.94	(0.04)	1.06	(0.04)
3 (average)	1.10	(0.07)	1.06	(0.07)	0.99	(0.04)	0.99	(0.03)
4 (somewhat poor)	1.49 ***	(0.12)	1.11	(0.10)	1.02	(0.06)	0.91	(0.05)
5 (poor)	2.43 ***	(0.31)	1.53 **	(0.25)	1.35 *	(0.17)	1.06	(0.14)
Unanswered	1.06	(0.78)	1.22	(0.91)	0.76	(0.15)	0.54 **	(0.11)
Diagnosed diseases								
Diabetes	1.09	(0.08)	1.06	(0.09)	1.32 ***	(0.10)	1.00	(0.08)
Obesity	1.46 *	(0.28)	1.09	(0.28)	1.23	(0.26)	1.45	(0.30)
Hyperlipidemia	0.81 *	(0.07)	0.75 **	(0.08)	0.95	(0.06)	0.90	(0.06)
Thyroid gland	0.89	(0.18)	0.94	(0.23)	1.09	(0.11)	1.20	(0.12)
Psychological distress	3.38 ***	(0.34)	2.45 ***	(0.32)	2.73 ***	(0.24)	1.56 ***	(0.16)
Dementia	0.78	(0.17)	0.74	(0.22)	0.77	(0.13)	1.17	(0.18)
Parkinson's disease	0.52	(0.23)	0.51	(0.31)	0.73	(0.25)	0.82	(0.29)
Other neurotic diseases	1.85 ***	(0.31)	1.89 **	(0.38)	1.86 ***	(0.28)	1.13	(0.19)
Eye diseases	1.24 *	(0.11)	1.37 **	(0.14)	0.90	(0.06)	0.87 *	(0.06)
Ear diseases	0.83	(0.17)	1.74 **	(0.32)	1.07	(0.16)	1.18	(0.17)
Hypertension	0.86 **	(0.05)	0.84 **	(0.05)	0.82 ***	(0.04)	0.87 **	(0.04)

Stroke	2.05	***	(0.27)	1.77	***	(0.29)	1.27	(0.19)	0.88	(0.15)	
Angina pectoris	1.15		(0.14)	1.05		(0.16)	0.87	(0.13)	0.97	(0.14)	
Other cardiovascular diseases	1.33	*	(0.16)	0.91		(0.15)	0.89	(0.11)	1.00	(0.12)	
Cold	1.30		(0.50)	1.65		(0.68)	0.83	(0.22)	1.01	(0.25)	
Allergic rhinitis	0.85		(0.13)	0.85		(0.15)	1.18	(0.11)	1.24	*	(0.11)
COPD	2.02		(0.77)	0.97		(0.59)	1.63	(0.96)	0.83		(0.61)
Asthma	1.16		(0.20)	1.07		(0.23)	1.08	(0.14)	1.23		(0.15)
Other respiratory diseases	0.86		(0.15)	1.12		(0.21)	1.05	(0.18)	1.03		(0.17)
Gastroduodenal diseases	0.92		(0.12)	0.93		(0.15)	1.00	(0.11)	0.81		(0.09)
Liver and gall bladder diseases	1.49	**	(0.22)	1.44	*	(0.26)	1.08	(0.16)	0.87		(0.14)
Other digestive diseases	1.27		(0.18)	1.02		(0.19)	1.19	(0.14)	1.12		(0.14)
Dental diseases	0.90		(0.08)	0.95		(0.10)	1.09	(0.06)	1.04		(0.06)
Atopic dermatitis	1.03		(0.29)	0.78		(0.29)	0.96	(0.13)	1.13		(0.15)
Other skin diseases	0.89		(0.13)	0.99		(0.17)	0.95	(0.09)	0.99		(0.09)
Gout	0.78		(0.11)	0.83		(0.13)	1.12	(0.29)	1.16		(0.29)
Rheumatoid arthritis	1.00		(0.23)	1.28		(0.33)	1.28	(0.17)	0.87		(0.13)
Arthropathy	1.13		(0.14)	0.90		(0.14)	0.92	(0.08)	1.07		(0.09)
Stiff shoulder	1.09		(0.13)	1.14		(0.16)	0.78	**	(0.06)	0.92	(0.07)
Backache	0.94		(0.08)	0.93		(0.10)	0.83	**	(0.06)	0.96	(0.06)
Osteoporosis	2.43	***	(0.32)	1.55	*	(0.29)	0.79	*	(0.09)	1.12	(0.12)
Kidney diseases	1.59	***	(0.22)	0.95		(0.20)	1.41	*	(0.23)	1.01	(0.18)
Benign prostatic hyperplasia	0.49	**	(0.11)	0.75		(0.18)					
Menopausal disorders							1.25	(0.17)	1.17		(0.16)

Fracture	1.16	(0.23)	1.10	(0.28)	1.03	(0.17)	1.06	(0.18)
Other injuries	0.58	(0.17)	1.20	(0.31)	0.93	(0.15)	1.14	(0.18)
Blood diseases	1.54 *	(0.33)	0.89	(0.29)	0.85	(0.15)	1.00	(0.16)
Cancer	1.12	(0.22)	1.29	(0.29)	1.26	(0.16)	0.88	(0.12)
Pregnancy					1.43	(2.03)	1.33	(1.89)
Infertility					2.03	(2.89)	0.00	(0.00)
Other	1.22	(0.14)	1.26	(0.18)	1.19 *	(0.09)	1.09	(0.09)
Unknown	1.60	(0.58)	0.00	(0.00)	0.73	(0.28)	1.20	(0.42)
Unanswered	2.16 ***	(0.52)	1.32	(0.44)	1.08	(0.26)	1.29	(0.29)
Functional disabilities								
Everyday activities	1.42 ***	(0.12)	1.31 *	(0.14)	1.01	(0.07)	0.93	(0.07)
Going out	1.79 ***	(0.16)	1.19	(0.15)	1.40 ***	(0.11)	1.04	(0.09)
Work, housekeeping, and study	1.53 ***	(0.12)	1.67 ***	(0.16)	1.09	(0.07)	1.07	(0.07)
Exercise and sports	1.02	(0.09)	1.15	(0.12)	1.17 *	(0.09)	0.96	(0.08)
Other	2.01 ***	(0.22)	1.56 **	(0.23)	1.14	(0.11)	0.78 *	(0.08)
Unanswered	2.90 *	(1.29)	1.80	(1.14)	1.06	(0.46)	0.69	(0.34)
Psychological distress (ref = K6 score 0-4)								
K6 score 5-12	1.14 **	(0.05)	1.03	(0.06)	0.99	(0.03)	0.96	(0.03)
K6 score 13-24	1.58 ***	(0.14)	1.25	(0.15)	1.12	(0.07)	1.02	(0.07)
Hospitalized	4.89 *	(3.62)	1.94	(1.45)	1.85 **	(0.37)	1.77 **	(0.39)
Smoking	0.72 ***	(0.05)	0.92	(0.07)	0.94	(0.06)	0.91	(0.06)
Life expectancy	0.95 ***	(0.01)	0.94 ***	(0.01)	0.92 ***	(0.00)	0.99 *	(0.00)
Pseudo R^2		0.0520				0.0120		

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.