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Can Healthy Aging Boost Labor Supply? Evidence from Korea

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ABSTRACT: This paper examines the role of 'healthy aging' in boosting labor supply in Korea. First, we use microdata from surveys to assess whether there is evidence that the physical abilities of individuals aged 50 years and above have been improving over successive cohorts. Second, we investigate whether health improvements among older workers influence their labor market outcomes, such as the decision to supply labor or to retire. We use an instrumental variable approach to enable causal inference, proxying exogenous variations in health with the incidence of certain chronic diseases. Our findings reveal that (i) physical health indicators have improved on average across birth cohorts, providing evidence in favor of 'healthy aging' in Korea, and (ii) better health increases the probability of participating in the labor force and postponing retirement. Overall, our results suggest that healthy aging has increased the labor supply of older individuals in Korea by around 1.9 percentage points per year during the 2006-20 period. The results for Korea are qualitatively comparable but quantitatively somewhat stronger than those for comparator Asian countries.

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WORKING PAPERS

Can Healthy Aging Boost Labor Supply? Evidence from Korea

Prepared by Bertrand Gruss, Eric Huang, Andresa Lagerborg, Diaa Noureldin, and Galip Kemal Ozhan[1]

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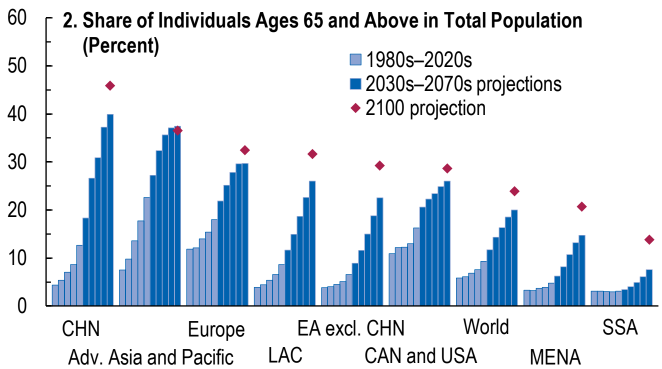
Contents

1. Introduction

Population aging—driven by falling fertility rates and rising longevity—is profoundly impacting economies worldwide. This transformation is occurring rapidly in Asia (Figure 1). Japan has currently one of the highest shares of old-age population (above age 65) in the world and countries such as Korea and China are projected to be among the fastest aging populations in the coming decades, according to the United Nations World Population Projections (UNWPP). As population aging is generally associated with a shrinking labor force a deeper understanding of its implications for labor markets is key.[1]

Figure 1 Global Population Aging Trends



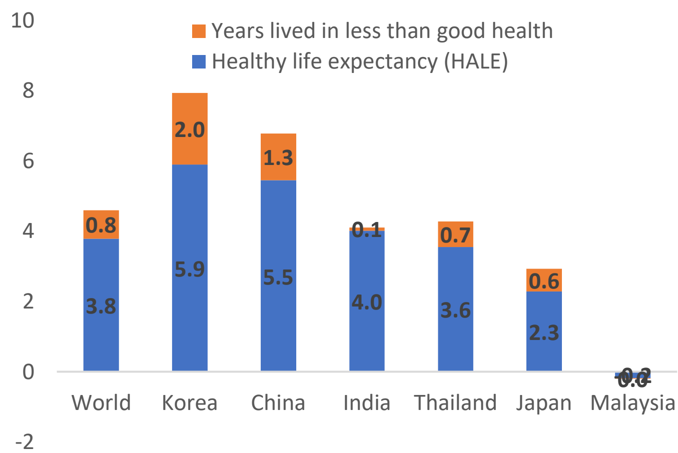
Source: United Nations World Population Prospects (UNWPP); and authors' calculations.
Note: This figure plots the average share of individuals aged 65 and over in the total population by decade from 1980 to 2100 using historical data and projections from the UNWPP.

The traditional view of the macroeconomic implications of population aging is largely gloomy, premised on an inevitable drag on economic growth associated with fiscal strain due to rising fiscal spending on pensions and healthcare, along with reduced labor income tax revenue. However, this view abstracts from the fact that health improvements have been a key driver of rising longevity. For instance, global life expectancy has increased by around 4.5 years over the last two decades, and the additional years individuals live have been largely free from chronic diseases. In Asia, a number of countries have seen both life expectancy and healthy life expectancy—defined by the World Health Organization as the number of years expected to be lived in full health—rising faster than the world average (Figure 2).[2] This 'healthy aging' phenomenon has the potential to partly mitigate the adverse economic effects of population aging, particularly in Asia.

[1] While higher savings are typically associated with population aging and could lead to lower interest rates, this is not necessarily enough to offset the expected growth decline, leading to a potential increase in the differential between the cost of borrowing for governments and the rate of growth, further amplifying fiscal pressures.

[2] A possible exception is Malaysia where life expectancy has stagnated.

Figure 2. Additional Years of Life Expectancy, 2000-21



Source: World Health Organization; and authors' calculations.
Note: HALE denotes health-adjusted life expectancy, defined by the WHO as the average number of years a person is expected to live in full health and free from chronic diseases.

This paper studies whether (i) individuals from more recent cohorts in Korea have been aging in better health compared with individuals from earlier birth cohorts, and (ii) whether this healthy aging trend has raised individuals' ability and willingness to remain attached to the labor market. The focus on Korea stems from two considerations: First, Korea stands out as a country where demographic change has been particularly acute given the notably low fertility rate and the steep rise in life expectancy over the last two decades. Second, , Korea produces rich microdata tracking older individuals over time with regularly conducted surveys. To place the findings for Korea in context, we also include other comparator Asian economies in the analysis: China, India, Japan, Malaysia, and Thailand. These countries provide a rich point of comparison given that they are at different stages of their demographic transition. They also have comparable microdata on health indicators and labor market outcomes for older individuals.

This paper makes two contributions. First, we analyze the determinants (correlates) of physical health indicators and whether there is evidence of healthy aging across birth cohorts. We consider different physical health indicators from survey-based micro datasets focused on individuals aged 50 and above. These include a measured indicator of physical strength—grip strength—as well as three self-reported measures: Overall health status; the ease of doing activities of daily living (ADLs); and the ease of conducting the instrumental activities of daily living (IADLs).[3]. The survey-based datasets also include a rich set of indicators on individuals' socioeconomic characteristics such as age, gender, educational level, and household wealth.

Our empirical approach is focused on estimating whether health has been improving over time (i.e. across successive birth cohorts) when controlling for age, other individual socio-economic characteristics, and—when relevant—country fixed effects. This is estimated using (i) a pooled OLS regression, and (ii) a Mundlak (1978) regression—a modified version of the random effects panel regression model that is suited to exploiting longitudinal data. Our findings reveal a broad-based healthy aging phenomenon in Korea, as evidenced by steady improvements in health indicators over successive birth cohorts. For example, our findings suggest that,

[3] Examples of ADLs include getting out of bed and walking across the room, and IADLs include managing money and shopping for groceries. Further details are included in Section 2.

on average, the grip strength of a 70-year-old individual in 2022 was approximately equivalent to that of a 60-year-old in 2006.

Second, we study how these health indicators relate to labor supply outcomes, namely the decision of whether to supply labor and when to retire. In addition to studying correlations using a standard OLS regression, we employ a two-stage-least-squares (2SLS) regression approach to identify a causal relationship. In particular, we use exogenous health shocks, proxied by the incidence of certain chronic diseases, to estimate the causal effect of health improvements for older-age populations on their labor supply decisions. Our identification strategy rests on the assumption that at least some incidences of chronic diseases can be considered exogenous to lifestyle factors and socioeconomic characteristics that determine health outcomes. As such, they can be considered as randomly assigned. Since smoking, poor nutrition, physical inactivity, and excessive alcohol use are key risk factors for most chronic diseases (Hacker 2024), we control for these lifestyle factors in the estimation.

We find that better old-age health is associated with decisions to increase labor supply, both in terms of participating in the labor force and postponed retirement. Next, using chronic diseases as an instrument for health shocks, we confirm that exogenous improvements in health lead to increases in labor supply. The estimated impact using our IV approach is substantially larger than that implied by OLS regression estimates, pointing to the importance of tackling potential endogeneity using our instrumental variable. Our results are robust to considering different variants of the chronic disease instrument, as well as to controlling for year fixed effects capturing changes in labor markets and retirement policies over time.

Taken together, our results imply that as healthy aging continues, older-age individuals are expected to increasingly contribute to the labor market, including on a voluntary basis. The healthy aging trends and the effects of health improvements on labor market outcomes of older individuals are also found to be qualitatively comparable for the sample of Asian peer economies. While there are differences across health metrics, the results for Korea are generally somewhat stronger.

Our paper relates closely to several strands of literature. First, it relates to papers that have studied evidence of healthy aging trends across birth cohorts (Abeliansky and Strulik 2019 for Europe; Abeliansky, Erel, and Strulik 2020 for the US; and Old and Scott 2023 for the UK). Second, it relates to papers looking at the effects of healthy aging on the labor force and economic growth (Kotschy and Bloom, 2023). More broadly, it also relates to a larger literature studying the impact of health on economic outcomes. For instance, previous studies have demonstrated that sudden changes in health induce retirement decisions or labor supply reductions for the older work population (Disney et al., 2006; Wing Han Au et al., 2004; Bound et al., 1999; Riphahn, 1999), force younger individuals into inactivity (García-Gomez et al., 2010; García-Gómez and López-Nicolás, 2006), and that the employment effects may persist over many years (García-Gómez et al., 2013).

Primarily, we differentiate from this literature by: (i) providing new empirical evidence on the healthy aging phenomenon considering a variety of measures of health for Korea and selected Asian peer countries, and (ii) seeking to identify the causal impact of healthy aging on the decision of whether to participate in the labor market, by using a novel instrument for health shocks—being diagnosed with chronic diseases.

Finally, this paper relates closely to concurrent work in which we analyze healthy aging trends for a wider sample of 41 advanced economies and developing countries, across an expanded set of health metrics, and estimating the impact on a broader set of labor market outcomes, including also the intensive margin of labor supply, labor earnings, and productivity (Gruss et al., 2025; IMF 2025).

The remainder of this paper is organized as follows. Section 2 describes the data used in the analysis, while section 3 presents the empirical strategy. Sections 4 and 5, respectively, present our estimates of healthy aging trends and their impact on labor supply. Section 6 concludes.

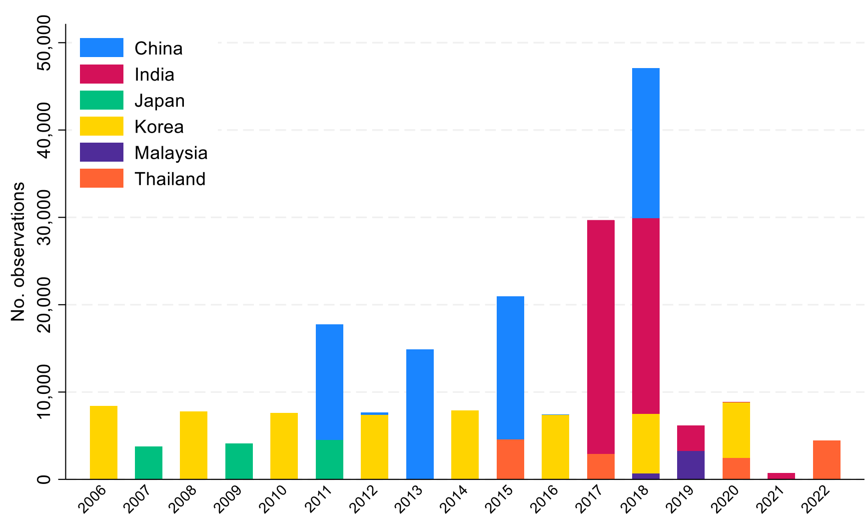
2. Data

This section describes the data used in our analysis, including the sample of countries, health indicators, and labor force status data considered.

2.1 Sample coverage

While our analysis focuses on Korea during the time period 2006-20, our full sample also includes five other countries in the Asia and Pacific region: China, India, Japan, Malaysia, and Thailand, spanning up to 2022 (Figure 3). In total, we have around 200,000 observations for individuals aged 50-90 based on household surveys focused on older populations (Appendix Table 1), with about one-third of the sample drawn from Korea. We use pre-harmonized data from the Gateway for Global Aging for all countries except Thailand, for which we harmonized the microdata . The presence of multiple survey waves enables longitudinal analysis—tracking a subset of individuals over time—in all countries except for India and Malaysia, where data exist for only one wave.[4]

Figure 3. Sample Coverage



Source: CHARLS, HART, JSTAR, KLoSA, LASI, MARS and authors' calculations.

[4] Note that a single survey wave can span more than one year.

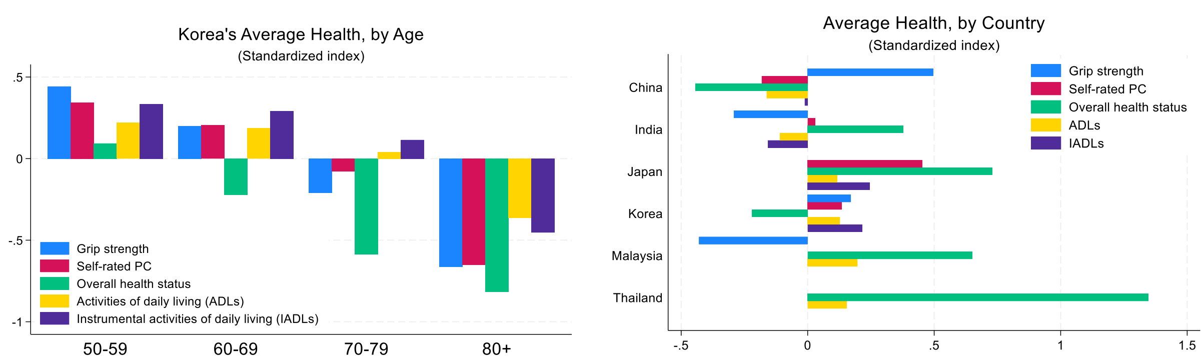
2.2 Health indicators

We consider a variety of physical health indicators that are comparable across different surveys, including both measured and self-reported metrics.[5] For measured indicators, we use respondents' maximum grip strength (in kilograms). For self-reported metrics, we rely on responses regarding overall health status (reported on a 1-5 scale), the ease of performing activities of daily living (ADLs)—such as getting in and out of bed, bathing, dressing, eating, and walking across the room—and instrumental activities of daily living (IADLs)—such as managing money, taking medications, shopping for groceries, and preparing a hot meal.[6] We also summarize the self-reported health measures into a first principal component.

There are advantages and drawbacks when using either measured or self-reported indicators of individuals' health. Measured indicators like grip strength are objective and arguably more reliable, but they capture only a narrow dimension of physical health, and no other measured indicators are available for Korea. In contrast, self-reported measures capture individuals' perceptions on their physical condition and their ability to perform basic daily tasks—factors that are likely to be of first-order importance to their willingness and ability to work. To provide a more comprehensive picture, we use both types of indicators in the analysis.

For comparability, all health indicators are standardized to have a mean of zero and a standard deviation of one, with higher values indicating better health. As shown in Figure 4, and perhaps unsurprisingly, health outcomes tend to deteriorate with age. We also observe important differences across countries. For instance, average grip strength is substantially higher in China than in India and Malaysia, while average self-rated health is significantly higher in Thailand, Japan and Malaysia when compared with China and Korea. In contrast, cross-country variation is considerably smaller for ADLs and IADLs. Notably, the availability of health indicators is unbalanced across countries in our sample, with data on grip strength missing for Japan and Thailand, while data on IADLs and hence also our constructed principal component are missing for Malaysia and Thailand; see Appendix Table 1.

Figure 4. Health Indicator Averages, by Age and Country



Source: CHARLS, HART, JSTAR, KLoSA, LASI, MARS and authors' calculations.

[5] Gruss et al. (2025) considers a broader set of health indicators, including cognitive and mental health measures, but those indicators are not available for Korea.

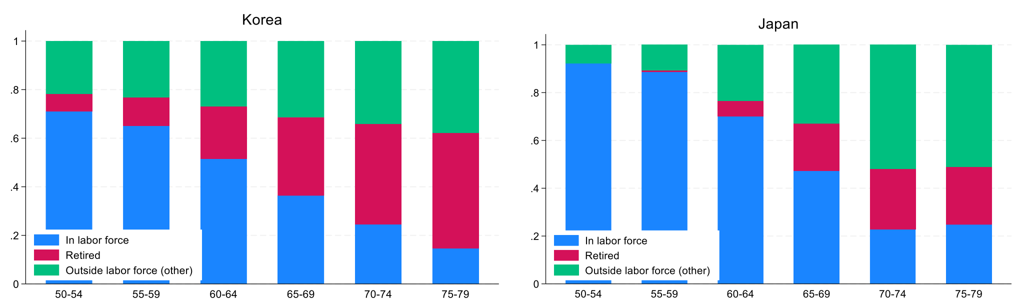
[6] To measure ease of ADLs and IADLs, respondents note whether they experience difficulty in performing any of the listed activities, and the responses are then summed together.

We also draw on self-reported data on health behaviors and the incidence of 17 chronic diseases.[7] Appendix Figure 1 illustrates average scores on health behaviors across countries, revealing substantial differences that highlight the potential role of national health policies in promoting healthy lifestyles.[8] It also shows the average incidence of chronic diseases, ranging from over one-third of individuals reporting high blood pressure to a much smaller fraction reporting conditions such as Parkinson's disease. To account for reporting differences for chronic diseases across individuals and surveys, we construct our instrument—chronic disease incidence—as the number of chronic diseases an individual reports having, expressed as a share of the total number of chronic diseases listed in the survey.

2.3 Labor force status

To examine whether better health leads individuals to increase their labor supply, we also utilize survey data on labor force status, specifically: (i) whether the individual participates in the labor market, and (ii) whether the individual is retired. While related, these two measures are distinct. Retirement is only one form of labor market inactivity and is typically only applicable beyond a certain age. For example, Figure 5 shows labor force status by age group, illustrating the tendency for individuals in Korea to transition from activity into retirement as they age, notably from 60 years old onward, with only a small fraction moving into non-retirement inactivity. In contrast, in Japan, individuals are more likely to shift into non-retirement inactivity, especially before 65.[9]

Figure 5. Labor Force Status by Age, Korea vs. Japan



Source: JSTAR, KLoSA, and authors' calculations.

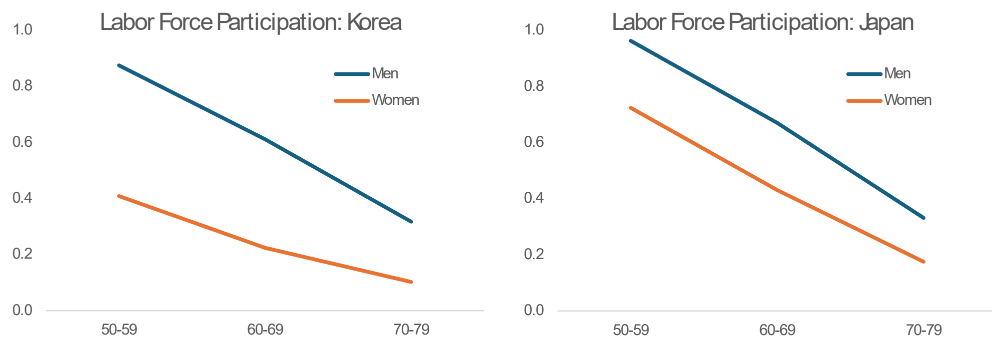
Another notable difference arises from gender gaps in labor force participation (Figure 6), which are particularly pronounced in Korea, even at relatively younger ages (50-59), leading to a lower aggregate labor force participation rate. Given these differences in labor force status composition and transitions over the age spectrum, both margins—participation and retirement—are of interest.

[7] Health behaviors include smoking, physical inactivity, and alcohol consumption. These indicators are augmented with data on individuals body mass index (BMI) to capture the incidence of being overweight. Information on ten chronic diseases is available for Korea—namely high blood pressure, arthritis, heart disease, diabetes, psychological disorders, cataracts, cancer, lung disease, stroke, urinary incontinence. We also consider seven additional chronic diseases available for other countries: High cholesterol, ulcers, Alzheimer's, Parkinson's, osteoporosis, asthma, and kidney disease.

[8] For instance, the incidence of being overweight is shown to be higher in China, India, and Malaysia, than in Japan and Korea. On the other hand, Korea has a higher rate of physical inactivity. Meanwhile, prevalence of alcohol consumption is higher in Korea and Japan than in India and Malaysia.

[9] Figure 6 shows averages over the sample period, spanning over 2007-11 in Japan and 2006-20 in Korea.

Figure 6. Labor Force Participation Gender Gaps, Korea vs. Japan



Source: JSTAR, KLoSA, and authors' calculations.

3. Empirical Strategy

To investigate whether health has improved across successive birth cohorts, we regress various health indicators ($H_{i,t}$), one at a time, on individuals' year of birth ($\boldsymbol{YOB}_i$),[10] controlling for a vector ($\boldsymbol{X}_{i,t}$) of individual socioeconomic characteristics, including age, gender, education, and log household wealth. We estimate this specification separately for Korea and for a pooled sample of Asian peer countries, where we additionally control for country fixed effects. Standard errors are clustered at the year-of-birth level. The pooled ordinary least squares (OLS) specification is given by:

$$H_{i,t} = \alpha_0 + \alpha_1 \boldsymbol{YOB}_i + \boldsymbol{\theta X}_{i,t} + \varepsilon_{i,t}$$

For robustness, and following the literature (Abeliansky and Strulik 2018, 2019, 2020; Old and Scott, 2023), we also leverage the longitudinal nature of the data and estimate a Mundlak (1978) regression. This regression addresses concerns that unobserved individual effects may be correlated with explanatory variables, potentially biasing the OLS and random effects estimates. Unlike a fixed-effects model, which discards the between-individual variation, the Mundlak regression augments a random-effects model with the within-individual averages of the time-varying explanatory variables ($\overline{\boldsymbol{X}}_i$):

$$H_{i,t} = \beta_0 + \beta_1 \boldsymbol{YOB}_i + \boldsymbol{\delta X}_{i,t} + \overline{\boldsymbol{X}}_i + u_i + e_{i,t}$$

This method treats individual-specific effects as partially explained by the means of the explanatory variables over time, effectively providing a middle ground between fixed effects and random effects models. It allows for the estimation of coefficients on both time-varying (e.g., age, wealth) and time-invariant (e.g., year of birth, gender, education) explanatory variables at the individual level.

Next, to estimate the effect of better health on labor market outcomes among older individuals—such as the decision to participate in the labor force or to retire—we take the following two-step approach:

Correlations. We begin by estimating the association (correlation) between each health indicator ($\boldsymbol{H}_{i,t}$) and each labor market indicator ($\boldsymbol{LMI}_{i,t}$), one at a time, using an OLS regression. The specification controls for a

[10] Controlling for age and year of birth is conceptionally equivalent to controlling for age and survey year, given that they are linear combinations of one another: survey year = year of birth + age.

vector ($\boldsymbol{Z}_{i,t}$) of individual socioeconomic characteristics (age, gender, education, log household wealth), and a time trend (or time fixed effects as a robustness check):

$$LMI_{i,t} = \beta_0 + \beta_1 H_{i,t} + \boldsymbol{\theta Z}_{i,t} + \beta_2 t + \varepsilon_{i,t}$$

In addition to studying this relationship for Korea, we also conduct a separate analysis for the pooled sample of peer countries for comparison, in which case we also control for country fixed effects.

Causal effects. To address potential endogeneity concerns—such as reverse causality, where labor market participation may influence individuals' health—and attempt to capture causal effects, we employ a two-stage least squares (2SLS) regression approach. We instrument health using exogenous health shocks, proxied by the incidence of chronic diseases.[11] Since most chronic diseases are caused by a short list of risk factors — smoking, poor nutrition, physical inactivity, and excessive alcohol use (Hacker 2024), we control for these lifestyle factors in the regression.[12] The identification strategy rests on the assumption that at least some chronic diseases—those not explained by individuals' socioeconomic or behavioral factors—can be considered exogenous. It is also unlikely that chronic diseases affect labor supply directly, rather than through their impact on health, thereby supporting the exclusion restriction.[13]

4. Evidence of Healthy Aging

Our results provide broad-based evidence of healthy aging in Korea. After controlling for age and other individual socioeconomic characteristics, later-born cohorts exhibit better physical health than earlier-born cohorts.

In particular, OLS regression estimates for Korea reveal significant improvements in the health of subsequent birth cohorts for all of the health indicators considered (Figure 7 and Appendix Table 2). The most pronounced gains are observed for grip strength, a measured metric. However, positive and statistically significant trends are also found for the principal component summary of self-reported health indicators as well as for its subcomponents—overall health status, ADLs, and IADLs.

The results using the Mundlak regression specifications are qualitatively similar in terms of sign and significance, with positive and significant annual improvements across all health indicators (Figure 8 and Appendix Table 4). Compared to OLS, the Mundlak estimates suggest somewhat stronger healthy aging trends.

For comparison, we also examine the pooled sample of the five Asian peer countries (China, India, Japan, Malaysia, and Thailand) while excluding Korea. On average, we find no significant evidence of healthy aging for the grip strength metric (Figure 7 and Appendix Table 3). However, self-reported indicators show significant

[11] The chronic disease instrument is the *share* of chronic diseases that respondents report having out of the total number of chronic diseases listed in the survey

[12] While we do not control for alcohol consumption in our baseline, results are robust to including this as an additional control.

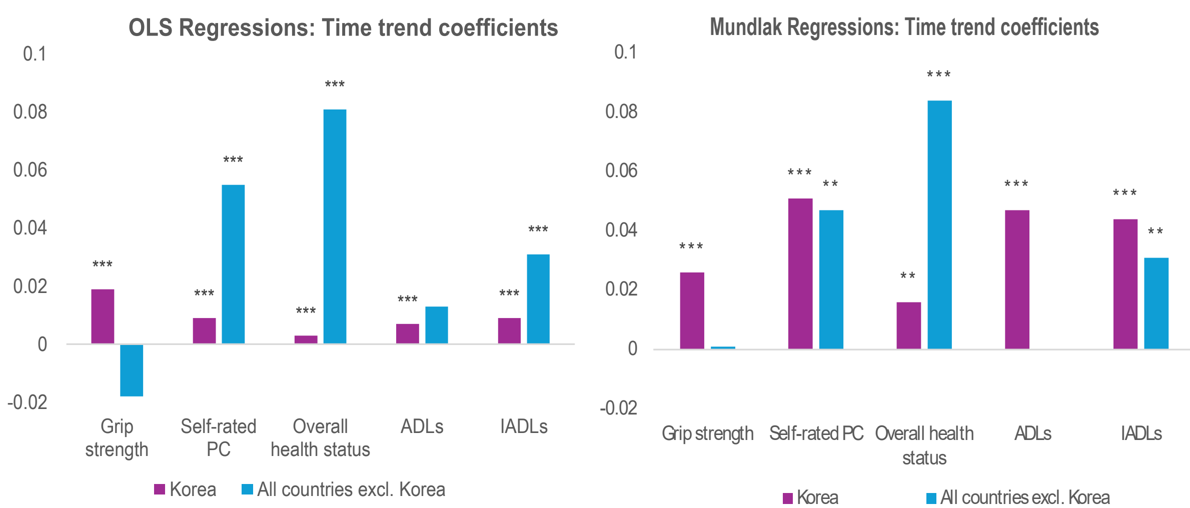
[13] A possible concern is that chronic illness could affect employment directly, for example through employer discrimination or accommodation needs. We argue instead that the dominant channel operates through health itself. Chronic conditions primarily impair physical and cognitive functioning—evidenced by negative and significant effects of each chronic disease on all health measures considered—which in turn constrains labor supply. Moreover, employers typically become aware of employees' chronic illnesses only if individuals disclose them, which they are most likely to do when their health is already adversely affected. Thus, chronic disease incidence can reasonably be interpreted as capturing health deterioration, with its effect on labor supply operating indirectly through health outcomes.

improvements over time for the principal component of health indicators, as well as two of its components: overall health status and IADLs. These results are qualitatively and quantitatively consistent across both OLS and Mundlak specifications (Figure 7 and Appendix Table 5). That said, we caution that the limited time coverage of health data in Korea's peer countries (often spanning only a few survey waves) may lead to imprecise trend estimates.

Overall, Korea appears to have experienced larger improvements in measured health metrics (grip strength) than its regional peers, based on both OLS and Mundlak estimates. For self-reported health measures, the comparison is less clear and depends on the estimation approach. For example, healthy aging trends in Korea based on self-reported health appear substantially smaller than in peer countries according to OLS estimates, however, the Mundlak regression estimates suggest stronger trends, particularly for ADLs and IADLs.

To illustrate the magnitude of healthy aging gains in Korea, we use the estimated coefficients on year of birth and age to calculate age-equivalent health gains.[14] Our estimates suggest that, by 2022, the average 70-year-old in Korea had grip strength comparable to that of a 60-year-old in 2006 (Figure 8). Similarly, self-reported health for a 70-year-old in 2022 was equivalent to that of someone aged 59-64 in 2006—depending on the regression specification used. Among the subcomponents, the largest gains are observed for ADLs and IADLs, with age-equivalent improvements of 8–13 years. The smallest gains are found for self-reported overall health status, where a 70-year-old in 2022 is comparable to someone aged 64-68 in 2006. Altogether, these findings suggest that "the 70s are the new 60s" in Korea, with roughly a decade of improvement in age-equivalent health over the sample period.

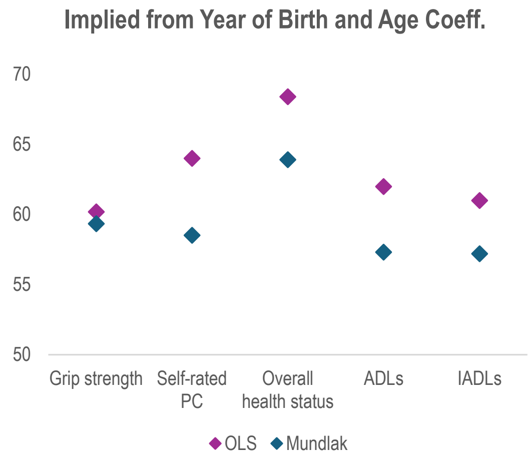
Figure 7. Healthy Aging: Time Trend Coefficients, Korea vs. Peers



Source: CHARLS, HART, JSTAR, KLoSA, LASI, MARS and authors' calculations.
Note: This figure shows estimates from OLS and Mundlak regressions of health indicators on year of birth, with individuals' age, gender, education, wealth, and country of residence controlled for. Stars (***, **, and *) respectively denote significance of the year-of-birth coefficients at the 1,5, and 10 percent level.

[14] In particular, the age-equivalent gains are measured as the coefficient on year of birth (trend improvement effect) multiplied by the number of years in our sample (17 years) and divided by (coefficient on age minus coefficient on year of birth). Similar calculations are made, for instance, in Old and Scott (2023).

Figure 8. Healthy Aging in Korea: Age 70 is the New...



Source: KLoSA, and authors' calculations.
Note: This figure shows age-equivalent gains, measured as the coefficient on year of birth (trend improvement effect) multiplied by the number of years in our sample (17 years) and divided by (coefficient on age minus coefficient on year of birth).

In addition to cohort trends, our regressions highlight other important socio-economic determinants of health. As expected, health tends to deteriorate with age and is generally better among individuals with higher education and greater household wealth. Gender differences are also notable: men tend to have higher grip strength and overall self-rated health, while women in Korea report better outcomes in ADLs—contrasting with the regional average, where men tend to fare better.[15]

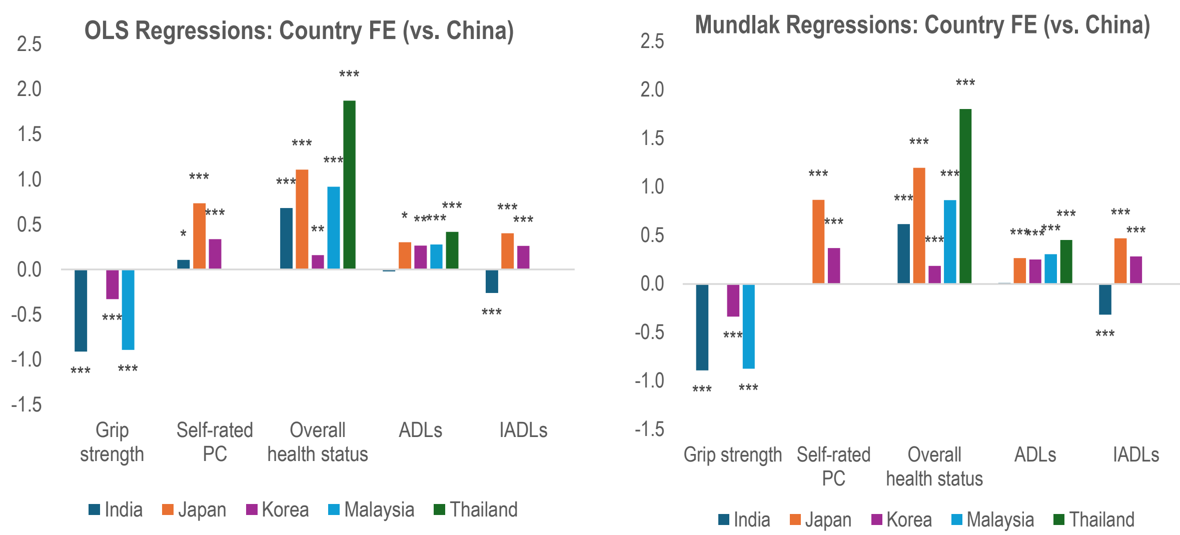
By interacting cohort trends with these socio-economic determinants, we can investigate whether healthy aging trends are similar across subgroups of the population. The results shown in Appendix Table 6 indicate that within-country health disparities have persisted in Korea. In particular, health gaps have persisted across household wealth quintiles (given equal trends), widened by gender (given stronger healthy aging trends for males relative to females), and narrowed across education groups (given stronger healthy aging trends for individuals with lower levels of education).

Finally, we also observe important cross-country differences in average health outcomes. Figure 9 shows country fixed effects from regressions using the full sample, benchmarked against China. Even after controlling for individuals' age, gender, education, and wealth, significant variation remains. Self-rated overall health status is notably higher in Thailand, Japan, and Malaysia. Meanwhile, grip strength is notably lower in India and Malaysia. Cross-country differences in ADLs and IADLs are smaller but still meaningful, with most countries scoring slightly higher than China—except for India. The results are robust across both the OLS and Mundlak specifications.

Next, we examine how better health outcomes influence older individuals' labor supply decisions.

[15] Note that for grip strength, which measures physical strength, a lower score for women does not necessarily mean that they have poorer health than men.

Figure 9. Cross-Country Health Heterogeneity



Source: CHARLS, HART, JSTAR, KLoSA, LASI, MARS and authors' calculations.
Note: This figure shows estimates from regressions of health indicators on country fixed effects, with individuals' age, year of birth, gender, education, and wealth controlled for. The left chart shows OLS estimates while the right chart shows Mundlak estimates that further control for individuals' mean age and wealth. Stars (***, **, and *) respectively denote significance of the country fixed effect coefficients at the 1,5, and 10 percent level.

5. Effect of health on labor market outcomes

This section describes the data used in our analysis, including the sample of countries, health indicators, and labor force status data considered.

Our OLS estimates indicate that better physical health—both measured and self-reported—is associated with a higher likelihood of labor force participation and a lower probability of retirement among older workers in Korea (Table 1). These estimates should be interpreted as correlations, given the potential endogeneity between health and labor market outcomes that could bias the OLS estimates.

The results from our 2SLS regression, aimed at estimating causal effects, are consistent with the OLS estimates. We instrument health using the incidence of chronic diseases, which we assume to be exogenous to labor market behavior after controlling for socio-economic characteristics and health-related behaviors. Our first-stage regressions confirm that the incidence of chronic diseases is a strong instrument for physical health across all measures, with F-statistics exceeding the Stock and Yogo (2005) rule-of-thumb critical value of 10 and thereby ruling out weak instruments (Table 1). The second stage regressions show that exogenous improvements in health significantly increase labor force participation and reduce retirement rates. Notably, the estimated effects from the IV approach are substantially larger than those from OLS regressions, stressing the importance of tackling potential endogeneity.

Combining these results with the earlier evidence on healthy aging allows us to estimate the effects of healthy aging on labor market outcomes. We normalize the results to reflect the effect of a one-decade improvement in health. The largest effects are found for grip strength: a 10-year gain in this measure increases the probability of labor force participation by about 19 percentage points and decreases the probability of retirement by about

18 percentage points (Table 2).[16] In turn, improvements in self-reported health observed over one decade are found to increase labor force participation by about 2.5 percentage points.

Table 1. Effect of Health on Decision to Participate and/or Retire: OLS vs. 2SLS, Korea

	(1)	(2)	(3)	(4)	(5)
			Self-reported health		
	Grip strength	Self-reported PC	Overall health status	ADLs	IADLs
OLS					
Labor force participation (dummy)	0.056***	0.080***	0.072***	0.059***	0.073***
	(0.007)	(0.007)	(0.006)	(0.005)	(0.006)
Retired (dummy)	-0.042***	-0.068***	-0.065***	-0.048***	-0.062***
	(0.006)	(0.007)	(0.005)	(0.006)	(0.007)
IV: 2nd Stage					
Labor force participation (dummy)	1.013***	0.287***	0.196***	0.493***	0.559***
	(0.144)	(0.037)	(0.020)	(0.091)	(0.095)
Retired (dummy)	-0.938***	-0.266***	-0.181***	-0.456***	-0.518***
	(0.124)	(0.033)	(0.021)	(0.077)	(0.083)
IV: 1st Stage					
Chronic disease	-0.326***	-1.334***	-2.021***	-0.751***	-0.666***
	(0.050)	(0.094)	(0.052)	(0.108)	(0.089)
Weak IV F-statistic	43	202	1496	48	56
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Source: KLoSA, and authors' calculations.

Note: This table shows estimates from OLS and 2SLS regressions of labor force participation and retirement dummy indicators on health indicators (one at a time), with individuals' socio-economic characteristics (age, gender, education, household wealth), lifestyle factors (dummy indicators for having ever smoked, being over/underweight, or infrequent moderate physical activity), and survey year controlled for.

Table 2. Effect of 1-Decade Improvements in Health on Probability of Working and/or Retiring, Korea

	(1)	(2)	(3)	(4)	(5)
			Self-reported health		
	Grip strength	Self-reported PC	Overall health status	ADLs	IADLs
Effect on labor force participation	0.191***	0.025***	0.007***	0.036***	0.048***
	(0.027)	(0.003)	(0.001)	(0.007)	(0.008)
Effect on retirement	-0.177***	-0.024***	-0.006***	-0.033***	-0.045***
	-0.023	-0.003	-0.001	-0.006	-0.007
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Source: KLoSA, and authors' calculations.

Note: The estimations come from two-stage-least-squares regressions of labor market outcomes on health indicators (one at a time), rescaled to represent effects of a 1-decade improvement in health (diving health measures by 10 times the coefficient on the year of birth).

[16] This is in line with findings of the impact of cognitive health improvements—but much larger than findings for grip strength—estimated for a wider sample of countries (IMF, 2025). Over the sample period 2006-20, it implies healthy aging has increased the labor supply of older individuals in Korea by around 24 percentage points.

We also explore heterogeneity in the effects of health on labor force participation across socio-economic characteristics.[17] This also allows for assessing the external validity of our findings. We find somewhat larger effects for relatively younger age groups, males, and lower-education and lower-wealth individuals (Table 3).[18] The impact of better health on labor force participation is strongest among individuals in their 50s and 60s, with smaller effects for older age groups. This suggests that other factors, such as skill obsolescence, incentives of pension plans, and age discrimination, increasingly constrain the attachment to the labor market at older ages. Turning to gender, the effects for men are almost twice as large as those for women, suggesting that men's labor supply decisions are more responsive to health status. The results also show a stronger likelihood of healthier older individuals with lower education levels remaining in the labor market relative to those with tertiary education. Finally, the effect of health on the probability of remaining in the labor market is higher for individuals from lower-wealth households.

Table 3. Heterogeneous Effects of Health on Labor Force Participation, Korea

	(1)	(2)	(3)	(4)	(5)
			Self-reported health		
	Grip strength	Self-reported PC	Overall health	ADLs	IADLs
Age					
50-59	1.172***	0.391***	0.194***	1.082***	1.110***
60-69	0.892***	0.348***	0.210***	0.675***	0.751***
70-79	0.891***	0.221***	0.205***	0.307***	0.346***
80-89	0.517***	0.115***	0.183***	0.125***	0.160***
Gender					
Female	0.584***	0.248***	0.155***	0.449***	0.529***
Male	1.301***	0.348***	0.263***	0.561***	0.623***
Education					
< Upper secondary	0.926***	0.301***	0.218***	0.503***	0.540***
Upper secondary	1.580***	0.340***	0.215***	0.623***	0.737***
Tertiary	0.210	0.107	0.072	0.164	0.254
Wealth					
Quintile 1 (lowest)	2.190**	0.367***	0.295***	0.602***	0.610***
Quintile 5 (highest)	0.800**	0.219***	0.122***	0.437**	0.600**
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Source: KLoSA, and authors' calculations.

Note: This figure shows estimates from 2SLS regressions of labor force participation on health indicators (one at a time), with individuals' socioeconomic characteristics (age, gender, education, household wealth), lifestyle factors (dummy indicators for having ever smoked, being over/underweight, or infrequent moderate physical activity), and survey year controlled for. Separate regressions are estimated for subsamples based on individuals' socioeconomic characteristics relating to age group, gender, education, and household wealth.

[17] Given the proven similarity of results for labor force participation and retirement probability (see Table 1), the heterogeneity analysis focuses on the former. Nevertheless, a similar pattern holds for retirement probability.

[18] These results are found to hold for all health indicators, except for overall health status which shows a different pattern across age groups.

Our results remain robust to a range of sensitivity checks, including alternative specifications of the chronic disease instrument. Importantly, our baseline estimates are robust to alternative instruments that restrict our instrumental variable to consider only a subset of chronic diseases that are most plausibly exogenous to work or occupational factors[19] (Appendix Table 7). Results are also robust to accounting for differing chronic disease severity by using alternative instruments that: (i) weigh diseases by their severity (measured as their estimated impact on the principal component of self-reported health)[20], and (ii) consider a dummy indicator for the top 10 chronic diseases with most severe impact on health according to the ranking by Gruss et al. (2025)—namely Parkinson's, Alzheimer's, psychological disorders, stroke, kidney disease, lung disease, osteoporosis, arthritis, asthma, and urinary incontinence[21] (Appendix Table 7). Moreover, results are robust to alternative instrument definitions such as the total number of chronic diseases and a dummy indicator for whether the respondent reports having any of the 17 chronic diseases.[22]

In addition, we show that positive health effects remain robust even after controlling for year fixed effects (Appendix Table 8). This suggests that the observed increases in labor supply are not driven by time-variation in policies at the country level, such as changes in statutory retirement ages or other labor market reforms. Relatedly, we also find that health—instrumented by chronic diseases—has no significant impact on older individuals' probability of being unemployed, conditional on their decision to participate in the labor market (Appendix Table 9).[23] Altogether, the positive effect of health on labor supply seems to reflect stronger voluntary attachment to the labor market by healthier older individuals, potentially supported by appropriate incentives, rather than the byproduct of labor market reforms or firms decisions.

Finally, we also study results for Korea's peer countries, summarized in Table 4.[24] OLS estimates are qualitatively similar across most health indicators, except for grip strength and self-reported overall health status, which are not statistically significant in the comparator group.[25] However, when using 2SLS with the incidence of chronic disease as an instrument, we find significant effects for all health indicators—including

[19] Based upon their risk factors, six chronic diseases are plausibly more exogenous to work or occupational factors: Alzheimer's, Parkinson's, cataracts, cancer, stroke, and kidney disease. Alzheimer's and Parkinson's disease are neurodegenerative diseases, primarily age- and genetics-driven, not plausibly linked to work. Cataracts is primarily caused by age-related biological degeneration, and UV exposure (much less tied to occupation except in rare cases e.g. welders). Many forms of cancer are exogenous, though some cancers are linked to occupational exposures (asbestos, chemicals); still, at the population level, cancer is often treated as a plausibly exogenous health shock. Stroke can be linked to lifestyle/occupation (via stress and hypertension) but is often considered a sudden exogenous shock. Kidney disease has some occupational links (e.g dehydration in agricultural workers), but much less direct than other chronic diseases. Notably, as Korea has data only on a subset of these illnesses—namely cataracts, cancer, and stroke—we restrict our instrumental variable to consider these three chronic diseases. However, results are also robust to considering the broader set for the full sample of comparator Asian countries.

[20] The chronic disease weights are ordered from highest to lowest as follows: Alzheimer's (1.68), Parkinson's (1.31), stroke (0.62), kidney disease (0.55), urinary incontinence (0.48), psychological disorders (0.44), asthma (0.37), lung disease (0.35), heart disease (0.32), osteoporosis (0.28), ulcer (0.26), arthritis (0.25), diabetes (0.25), cataracts (0.18), cancer (0.16), high blood pressure (0.14), and high cholesterol (0.10), where the figures in parenthesis denote the absolute value of the estimated coefficient when regressing the principal component of self-reported health on individual chronic diseases, controlling for individual socio-economic and behavioral factors and country fixed effects.

[21] In a larger sample of countries and for additional health metrics, Gruss et al. (2025) rank the top 10 most severe chronic diseases based on OLS regressions of health indicators on individual chronic diseases, controlling for individuals' socio-economic, lifestyle factors and country fixed effects.

[22] Results for these exercises are not reported in the interest of brevity but are available upon request.

[23] Looking a broader sample of 41 countries, Gruss et al. (2025) find that old-age health has a positive effect on the probability of participating in the labor market and also on the probability of being employed, conditional on labor market participation.

[24] Since Japan and Thailand are missing data on physical inactivity, we omit this variable in regressions where data is otherwise available for these two countries to ensure their inclusion in the sample.

[25] In particular, results for grip strength are also insignificant for comparator countries (China, India, and Malaysia) when estimated separately for each country.

those that were insignificant in the OLS regressions. Notably, the magnitude of the causal effects is substantially larger in Korea than in the comparator countries, nearly twice as large for most indicators with the exception of self-rated overall health, where the effects are similar. These findings suggest that objectively measured health is a particularly strong determinant of labor supply in Korea.

Table 4. Effect of Health on the Decision to Participate in the Labor Market and/or Retire: OLS vs. 2SLS, Asia-5 (Excl. Korea)

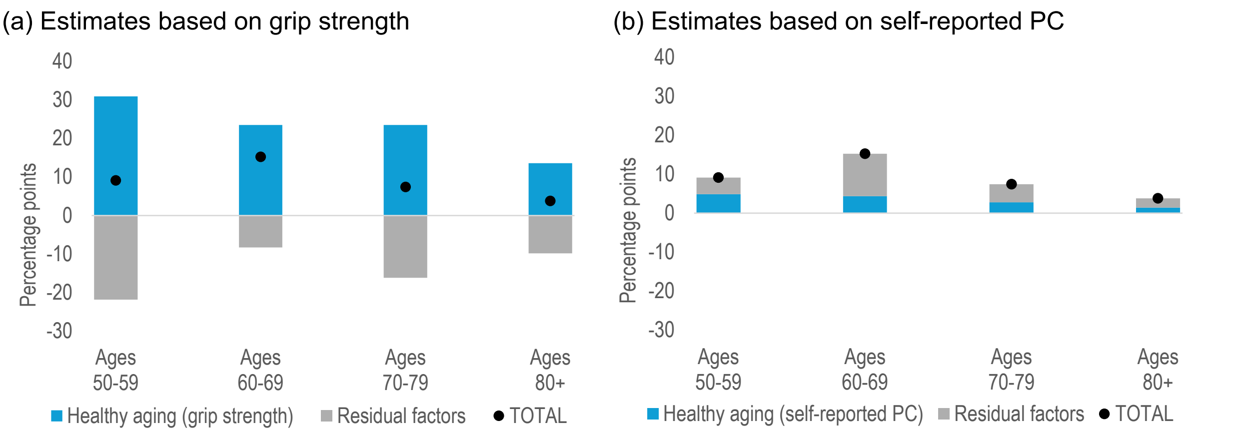
	(1)	(2)	(3)	(4)	(5)
			Self-reported PC		
	Grip strength	Self-reported PC	Overall health	ADLs	IADLs
OLS					
Labor force participation (dummy)	-0.019	0.037***	0.011	0.038***	0.037***
	(0.017)	(0.009)	(0.014)	(0.007)	(0.006)
Retired (dummy)	-0.012	-0.038***	-0.006	-0.040***	-0.024***
	(0.009)	(0.013)	(0.006)	(0.014)	(0.005)
IV: 2nd Stage					
Labor force participation (dummy)	0.260*	0.101**	0.108***	0.142**	0.149**
	(0.151)	(0.041)	(0.037)	(0.059)	(0.064)
Retired (dummy)	-0.237**	-0.105***	-0.101***	-0.140***	-0.165***
	(0.105)	(0.032)	(0.028)	(0.045)	(0.047)
IV: 1st Stage					
Chronic disease	-0.971***	-2.619***	-2.098***	-1.993***	-1.622***
	(0.187)	(0.163)	(0.194)	(0.214)	(0.184)
Weak IV F-statistic	26.87	256.7	116.8	86.61	77.73
No. countries	2	2	4	3	2
Automatically dropped countries	JAP, THA	MYS, THA	-	THA	MYS, THA
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Source: CHARLS, HART, JSTAR, LASI, MARS and authors' calculations.
Note: This figure shows estimates from OLS and 2SLS regressions of labor force participation and retirement dummy indicators on health indicators (one at a time), with individuals' socio-economic characteristics (age, gender, education, household wealth), lifestyle factors (dummy indicators for having ever smoked and being over/underweight), survey year, and country of residence controlled for. The sample includes China, India, Japan, Malaysia, and Thailand unless otherwise specified in the regression column.

Our estimates imply that healthy aging has accounted for a significant share of the rise in the labor force participation in Korea during 2006-20 (Figure 10). Healthy aging, measured by gains in grip strength, more than accounted for the total rise in elderly labor force participation—suggesting that other factors may have played a counteracting negative role. Meanwhile, healthy aging, measured by the self-reported health principal component, contributed about 40 percent of the total rise in older workers' labor force participation.

Overall, these results suggest that further boosting healthy aging can help to raise voluntary labor supply among the older population. Health prevention and promotion policies can reduce the incidence of chronic disease and reduce health inequalities (Liu et al. 2016; Rashbrook 2019; Lee, Park, and Lee 2020; Hacker 2024). Policy tools range from expanding preventative healthcare (e.g. immunization and health screenings) and mental health services, to targeting healthy behaviors through substance-abuse prevention, tobacco and junk food taxes, smoke-free regulations, and promoting physical exercise. Many of these measures do not necessarily carry a high implementation cost and have often been found to be cost-effective by lowering future health expenditures (McDaid, Sassi, and Merkur 2015; OECD 2015).

Figure 10. Korea's Change in Labor Force Participation, 2006-20



Source: KLoSA, and authors' calculations.

Note: This figure shows the estimated contributions of healthy aging vis-à-vis other (residual) factors in explaining the change in Korea's labor force participation during 2006-2020. Dots denote the change in labor force participating during 2006-2020 implied by estimating a linear annual time trend by age group.

To extend working lives in line with longer life expectancy, health policies may need to be paired with other measures. Policies that promote higher effective retirement ages—through incentives to postpone retirement, phased retirement, and reduced early-retirement benefits—must balance fiscal sustainability with protection against old-age poverty. Lifelong reskilling, age-friendly workplaces, flexible work, and combating age discrimination are also crucial, particularly as artificial intelligence reshapes labor markets.

Demand-side factors may also influence the labor market outcomes of older individuals. For instance, anecdotal evidence suggests that structural labor market rigidities in Korea—particularly seniority-based wage and promotion systems—create incentives for firms to encourage early retirement and discourage the hiring of older workers. [26] This may partly explain the large number of retirements before age 55, well before the statutory retirement age of 60 and pension eligibility (OECD 2022; Lee and Cho 2022), despite improvements in health and increases in the statutory retirement age.

6. Concluding Remarks

Our findings provide micro-level evidence of a healthy aging phenomenon in Korea, where individuals are aging in better physical health than previously. The gains in the physical capacities of older individuals across subsequent cohorts are observed consistently across multiple dimensions of health, including objective measures such as grip strength and self-reported indicators on overall health status and the ease of performing

[26] These systems reward workers for their years of service regardless of performance, creating a disconnect between wages and productivity. As wages tend to increase with the number of years of service, severance payments become very large, making elderly workers more costly for employers.

a variety of daily activities. The most pronounced improvement is observed for grip strength: by 2022 and based on this metric, the average 70-year-old in Korea had physical health comparable to that of an average 60-year-old in 2006.

In turn, better health across cohorts leads to increased labor supply among older individuals. Specifically, a decade's worth of healthy aging—measured through improvements in grip strength—is estimated to have increased the probability of labor force participation and reduced the likelihood of retirement by nearly 20 percentage points. The results are qualitatively comparable to, and somewhat stronger than, those observed in other Asian countries with available data.

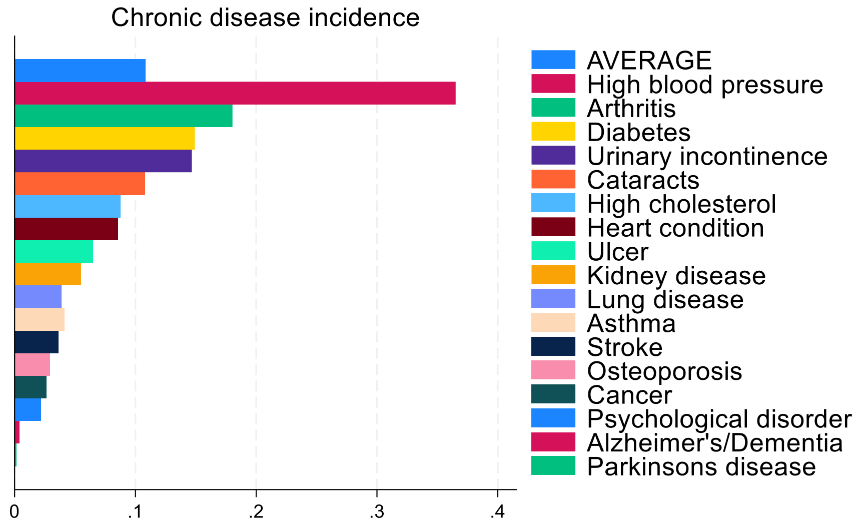
Our findings suggest that policies to promote health improvements and reduce the incidence of chronic diseases could help expand the effective labor supply of older individuals as they live longer, healthier lives. Together with workplace adaptations, adequate training, and incentives to postpone retirement and combat age discrimination, healthy aging policies could help ease the economic pressures typically associated with population aging in Asia —particularly the shrinking labor force that dampens potential growth and strains public finances.

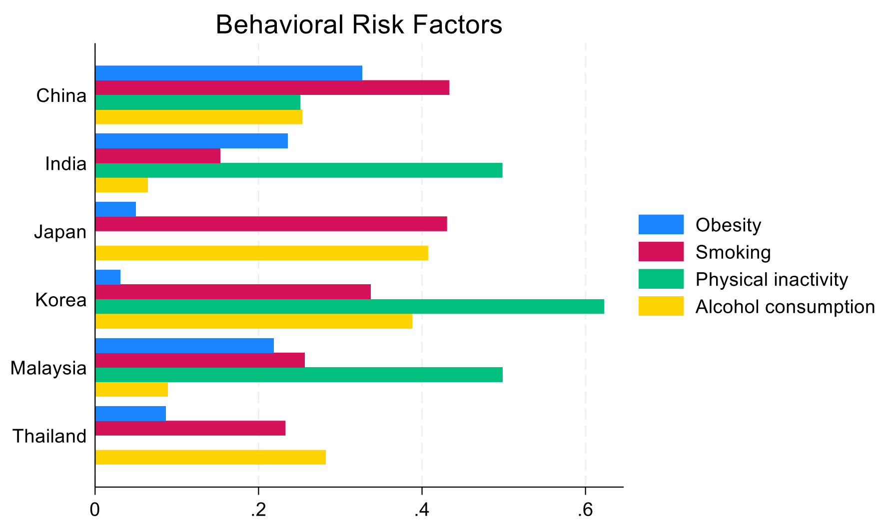
Appendix

Appendix Table 1. Data Sources and Availability: Household Surveys by Country

Country	Survey	Waves	Measured Health Indicators	Self-reported Health Indicators		
			Grip strength	Overall health status	ADLs	IADLs
China	The China Health and Retirement Longitudinal Study (CHARLS)	4 (2011, 2013, 2015, 2018)	X	X	X	X
India	Longitudinal Aging Study in India (LASI)	1 (2017-19, 2021)	X	X	X	X
Japan	Japanese Study of Aging and Retirement (JSTAR)	3 (2007, 2009, 2011)		X	X	X
Korea	Korean Longitudinal Study of Aging and Retirement (KLoSA)	8 (2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020)	X	X	X	X
Malaysia	Malaysia Aging and Retirement Survey (MARS)	1 (2018-19)	X	X	X	
Thailand	Health Aging and Retirement in Thailand (HART)	4 (2015, 2017, 2020, 2022)		X	X	

Appendix Figure 1. Chronic Diseases and Risk Factors





Source: CHARLS, HART, JSTAR, KLoSA, LASI, MARS and authors' calculations.

Appendix Table 2. OLS Regressions: Determinants of Health Indicators, Korea

	(1)	(2)	(3)	(4)	(5)
			Self-reported measures		
	Grip strength	Self-reported PC	Overall health	ADLs	IADLs
Year of birth	0.019***	0.009***	0.003**	0.007***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age	-0.012***	-0.015***	-0.027***	-0.007***	-0.007***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Male	1.242***	-0.024	0.138***	-0.025*	-0.107***
	(0.017)	(0.015)	(0.014)	(0.014)	(0.014)
Upper secondary and vocational training	0.052***	0.041***	0.193***	-0.022**	-0.017
	(0.013)	(0.012)	(0.015)	(0.011)	(0.011)
Tertiary education	0.052**	0.084***	0.268***	-0.012	0.011
	(0.024)	(0.016)	(0.020)	(0.015)	(0.014)
(Log) Household wealth	0.033***	0.059***	0.081***	0.029***	0.035***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)
Constant	-36.822***	-16.878***	-6.245**	-12.468***	-16.511***
	(3.055)	(3.285)	(3.003)	(3.243)	(3.307)
Observations	33,149	37,307	37,307	37,307	37,307
R-squared	0.539	0.096	0.179	0.028	0.056

Source: KLoSA, and authors' calculations.

Note: This figure shows estimates from OLS regressions of health indicators on year of birth, with individuals' age, gender, education, and wealth controlled for. Stars (***, **, and *) respectively denote significance of the year-of-birth coefficients at the 1,5, and 10 percent level.

Appendix Table 3. OLS Regressions: Determinants of Health Indicators, Asia-5 (Excl. Korea)

	(1)	(2)	(3)	(4)	(5)
			Self-reported measures		
	Grip strength	Self-reported PC	Overall health	ADLs	IADLs
Year of birth	-0.018	0.055***	0.081***	0.013	0.031***
	(0.014)	(0.015)	(0.010)	(0.013)	(0.008)
Age	-0.055***	0.026	0.069***	-0.004	0.001
	(0.014)	(0.015)	(0.010)	(0.013)	(0.008)
Male	1.073***	0.212***	0.070**	0.116***	0.197***
	(0.036)	(0.043)	(0.029)	(0.043)	(0.033)
Upper secondary and vocational training	0.132***	0.266***	0.205***	0.142***	0.209***
	(0.043)	(0.052)	(0.057)	(0.037)	(0.048)
Tertiary education	0.148***	0.193***	0.228***	0.096**	0.117
	(0.042)	(0.065)	(0.043)	(0.037)	(0.081)
(Log) Household wealth	0.029**	0.029	0.039***	0.026	0.008
	(0.012)	(0.019)	(0.012)	(0.020)	(0.012)
Country identifier = 2, India	-0.762***	-0.096	0.355***	-0.051	-0.338***
	(0.111)	(0.080)	(0.091)	(0.052)	(0.047)
Country identifier = 3, Japan		0.841***	1.451***	0.270*	0.385***
		(0.121)	(0.080)	(0.136)	(0.081)
Country identifier = 5, Malaysia	-0.763***		0.633***	0.245***	
	(0.115)		(0.096)	(0.046)	
Country identifier = 6, Thailand			1.500***	0.403***	
			(0.101)	(0.092)	
Constant	37.215	-108.779***	-163.991***	-25.070	-60.207***
	(28.204)	(30.388)	(21.034)	(25.926)	(15.875)
Observations	67,253	78,169	84,669	99,505	93,863
R-squared	0.493	0.135	0.337	0.046	0.106

Source: CHARLS, HART, JSTAR, LASI, MARS and authors' calculations.

Note: This figure shows estimates from OLS regressions of health indicators on year of birth, with individuals' age, gender, education, wealth, and country of residence controlled for. Stars (***, **, and *) respectively denote significance of the year-of-birth coefficients at the 1,5, and 10 percent level.

Appendix Table 4. Mundlak Regressions, Korea

	(1)	(2)	(3)	(4)	(5)
			Self-reported measures		
	Grip strength	Self-reported PC	Overall health	ADLs	IADLs
Year of birth	0.026***	0.051***	0.016**	0.046***	0.044***
	(0.004)	(0.010)	(0.006)	(0.009)	(0.007)
Age	-0.013***	-0.020***	-0.026***	-0.012***	-0.011***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
Male	1.245***	-0.007	0.144***	-0.010	-0.093***
	(0.017)	(0.015)	(0.015)	(0.014)	(0.013)
Upper secondary and vocational training	0.049***	0.031**	0.183***	-0.029**	-0.024**
	(0.013)	(0.012)	(0.016)	(0.011)	(0.011)
Tertiary education	0.046*	0.057***	0.243***	-0.032*	-0.008
	(0.023)	(0.019)	(0.022)	(0.017)	(0.016)
(Log) Household wealth	0.022***	0.022***	0.024***	0.011	0.016**
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
Mean age	0.008**	0.053***	0.014**	0.050***	0.044***
	(0.004)	(0.011)	(0.007)	(0.010)	(0.008)
Mean wealth	0.016*	0.053***	0.080***	0.025**	0.029***
	(0.009)	(0.010)	(0.008)	(0.010)	(0.008)
Constant	-50.347***	-102.729***	-31.567**	-93.004***	-87.140***
	(7.706)	(19.166)	(13.056)	(17.654)	(14.034)
Observations	33,149	37,307	37,307	37,307	37,307
R-squared	0.539	0.109	0.183	0.040	0.067
SE cluster	Year of birth	Year of birth	Year of birth	Year of birth	Year of birth

Source: KLoSA, and authors' calculations.

Note: This figure shows estimates from Mundlak regressions of health indicators on individuals' year of birth, age, gender, education, wealth, mean age, and mean wealth controlled for. Stars (***, **, and *) respectively denote significance of the year-of-birth coefficients at the 1,5, and 10 percent level.

Appendix Table 5. Mundlak Regressions, Asia-5 (Excl. Korea)

	(1)	(2)	(3)	(4)	(5)
			Self-reported measures		
	Grip strength	Self-reported PC	Overall health	ADLs	IADLs
Year of birth	0.001	0.047**	0.084***	-0.000	0.031**
	(0.015)	(0.018)	(0.012)	(0.013)	(0.015)
Age	-0.087***	0.040	0.065***	0.006	0.001
	(0.023)	(0.026)	(0.010)	(0.012)	(0.008)
Male	1.074***	0.215***	0.070**	0.118***	0.196***
	(0.036)	(0.043)	(0.028)	(0.043)	(0.033)
Upper secondary and vocational training	0.129***	0.261***	0.202***	0.132***	0.212***
	(0.043)	(0.053)	(0.058)	(0.037)	(0.049)
Tertiary education	0.147***	0.185***	0.223***	0.083**	0.121
	(0.044)	(0.065)	(0.044)	(0.037)	(0.082)
(Log) Household wealth	-0.008	-0.010	-0.002	-0.017	0.025
	(0.032)	(0.034)	(0.017)	(0.027)	(0.027)
Mean age	0.052*	-0.022	0.008	-0.025***	0.001
	(0.026)	(0.031)	(0.006)	(0.007)	(0.017)
Mean wealth	0.039	0.043	0.045***	0.048	-0.018
	(0.032)	(0.037)	(0.017)	(0.033)	(0.031)
Country identifier = 2, India	-0.817***	-0.081	0.342***	-0.000	-0.339***
	(0.094)	(0.080)	(0.090)	(0.055)	(0.070)
Country identifier = 3, Japan		0.796***	1.461***	0.204	0.390***
		(0.132)	(0.083)	(0.136)	(0.101)
Country identifier = 5, Malaysia	-0.811***		0.622***	0.289***	
	(0.102)		(0.096)	(0.053)	
Country identifier = 6, Thailand			1.486***	0.460***	
			(0.103)	(0.080)	
Constant	0.362	-94.468**	-170.186***	1.562	-61.498**
	(29.854)	(35.692)	(23.322)	(26.604)	(30.220)
Observations	67,253	78,169	84,669	99,505	93,863
R-squared	0.495	0.136	0.338	0.048	0.106
SE cluster	Year of birth	Year of birth	Year of birth	Year of birth	Year of birth

Source: CHARLS, HART, JSTAR, LASI, MARS and authors' calculations.

Note: This figure shows estimates from Mundlak regressions of health indicators on individuals' year of birth, age, gender, education, wealth, mean age, mean wealth, and country of residence controlled for. Stars (***, **, and *) respectively denote significance of the year-of-birth coefficients at the 1,5, and 10 percent level.

Appendix Table 6. Heterogeneity in Healthy Aging Trends, Korea

	(1) Grip strength	(2) Self-rated PC	(3) Overall health	(4) ADLs	(5) IADLs
by Age					
Year of birth x Ages 50-59	0.018***	0.008***	0.004**	0.006***	0.008***
Year of birth x Ages 60-69	0.018***	0.008***	0.004**	0.006***	0.008***
Year of birth x Ages 70-79	0.018***	0.008***	0.004**	0.006***	0.008***
Year of birth x Ages 80-89	0.018***	0.008***	0.004**	0.006***	0.008***
by Gender					
Year of birth x Female	0.013***	0.007***	0.006***	0.004**	0.006***
Year of birth x Male	0.024***	0.010***	0.001	0.008***	0.011***
by Education					
Year of birth x Lower	0.021***	0.011***	0.003*	0.009***	0.011***
Year of birth x Upper secondary	0.018***	0.007***	0.004**	0.005***	0.007***
Year of birth x Tertiary	0.014***	0.004**	0.001	0.002	0.005**
by Wealth quintiles					
Year of birth x Quintile 1	0.020***	0.009***	0.004**	0.006***	0.008***
Year of birth x Quintile 2	0.020***	0.009***	0.004**	0.006***	0.008***
Year of birth x Quintile 3	0.020***	0.009***	0.004**	0.006***	0.008***
Year of birth x Quintile 4	0.020***	0.009***	0.004**	0.006***	0.008***
Year of birth x Quintile 5	0.020***	0.009***	0.004**	0.006***	0.008***

Source: KLoSA, and authors' calculations.

Note: This table shows estimates from OLS regressions of health indicators on year of birth interacted with socioeconomic groupings, with individuals' age, gender, education, and wealth controlled for.

Appendix Table 7. Effect of Better Health on Labor Market Outcomes: Robustness to Alternative Instrumental Variables, Korea

	(1) Grip strength	(2) Self-reported PC	(3) Overall health status	(4) ADLs	(5) IADLs
2nd Stage:					
IV: Chronic diseases unrelated to work					
Labor force participation (dummy)	0.738***	0.282***	0.290***	0.367***	0.451***
Retired (dummy)	-0.712***	-0.273***	-0.281***	-0.356***	-0.437***
IV: Severity-weighted chronic diseases					
Labor force participation (dummy)	1.182***	0.250***	0.222***	0.401***	0.344***
Retired (dummy)	-1.055***	-0.223***	-0.199***	-0.358***	-0.307***
IV: Dummy-top 10 most severe chronic diseases					
Labor force participation (dummy)	0.806***	0.231***	0.190***	0.345***	0.406***
Retired (dummy)	-0.671***	-0.192***	-0.158***	-0.287***	-0.337***
1st Stage:					
Chronic diseases unrelated to work	-0.309***	-1.001***	-0.998***	-0.757***	-0.619***
Severity-weighted chronic diseases	-1.042***	-5.716***	-6.677***	-3.468***	-4.055***
Dummy-top 10 most severe chronic di	-0.066***	-0.299***	-0.385***	-0.193***	-0.165***
Weak IV F-statistic					
Chronic diseases unrelated to work	55.27	283.7	411.9	109.3	136.2
Severity-weighted chronic diseases	59.23	181.1	1462	59.14	69.86
Top 10 most severe chronic diseases	34.97	121.7	528.6	47.02	47.35
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Source: KLoSA, and authors' calculations.

Note: This figure shows estimates from 2SLS regressions of labor force participation and retirement dummy indicators on health indicators (one at a time), with individuals' socio-economic characteristics (age, gender, education, household wealth), lifestyle factors (dummy indicators for having ever smoked, being over/underweight, or infrequent moderate physical activity), and survey year controlled for. Different instruments are considered: incidence of chronic diseases that are plausibly more exogenous to labor supply, incidence of chronic diseases weighted by their severity, and a dummy for the top 10 most severe chronic diseases.

Appendix Table 8. Effect of Better Health on Labor Market Outcomes: Robustness to Controlling for Year Fixed Effects, Korea

	(1)	(2)	(3)	(4)	(5)
			Self-reported indicators		
	Grip strength	Self-reported PC	Overall health status	ADLs	IADLs
IV: 2nd Stage (with Year FE)					
Effect on labor force participation	1.054***	0.291***	0.199***	0.499***	0.566***
	(0.151)	(0.037)	(0.020)	(0.091)	(0.095)
Effect on retirement	-0.950***	-0.262***	-0.179***	-0.450***	-0.512***
	(0.125)	(0.033)	(0.021)	(0.077)	(0.083)
Normalization: Effect of 1-decade health improvements (with Year FE)					
Effect on labor force participation	0.199***	0.026***	0.007***	0.036***	0.049***
	(0.028)	(0.003)	(0.001)	(0.007)	(0.008)
Effect on retirement	-0.179***	-0.023***	-0.006***	-0.033***	-0.044***
	(0.024)	(0.003)	(0.001)	(0.006)	(0.007)
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Source: KLoSA, and authors' calculations.
Note: This figure shows estimates from 2SLS regressions of labor force participation and retirement dummy indicators on health indicators (one at a time), with individuals' socio-economic characteristics (age, gender, education, household wealth), lifestyle factors (dummy indicators for having ever smoked, being over/underweight, or infrequent moderate physical activity), and year fixed effects controlled for. The bottom panel rescales coefficients to represent the effect of 1-decade improvements in health due to healthy aging.

Appendix Table 9. Effect of Better Health on Unemployment Probability, Korea

	(1)	(2)	(3)	(4)	(5)
	Grip strength	Self-reported PC	Overall health status	ADLs	IADLs
IV: 2nd Stage					
Unemployment (dummy)	-1.233	-0.044	-0.016	-0.481	-0.336
	(3.288)	(0.029)	(0.010)	(0.384)	(0.302)
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Source: KLoSA, and authors' calculations.
Note: This figure shows estimates from 2SLS regressions of an unemployment dummy indicator on health indicators (one at a time), with individuals' socio-economic characteristics (age, gender, education, household wealth), lifestyle factors (dummy indicators for having ever smoked, being over/underweight, or infrequent moderate physical activity), and survey year controlled for.

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