The Study on Retirement Age Adjustment Reflecting Possible Workability of Elderly Population

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Abstract This study aims to discern the determinants influencing the perception of workability among the elderly population and delineate an appropriate retirement age within the labor market context. Employing binary logistic regression, this research utilizes data from the Korea Welfare Panel Study (2008, 2012, 2016, and 2020) provided by the Korea Institute for Health and Social Welfare. The findings indicate that key factors shaping the elderly's perception of workability encompass familial responsibilities (household and marital status) and their levels of physical and mental well-being. Econometric analysis suggests an anticipated retirement age for the elderly population ranging between 67 and 69 years. In addressing labor market demands and informing policymakers, the study proposes deliberations on extending the retirement age for individuals aged 60 to 65. This range serves as a compromise between the identified retirement age of 67 to 69 and the current average retirement age for elderly labor market participants. Bridging the disparity between the perceived workability age and the prevailing labor market baseline is crucial for achieving social consensus. Therefore, any extension of the retirement age should carefully consider both the demand and supply perspectives within the labor market. The study's contribution lies in two main aspects: firstly, presenting a retirement age framework for the labor market that integrates the workability of the elderly population, and secondly, providing evidence-based research outcomes to guide informed labor policies.

Keywords Perception of Workability Age, Retirement, Elderly Population, Labor Market, Elderly Poverty

I. Introduction

Having navigated Korea's transformative phases of growth, middle-aged Koreans have weathered the storms of the IMF crisis (1997-1998), the global

financial crisis (2008-2009), and are presently grappling with the societal implications of low birthrates and an aging population. Throughout this journey, the middle-aged and elderly demographic has found itself marginalized amidst evolving social expectations. Presently, Korean society is predominantly preoccupied with the issue of declining birthrates, with insufficient attention directed towards discussions concerning the labor market withdrawal of the older population, as highlighted by study such as Cha (2012). A noteworthy phenomenon is the significant proportion of the labor force disengaging from the market between the ages of 55 and 60. The exclusion of the elderly from the labor market poses challenges, impeding their ability to break free from economic hardships, especially given the delayed pension payments and the low-income replacement rate associated with pensions, as indicated by Choi et al. (2012). This failure to incorporate the elderly into the labor force further exacerbates economic vulnerability among this demographic.

The perpetual advancements in medical technology, concomitant with strides in science and technology, coupled with enhancements in nutrition, contribute substantively to the amelioration of health outcomes for individuals in tandem with the escalation of personal income. The prognosticated surge in life expectancy across diverse age cohorts was envisioned to precipitate a concomitant quantitative expansion of the populace. Contrary to initial expectations, however, this phenomenon has not translated into population growth, owing to an escalatingly low birthrate within societal frameworks. Instead, the demographic landscape is undergoing a discernible imbalance. The polarization of demographic contours, stemming from an upswing in the elderly population and a concurrent diminution in the youth demographic, portends a forthcoming contraction in the productive populace. This demographic shift is poised to elevate the dependency ratio within societal frameworks (Lee and Choi, 2019).

Forecasts indicate that the elderly population in Korea is projected to surpass 10 million by 2025 and escalate to 18.8 million by 2048 (Jang, 2017). In stark contrast to this demographic surge, the fertility rate, standing at approximately 0.81 as of 2021 (Statistics Korea, 2022), signals a persistent trend of declining birth rate. The forthcoming demographic transition, characterized by an augmented elderly population and a concurrent decrease in birth rates, portends a shift towards an ultra-elderly society, with the elderly constituting more than 15% of the population. From 2011 to 2020, Korea exhibited an average annual aging growth rate of 4.4%, surpassing the OECD average of 2.6%. Projections suggest that by 2048, Korea will claim the highest aging rate among OECD nations (Korea Economic Institute, 2021). This pronounced aging trend in Korea is concomitant with a pressing concern—elderly poverty. Notably, the statistical data reveals an elder poverty rate of 43.4%, markedly exceeding the OECD average of 14.8%. The entrenched issue of poverty within the elderly

demographic persists unabated within the social fabric, compelling this cohort towards a precarious economic precipice. The recourse for many older individuals often involves remaining on the fringes of the labor market, engaging in precarious, low-wage, and low-skilled occupations to alleviate financial hardships. Despite initiatives aimed at extending retirement age, implementing a wage peak system, and expanding welfare provisions, apprehensions persist regarding potential social ramifications. These include heightened social burdens and potential labor market challenges for the younger demographic.

In response to the demographic imbalance, the government has established the National Commission on Declining Birthrate and Aging Society and established the Basic Plan for Declining Birthrate and Aging to strategically promote policies. The deterioration of the birthrate is recognized as a serious social problem, and a significant amount of financial resources are being invested in it, but the output performance in relation to the input has not met expectations. In contrast to the social attention and support for the declining birthrate, the aging population has received relatively little attention from the government. Overseas, countries have introduced measures such as extending the retirement age and delaying the age of pension receipt to address the burden of dependency and poverty among the elderly (Lee and Choi, 2019). Korea is also promoting various improvement measures such as extending the retirement age, postponing the pension starting age, and changing the payment amount by referring to overseas aging measures. The Supreme Court has raised the physically able-bodied working age from 60 to 65, and the government is also exploring ways to postpone the age of pension receipt from 62 to 65. The need to adjust the retirement age is related to the increase in the duration of pension and elderly welfare receipt. It is necessary to introduce an automatic adjustment of the age at which pension benefits start to take into account the rate of increase in the number of expected workers, as in developed countries (Lee, 2022).

In the event of insufficient labor market engagement among the elderly, individuals are prone to experiencing poverty, notwithstanding governmental initiatives. A considerable portion of the older demographic exits the labor market before the tacitly acknowledged retirement age of 60. Those who remain employed for economic reasons are confronted with challenges in securing wages and status commensurate with their human capital within the established system. Even if they receive a pension, it merely constitutes 43% of the prevailing income replacement rate, falling short of enabling them to attain income levels commensurate with their earlier labor market participation (Korea Economic Institute, 2021). Absent a comprehensive substitution for the income cliff, delays in pension disbursement for older individuals may precipitate extreme poverty, exacerbated by a confluence of low-income replacement and income disparities.

In addressing the challenges confronting the elderly demographic, proposing a revised retirement age within the labor market emerges as a potential solution to mitigate issues faced by this population. A crucial aspect of this initiative involves restructuring the labor market to accommodate the physical, social, and human capital attributes unique to the elderly (Bang, 2011; Lee and Choi, 2019). The primary imperative is to determine an optimal retirement age that considers an individual's perceived workability and aligns with both individual retirement age (reflecting labor supply) and socioeconomic retirement age (reflecting labor demand). By calculating the working age and presenting viable alternatives to the conventional retirement age for the elderly in the labor market, this approach aims not only to foster a conducive working environment that sustains the mental and physical well-being of the elderly but also to alleviate economic hardship for socially vulnerable individuals, thereby reducing the societal burden of dependency. Furthermore, leveraging the elderly population's untapped labor capacity not only enhances economic efficiency within the labor market but also contributes to national economic growth during periods of stagnation.

For a meaningful exploration of structural shifts in the labor market, it is imperative to employ scientific methodologies that offer a rational basis for academic and policy discourse. While numerous studies have addressed changes in labor market structures, there exists a scarcity of research employing rigorous scientific tools to present alternative explanations. This study endeavors to address this gap by employing an econometric model to scrutinize the structural transformations within the labor market, with a specific focus on the elevation of the retirement age among the elderly population. The application of an econometric model in this research contributes a compelling dimension to the discourse, fostering a basis for societal consensus that transcends the limiting confines of age-centric perspectives and implicit societal norms. The study aims to propose a retirement age standard grounded in individuals' perceived workability, thereby mitigating the disjunction between individual and market-defined retirement ages. Through this approach, the study seeks to provide substantive policy recommendations conducive to enhancing labor market efficiency.

II. Theoretical Backgrounds

The shifting demographic landscape instigates a transformation in social structures, heralding a new juncture for Korea across societal, economic, and social welfare domains due to the compounded effects of a declining birthrate and aging phenomenon (Cho, 2016). The labor market serves as the locus for

the delineation of the productive population, marking the inception of social structural metamorphosis. Alterations in the economic demographic structure, propelled by the diminishing productive population within the economically active demographic, are poised to exert direct or indirect influences on diverse interconnected domains, encompassing society and welfare (Cho, 2016; Choi et al., 2017; Caudroit et al., 2012; Cerino and Leszczynski, 2015). Addressing the escalating fiscal demands for social support necessitates policy adaptations. The burgeoning elderly population prompts policy endeavors aimed at their inclusion.

The societal transformations experienced by the elderly population are concomitant with distinct economic challenges. Despite the legislative framework established by the Age Discrimination Act, which designates 60 as the retirement age, a substantial segment of labor market participants withdraw from active employment in their early 50s (Cha, 2012; Choi et al., 2012). When this age group drops out of the labor market, the problem that emerges is economic poverty. The government is attempting to streamline pension management by raising the age of eligibility for the national pension from 62 to 65 by 2033. While this is a good idea from a pension management perspective, it creates a paradoxical income cliff for individuals who leave the labor market at an early age. Furthermore, even if they do receive a pension, the income replacement rate is very low. The economic impoverishment of middle-aged households that begins after labor market exit is not alleviated after pension receipt, and the majority remain in the labor force and attempt to pursue income beyond the working-age population threshold of 65. Moreover, less than 20% are financially prepared for retirement and old age, resulting in an effective retirement age of 72.3 years, the highest in the OECD, due to the continued working life of the older population. In the past, the financial burden of the elderly was reduced to a certain extent due to the support of their children, but the child support rate has decreased from about 32% in 2011 to about 14% in 2021, making it difficult for the elderly to leave the labor market due to economic factors. On the other hand, the quality of jobs for older workers is declining as they stay in the labor market longer. A large proportion of them are temporary workers and self-employed, while less than 40% are employed in commercial jobs.

The discourse surrounding the extension of labor market participation emerges as a pertinent avenue for mitigating economic destitution among the aging workforce and elevating the caliber of employment opportunities. Approaching this matter through a generic extension of the retirement age to 65, solely based on physical viability per Supreme Court precedent or survey data, lacks scientific precision. Ensuring the efficacy of social agreements necessitates a concerted effort to narrow the gap between labor market supply, demand, and societal retirement expectations. To augment this discourse,

numerous studies have delved into aspects related to the aging labor market, encompassing age standards, retirement age systems, and retirement expectations (Jang, 2017; Jang et al. 2017; Jung, 2011; Jung et al., 2017; Lee and Choi, 2019; Cho, 2014; Ji, 2019). These studies underscore the imperative of restructuring the support burden in response to an aging population and the concomitant decline in the working-age demographic. As an alternative consideration, they explore adjustments to the working age standard, aiming to harness the labor potential of the elderly population irrespective of their capacity to work and to instigate social structural transformations in light of demographic shifts.

In the labor market, intentional exclusionary behavior based on stereotypes of older adults, such as "physically frail," "less productive," or "less able to learn," can be attributed to ageism (Ji, 2019; Sagreant, 2011). Older adults may not consider themselves to be part of the elderly category, but they are socially embedded in ageism, resulting in negative perceptions and discrimination. Negative forms of ageism include labeling older people as old-fashioned, conventional, and physically weak (Palmore, 1999). People in the older age group also feel that they are discriminated against by younger generations (Kim and Mo, 2012; Kim, 2015), especially in the labor market (Lim, 2017). Economically, the key to the discussion of increasing the elderly dependency ratio is to raise the legal retirement age of 65. It is reported that the age of "elderly" in the minds of the 65+ group is different from the actual age set (Yoon, 2016; Lee and Choi, 2019), and Jung (2017) mentions 71.2 years as the perceived age of the elderly. Regardless of the perceptions of the elderly population themselves, the socially constructed frame of "elderly" leads to a pronounced phenomenon of non-preference for older workers in the labor market, justifying discriminatory treatment regardless of wages, status, or willingness to work (Kim, 2009; National Human Rights Commission, 2018).

In anticipation of the aging phenomenon, international attention has been directed toward addressing social problems arising from ageism through discussions centered on senior citizens (Ahmed et al., 2012; Barrington, L., 2015; Drydakis, N. et al., 2018; Riach, P. A., and Rich, J., 2010). Contrarily, in Korea, discussions pertaining to ageism have predominantly revolved around social activities, life satisfaction, and personal health (Kim, 2015; Lee and Choi, 2019; Jang, 2018; Choi et al., 2017). Some scholars have underscored the importance of measuring the extent of discrimination and perceived discrimination in the labor market against the elderly population, attributing these negative effects to ageism, and have advocated for relevant measures (Kim and Mo, 2012; Ji, 2019). In recent years, discussions surrounding the elevation of the retirement age have emerged as a potential strategy to ensure sustainable funding for elderly welfare (Lee, 2022; Jung et al. 2017). Nevertheless, there remains a dearth of quantitative research on this subject.

Achieving consensus for a shift in age standards for the elderly necessitates a societal understanding that perceives the elderly as potentially physically and mentally capable contributors to the labor force. Such a perspective challenges the prevailing notion that older individuals are inherently unfit for work, positioned at the fringes of the labor market, and reliant on social welfare. Radl (2012) posits that age adjustment is feasible, citing changes in demographic, labor market, and social structures as catalysts for differential adjustments in labor market norms and pension systems. In the Korean context, Ji's empirical exploration (2019) of measures to gauge ageism in the labor market underscores the imperative to rectify negative perceptions of older labor market participants and implement pertinent measures. Despite potential social consensus on age adjustment, studies by Ji (2017) and Ahmed et al. (2012) suggest that job searches for older adults remain challenging in the labor market due to prevalent ageist stereotypes.

The ageist perception of the "elderly" as "old," despite their proven capability to work, implicitly pressures them to exit the labor market, depriving them of the autonomy to self-regulate their working lives. Socially, the coerced departure of older individuals from the labor market contributes to their economic impoverishment and places an increased burden on welfare finances. From a labor market perspective, neglecting the potential contributions of the elderly workforce contradicts sound development strategies that could harness their abilities to achieve labor market efficiency and secure growth engines. Hence, this study seeks to employ scientific tools to address the structural issues in the labor market stemming from age stereotyping of the elderly, compensating for inherent limitations in existing studies.

III. Methodology and Data

1. Methodology

This study estimates the optimal retirement age for older workers in the labor market based on their self-perceived ability to work. Since working ability can be classified into two forms, "possible" and "impossible," we applied a binary logistic model that is suitable for this form. The binary logistic model is expressed as (1) below (Lee et al., 2005; Madala, 1983).

$$y^* = \sum_{k=1}^{N} \beta_k x_k + \varepsilon$$

$$y^* = \begin{cases} 1 = if \ y^* > 0 \\ 0 = otherwise \end{cases} \qquad \text{Eq. (1)}$$

The provided equation delves into the nuanced assessment of an older adult's work capability, distinctly categorized based on their perceived ability to engage in employment. In this context, a binary differentiation is established, assigning a value of 1 to individuals deemed capable of undertaking regular work and a value of 0 to those judged as proficient in performing only simple tasks or as entirely incapable of working. The presented expression serves as the cumulative distribution function (CDF) characterizing the binomial selection probability error term. The incorporation of equation (2) is purposeful, facilitating analytical exploration utilizing the designated dependent variable.

$$\text{Prob}(y = \text{workability}) = \text{Prob}(\sum_{k=1}^{K} \beta_k x_k + \varepsilon > 0)$$
$$= F(\sum_{k=1}^{K} \beta_k x_k) \qquad \text{Eq. (2)}$$

Based on the regression results of the binary logistic model derived through the above equation (2), the Expected Probability of each independent variable is calculated to suggest the appropriate retirement age standard perceived by the elderly based on their working ability.

1. Data

This study employs the Korea Welfare Panel data, sourced from the Korea Institute of Health and Social Research, for a cross-sectional analysis spanning four years from 2008 to 2020. While the majority of labor market studies traditionally utilize labor panel data, our objective is to delve into the suitable retirement age from the perspective of labor market providers. To achieve this, we have opted for the Korean Welfare Panel Data, a survey designed to gauge the subjective perception of working ability, making it an appropriate candidate for use as a dependent variable in our analysis. Despite potential preconceptions about the data's applicability to labor market analysis based on its nomenclature, it contains pertinent indicators influencing both subjective and objective workability, aligning with the variables essential for our study. Therefore, we determined that the nomenclature does not impede our ability to conduct a meaningful analysis.

Table 1. Variable

Variable		Explanation	Correlation
Dependent variable			
Workability	Workability considering Physical and Mental Condition	Workability=1, None Workability =0(Ref.)	-
Independent variable			
Age	Age	Between 60-80	(+)
	Age square	Age*Age	(-)
Gender	Gender	Male=1, Female=0(Ref.)	(+)
Household	Household	Household =1, Not Household=0(.)	(+)
Marriage	Marriage	Spouse=1, No Spouse=0(Ref.)	(+)
Education level	Edu1	Not Educated, Elementary school(Ref.)	-
	Edu2	Middle school	(+)
	Edu3	High school and 2year-college	(+)
	Edu4	University	(+)
	Edu5	Graduate School	(+)
Level of Health Condition	Health condition1	Good	(+)
	Health condition2	Intermediate	(+)
	Health condition3	Bad (Ref.)	-
Life satisfaction	satisfaction1	Good	(+)
	satisfaction2	Intermediate	(+)
	satisfaction3	Not Good (Ref.)	-

Note: The age variable reflects the physically capable age, set based on the precedent commonly used before the 2019 Supreme Court ruling, which was the standard of 60 years and older.

The study confines its sample population to individuals aged 60 to 80, with 60 as the outset, aligning with the socially acknowledged retirement age, and 80 as the upper limit, considering prevalent labor market exit patterns. The dependent variable focuses on observable subjects responding affirmatively to "able to work," while unobservable subjects, answering "able to work," "not able to work," or "not economically active due to inability to work," are categorized as unobservable.

Among the independent variables, age is anticipated to exhibit a positive correlation with the dependent variable, as advancing age is expected to heighten

the likelihood of encountering personal and economic workability limitations. Gender, while posited to have a positive correlation due to men's perceived physical fitness advantage, may also exhibit negative correlation, considering women's comparative advantage in certain low-skilled, less mobile tasks prevalent among the elderly. Household head status is expected to positively influence the dependent variable, reflecting a leadership role within the household. The dummy variable for education encompasses various levels, with higher human capital associated with enhanced labor capabilities and positive correlation with the dependent variable. Beyond objective factors, subjective elements, such as perceived health and life satisfaction, are incorporated, with higher life satisfaction presumed to correlate positively with perceived work ability, reflecting healthier physical and mental conditions.

IV. Research result

1. Descriptive statistics

The basic statistics were analyzed by focusing on the variables used in this study from 2008 to 2020. In the case of the dependent variable, the proportion of people who reported being able to work increased from 64.03% in 2008 to 74.73%, 83.02%, and 84.00% in 2012, 2016, and 2020, respectively. The increase in the proportion of people who reported being able to work in the older age group has the following implications. First, physical and mental age may be overtaking social age, and second, economic factors may continue to require participation in the labor market throughout the life cycle. Third, there is a significant number of idle labor force that is physically and mentally available but not utilized in the older workforce. Therefore, overall policy review and development of the older workforce in labor policy is required. The disparity in the labor market is evident when summarizing the level of working ability and main economic activity participation by age group.

Table 2 below can be interpreted as follows. In the 60-64 age group, the proportion of wage earners in 2008, 2012, 2016, and 2020 has been on a steady upward trend, while the proportion of the economically inactive population has remained around 28-30% from 2008 to 2016, declining to 20.7% in 2020. To sum up the results, the increase in the number of wage earners and the decrease in the number of economically inactive people in the 60-64 age group have coincided, suggesting that involuntary exclusion from the labor market has decreased somewhat. Even in the age group of 65 to 69, the wage earners can be considered to have a continuous upward trend, i.e., the matching of the working and economically active status is increasing, but the inactive population

has increased rather than decreased compared to the age group of 60 to 64. This result suggests that after age 65, there is an increase in the corresponding age group participating in the labor market for both working and economically active status, but on the other hand, there is an increase in the number of inactive people who are excluded from the labor market despite their working status, resulting in a polarization of age groups within the labor market. The 70+ age group can be characterized as a group that is entirely excluded from the labor market, as very few of them are available for work and are relatively stable wage earners.

Table 2. Proportion of wage earners and economically inactive population

Age group	Economic status	2008	2012	2016	2020
60-64	Wage earners	17.5%	25.0%	31.3%	39.9%
	Inactive economic population	28.7%	31.1%	29.6%	20.7%
65-69	Wage earners	11.6%	14.8%	19.7%	27.9%
	Inactive economic population	24.6%	38.3%	40.0%	34.4%
70-74	Wage earners	4.1%	7.1%	10.9%	13.9%
	Inactive economic population	23.7%	40.1%	42.2%	36.6%
75+	Wage earners	1.5%	2.4%	3.2%	5.0%
	Inactive economic population	16.2%	29.4%	35.3%	34.2%

In terms of gender, the proportion of males was found to be between 44.0 and 46.7% at each time point. The number of household heads was found to be between 59.4 and 64.2 percent at each time point. Married individuals were found to be around 72% to 73% at all-time points. In terms of education, the overall level of education has increased over time. Since 2008, the proportion of people with a junior high school diploma or less (Education level 1 and Education level 2) has steadily decreased, while in 2012, the proportion of people with a high school diploma or higher (Education level 3), a college degree (Education level 4), and a graduate degree (Education level 5) has steadily increased. Health levels were also found to have increased by more than 18.5%, from about 60.2% in 2008 to about 78.7% in 2020, indicating a significant improvement in the overall health of the older age group. In terms of life satisfaction, the proportion of respondents who rated their life satisfaction as moderate or above has increased consistently since 2008.

Table 3. Descriptive statistics

Variable	2008		2012		2016		2020	
	Avg.	Std.	Avg.	Std.	Avg.	Std.	Avg.	Std.
D.V	0.6403	0.3528	0.7473	0.3166	0.8302	0.2926	0.8400	0.3106
Age	67.2402	4.1865	67.6417	4.2821	67.1506	4.6593	66.7566	5.0201
Age square	4,553.68	570.16	4,609.94	586.03	4,544.95	635.95	4,491.54	684.96
Male	0.4526	0.3659	0.4404	0.3617	0.4615	0.3885	0.4665	0.4227
Household	0.5942	0.3610	0.6083	0.3556	0.6330	0.3756	0.6417	0.4063
Marriage	0.7238	0.3287	0.7231	0.3260	0.7345	0.3441	0.7349	0.3740
Edu1	0.5721	0.3637	0.5196	0.3640	0.3859	0.3794	0.3234	0.3964
Edu2	0.1627	0.2714	0.1809	0.2805	0.2234	0.3246	0.1947	0.3355
Edu3	0.1868	0.2865	0.2052	0.2942	0.2758	0.3483	0.3523	0.4048
Edu4	0.0642	0.1802	0.0743	0.1911	0.0922	0.2254	0.1033	0.2579
Edu5	0.0142	0.0869	0.0200	0.1021	0.0228	0.1163	0.0263	0.1355
Health Condition1	0.3176	0.3422	0.3911	0.3555	0.4134	0.3838	0.4683	0.4228
Health Condition2	0.2840	0.3315	0.3154	0.3386	0.3259	0.3653	0.3185	0.3948
Health Condition3	0.3983	0.3599	0.2936	0.3318	0.2607	0.3421	0.2132	0.3470
Satisfaction1	0.4029	0.3606	0.4858	0.3641	0.6294	0.3764	0.5934	0.4162
Satisfaction2	0.4783	0.3672	0.4167	0.3592	0.3142	0.3618	0.3520	0.4047
Satisfaction3	0.1188	0.2379	0.0975	0.2161	0.0564	0.1797	0.0546	0.1926
N	4,137		5,232		4,535		3,888	

A binary logistic model was applied to determine the influence of independent variables on the level of physical and mental work capacity of the elderly labor group. First, the analysis showed that the variance expansion factor was less than 5, except for the linear variables of age and age squared, so the problem of multi-collinearity was not highlighted. The explanatory power of the model was found to be 0.1452, 0.0988, 0.1190, and 0.1474 for the R-square and 0.2867, 0.2190, 0.2800, and 0.3149 for the Max Rescaled R-square in 2008, 2012, 2016, and 2020, respectively. Applying the rule of thumb that a model has good explanatory power if it has an R-square between 0.2 and 0.4 for cross-sectional analysis, we can conclude that the explanatory power of the model in this study has achieved a certain level. Overall, the model does not have much explanatory power for the independent variables due to the cross-sectional sample estimation weighting.

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To summarize the results of the analysis The age variable is positively related to the dependent variable except for 2020. It can be interpreted that the probability of being able to work increases as age increases. Although this result is contrary to common sense, based on the coefficient value (=magnitude), it is found that the value gradually decreases over time, which means that the influence of the age variable on the dependent variable decreases. It is reasonable to assume that the probability of being physically able to work decreases as age increases, so this is an area for further observation.

In the case of gender, in 2008, the probability of perceiving oneself as available for work is positive for men compared to women for the dependent variable at a statistically significant level. After 2012, the sign of the coefficient reverses, but does not reach statistical significance in 2012 and 2016. In 2020, the effect of being male on the dependent variable is negative and statistically significant at the 5% level of significance. In summary, men are less likely to report being available for work compared to women. In the realm of labor tenure, the following elucidations can be derived. Typically, men tend to maintain extended periods of engagement in the labor market, accumulating a wealth of high-skilled and densely networked human capital. However, upon re-entry into the labor market post-retirement age (=supply side), these individuals encounter challenges in effectively leveraging the human capital they have amassed. This predicament arises due to a hesitancy on the part of firms in the labor market (=demand side) to overlook age-related declines in productivity and extend wage offers commensurate with the accumulated human capital of older men. Consequently, the ease of aligning demand and supply in the labor market for older men is notably diminished. Conversely, women returning to the labor market after a career hiatus often confront a mismatch between the jobs offered and their existing human capital. This mismatch frequently manifests in a disproportionate prevalence of low-skilled positions, trapping women in the labor market at a lower wage level reflective of their perceived lower human capital. In light of the analytical findings and the aforementioned interpretation, there arises a critical need to formulate policies addressing the effective assimilation of the labor supply of older men into the workforce.

In the case of household headship and marital status, the dependent variable is positively related to the dependent variable in all years at the 5% level of significance. Household heads perceive the imperative to extend their work tenure beyond the age of 60 due to their role as primary providers for the household. Likewise, married individuals contend with the necessity of securing a requisite level of economic income, given the heightened financial demands associated with marital commitments. This juncture also signifies a phase wherein societal considerations, such as planning for children's marriages and the ensuing wealth transfers, as well as addressing the healthcare requirements of the elderly, come to the forefront. The confluence of these multifaceted

factors is posited as the driving force behind the observed positive correlation with the dependent variable.

In the case of education, which represents the level of human capital for labor market participation, statistical significance was not achieved in all years except Edu3 in 2020. Indirectly, by estimating the effect of each dummy variable on the dependent variable based on its estimated coefficient, it is found that the probability of perceiving oneself as physically and mentally able to work is higher if one has good human capital.

In the case of health, the healthier the individual, the higher the probability of perceiving themselves as able to work within the 1% statistical significance level in all years. Therefore, it can be said that staying healthy is essential for maintaining the workability of the elderly population. Life satisfaction was statistically significant within 1% in all years except 2012 and was analyzed to have a positive effect on the dependent variable. It can be assumed that positive satisfaction with life affects the state of mind and body, which is one of the main reasons why the older population is active in the labor market. The results of the above two variables show that good physical and mental health is associated with a higher probability of positive labor market participation among the elderly population.

Table 4. Regression result

Item	2008		2012		2016		2020	
	Est.	Std. Error	Est.	Std. Error	Est.	Std. Error	Est.	Std. Error
Intercept	-4.440	7.914	-2.039	7.500	3.324	8.919	-0.283	9.016
Age	0.205	0.233	0.146	0.218	0.008	0.258	0.115	0.261
Age square	-0.002	0.002	-0.002	0.002	-0.001	0.002	-0.002	0.002
Male	0.420 **	0.170	0.183	0.157	-0.024	0.179	-0.300 *	0.171
Household	0.445 ***	0.161	0.268 *	0.153	0.394 **	0.184	0.253	0.189
Marriage	0.759 ***	0.145	0.679 ***	0.139	0.877 ***	0.164	0.966 ***	0.160
Edu2	-0.078	0.151	0.247 *	0.141	0.167	0.156	0.080	0.162
Edu3	-0.100	0.154	0.194	0.148	-0.030	0.164	0.465 ***	0.163
Edu4	-0.221	0.242	0.229	0.232	0.034	0.258	-0.046	0.244
Edu5	2.542 *	1.467	0.021	0.460	-0.018	0.528	-0.009	0.447
Health Condition1	1.688 ***	0.142	1.371 ***	0.130	1.665 ***	0.169	1.948 ***	0.173
Health Condition2	1.035 ***	0.121	0.892 ***	0.115	0.898 ***	0.131	0.950 ***	0.135
Satisfaction1	0.465 ***	0.170	0.264	0.165	1.011 ***	0.214	0.640 ***	0.236
Satisfaction2	0.454 ***	0.159	0.110	0.160	0.625 ***	0.211	0.040	0.228
-2 Log L	2,271.58		2595.23		1934.30		1834.15	

R-Square	0.1452	0.0988	0.1190	0.1474
Max-rescaled R-Square	0.2867	0.2190	0.2800	0.3149
N	4,137	5,232	4,738	3,888

Note) *** p<.01, ** p<.05, * p<.1

The social and academic definition of the elderly is 60 to 65 years of age, but as life expectancy increases due to advances in medical and nutritional technologies, there are discussions around the world about raising the elderly age. Jung et al (2017) propose an age standard for the elderly based on a survey. While this is a valid approach in terms of building a social consensus, a more scientific approach is needed to lend credibility to a new elderly age standard. An approach that utilizes econometric tools may be able to meet the rationality and persuasiveness of the results unlike previous studies. In this study, based on the binary logistic results in Table 4, we propose a new age standard by deriving the expected probability of being able to work by age and intersecting it with the probability under the average condition of the research model.

In the average condition, the predicted value of the probability for the value of the given explanatory variable was calculated first, and then the predicted value of the probability for the dependent variable by age was calculated. At the point (Average of predicted value = Age-specific value of predicted value) where the two predicted values intersect, the socially acceptable labor market retirement age is determined.

Table 5. Marginal effect and exploring retirement age

Age	2008	2012	2016	2020
Average Probability	69.15%	79.79%	89.09%	90.78%
60	82.92%	88.84%	95.15%	95.60%
61	81.74%	88.11%	94.61%	95.21%
62	80.42%	87.30%	94.00%	94.76%
63	78.95%	86.40%	93.32%	94.25%
64	77.32%	85.40%	92.54%	93.68%
65	75.51%	84.30%	91.68%	93.04%
66	73.52%	83.07%	90.70%	92.31%
67	**71.32%**	81.72%	**89.61%**	**91.48%**
68	**68.92%**	**80.23%**	**88.38%**	**90.55%**
69	66.31%	**78.58%**	87.00%	89.49%

70	63.49%	76.78%	85.47%	88.30%
71	60.46%	74.80%	83.76%	86.95%
72	57.22%	72.65%	81.86%	85.43%
73	53.81%	70.31%	79.76%	83.72%
74	50.24%	67.78%	77.46%	81.80%
75	46.56%	65.05%	74.93%	79.65%
76	42.79%	62.15%	72.18%	77.26%
77	38.99%	59.06%	69.22%	74.62%
78	35.21%	55.81%	66.04%	71.71%
79	31.51%	52.42%	62.66%	68.53%
80	27.93%	48.92%	59.11%	65.09%

Table 5 compares the probability of being able to work under average conditions with the probability of being able to work by age. It is noteworthy that in 2008, 2012, 2016, and 2020, the probability crosses the average condition at the age of 67 to 69. The findings of this study yield notable implications. On the supply side of the labor market, there exists a belief that individuals in their 60s are available for work, challenging the prevailing ageist perspective on the demand side, which often asserts diminished productivity for this age cohort. However, the substantial challenges faced by individuals in securing employment beyond the age of 50, despite the perceived availability on the supply side, point to a marked underutilization of labor within the labor market. Additionally, the established retirement age of 60 (and 65 in certain occupations) reflects an operational inefficiency in the utilization of the labor factor in the market.

This divergence from the working age endorsed by the supply side, as uncovered in this study, underscores the ongoing discourse on elevating the retirement age, a conversation gaining momentum not only internationally but also within the Korean context. Addressing the imbalance between labor supply and demand among the elderly is deemed socially imperative. While the state is tasked with ensuring the livelihood needs of this demographic post-retirement, a fixed total pension amount may inadvertently shift the burden from the current generation to subsequent ones, potentially instigating social conflict. Economically, grappling with the challenges of low growth necessitates a strategic expansion of the labor force's scope. Consequently, this study advocates for an active and informed discussion on the proposition of raising the retirement age as a means of fostering economic resilience.

V. Conclusion

This study is centered on empirically discerning the retirement age based on the perceived workability of older workers who often face marginalization in the labor market due to age-related factors. The widening disparity between biological age and socially determined age, influenced by advancements in medical and technological fields, coupled with the depletion of accumulated human capital and networks during corporate restructuring, contributes to an untimely cessation of working life. This phenomenon is exacerbated by societal expectations favoring sacrifices in the labor market to facilitate the employment of younger individuals. Fortunately, there has been a recent societal discourse on the prospect of raising the retirement age. Previous research has primarily concentrated on investigating job satisfaction and the factors influencing retirement decisions, significantly contributing to our comprehension of the aging labor market and the formulation of mitigative strategies. However, a noticeable gap exists in the literature concerning the resetting of retirement age based on the perceptions of older workers. This is particularly pertinent for older workers who, as both suppliers and non-dominant entities in the labor market, find themselves involuntarily excluded by dominant groups, such as corporations and society at large. Markets influenced by the dominance of specific groups are often deemed inefficient. In the context of the aging labor market's pronounced inefficiency, a crucial perspective involves examining the labor market needs of less dominant suppliers to foster social efficiency. The determination of an individual's perceived working age and its alignment with the anticipated social retirement age constitutes an initial step in this direction. This study undertakes a longitudinal examination of individuals' perceived working age, aiming to contribute to labor market expansion by proposing a novel and more inclusive retirement age. The primary empirical findings of this study can be summarized as follows. Firstly, there exists a discrepancy in the labor market as individuals, irrespective of their workability, refrain from labor market participation with increasing age (refer to Table 2). Aligned with societal perspectives, the widespread agreement on the appropriateness of "raising the retirement age from 60 to 65" is acknowledged within the labor market. In the context of an aging society and the ongoing discourse on adjusting the age threshold for the elderly, this study empirically confirms the phenomenon of age-based exclusion from the labor market. However, it leaves an open question: does the proposed age, from a social and economic standpoint, genuinely reflect the views of labor market participants?

The principal empirical findings derived from this study are as follows. Firstly, an observable mismatch in the labor market is evident as individuals,

irrespective of their workability, progressively disengage from labor market participation with advancing age. Aligned with societal sentiments, there is a unanimous endorsement within the labor market for the proposition that "raising the retirement age from 60 to 65 is appropriate." In the context of a society undergoing rapid aging and an escalating discourse on elevating the age threshold for the elderly, this study empirically verifies the manifestation of age-related exclusion within the labor market. However, this recognition of age-related exclusion does not conclusively answer the question of whether a particular age serves as an equilibrium point from both social and economic perspectives, aligning with the viewpoints of labor market participants. To address this, the study employs logistic outcome analysis and marginal effects calculations through an overloading tool to derive the subjective workability perspectives of older labor market participants. The findings suggest that the optimal age for retirement, as perceived by participants, falls within the range of 67 to 69. Consequently, considering the results of both analyses, there emerges a compelling case for policy interventions aimed at rectifying inefficiencies within the older population's engagement in the labor market. The study advocates for the appropriateness of raising the socially perceived retirement age (from 60 to 60+) as a policy measure to bridge the gap with the retirement age (67-69) from the standpoint of labor market participants. Additionally, a gradual increase in the annual pensionable age to 65 is proposed as a strategy to mitigate income disparities during the retirement transition.

The study further provides insights into internalizing the social changes brought about by the retirement of older workers in the labor market. Elevating the retirement age for the older population emerges as a strategy to alleviate the societal burden of aging. The onset of an aging society triggers a surge in social welfare costs, heightened fiscal burdens on the government, and an increased individual tax burden. Rather than attempting to externally curb these rapid societal changes or proposing new policies, internalizing social change by leveraging its inherent characteristics is deemed more effective. Efficiently adjusting the retirement age for the elderly population offers micro benefits, such as individuals avoiding economic poverty and maintaining stable household conditions, alongside macro benefits of reduced welfare expenditures and other social costs. It is crucial to recognize that policies favoring specific demographic groups can potentially instigate inter-class conflict. The issue of employment holds significant sensitivity across age groups, given its fundamental role in sustaining livelihoods. In the absence of a comprehensive assurance of overall labor market growth, raising the retirement age for the elderly, as a measure limiting job creation, could inadvertently result in the displacement of opportunities for younger individuals aspiring to enter the workforce. Effectively, this scenario posits a zero-sum game between generations for employment opportunities. Within this constrained environment,

companies seeking to hire younger individuals, often surpassing older counterparts in terms of productivity, require a nuanced social understanding of the potential feelings of deprivation among the younger demographic. To achieve this, it becomes paramount to discern a balanced approach to policymaking through inclusive discussions spanning various domains, including society and academia. Such deliberations are essential for identifying policy equilibrium that navigates the complex interplay of generational interests and aspirations.

This study offers robust and efficient results by leveraging econometric tools on authoritative data provided by the Korea Institute for Health and Social Research and related organizations. Above all, it stands as a valuable resource for shaping labor policies that align with societal needs, aiming to reconcile the timing of the social retirement age based on individuals' perceived working age.

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