Life Expectancy, Retirement Age, and Pension Wealth*

by

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Abstract:

Population aging has led several countries to adopt policies that link the retirement age to life expectancy. Although such policies may be necessary to keep public finances sustainable, they risk increasing socioeconomic inequalities. Individuals with lower socioeconomic status tend to live shorter lives, collect benefits for fewer years, and may therefore be disproportionately burdened by increases in the retirement age, potentially undermining the intended progressivity of pension systems. An additional challenge is that the growing accumulation of private pension wealth may reduce the effectiveness of public pension reforms, as wealthier individuals can afford to retire early regardless of changes to the statutory retirement age. This chapter examines these dynamics and presents a range of policy options to best align pension design with demographic, socioeconomic, and fiscal realities.

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1. Introduction

In the face of demographic changes, the design of pension systems has become one of the most pressing policy challenges for aging societies. Steadily rising life expectancy and declining fertility rates are putting financial pressure on public pension systems, as fewer workers are available to support an increasing number of retirees, thereby threatening their long-term sustainability. In response, many governments have enacted reforms aimed at containing costs and extending working lives, most notably by raising the retirement age. While such reforms are often necessary to preserve fiscal balance, they raise important questions about distributional effects, especially in the context of growing disparities in life expectancy across socioeconomic groups.

This chapter begins by documenting the rise in average life expectancy and the growing inequalities in its distribution. Life expectancy is shown to vary significantly across gender, education, income, occupation, and wealth. In many high-income countries, the gap in expected years of life between the most and least advantaged groups can exceed a decade, with increasing evidence that these disparities are widening over time. Healthy life expectancy is also examined, similarly revealing socioeconomic disparities in the number of years lived in good health.

Divergence in life expectancy across socioeconomic groups has significant implications for public pension design: when retirement ages and benefit structures are based on average life expectancy, they may unintentionally favour higher-income individuals, who not only live longer but also receive, under so-called Bismarckian systems, higher annual public pension benefits over their extended retirement years. Consequently, systems that are progressive in their benefit formulas, by offering higher replacement rates to low-income earners, may, in practice, become regressive once systematic differences in longevity are considered.

The chapter then discusses the effects of pension reforms aimed at ensuring fiscal sustainability, with a focus on increasing the retirement age. Raising pension eligibility ages effectively delays retirement and increases labor supply, not only through changed financial incentives but also because individuals treat the statutory retirement age as a behavioral reference point. Individuals seem to evaluate their retirement timing relative to the salient statutory retirement age, which is perceived as the 'normal' age to exit the labor force. Deviating from this reference point entails psychological costs, inducing workers to adjust their retirement toward the statutory age. As a result, reforms that increase the statutory retirement age generate positive fiscal externalities. While these externalities make a tighter link between retirement age and life expectancy fiscally desirable, the paper also emphasizes the trade-off with greater distributional concerns.

The final part of the chapter explores policy options to better align pension system design with the realities of increasing but unequally distributed life expectancy. It discusses a range of reform strategies aimed at enhancing both equity and fiscal sustainability, including more accessible disability insurance for

individuals in poor health, benefit rules conditioned on career-length, and progressive contribution structures. The chapter also examines the potential of pooling longevity risk within occupational pension schemes and the benefits of multi-pillar systems that combine universal public pensions with mandatory, funded private savings.

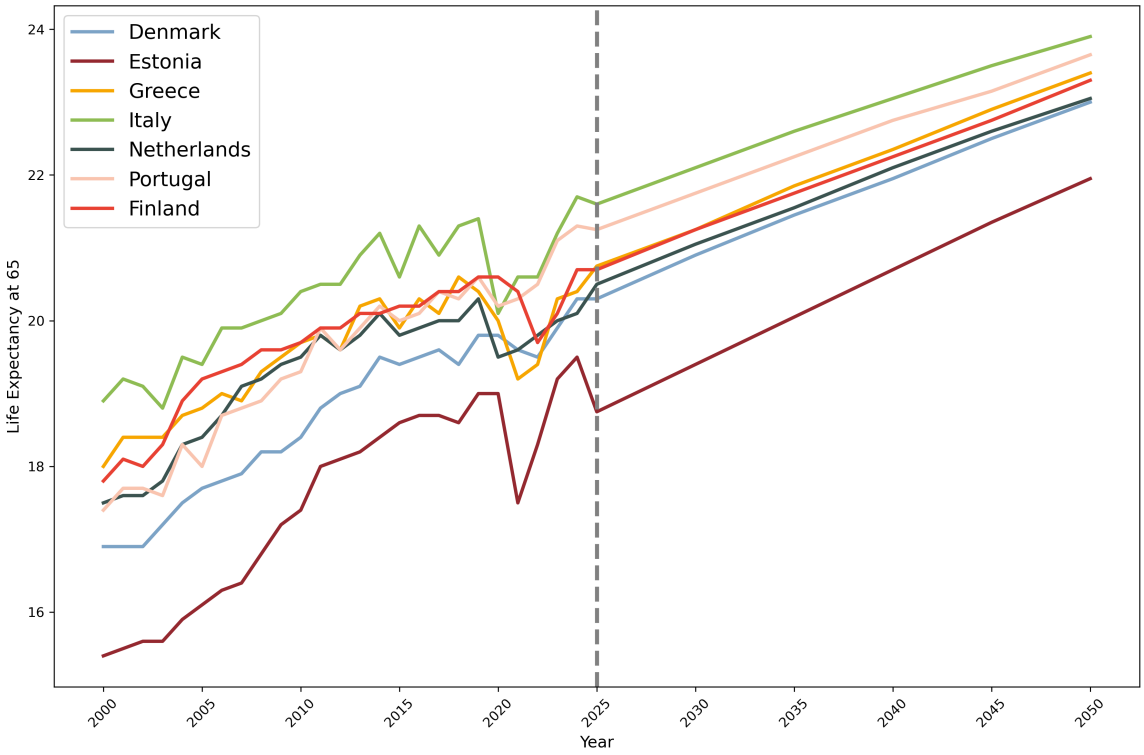
Drawing on good practices from countries like Denmark, Iceland, and the Netherlands, the discussion highlights how pension systems can be structured to balance redistribution, work incentives, and long-term sustainability. However, it also cautions that rising private pension wealth outside the public pension pillar may undermine the effectiveness of public reforms. Individuals with substantial private savings can afford to retire early regardless of public pension incentives, thereby weakening labor supply responses and reducing fiscal gains from reforms. This concern may become particularly acute when retirement ages, due to indexation to rising average life expectancy, reach very high levels, making it increasingly attractive for wealthier individuals to exit the labor market early and self-finance their retirement using private resources. Improved coordination across pillars, such as aligning the early access age of private pensions with increases in the public retirement age, may therefore be essential to preserve the effectiveness and equity of pension reform.

2. Trends and inequality in life expectancy

Life expectancy rose steadily across all countries in the decades leading up to the COVID-19 pandemic, which marked a significant setback. Moving forward, global health gains are expected to keep increasing, though at a slower pace (World Health Organization, 2025). While the pace of longevity improvements has been relatively consistent among nations, the global average has shown only modest convergence, with higher life expectancies, traditionally seen in Western countries. Even within countries, however, there are significant inequalities in longevity. One of the most striking disparities is that of gender as women live several years longer than men across all age groups and countries. In 2019, women had a global life expectancy of 74.2 years, compared to 69.8 years for men, a difference of 4.4 years (World Health Organization, 2019).

Figure 1 shows life expectancy at age 60 for men and women for countries that index their retirement age to life expectancy. Projections extend to 2050, highlighting a sustained upward trajectory in longevity, with the temporary shortfall caused by the COVID-19 pandemic already recovered by the mid-2020s.

Figure 1: Life Expectancy at Age 60, by Gender.



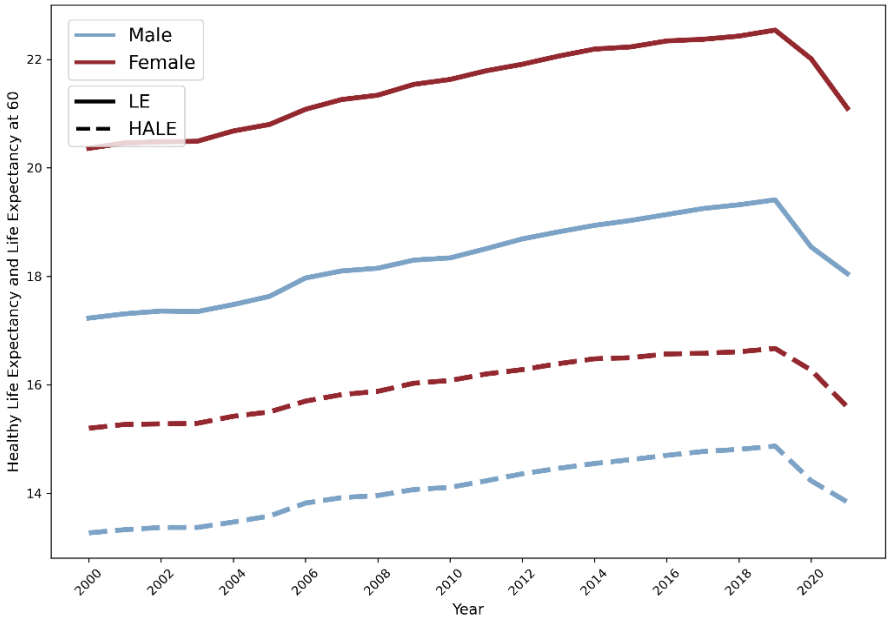
Source: (OECD, 2024)

As life expectancy continues to rise, attention is increasingly shifting toward the quality of those additional years. This is the idea behind healthy life expectancy, which provides a more nuanced outlook by estimating the average number of years individuals can expect to live in good health, free from significant illness or disability. While life expectancy has increased, only about 76% of these additional years are spent in good health, a proportion that has remained stable since 2020 (OECD, 2023).

Patterns in healthy life expectancy follow those observed for general life expectancy. In 2016, healthy life expectancy at birth was 64.8 years for women and 62.0 for men, indicating not only a gender gap in longevity but also a disparity in quality of life during those additional years. On average, women spend 9.5 years and men 7.8 years in less than good health, reflecting that women's longer lives are often accompanied by extended periods of age-related illness and activity limitations (Eurostat, 2024).

*Figure 2*shows the increase in healthy life expectancy over time along with the setback during the COVID-19 pandemic. The pandemic years 2020 and 2021 have offset a decade of global gains in both general life expectancy and healthy life expectancy. Global life expectancy fell from 73.1 years in 2019 to 71.4 in 2021, returning to the levels of 2012. The gender disparity persisted during the pandemic, with women losing more years of healthy life expectancy overall, while still maintaining a longer healthy life expectancy than men (World Health Organization, 2024).

Figure 2: Global Trends in Life Expectancy at 60, by Gender.



Source: (World Health Organization, 2024)

2.1. Inequality in Life Expectancy Across Socioeconomic Status

Beyond gender, socioeconomic status is a major driver of inequality in life expectancy (see e.g., Kitagawa and Hauser (1973), Chetty et al. (2016a), Cutler et al. (2011), Geruso (2012), Currie and Schwandt (2016), Schwandt (2021), and Olshansky (2012)). Therefore, the analysis now turns towards breaking down life expectancy by the key components of socioeconomic status, with particular attention to education, occupation, income, and affluence.

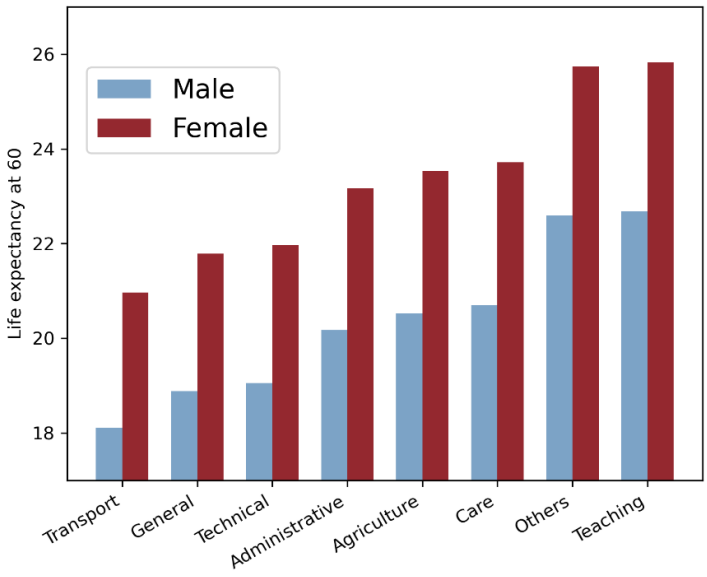
The link between education and life expectancy is well-documented in the literature. At a global level, Balaj et al. (2024) find that an extra year of schooling cuts adult-mortality risk by 1.9 % and finishing the full primary-to-tertiary ladder lowers that risk by about one-third. In Europe, higher education levels are associated with lower mortality, better self-rated health outcomes and more years lived without activity limitations, showing better life expectancy and healthy life expectancy (Mackenbach *et al.*, 2008; Sauerberg, 2021). Across the Nordics, higher-income and better-educated groups not only live longer but benefit from mortality compression, dying later and within a narrower age range. In contrast, lower-income and less-educated groups face shorter lifespans and stagnating longevity (Brønnum-Hansen et al., 2021). For the UK, education is found to exert the steepest independent gradient in life expectancy, a gap that persists even after accounting for occupation and wages (Ingleby *et al.*, 2021). In the United States, educational attainment is the primary determinant of inequality in life expectancy. In 2019, individuals who had completed some

college lived between 4.1 and 4.9 years longer than high-school graduates, who in turn outlived those without a high-school diploma by similar margins (Sylte *et al.*, 2025). In summary, education strongly influences both longevity and health. People with higher education levels tend to live longer, healthier lives, partly due to higher earnings and better access to healthcare, but also due to healthier behaviors like lower rates of smoking and drinking (Hummer and Hernandez, 2013).

Occupational status is another factor affecting health and life expectancy. It reflects physical demands, job stability, and working conditions such as stress or control over tasks. People in manual or low-skill jobs are often exposed to more risks and have worse health outcomes. Evidence from the Netherlands points towards fewer healthy years for women working in more physically demanding and less autonomous jobs (de Wind *et al.*, 2020). Another Dutch study finds that life expectancy at age 65 varies by up to 3.5 years across occupations. Men in transport had the shortest life expectancy (14.7 years), while those in teaching lived longest (18.3 years). For women, the gap was 3.1 years (Deeg, De Tavernier and de Breij, 2021).

Figure 3 illustrates these discrepancies at age 60 with data from the study as well as gender-specific mortality data from the Human Mortality Database. In Sweden, job strain is found to reduce working life expectancy, even after accounting for education, with women in routine jobs having the highest job strain and the shortest working lives (Chungkham *et al.*, 2025). In Spain, both men and women in managerial positions enjoy higher life expectancy (Lozano and Solé-Auró, 2021). These differences suggest that retirement age rules could be made fairer by considering occupation. However, it usually explains less variation in life expectancy than education, and is subject to change throughout life.

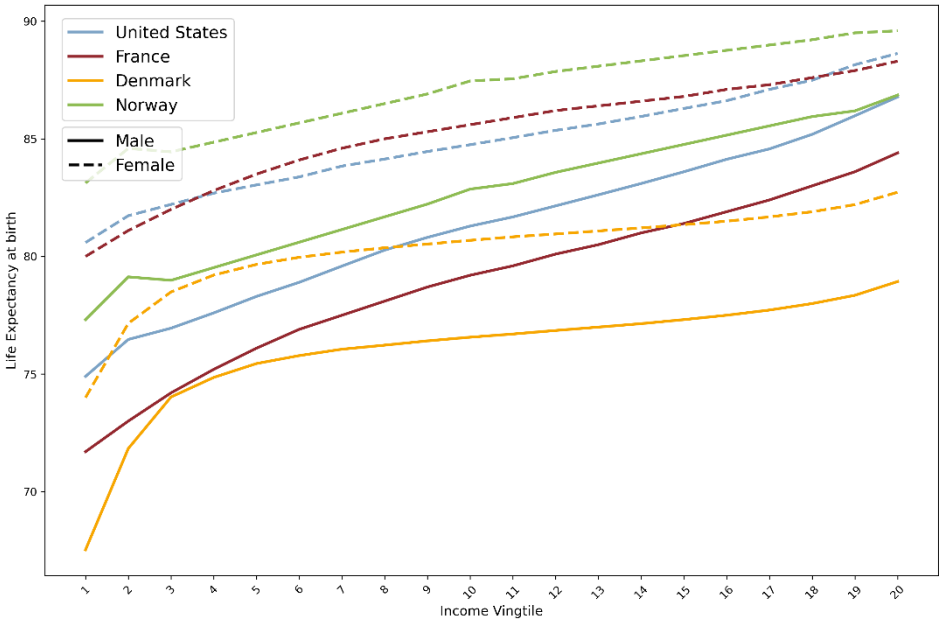
Figure 3: Occupation-Based Life Expectancy in the Netherlands.



Source: Sector-specific realised probability of death taken from Deeg et al., 2021 and Human Mortality Database used for own calculations.

Income is a key factor in explaining differences in life expectancy. *Figure 4* illustrates a clear and steep income gradient in life expectancy for three advanced economies. Across Denmark, France, and the United States, individuals with higher income consistently outlive those at the bottom of the distribution. The gap is especially pronounced in the United States, where men in the top 5% of the income distribution live on average 14.6 years longer than those in the bottom 5%, whereas the gap for women is 10.1 years (Chetty *et al.*, 2016).

Figure 4: Life expectancy by income vingtile.



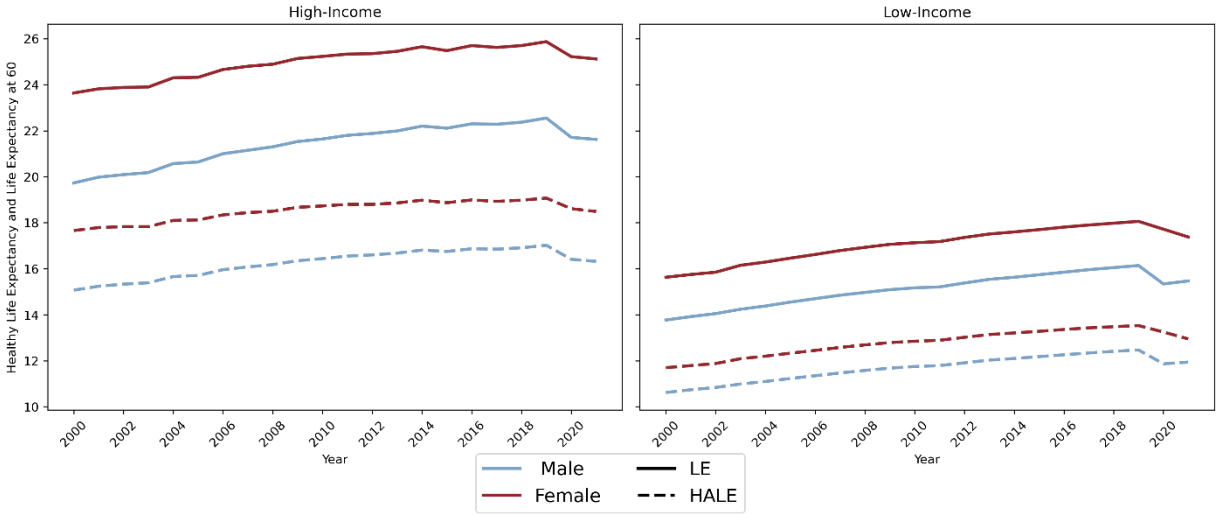
Source: (Chetty et al., 2016; Blanpain, 2018; Kreiner, Nielsen and Serena, 2018)

In Denmark, Brønnum-Hansen (2024) reports that by 2023, the life expectancy gap between the top and bottom income quartiles reached 10.9 years for Danish men and 7.3 years for women. This divergence reflects broader evidence from the Nordics, where higher-income and better-educated groups not only live longer but also experience mortality compression, meaning they die later and within a narrower age range, while lower socioeconomic status groups face shorter lifespans and greater unpredictability in the timing of death. (Brønnum-Hansen et al., 2021; Enroth et al., 2022). In the United Kingdom, individuals in the most deprived areas live up to 10 years less than those in high-income areas (Bennett et al., 2018).

While much of the literature has focused on differences in total life expectancy, similar patterns of inequality are beginning to emerge for healthy life expectancy as well. As shown in *Figure 5*, healthy life expectancy varies significantly across income groups, with high-income individuals living not only longer lives, but also more years in good health. These differences mirror the socioeconomic patterns seen in total life expectancy, though research on healthy life expectancy by socioeconomic status is still relatively

limited. More work is thus needed to understand how socioeconomic factors like the ones studied here influence not only length but also quality of life.

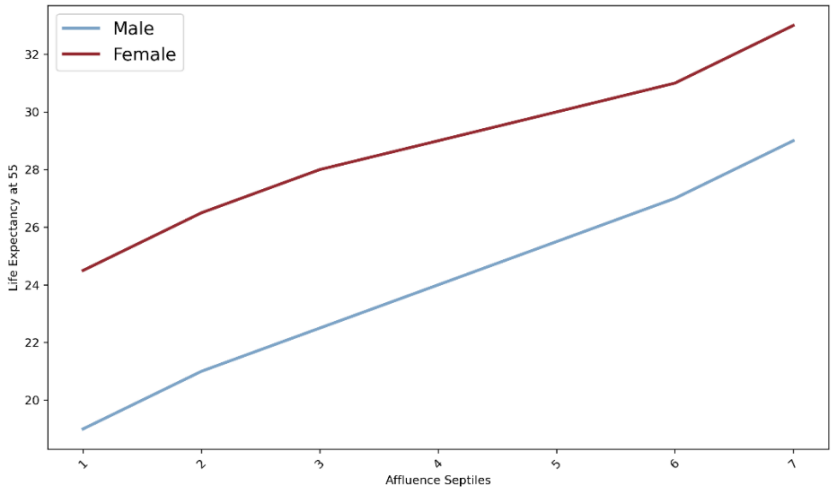
Figure 5: Trends in Life Expectancy and Healthy Life Expectancy at Age 60, by Gender and Income Group.



Source: (World Health Organization, 2024)

A notable contribution to the study of longevity inequality comes from Denmark. Cairns et al. (2016) examine how mortality among Danes aged 55 and above evolved, using a new affluence index constructed from administrative records. The index combines income and wealth, weighting income 15 times more than wealth, and offers a more comprehensive and stable measure of long-term socioeconomic status than income alone. The study reveals a steep and persistent mortality gradient: men in the least affluent group consistently experience much higher death rates than their more affluent peers, see *Figure* 6.

Figure *6*: Life Expectancy at Age 55 by Affluence Group



Note: Own calculations based on Danish administrative records and the affluence measure of Cairns et al. (2016).

The gap in expected remaining years of life between the most and least affluent group exceeds eight years, and Cairns et al. (2016) show that the disparity particularly pronounced at younger ages. Moreover, they document that the mortality gap has widened since the early 1990s, underscoring the growing importance of socioeconomic factors in shaping longevity outcomes.

The widening life expectancy gap observed by affluence is also evident across the other socioeconomic indicators of education, income, and occupation. Whitehouse and Zaidi (2008) note in an OECD report, substantial socio-economic differences in mortality, especially for men, which appear to have become bigger over time. More recently, OECD (2023) are more cautious, offering a review of the literature on the evolution of the educational gap in life expectancy and stating that though the evidence on changes in socio-economic inequalities in longevity is mixed, "it is not possible to exclude a potential widening of the occupational life-expectancy gap". In the discussion that follows, the literature on *changes* in inequality in longevity across socioeconomic status is reviewed.

Increasing life expectancy gaps are documented in Western Europe, though not in Eastern Europe (Mackenbach *et al.*, 2018), OECD countries (Murtin *et al.*, 2017; Lübker and Murtin, 2022), Denmark (Brønnum-Hansen and Baadsgaard, 2012; Brønnum-Hansen, 2024), Sweden (Fors, Wastesson and Morin, 2021; Hagen *et al.*, 2025), Norway (Kravdal, 2017), the Nordics overall (Enroth *et al.*, 2022), Spain (Permanyer *et al.*, 2018), England (Bennett *et al.*, 2018), Japan (Kagamimori, Gaina and Nasermoaddeli, 2009) and the US (Singh and Siahpush, 2006; Montez, Hummer and Hayward, 2012; Olshansky *et al.*, 2012; Hummer and Hernandez, 2013; Chetty *et al.*, 2016; Sasson, 2016; Cantu *et al.*, 2021; Case and Deaton, 2021, 2023; Sylte *et al.*, 2025). In summary, there is vast evidence, though not unambiguous, of widening gaps in the socioeconomic status gradient of life expectancy.

This section has examined inequalities in longevity related to socioeconomic status, showing persistent and often widening gaps across education, income, and occupation. Since individuals with lower earnings tend to have shorter life expectancies, they collect pension benefits for a shorter period. This results in a regressive effect, reducing the overall progressivity of pension systems. Although this is a concern in itself, further questions are raised when it comes to the interplay between changes to life expectancy inequality and increases to the retirement age, as discussed below in Section 4.

Raising the retirement age is one of the most common pension reforms to face population aging. However, when considering policy responses to rising longevity, it is not only the existence of these inequalities that are relevant, but also how the gaps in life expectancy change over time. The more socioeconomic-based disparities in longevity widen, the more inequitable the effects of linking retirement ages to life expectancy become. Reforms that increase retirement ages can, hence, result in significant

transfers from individuals with shorter life expectancies to those who live longer, as they often overlook socioeconomic differences in mortality (Jijiie, Alonso-García and Arnold, 2022).

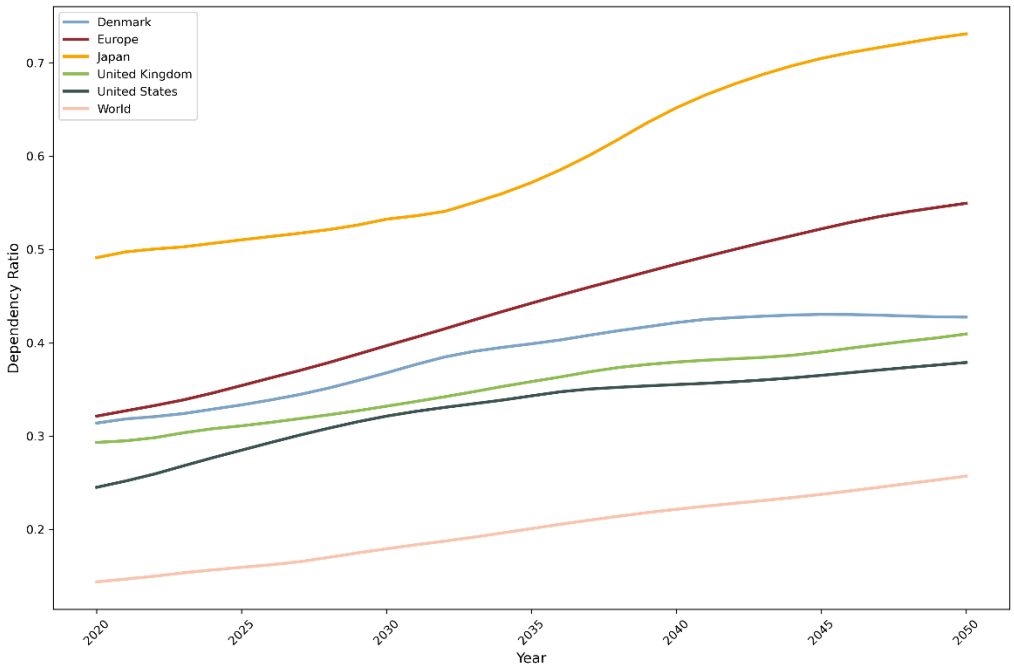
Given the evidence that socioeconomic-based disparities in longevity are widening, redistributive concerns, following increases to the retirement age in line with increases to the *average* life expectancy, are not unfounded. As individuals with lower socioeconomic status tend to live shorter lives, increases in the retirement age linked to average life expectancy risk being regressive. Such reforms may thus disproportionately benefit groups with high socioeconomic status unless they explicitly account for persistent mortality differences. The demographic trend of a widening socioeconomic status gradient in life expectancy implies that pension systems become more regressive (Sánchez-Romero, Schuster and Prskawetz, 2024).

3. Implications for Pensions

3.1. Fiscal pressure

The documented increase in longevity, together with decreasing fertility, has led to a significant increase in population aging. To illustrate these trends, *Figure* 7 shows how the old-age dependency ratio, the number of individuals aged 65 and above relative to the working-age population, is projected to increase from 35% in 2025 to 52% by 2050 (Eurostat, 2022).

Figure 7*:* Dependency Ratio in the European Union



Source: (Eurostat, 2022)

With fewer workers to support a growing number of retirees, public pension systems are under increasing fiscal pressure. Despite recent reforms aimed at ensuring long-term sustainability, public pension spending in the EU is projected to rise by an average of 0.4 percentage points of GDP over the 2022–2070 period (European Commission, 2024). Productivity growth, resulting from, e.g., more widespread use of AI, could potentially mitigate demographic pressures by increasing efficiency units of labor and thereby lowering the effective old-age dependency ratio. However, Acemoglu (2024) points to limited aggregate productivity effects of AI, suggesting that such gains are unlikely to fully offset the projected rise in pension spending.

Growing inequality in longevity must also be considered when evaluating the fiscal balance of pension systems. In actuarially fair systems, where contributions are pooled and individuals who die earlier subsidize the pensions of those who live longer, benefits are typically based on average life expectancy. However, if high-income earners, who receive larger pension benefits, also tend to outlive the average, these systems risk becoming financially unbalanced.

3.2. Inequality in longevity, public pension wealth and redistribution

Public pension systems are typically designed not only to insure against longevity risk, which is the risk of outliving one's assets, but also to serve a redistributive function. This is often reflected in progressive benefit formulas that grant higher replacement rates, defined as the ratio of a retiree's pension benefit to their pre-retirement earnings, to low-income individuals. A key concept in evaluating their distributional impact is implicit public pension wealth, which is the present value of future pension entitlements net of contributions. In principle, because individuals with lower socioeconomic status contribute less but receive higher income replacement rates in retirement, this implicit public pension wealth should decline with socioeconomic status. However, this expectation is increasingly challenged by inequalities in longevity. Individuals with higher socioeconomic status may not only receive larger pensions in absolute terms but also live longer, allowing them to collect benefits over a longer period, and, thus, accrue more implicit pension wealth. If these longevity gaps continue to widen, the redistributive function of public pension systems may be undermined or even reversed. Verberi and Kaplan (2024) find that public pension income reduces income inequality in the US, Italy, and Turkey, while in the UK and the Netherlands it either has little impact or exacerbates inequality. Although public pensions alone vary in their effect, the combination of public and private pensions tends to produce a more consistent equalizing outcome across all countries studied.

The risk of regressivity in public pension systems is more pronounced in Bismarckian systems, where benefits are tied to prior earnings and contributions through payroll taxes. In these systems, individuals with higher lifetime earnings receive larger pensions, and if they also live longer, they may gain

disproportionately more in terms of implicit pension wealth. In contrast, Beveridgean systems aim for universal coverage and provide flat-rate benefits regardless of an individual's work history. These systems are typically financed through general taxation, which is more progressive and can help mitigate inequality in retirement outcomes.

Despite Denmark's Beveridgean pension system, recent evidence by Christensen and Maurer (2023) shows that inequality in longevity significantly dampens redistribution. Implicit public pension wealth varies non-monotonically with affluence, with middle-class men receiving 26% more than the least affluent, and only the top 30% receiving less.

For the German Bismarckian system, Haan et al. (2020) find that it becomes regressive once heterogeneity in longevity is considered. This highlights how even actuarially structured systems can generate unintended redistribution from shorter-lived to longer-lived individuals, undermining their equity. Belloni et al. (2020) similarly argue that in Germany, the inequality found in lifetime earnings is maintained in social security wealth, whereas other European countries – in particular, Sweden – experience redistribution in favour of the 'lifetime poorest' individuals.

Mélard et al. (2024) find that among private sector workers in France, high-income individuals benefit from hidden lifetime redistribution within each gender. Their longer life expectancy enables them to collect pension benefits over a more extended period, effectively increasing their lifetime returns. Among men, this longevity advantage is substantial enough to offset the intended progressivity of the pension system. While women tend to live longer than men, this mortality gap narrows lifetime pension inequality across gender. Without it, the gender pension gap would be considerably larger.

Several studies focusing on the US classify public pension recipients by different measures of income and incorporate mortality probabilities that differ by income or by race, gender, and education (Brown et al., 2009; Coronado et al., 2000; Garrett, 1995; Goda et al., 2011). They all conclude that the system is far less progressive than it first appears and may even be regressive. Goldman and Orszag (2014) and Auerbach et al. (2016) focus on US Social Security and Medicare and show that the well-documented divergence in along the income distribution causes a substantial gap between average lifetime benefits received. Similarly, Whitehouse and Zaidi (2008) and Ayuso et al. (2017) find evidence that socio-economic differences in mortality are increasing in several other OECD countries, which leads to increasing losses of progressivity within the pension system.

In the US, Social Security has been shown to exacerbate wealth inequality, partly because of the ceiling that Social Security applies to its tax collection and the lack of inheritance opportunities for children from low-income families (Gokhale and Kotlikoff, 1999; Gokhale *et al.*, 2001).

In sum, differences in life expectancy across socioeconomic groups can undermine the redistributive goals of public pensions, potentially making them regressive. As concisely put by the OECD (2023), "if

inequalities in life expectancy are broadly stable, this means that improvements in life expectancy tend to benefit the different socio-economic groups equally". However, given the likely widening gap in life expectancy inequality discussed in the previous section, redistribution may continue to deteriorate. If future gains in life expectancy are concentrated among individuals with high socioeconomic status, the pension system risks both fiscal imbalance and growing inequality. This remains a concern even if the retirement age is adjusted upward in line with increases in average life expectancy, which is a common reform approach to be discussed next.

4. Increasing the Retirement Age

Public pension systems across the OECD have undergone significant reform over the past decades in response to rising fiscal pressure caused by population aging. While the design and scope of reforms vary by country, most major changes fall into three broad categories: (1) reducing the level of pension benefits, (2) strengthening marginal financial incentives to postpone retirement, and (3) increasing the claiming age for early and full retirement benefits. While this chapter focuses primarily on reforms in the third category, the effects of the first two reforms are briefly reviewed at the end of this section.

Among all pension reforms, raising the early retirement age and the normal retirement age has emerged as a very effective policy for delaying retirement and improving the long-term sustainability of public pension systems. The fiscal rationale behind raising retirement ages is straightforward: by delaying benefit eligibility, governments reduce the duration of pension payouts while increasing contributions through prolonged labor force participation.

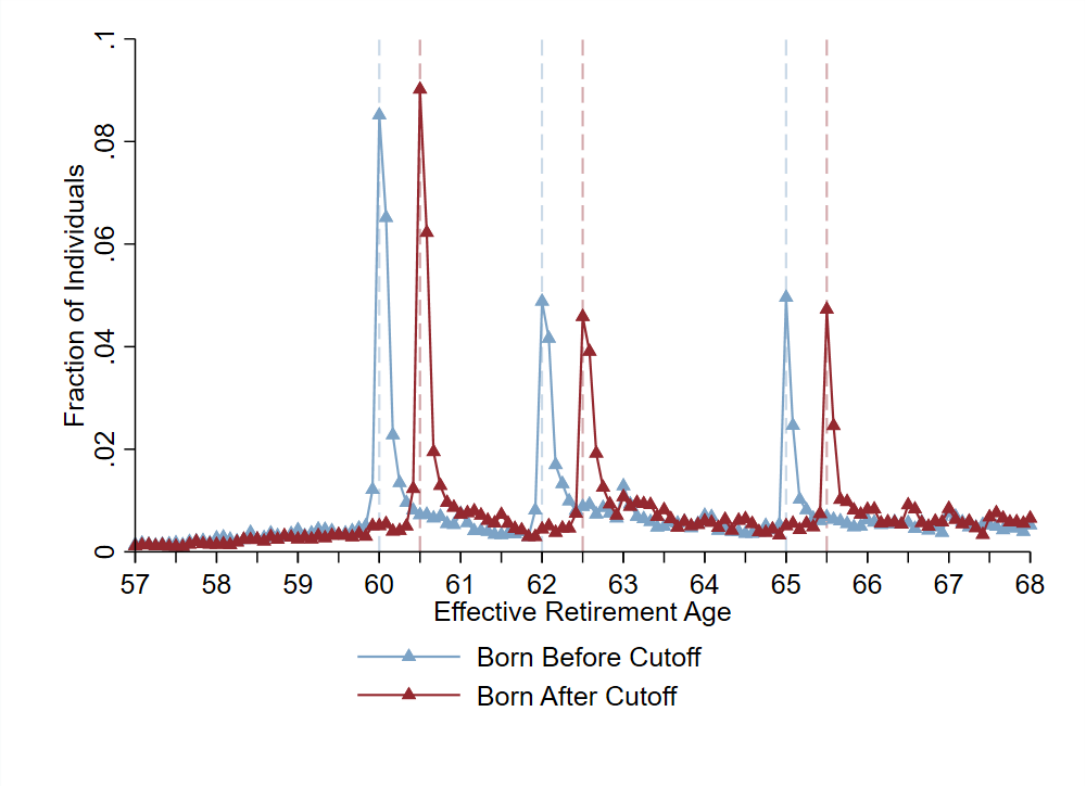
4.1. Labor Supply Responses and Fiscal Impact

There is a substantial body of empirical research showing that increases in pension eligibility ages have strong positive effects on labor supply and delay retirement (Duggan, Singleton and Song, 2007; Mastrobuoni, 2009; Behaghel and Blau, 2012; Staubli and Zweimüller, 2013; D. S. Manoli and Weber, 2016; Fetter and Lockwood, 2018; Haller, 2019; Seibold, 2021; García-Miralles and Leganza, 2024). Evidence suggests that part of this effect is driven by a behavioral mechanism, in which individuals perceive the normal retirement age as a salient reference point that shapes their retirement decisions (Manoli and Weber, 2016; Mastrobuoni, 2009; Seibold, 2021).

Ongoing work by Jensen et al. (2025) evaluates how Danish individuals respond to a six-months increase in the country's three pension eligibility ages. As illustrated in *Figure 8*, there is pronounced bunching in retirement behavior around specific statutory retirement ages. The figure reveals a distinct rightward shift in the retirement age distribution for treated individuals, indicating strong adherence to the reform. This shift suggests that individuals closely track statutory eligibility criteria and adjust their retirement timing

accordingly. The nearly identical pattern of bunching, but shifted by half a year, highlights the reform's effectiveness in delaying retirement and reinforces the salience of eligibility thresholds in shaping labor market exit behavior.

Figure 8: Effective Retirement Age Distribution in Denmark



Source: Own calculation.

Note: The control group in this figure, consisting of individuals born in the half-year preceding January 1, 1954, did not experience an increase in the pension eligibility ages, whereas the treated group, born in the half-year thereafter, saw the eligibility ages increase by 6 months.

Increasing the retirement age can also create spillover effects to alternative welfare programmes, as some individuals may substitute their foregone pension benefit with unemployment or disability insurance. The literature generally finds increases in the take-up of alternative welfare benefits, when the early and/or normal retirement age rises. However, much of this increase appears to be primarily mechanical: rather than actively leaving work to claim these benefits, many individuals remain in the labor market status they were already in for a longer period due to the delayed pension eligibility (Staubli and Zweimüller, 2013; Geyer and Welteke, 2021; Rabaté, Jongen and Atav, 2024). As a result, net positive fiscal saving is observed as a response to increases in the pension eligibility ages (Atalay and Barrett, 2015; Cribb and Emmerson, 2016; Rabaté and Rochut, 2020; Rabaté, Jongen and Atav, 2024). Finally, much of this literature evaluates reforms that raise eligibility from relatively low starting ages; more research is needed on reforms at higher eligibility ages to assess whether the labor supply and fiscal effects are smaller in such settings.

4.2. Retirement age indexation

Given the ongoing increases in life expectancy, one in four OECD countries have moved away from *ad hoc* reforms and instead adopted automatic indexation of the early and normal retirement ages to average longevity. These mechanisms are desirable, as they align retirement ages with demographic trends and promote long-term fiscal sustainability without the need for repeated policy intervention. However, to further evaluate the adequacy of retirement age indexation, several points should be addressed.

First, the strength of the numerical link between the retirement age and average life expectancy should be considered. Specifically, what is the degree of pass-through from changes in longevity to changes in the retirement age? In some countries, such as Denmark, Estonia, Greece, Italy, and the Slovak Republic, the retirement age increases one-to-one with life expectancy to keep the expected duration of retirement constant. In others, such as Finland, the Netherlands, Portugal, and, with effect from 2026, Sweden, the adjustment is more moderate, with the retirement age increasing by only two-thirds of the gain in life expectancy to maintain a stable ratio between working years and retirement years (OECD, 2021, 2023).

The choice of how tightly to link retirement age to life expectancy is closely connected to the concept of healthy life expectancy. As discussed in Section 2, healthy life expectancy accounts for approximately 76 percent of total life expectancy. This means that for every additional year of life, only about 0.76 years are expected to be lived in good health. This raises the concern that a one-to-one indexation reduces the number of healthy years individuals spend in retirement. From an intergenerational perspective, it may therefore be perceived as fairer to adopt a less strict indexation rule, one that aligns more closely with the empirical 0.76-to-1 ratio between gains in healthy life expectancy and total life expectancy to keep the number of healthy retirement years across cohorts constant.

While indexing the retirement age directly to healthy life expectancy could be considered as an alternative, it is unlikely to produce significantly different outcomes. This is because the correlation between healthy life expectancy and total life expectancy is very high, which is estimated at 0.95 across countries (OECD, 2023), and the ratio between the two has remained remarkably stable over time.

A second consideration regarding retirement age indexation is that some countries, including Denmark, Italy, and the Netherlands, do not adjust the retirement age downward when life expectancy declines. This raises important questions not only about intergenerational fairness, but also about the conditions under which retirement age reductions are implemented in countries that allow them, as well as the reliability of life expectancy projections that inform indexation. Declines in life expectancy have occurred, most notably during the COVID-19 pandemic, as previously discussed.

However, the accuracy of life expectancy forecasts is inherently difficult to assess in real time. Projections are regularly updated as new data become available, and their reliability can only be fully

evaluated *ex post*. For example, in the UK, Vriend and Gazillo (2024) report that individuals born in 2023 were projected to live to 94 years based on 2010 forecasts, but updated projections from 2022 now estimate a life expectancy of just 88 years. Similarly, Olshansky et al. (2024) highlight that gains in life expectancy have slowed substantially in the most long-lived populations since 1990. Despite these developments, the literature on the accuracy of life expectancy forecasting remains relatively limited and would benefit from further research.

A third important consideration relates to the distributional consequences of indexing the retirement age. Tighter indexation rules, particularly those that increase the retirement age one-to-one with gains in life expectancy, can have more pronounced effects across different socioeconomic groups. This is especially relevant in the context of widening disparities in both life expectancy and healthy life expectancy between high-income and low-income individuals. When longevity gains are concentrated among those with higher socioeconomic status, uniform increases in the retirement age may disproportionately reduce the time spent in retirement, particularly in healthy retirement, for more disadvantaged groups. As a result, the equity implications of indexation become increasingly important.

4.3. The Role of Private Pension Wealth

Beyond public policy mechanisms, individual financial behavior – particularly the accumulation of private pension wealth – also influences retirement patterns and reform outcomes. As many countries transition from predominantly public pension schemes to multi-pillar arrangements, where individuals accumulate explicit private pension wealth outside the public scheme, this growing private wealth can weaken the intended effects of pension reforms. Individuals with substantial private retirement savings may be less responsive to policy incentives aimed at extending working lives, as they can afford to retire early without relying on public pension benefits.

Ongoing work in Denmark by Andersen et al. (2025) indeed finds a negative relationship between pension wealth at age 55 and earnings at age 63. Larger pension wealth leads to earlier withdrawal from the labor market, reflecting that individuals self-finance their retirement - neither working, nor receiving public transfers. Also, Sæverud (2025) shows that Danes with low pension wealth exhibit a stronger increase in labor force participation when social security eligibility is increased, again raising equity concerns.

In the UK, while early retirement before the normal retirement age is most common among the poorest fifth, which is likely due to health-related constraints, recent trends show a notable rise in early retirement among the richest fifth as well. Individuals in the top wealth quintile are now more likely to retire before the normal retirement age than those with average wealth, and the share of 55–64-year-olds in this group who are retired has increased in recent years (Cribb, 2023).

4.4. Alternative Pension Reforms

As mentioned, many countries have also implemented two alternative pension reforms to increasing the retirement age: reducing the level of pension benefits and strengthening marginal financial incentives to delay retirement.

Changes in pension benefit levels have been shown to affect labor supply and retirement timing significantly. Increases in pension generosity are associated with earlier retirement and lower labor force participation (Costa, 1995; Danzer, 2013; Fetter and Lockwood, 2018; Artmann, Fuchs-Schündeln and Giupponi, 2023).

Reductions in benefits tend to increase labor supply and delay retirement, offering a "double dividend" by improving fiscal sustainability while raising employment among older workers. (Gelber, Isen and Song, 2016). However, benefit reductions raise important redistributive concerns, as they may disproportionately affect lower-income individuals who rely more heavily on public pensions in retirement. Understanding whether the observed labor supply responses stem from a high utility value placed on pension benefits or from a relatively low disutility of continued work is crucial for evaluating the welfare implications of these policy changes.

Reforms that raise marginal financial incentives to delay retirement by increasing the penalties for early retirement or bonuses for delayed retirement have modest effects on actual retirement behavior (Brown, 2013; D. Manoli and Weber, 2016; Duggan *et al.*, 2023; Lalive, Magesan and Staubli, 2023). Evidence also suggests that such reform may exacerbate inequality, as the financial gains from postponing retirement tend to be more accessible to higher-income individuals (Kolsrud *et al.*, 2024).

Overall, increasing the retirement age is one of the most effective tools for enhancing the fiscal sustainability of public pension systems and extending working lives. Yet, the design and implementation of such reforms, particularly the use of indexation rules, raise important distributional concerns. The next section addresses pension policy responses to these equity concerns. It is important to stress, however, that narrowing life expectancy differentials remains the first-best policy option, and this objective cannot be achieved through pension design changes.

5. Implications for the design of pension systems

The financial sustainability of pension systems depends heavily on average life expectancy, which has led countries to adopt reforms that link retirement age to average life expectancy. However, no system currently explicitly accounts for differences in life expectancy across socioeconomic groups, despite their potential impact on both fiscal balance and redistribution. This chapter discusses approaches to incorporating life expectancy inequality into pension design, along with broader recommendations for improving overall system design and its fiscal sustainability.

A first consideration for pension design considering life expectancy inequality is the need for well-functioning disability insurance schemes. Increases in the retirement age may place a disproportionate burden on individuals with low socioeconomic status and in poor health, particularly those with limited capacity to continue working. Forcing such individuals to remain in the labor force can result in substantial welfare costs. Thus, disability benefits should be available for those with illnesses. Medical screening for eligibility plays an important role in preventing costly fraud, but it also imposes psychological and administrative burdens on applicants. This trade-off suggests that medical screening procedures could become less intensive as individuals approach the normal retirement age, when the cost of fraud is lower.

Another approach to addressing life expectancy inequality in pension design is to allow earlier retirement solely based on career length, without requiring medical screening. The rationale is that individuals with long careers are more likely to have lower life expectancy, as they typically enter the labor market earlier and may come from lower socioeconomic backgrounds. However, recent evidence from Germany suggests that this method may result in poor targeting. Individuals with long career durations often have better health and higher life expectancy, while those with shorter careers may have exited the labor force early due to health problems or labor market disadvantages (Börsch-Supan *et al.*, 2022). As a result, career-length-based rules may fail to reach those most in need of early retirement pathways. Keeping the benefit generosity of such schemes relatively low may improve targeting, as healthier individuals with long careers, who are often also relatively well-off, would be less likely to take them up. However, this comes at the cost of reducing the insurance value for those genuinely at risk.

Kolsrud et al. (2024) argue that there is, in fact, a promising approach based on career length, but one that is conditional on retirement age rather than used as a stand-alone criterion for early retirement. They show that, at any given retirement age, individuals with shorter career durations tend to be significantly wealthier and enjoy higher levels of consumption than those with longer careers, often reflecting earlier labor market entry, more interruptions, or lower lifetime earnings. This pattern suggests that rewarding longer careers or penalizing shorter ones, conditional on when individuals retire, improves both the incentive structure and the equity of the system, while also generating positive fiscal externalities.

Another way to address differences in life expectancy is to pool longevity risk within more homogeneous groups, such as occupational or sector-specific pension funds. This approach can help counteract the implicit redistribution from individuals with lower life expectancies to those with higher life expectancies that occurs in broad public schemes that pool the entire population, thereby promoting a more equitable distribution of pension resources. Moreover, when occupational pensions are structured as fully funded private schemes that supplement public pensions, their introduction or expansion can further relieve fiscal pressure on the public system, particularly in the face of rising longevity. In this context, a rather radical proposal by Jensen et al. (2024) is to delegate to occupational pension funds the responsibility for paying out public pension

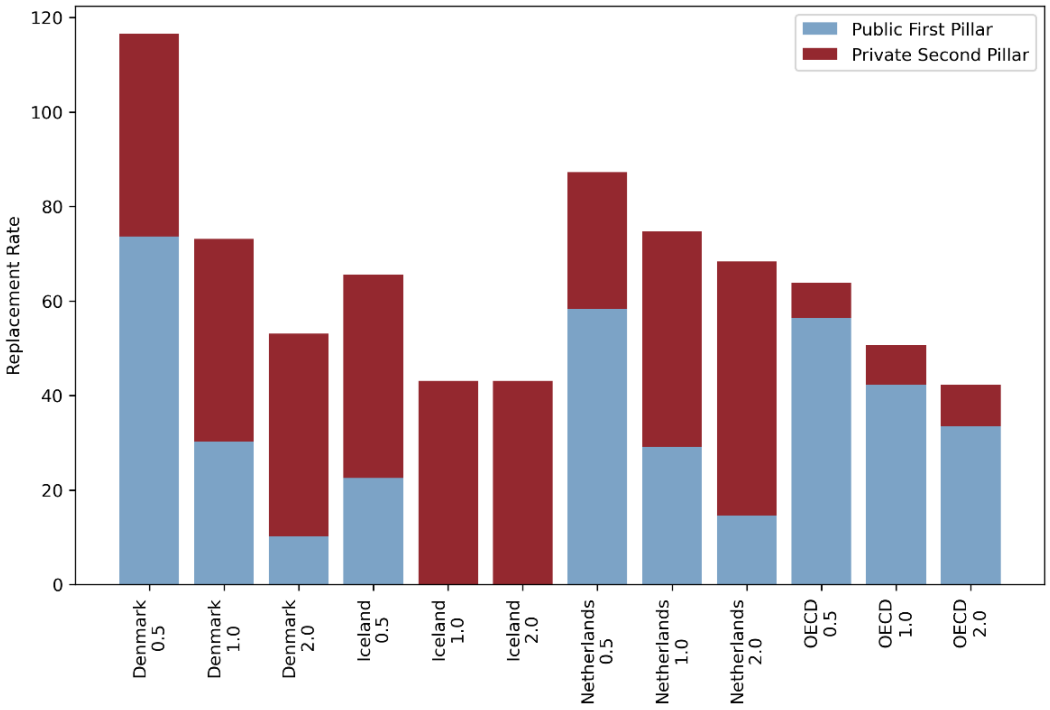
benefits, with the government providing each fund a lump-sum transfer per retiree equal to the expected discounted value of future benefits for the average worker under the current system. This would allow benefits to be tailored to the longevity profile of the pension fund's members without altering the government's overall financial commitment, although it would require debt financing.

Finally, contributions to public pensions could be made progressive. Since higher-income individuals tend to live longer, linking contributions more closely to earnings can help offset the regressive tendencies of uniform retirement ages and benefit formulas.

In particular, the last two design principles are not merely theoretical but are reflected in the structure of some of the top-performing pension systems in terms of adequacy, sustainability, and equity, such as those in Denmark, Iceland, and the Netherlands (Mercer Institute, 2024). These countries have multi-pillar pension systems. Their first pillar consists of a public pension that provides universal and income-tested benefits, financed through fully or partially progressive taxation. Additionally, they have a relatively large second pillar, comprising fully-funded occupational schemes with mandatory contributions for workers. This structure results in high replacement rates from the second pillar relative to the first, as illustrated in *Figure 9*.

A key challenge for these countries, which was discussed in Section 4.3., is that high levels of private second-pillar pension wealth may undermine the effectiveness of future increases in the normal retirement age, which is automatically indexed to life expectancy in Denmark and the Netherlands. Individuals with substantial private retirement savings may choose to retire early and finance their exit using second-pillar assets, thereby reducing the intended gains in labor supply and fiscal savings, while also reinforcing equity concerns. This issue can be addressed by simultaneously increasing the early access age for second-pillar pensions with the normal retirement age, thereby maintaining alignment between public and private retirement incentives.

Figure 9: Gross Pension Replacement Rates at Half, Average, and Twice the Average Wage



Source: OECD (2023).

Note: the replacement rates presented are the ones provided by the OECD for an individual earning half the average wage (0,5), one earning the average wage (1) and one earning twice that amount (2).

6. Summary

This chapter examined how increasing life expectancy and particularly its unequal distribution across socioeconomic groups, poses challenges to both the fiscal sustainability and equity of public pension systems. As discussed, reforms such as indexation of the retirement age to average life expectancy, while fiscally effective, may unintentionally reinforce inequality if systematic disparities in life expectancy are ignored. The chapter also explored a range of policy options to address these challenges and ensure pension systems remain both fair and financially sound.

Globally, average life expectancy continues to rise. However, convergence across countries has been limited, and significant disparities persist within nations. The most pronounced divide remains that of gender, with women living on average more than four years longer than men. Beyond gender, substantial longevity gaps exist across socioeconomic dimensions, most notably occupation, education, income, and affluence. The gap in expected years of life between individuals at the top and bottom of the socioeconomic spectrum can exceed a decade. Importantly, it is not only the length but also the quality of life that matters. Measures of healthy life expectancy show that disparities persist across income and gender lines, though the evidence on healthy life expectancy by socioeconomic status is still emerging. These patterns underscore

the need for pension policies that account not only for population-wide averages but also for the unequal distribution of gains in longevity.

Longer lives pose pressure on the budgets of pension schemes. Moreover, inequalities in life expectancy threaten the redistributive function of public pension systems. While these systems are designed to provide income security and reduce disparities in old age, growing longevity gaps across socioeconomic status risk reversing these intended effects. As individuals with higher socioeconomic status live longer, they can collect pensions over more years. This dynamic can erode or even negate the progressivity embedded in pension formulas, especially in earnings-related Bismarckian systems, but also increasingly in universal, flat-rate Beveridgean systems. Evidence from various countries, including Denmark, France, and Germany, underscores that the interaction between income, longevity, and pension design is central to evaluating equity.

Given the need for addressing budgetary concerns, increasing the retirement age emerges as one of the most common ways of improving fiscal positions. This measure succeeds both in increasing employment and improving fiscal sustainability. About 25% of OECD countries have indexed the retirement age to longevity. Both 1:1 and 2:3 ratios are widely used. The former keeps the time in retirement constant. In contrast, the latter, more cautious, keeps the ratio of time working to time in retirement constant, while also being better at keeping healthy years in retirement constant, which can be deemed as a fair intergenerational goal. In fact, when increases in life expectancy are primarily experienced by individuals with higher socioeconomic status, raising the retirement age uniformly can disproportionately reduce both the overall and healthy retirement time for those in more disadvantaged groups. It is important to note that increases to the normal retirement age do not necessarily impact everyone in the same manner. Individuals with significant private pension wealth may be less influenced by policies designed to extend working lives, as they have the financial means to retire early without depending on public pension benefits.

Other measures that aim at improving the pension system's budget like the reduction of pension benefits or the strengthening of the marginal financial incentives for delaying retirement, are not exempt from equity concerns, as lower-income individuals rely more heavily on public pensions and as higher-income individuals are typically better positioned to benefit financially from postponing retirement.

Possible solutions for improving social security schemes are addressed. First, it is fundamental to have adequate disability insurance schemes that rely on medical screening for granting benefits. Second, allowing for earlier retirement based on career length depends on the correlation between longer careers and lower life expectancy to target individuals with low life expectancy, without the burden of medical screening. There is some evidence of mistargeting of this policy, which can be improved by lowering benefit generosity, though at the expense of diminishing the insurance value for those truly in need. Third, bunching

people in homogeneous life expectancy groups, such as sector-specific pension funds, promotes a more equitable distribution of pension resources. Fourth, the progressiveness of the system can be increased.

Well-performing pension systems in terms of adequacy, equity, and sustainability, are typically aligned with the latter two policies through their multi-pillar structure. A first pillar with flat-rate benefits and means-tested supplements improves the progressivity of the system. In contrast, a mandatory occupational second pillar provides strong labor supply incentives and pools longevity risk among individuals with more homogeneous life expectancies.

Overall, these elements represent a balanced approach that prevents old-age poverty, allows for moderate redistribution, and promotes fiscal sustainability. While a strong second pillar is generally positive, it also leads to the accumulation of significant private pension wealth, which may reduce the effectiveness of future increases to the normal retirement age, as individuals with high private pension wealth may choose to retire early regardless of the incentives in the public pension scheme. This concern is amplified in systems with automatic longevity indexation, where statutory retirement ages may rise to historically high levels. Future research should further investigate how private wealth accumulation influences retirement timing, particularly in scenarios with high statutory retirement ages, to better inform the coordination of public and private pension pillars.

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