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Edited by Giulia Giupponi and Arthur Seibold

Rethinking Pension Reform

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Contents

Foreword

Demographic change caused by ageing populations is occurring rapidly across the developed world. Surges in life expectancy coupled with declining fertility rates have led to unprecedented fiscal pressure on social security systems. In an attempt to alleviate this pressure, governments around the world have implemented various reforms of public pension systems over the last 30 years and continue to work towards pension reforms that are more effective and equitable.

At the same time, there has been a large increase in academic research on retirement behaviour and the impact of pension reforms, and this eBook brings together a diverse array of contributions focused on rethinking and reforming public pension systems around the world, in the light of changing demography. The eBook pursues two main objectives. First, it reviews insights from the newest advances in this area of academic research; and second, it delves into practical policy lessons that can inform the debates around pension reform in many countries. The chapters offer a wealth of new insights and discuss pension reform in Europe and the United States, along with topics covering incentives to induce individuals to work longer, the efficacy of different types of reforms, and alternative methods to delay retirement.

Other chapters explore the consequences of these reforms and the potential trade-offs at stake when designing and implementing these policies. Furthermore, the eBook discusses trends and inequalities in life expectancy and the implications those have for the distributive properties of pension systems, as well as the interaction between retirement and other social insurance schemes.

Overall, this eBook offers a comprehensive understanding of pension reforms, balancing fiscal sustainability with insurance and redistribution effects. With unease about fiscal sustainability to the fore in many advanced economies, and countries around the world attempting to balance an ageing population with budgetary concerns, the eBook, drawing as it does on the expertise of these leading academic authors, aims to provide fresh perspectives on how to (re)think pension reforms and is more relevant to policymakers now than ever.

CEPR is grateful to Giulia Giupponi and Arthur Seibold for their expert editorship of the eBook. Our thanks also go to Anil Shamdasani for his skilled handling of its production. The editors would like to thank Ginevra Casini, Francesco Cassano and Clemens Gollub for excellent research assistance.

CEPR, which takes no institutional positions on economic policy matters, is delighted to provide a platform for an exchange of views on this important topic.

Tessa Ogden
Chief Executive Officer, CEPR
November 2024

CHAPTER 1

Introduction

Giulia Giupponi and Arthur Seibold

Bocconi University and CEPR; University of Mannheim and CEPR

Populations are ageing rapidly across the developed world. While in 1950 only 8% of individuals in Europe and North America were aged 65 or older, in 2024 close to 20% are in that group. As Figure 1 shows, the old-age dependency ratio – the ratio of the old-age to the working-age population – has more than doubled from 14% in 1950 to 33% in 2024 in European and North American countries. These trends are continuing at an unabated pace: on average, the dependency ratio is projected to reach 50% by 2050 and 60% by 2100. Dependency ratios are predicted to increase across all OECD countries, albeit by different magnitudes (see Figure 2). While the projected 2050 dependency ratio is below 50% in the Nordic countries, the United States, the United Kingdom, the Netherlands, Ireland, Luxembourg and Türkiye, it will exceed 75% in Italy and Spain.

FIGURE 1   POPULATION AGED 65+ AS A PERCENTAGE OF THE POPULATION AGED 20-64 IN EUROPE AND NORTH AMERICA
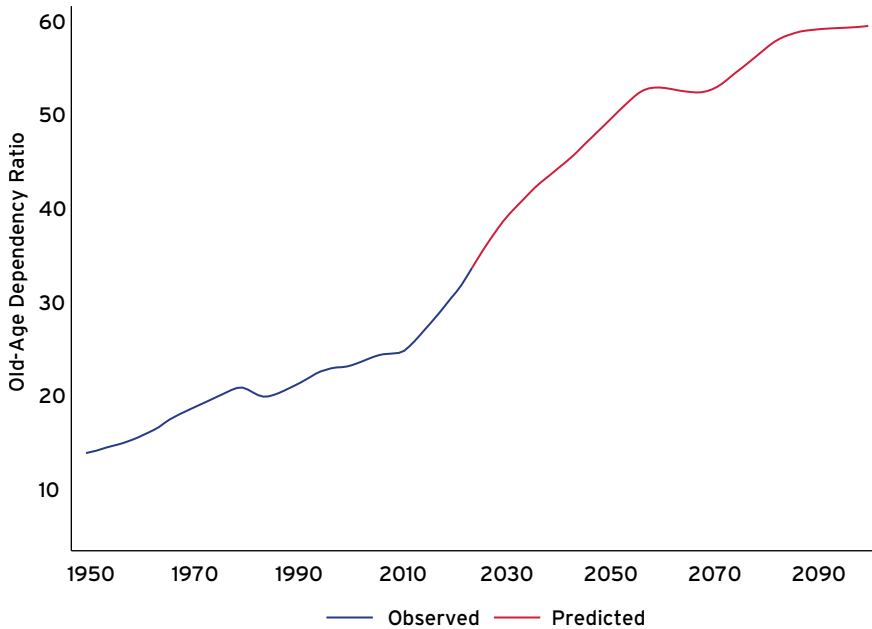
Source: United Nations (2024).

FIGURE 2   DEPENDENCY RATIOS
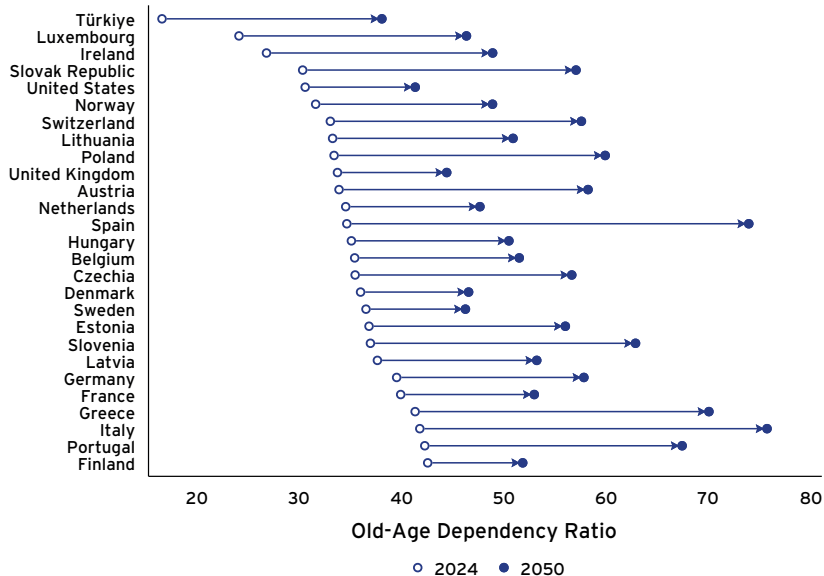
Source: United Nations (2024).

FIGURE 3   LIFE EXPECTANCY AT 65 FOR MEN AND WOMEN
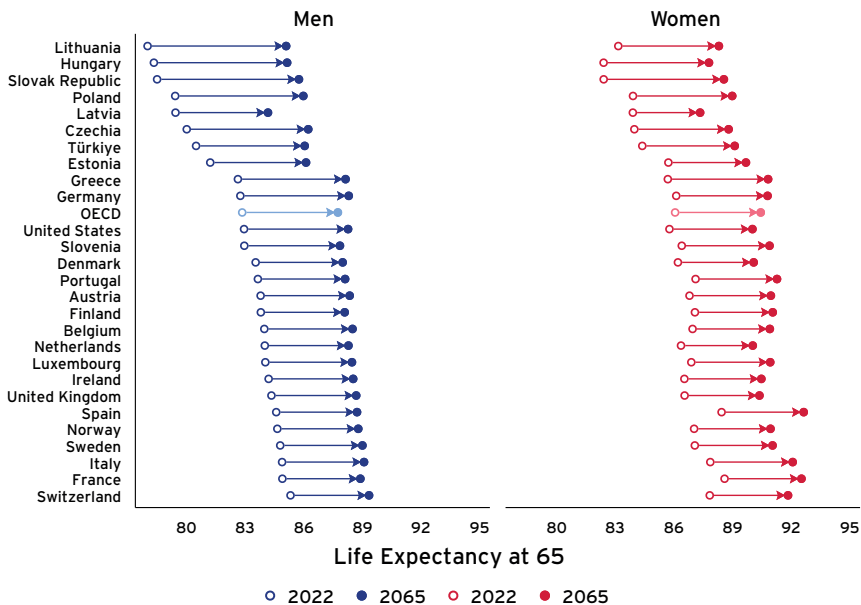
Source: OECD (2023).

Underlying population ageing are two important demographic trends. First, there have been large improvements in life expectancy over the last century. In 2022, the average life expectancy at age 65 was 83.0 years for men and 86.2 years for women across OECD countries, and it is projected to increase to 87.9 for men and 90.6 for women by 2065 (see Figure 3). Second, fertility rates have declined below the replacement level since the early 1970s in Europe and North America. After a steady decline until the 2000s and a short-lived upturn in the 2010s, they settled at around 1.5 children per woman in the 2020s, and according to projections by the United Nations World Population Prospects, they will remain largely stationary over the 21st century.

Population ageing places pressure on the fiscal stability of public pension systems. Most publicly provided mandatory pension schemes are pay-as-you-go systems, in which social security contributions are collected from current workers and these funds are paid out to current retirees as pension benefits.[1] A pay-as-you-go system is fiscally balanced when the value of contributions is sufficient to satisfy benefit payment obligations. Equation (1) illustrates this fiscal balance in a stylised way. In any given period, total contributions are given by the product of the contribution rate (α), the average wage in the economy (W) and the number of workers (N_W). Total benefit obligations are the product of average pension benefits (P) and the number of retirees (N_P).

$$\underbrace{\alpha \cdot W \cdot N_W}_{\text{Total contributions}} = \underbrace{P \cdot N_P}_{\text{Total benefit obligations}} \tag{1}$$

In this simple framework, population ageing can be understood as an increase in the number of old individuals (i.e., retirees N_P) relative to the number of young individuals (i.e., workers N_W). Everything else equal, this implies higher spending on pensions relative to government revenue from contributions, i.e., the fiscal balance of the pension system worsens. Beyond systems with pay-as-you-go funding, we note that increases in life expectancy are a challenge for any system – including funded ones – in which the retirement age is fixed (see Barr and Diamond, 2006).

The average OECD country already spends close to 8% of GDP, or 18% of total public expenditure, on pensions. In many countries, pensions already account for the largest single item of public expenditure. As Figure 4 shows, pension expenditure is projected to increase by about 1.5 percentage points of GDP by 2050. Note that this projection takes into account pension reforms that curb future expenditure, effectively countering the impact of demographic change. Indeed, there are a few countries, such as Greece, Estonia and Denmark, where the impact of legislated reforms is so substantial that pension expenditure is projected to decrease. However, most countries will experience large rises in pension expenditure of up to 6 percentage points of GDP in the absence of further reforms.

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1 Funded schemes, on the other hand, are pension systems in which current contributions are invested in assets in order to pay future benefits. Partially funded schemes are hybrid systems in which current contributions are partly invested in assets and partly used to finance current pension benefits.

FIGURE 4   PROJECTED CHANGE IN PENSION SPENDING AS A PERCENTAGE OF GDP (PERCENTAGE POINTS)
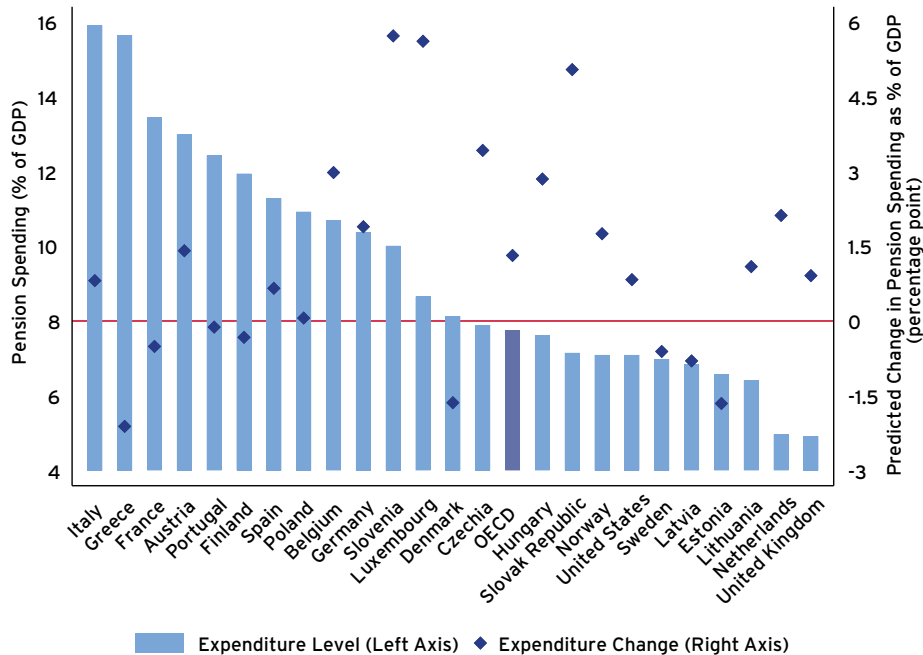
Source: OECD (2023).

In order to alleviate these fiscal pressures, government around the world have implemented far-reaching reforms of public pension systems, and in many cases further reforms are planned. Broadly speaking, there are three typical approaches to restoring fiscal sustainability. First, benefit obligations can be limited by lowering pension benefits. Such a reform directly decreases the right-hand side of equation (1) by lowering P. Second, revenue can be boosted by increasing social security contribution rates (represented by α on the left-hand side of equation 1). As a third reform option, retirement ages can be raised. This type of reform decreases the ratio of retirees to workers, directly countering the increase in the old-age dependency ratio due to demographic change. As we discuss in more detail in Chapter 2, most major public pension reforms implemented in European countries have followed the third route, sharing the common objective of encouraging individuals to delay retirement and work longer. Moreover, cuts in benefit levels have been implemented by many countries.

Academic research on retirement behaviour and policy has developed alongside the evolution of social security systems and their complexity. A well-established body of literature in public economics and labour economics has investigated how the design of pension systems affects individual labour supply and the timing of retirement and discussed implications for social security reforms. In addition to numerous individual academic contributions, this body of work is exemplified by the International Social

Security Project (Coile et al., 2022). This long-running project examines the impact of public pensions on work and retirement behaviour, drawing on extensive empirical analyses from 12 participating countries.

Recent years have seen a revival of the literature on retirement and pensions, building on this important prior work and conceptual advances in adjacent research fields. This has been facilitated, first, by increased availability of administrative data sources that greatly expanded the scope and accuracy of empirical analysis of retirement behaviour. Second, a paradigmatic shift has occurred in the field of public economics, with significant progress being made in developing frameworks that transparently map empirical work onto optimal policy implications (Chetty and Finkelstein, 2013). The progress made so far in applying this approach to social security policy has advanced our understanding of welfare implications, but more research is needed to investigate the various complexities of real-world pension systems. A third important advance has been the incorporation of insights from psychology and behavioural economics in the study of retirement behaviour. The widespread evidence of optimisation failures and non-standard behaviour in this context has raised new challenges for the definition of optimal policy instruments.

In this eBook, we pursue two chief objectives. First, we review insights from the newest advances in academic research on retirement policy in a non-technical manner. Second, we distill practical policy lessons that can inform the intense ongoing debates around pension reform in many countries. We will delve into the manifold aspects of pension reforms, offering a comprehensive analysis of the functioning and effectiveness of policy levers designed to encourage later retirement. Chapter 2, written by Giulia Giupponi and Arthur Seibold, begins by illustrating the four main policy tools that reforms typically leverage to induce individuals to work longer: (i) the level of pension benefits; (ii) the strength of marginal retirement incentives; (iii) the age at which individuals can start claiming benefits (early retirement age); and (iv) the age at which they are entitled to full pension benefits (normal retirement age). The chapter then offers an overview of major pension reforms enacted in Europe and the United States in recent decades and classifies them according to their specific design features. The next two chapters survey the academic literature on the effectiveness of different types of reforms. In Chapter 3, Arthur Seibold reviews evidence on the relative effectiveness of statutory retirement ages and marginal financial incentives in delaying retirement. In Chapter 4, Giulia Giupponi examines the influence of changes in benefit levels on labour supply decisions near and far from retirement. Chapter 5, written by Camille Landais and Johannes Spinnewijn, turns to investigating the distributional consequences of these reforms and potential equity–efficiency trade-offs in the design of retirement incentives. In Chapter 6, Antoine Bozio, Simon Rabaté, and Maxime Tô discuss trends and inequalities in life expectancy and their implications for the distributive properties of pension systems. Chapter 7, written by Andreas Haller and Stefan Staubli, explores the interactions between retirement policy and other social insurance schemes, particularly unemployment and disability insurance, and their implications for the overall impact of pension reforms. In Chapter

8, Mark Duggan and Bess Olshen provide a perspective on retirement policy needs and reform options in the United States. Finally, Chapter 9, written by Camille Landais and Johannes Spinnewijn, concludes the eBook by drawing practical lessons for retirement policy.

While the labour supply effects of pension reforms are a central element of the debate around retirement policy, they are by no means the only one. Concerns over fiscal sustainability have opened up discussions about effective ways to boost savings, the introduction and subsidisation of complementary private pension plans, the fostering of financial education, and the optimal allocation of pension funds' assets, among others.[2] In addition, fiscal sustainability has not been the sole driver of recent pension reforms. In many countries, reform efforts have been devoted to the harmonisation of pension systems, for instance related to occupation-specific rules and exceptions. Another area of intense policy action is the provision of long-term care. All these policy issues, and the growing academic literature on them, are of course relevant for the future of retirement systems, but remain outside the scope of this eBook. Our primary focus is on reforms that, motivated by fiscal pressures, aim at inducing people to retire later.

REFERENCES

Barr, N. and P. Diamond (2006), "The Economics of Pensions", *Oxford Review of Economic Policy* 22(1): 15-39.

Chetty, R. and A. Finkelstein (2013), "Social Insurance: Connecting Theory to Data", in A.J. Auerbach, R. Chetty, M. Feldstein and E. Saez (eds), *Handbook of Public Economics*, Vol. 5, Elsevier, pp. 111-193.

OECD (2023), *Pensions at a Glance 2023*, OECD Publishing.

United Nations (2024), *World Population Prospects 2024*, Online Edition, Department of Economic and Social Affairs, Population Division (accessed 30 August 2024).

ABOUT THE AUTHORS

Giulia Giupponi is an Assistant Professor of Economics at Bocconi University and a CEPR Affiliate in the Labour and Public Economics groups. She was a Post-doctoral Fellow at the Institute for Fiscal Studies in 2019-2020. She earned a PhD in Economics from the London School of Economics and Political Science in 2019. Her research interests lie in the areas of labour and public economics, with a focus on the employment and welfare effects of social insurance and social security programs, and the impact of minimum wages on firm behaviour and distributional outcomes.

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2   More broadly, there are of course many reforms outside the realm of retirement policy that can improve the fiscal stability of pension systems – for example, policies to increase productivity growth, policies to foster immigration or policies to encourage women's paid work.

Arthur Seibold is an Assistant Professor of Economics at the University of Mannheim and a CEPR Affiliate in the Public Economics group. He holds a PhD in Economics from the London School of Economics and Political Science. His research interests lie in the areas of public, labour and behavioural economics. Much of his research studies the behavioural and welfare effects of social insurance programmes, in particular old-age pensions and disability insurance.

CHAPTER 2

Recent pension reforms in Europe

Giulia Giupponi and Arthur Seibold

Bocconi University and CEPR; University of Mannheim and CEPR

Across advanced economies, pension systems have been subject to intense reform activity over the past 30 years. Most recent pension reforms share the common objectives of encouraging later retirement and improving the fiscal sustainability of the pension system. To this end, reforms have mainly altered four key design features of pension systems: (i) the level of pension benefits; (ii) the strength of marginal retirement incentives; (iii) the age at which individuals can start claiming benefits (early retirement age); and (iv) the age at which they are entitled to full pension benefits (normal retirement age). In this chapter, we put forward a simple conceptual framework that clarifies how changes in these four policy levers operate and how they can impact individual retirement decisions. We then survey pension reforms enacted across several European countries and the United States in recent decades, and classify them according to the specific design features they altered. As we will see, viewing pension reforms through the lens of our proposed classification offers a simple way of mapping reform efforts across pension systems that otherwise differ in the complex rules governing pension benefit calculations and pension eligibility.

CLASSIFYING PENSION REFORMS

We begin by laying out a simple graphical framework that allows us to analyse the impact of pension reforms on retirement decisions. Figure 1 shows pension benefit schedules as a function of an individual's retirement age: the vertical axis reports the benefit level an individual would be entitled to if they were to retire at different ages (horizontal axis). Each panel depicts how a given type of pension reform affects benefit levels, sometimes differentially across individuals retiring at different ages. This graphical framework provides an intuitive way to understand how individual retirement decisions, and labour supply more generally, respond to pension reforms. Predicted retirement responses are similar to what is implied by standard labour supply models: both the level of income and marginal incentives (i.e., the slope) matter. In addition, statutory retirement ages determine the range of possible pension-claiming ages and set salient benchmarks for retirement behaviour. As we noted before, the main types of pension reforms that have been implemented across a broad set of countries can be examined in this framework. Next, we provide illustrative examples of such pension reforms.

Reform 1: Level of pension benefits

Panel (a) of Figure 1 illustrates the first type of pension reform: a change in the **level of pension benefits**. This reform corresponds to a parallel (vertical) shift of the pension benefit schedule. The figure depicts a cut in benefit levels at any given retirement age, i.e., a downward shift of the benefit schedule. An increase in benefit levels would analogously produce an upward shift. In practice, there are multiple ways in which a change in benefit levels can be implemented. One way is via general changes to the pension benefit formula that impact benefits paid to retirees of any age, such as switching the indexation of pension benefits from wages to prices (or vice versa). Moreover, changes in benefit levels can be directed toward specific groups, for instance by granting higher pensions to low-income individuals (e.g., through minimum benefits) or recognising childrearing periods as pensionable contribution periods.

Modifying the level of pension benefits of course exerts a direct effect on the fiscal balance of the pension system by changing benefit payouts. Moreover, economic theory predicts that a change in the level of pension benefits exerts *income or wealth effects* on labour supply. For instance, lowering pension levels is expected to lead individuals to work longer, i.e., to postpone retirement. Empirical evidence confirms that these effects are often substantial and labour supply effects can start materialising quite far from retirement (see Chapter 4).

Example: Pension reforms in Italy

Italy has a pay-as-you-go public pension system covering all workers in the country. Historically, the Italian pension system was characterised by relatively generous eligibility and benefit rules. Since the 1990s, concerns over fiscal sustainability as well as deteriorating macroeconomic conditions triggered a series of pension reforms. Among these were a number of reforms aimed at reducing benefit levels. For instance, the 'Amato' reform of 1992 changed the pension formula such that benefits depended on average earnings over workers' entire career history, rather than only the last five years of work. Since most workers have careers with increasing earnings profiles, this implied a general reduction in benefit levels. The same reform also changed the indexation of pension benefit growth to inflation rather than the previous function of inflation and real wage growth, effectively lowering future benefit levels. Later on, the 'Dini' reform of 1996 marked the shift to a notional defined contribution system. While this reform mainly impacted marginal financial incentives (see the Swedish case below), in the Italian case the transition also led to a further reduction in benefit levels, which was accelerated by the 'Fornero' reform in 2011. Taken together, these reforms imply a steady decline in pension benefit levels. Average gross replacement rates – the percentage of an individual's annual earnings that is replaced by pensions – are projected to decrease from 74% for a worker retiring in 2010 with 38 years of contributions to 59% for a similar worker retiring in 2050 (Italian Ministry of Economy and Finance, 2023).

Reform 2: Marginal financial incentives

Panel (b) of Figure 1 depicts a second type of pension reform: a change in **marginal financial incentives**. This reform implies a change in the slope of the pension benefit schedule. The case shown in the figure corresponds to increasing marginal benefit gains from later retirement, i.e., steepening the benefit profile. Lowering marginal gains would analogously imply a flatter benefit profile. There are several ways in which the slope of the benefit schedule can be altered in practice. Many pension systems feature explicit pension benefit adjustment as a function of the individual's retirement age, and a common direction of reform has been to increase adjustment factors in order to strengthen financial incentives for later retirement. Such a reform is shown in Panel (b) of Figure 1. A larger adjustment factor corresponds to higher penalties for retiring below the normal retirement age and higher bonuses for retiring above the normal retirement age. Alternative ways to affect the slope of the benefit profile include changes in the way pension contributions translate into benefits.

According to economic theory, a change in the slope of the benefit profile should affect retirement mainly via *substitution effects*. As the marginal financial gain of postponing retirement is higher under a steeper benefit profile, this should incentivise individuals to retire later. As discussed in Chapter 3, empirical evidence on the effectiveness of marginal financial incentives is somewhat mixed. Moreover, a slope change redistributes benefits across workers retiring at different ages (see Chapter 5). Thus, the fiscal impact of such a reform is ambiguous, depending on the share of retirees at different ages and on the specific implementation of the slope change.

Example 1: Actuarial pension adjustment in Switzerland
Switzerland has a pay-as-you-go public pension system covering all residents. Initially, there was no explicit pension adjustment for individuals' retirement age. This implied most workers could maximise their pension wealth by retiring as early as possible. Fuelled by concerns over early retirement, a pension reform in 1997 introduced an adjustment factor of 3.4% per year of claiming pension benefits before the normal retirement age. For younger cohorts, pension adjustment was increased to 6.8% per year, further steepening the benefit profile (Lalive et al., 2023).

Example 2: Introduction of the Swedish notional defined contribution system
In 1994, the Swedish government passed a fundamental pension reform, transitioning from a defined-benefit to a notional defined contribution (NDC) system. Incentivising later retirement was a key part of the stated goal behind the reform. Under the pre-reform system, pension benefits were a function of an individual's 15 highest-earnings years, and pension rights could only be accumulated until the age of 64. Under the NDC system, workers' lifetime contributions are credited to a notional account, and pension benefits are actuarially adjusted as a function of the individual retirement age. Overall, this reform implied a significant steepening of the benefit profile (Kolsrud et al., 2024).

FIGURE 1   STYLISED PENSION REFORMS

a) Benefit levels

b) Marginal financial incentives

c) Early retirement age

d) Normal retirement age
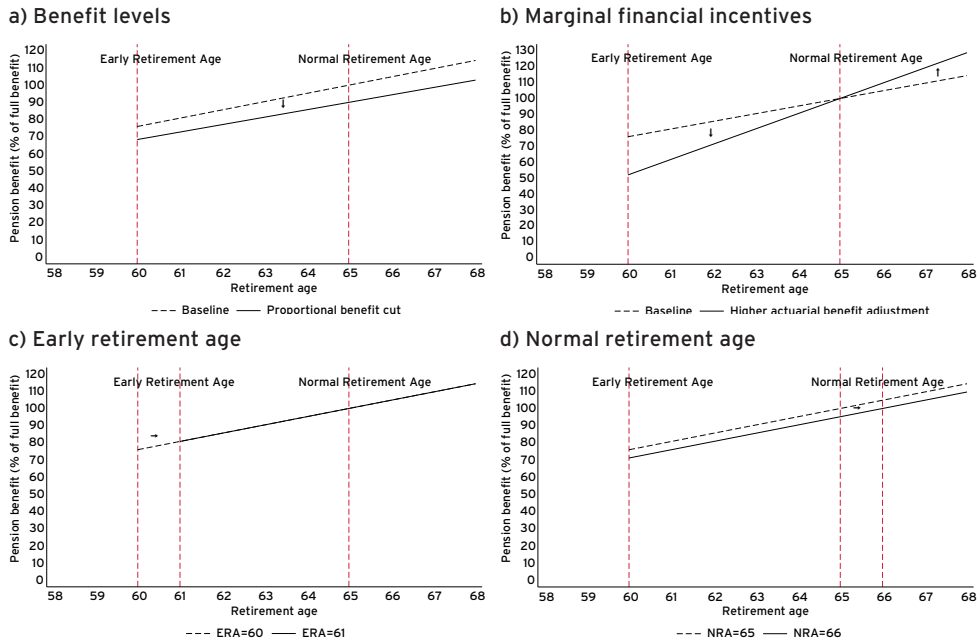
Reform 3: Early retirement age

An important tool of real-world retirement policy is given by statutory retirement ages, and these have been altered by pension reforms in many countries. Statutory retirement ages are used by governments to frame retirement rules and benefit calculation, and these ages tend to feature prominently in official communication and public debates around pension reform. One common type of reform involves changing the **early retirement age** (ERA). The ERA is defined as the earliest age at which old-age pensions can be claimed. The ERA can uniformly apply to all workers, or it can be differentiated across workers, for instance by gender or contribution periods. As shown in Panel (c) of Figure 1, when the ERA is increased by a reform, this limits the set of possible benefit claiming ages, effectively removing part of the benefit profile. Analogously, lowering the ERA would expand the set of possible claiming ages. Changing the ERA via reforms is straightforward, as this parameter is directly set by retirement policy.

An increase in the ERA exerts a mechanical effect on benefit claiming ages, as claiming at some early ages is simply not possible anymore. Empirical studies show that this often translates into large labour supply responses, with many individuals postponing their labour market exit following an ERA increase. At least some of this effect seems to be driven by the ERA serving as a salient benchmark for early retirement (see Chapter 3). In addition, as increasing the ERA prevents some workers from claiming an old-age pension, spillover effects onto other social insurance programs can occur (see Chapter 7).

Example: ERA reforms in Austria

Austria has a public pay-as-you-go pension system covering all private-sector workers. Historically, Austria allowed for some of the earliest retirement options across Europe: until 2000, the ERA was set at 55 years for women and at 60 years for men. Since then, several reforms have gradually increased the ERA to 60 for women and to 65 for men (Staubli and Zweimüller, 2013). Men with at least 37.5 years of pension contributions face a smaller increase in the ERA to 62 years of age.

Reform 4: Normal retirement age

A final type of reform entails changing the **normal retirement age** (NRA). The NRA is the age at which individuals are eligible for 'full' pension benefits, i.e., without incurring any penalties for early claiming. In other words, the NRA provides a reference point in terms of the retirement age and pension benefit calculation. Most pension systems specify an NRA that applies uniformly to all workers. In some countries, certain groups become eligible to claim a full pension before reaching the general NRA, effectively differentiating the NRA across individuals. Common examples of such differentiated policies are earlier NRAs for women or workers with long contribution periods. As Panel (d) of Figure 1 illustrates, a reform changing the NRA leads to a horizontal shift of the pension benefit schedule, everything else equal. This shift occurs due to the linkage between benefit levels and the NRA.[1] When the NRA increases, the age at which full benefits are available moves upwards, implying lower pension benefits at any given retirement age. In effect, this shift of the benefit profile is similar to the reduction in benefit levels from Panel (a). Conversely, a lower NRA implies higher pension benefits at any given retirement age.

Similar to a general change in pension benefit levels, changing the NRA has a direct effect on the fiscal balance of the pension system by impacting benefit payments. Furthermore, empirical evidence suggests that pension reforms modifying the NRA induce strong retirement responses, which can be largely explained by its reference point character (see Chapter 3).

Example 1: NRA reforms in Germany

Germany has a pay-as-you-go public pension system covering all private sector (and some public sector) employees. In the early 1990s, the German public pension system was characterised by a high degree of differentiation, allowing many workers to retire early. While the general NRA was set at 65 years, women, workers with long contribution periods and workers who were unemployed or in part-time work before retirement were allowed to claim a full pension already between 60 and 63 (Seibold, 2021). In other words, the 'effective' NRA (sometimes referred to as the full retirement age) was below 65 for these groups. In light of growing concerns over fiscal sustainability, two major

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1   Since the NRA is ultimately an arbitrary designation, one could, in principle, envision reforms that merely relabel a particular age as the NRA without altering the underlying benefit structure. Here, we consider the typical reform implemented in practice which includes the linkage to benefit levels.

reforms passed in 1992 and 1999 increased these group-specific NRAs on a cohort basis, effectively removing most exemptions from the general NRA. For instance, the NRA for women was increased from 60 to 65 for birth cohorts 1940 to 1945. Meanwhile, a reform passed in 2007 gradually increases the general NRA to 67 by 2031.

Example 2: NRA reform in the Netherlands
In the Netherlands, public pension benefits only depend on periods of residence in the country. Full pension benefits are available to anyone with at least 50 years of residence, and can be claimed from the NRA. The NRA was set at 65 years until 2014 and was gradually increased to 67 by 2024 (Rabaté et al., 2024). Afterwards, the NRA is linked to life expectancy, as forecast by Statistics Netherlands. Based on the latest official forecast, the NRA is scheduled to increase to 67 years and 3 months in 2028.

RECENT PENSION REFORMS ACROSS EUROPE

In this second part of the chapter, we provide a broader perspective on key pension system parameters and reforms across European countries. Our discussion is organised around the four policy levers from above: pension levels, marginal retirement incentives, and early and normal retirement ages. This part is based on an extensive review of pension reforms over the last decades in selected European countries (Austria, France, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom). Reforms are described in more detail in Tables 1 to 4.

Pension benefit levels
Figure 2 shows gross pension replacement rates from mandatory public pension schemes across countries for men entering the labour market in 2002 and 2022 who retire after a full career, based on OECD data. The replacement rate measure expresses what fraction of their pre-retirement earnings individuals receive as a pension. On average, individuals entering the labour market in 2022 receive a replacement rate of around 50%. There is lots of variation across countries, with replacement rates ranging from less than 30% in Ireland and Poland, to more than 75% in Italy, Spain and Greece.[2] Over the past 20 years, replacement rates have decreased in the vast majority of countries, with the average replacement rate going down from around 57% to 51% across the OECD.

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2 The apparent discrepancy in the gross replacement rate reported in Figure 2 for Italy (OECD, 2005, 2023) and in the text (Italian Ministry of Economy and Finance, 2023) is due to different assumptions underlying the two projections. The OECD projection is based on a projected average retirement age of 71, while the Ministry of Economy and Finance projection is based on the early retirement age.

FIGURE 2   GROSS REPLACEMENT RATE AT AVERAGE EARNINGS FOR MEN, MANDATORY
PENSION PROGRAMMES ONLY, 2002 AND 2022
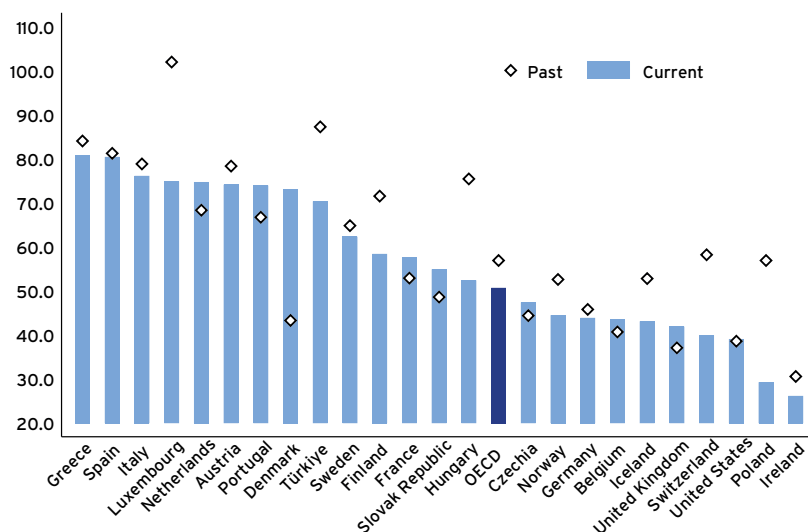
Note: Gross replacement rates are computed as gross pension entitlement at the time of retirement divided by gross
pre-retirement earnings. The chart reports gross replacement rates for male workers with average earnings. The current
replacement rate is for an individual who enters the labour market at the age of 22 in the year 2022 and retires after a full
career. The past replacement rate is for an individual who enters the labour market at the age of 20 in 2002 and retires
after a full career.

Source: OECD (2005, 2023).

Table 1 shows an overview of pension reforms impacting benefit levels across selected
European countries. Among the countries included in our review, a large number of
reforms modified benefit levels. As we discussed above, a key example is Italy, where
changes in the number of relevant contribution years and changes in the indexation of
pension benefits led to a significant decline in benefit levels over time. Although pension
systems differ in many respects, reforms in other countries have followed similar
patterns. Austria, another country with historically generous pension benefits, passed
a series of reforms that successively changed relevant contribution periods from the
last five years before retirement to 10, 15 and 40 years, and is currently transitioning to
using earnings over the full career. Everything else equal, such reforms effectively lower
pension benefits, since taking into consideration contributions at earlier ages implies
lower average earnings entering the pension formula. Both France and Germany saw a
number of reforms changing the indexation of pension benefits, which largely implied
lower benefits. In addition, Germany introduced new parameters into the pension
formula, explicitly linking pension levels to demographic factors, again lowering benefit
levels.

Thus, the general direction of reform was reducing benefit levels in order to lower
pension system expenditure. In some countries, this gave rise to concerns about old-age
income sufficiency for some vulnerable groups, which triggered reforms counteracting
the general decrease in benefits. For instance, France implemented a series of reforms

strengthening minimum pension guarantees for low earners. In Germany, partly out of concern over the gender pension gap, childcare periods were included in public pension calculations. Recently, Swiss voters decided in a referendum to add a 13th monthly pension payment per year, substantially increasing overall pension levels.

TABLE 1   REFORMS IMPACTING PENSION BENEFIT LEVELS

Country	Reform (Impact on benefit levels: ↓ negative, ↑ positive, ≈ none or limited, ? uncertain)
Austria	**Computation of pensionable earnings** Before 1985: pensionable earnings computed as an average of the last 5 years of work 1985: Pensionable earnings computed as average of the last 10 years of work (↓) 1988: Pensionable earnings computed as average of the last 15 years of work (↓) 1993: Pensionable earnings computed as average of the best 15 years of work (↑) 2003: Pensionable earnings computed as average of the last 40 years of work, then gradually increased towards entire earnings history (↓)
France	**Indexation (point-based component of pension benefits)** Before 1993, indexation to mean wage growth 1993: Indexation to mean wage growth minus 1 percentage point (↓) 2000: Indexation to price inflation excluding tobacco (?) 2013: No indexation (↓) 2018: Indexation to adjusted price inflation (↑) **Minimum pension guarantee** 2003: Increases in minimum pension in 2003, 2006 and 2009 (↑) 2014: Increase in eligibility threshold (↑) 2023: Increase in minimum pension (↑)
Germany	**Indexation of pension benefits** Before 1992, indexation to gross wage growth 1992: Indexation to net wage growth (↓) 1999: Introduce 'demographic factor', linking pension levels to life expectancy (↓) 2005: Introduce 'sustainability factor', linking pension levels to ratio of contributors to beneficiaries (↓) **Counting childcare periods as pension contributions** 1992, 2014, 2019: Number of years of childcare pension contribution increased in three steps (↑)
Italy	**Indexation of pension benefits** Before 1993, indexation to price inflation and real wage growth 1993: Indexation to price inflation (↓) 2012: No indexation for pensions above certain threshold (↓) **Computation of pension benefits** Before 1992, pensionable earnings computed as average of the last five years of work 1992: Pensionable earnings computed as average of entire earnings history (↓) 1995: Transition from defined-benefit to notional defined-contribution system (↓) 2011: Acceleration of transition to notional defined-contribution system (↓)
Switzerland	2024: Referendum decides to add a 13th monthly pension payment per year (to be implemented)

Note: Reform years refer to the time of reform legislation and may not coincide with the time of reform implementation.

Marginal financial incentives

Table 2 shows an overview of pension reforms impacting marginal retirement incentives across Europe. Until the beginning of the 1990s, there was often little or no explicit adjustment of pension benefits for the retirement age, implying that workers' pension wealth could be maximised by retiring early. Since then, many countries have implemented reforms strengthening marginal incentives to postpone retirement. Similar to the Swiss case we discussed above, Austria, Germany, France and Norway all introduced new adjustment factors into their pension formulas, penalising early retirement and rewarding late retirement. Moreover, Sweden and Italy transitioned to an NDC system featuring actuarially fair benefit adjustment. In both countries, this entailed substantially stronger marginal incentives to postpone retirement.

TABLE 2   REFORMS OF MARGINAL RETIREMENT INCENTIVES

Country	Reform (Impact on marginal incentives: ↓ negative, ↑ positive, ≈ none or limited, ? uncertain)
Austria	Before 1993, no explicit adjustment of benefits for retirement age 1993: Introduction of actuarial benefit adjustment (varying by age) (↑) 1996: Adjustment rates changed, depending on contribution years (?) 2000: Adjustment increased to 3% per year (↑) 2003: Adjustment increased to 4.2% per year (↑)
France	Earnings-based pension component: Before 2003, penalty of 2.5% for each missing quarter of contribution and missing quarter relative to normal retirement age 2003: Reduced penalty for missing contributions to 1.25% (↓) and introduced bonus of 1.25% for each quarter of contribution beyond 41-year contributory requirement for maximum benefits (↑)
Germany	Before 1997: no explicit adjustment of benefits for retirement age 1997: Penalty of 3.6% per year before NRA, bonus of 6% per year after the NRA (↑)
Italy	Before 1995, no explicit adjustment of benefits for retirement age 1995: Transition to NDC system with actuarially fair benefit adjustment (accelerated by 'Fornero' reform in 2011) (↑) 2011: For cohorts subject to defined-benefit system, penalty of 2% per year for claiming ages under 60, and of 1% for claiming ages between 60 and 62 (↑)
Norway	Before 2011, no explicit adjustment of benefits for retirement age (early retirement via occupational pensions without penalties) 2011: Actuarially fair pension adjustment introduced (↑)
Sweden	Before 1994: penalty of 6% per year before NRA, bonus of 8.4% per year after the NRA (but contributions after the NRA do not count towards benefits) 1994: Transition to NDC system with actuarially fair benefit adjustment (↑)
Switzerland	Before 1997: no explicit adjustment of benefits for retirement age 1997: Penalty of 3.4% per year before the NRA, increased to 6.8% per year for younger cohorts (↑)

Note: Reform years refer to the time of reform legislation and may not coincide with the time of reform implementation.

A clear consequence of these reforms can be seen in Figure 3: the implicit tax on working longer (hereafter ITAX) decreased across most European countries in the 2000s (except Spain and Sweden, where reforms occurred earlier). The ITAX is a measure developed by Börsch-Supan and Coile (2021, 2023) to capture the disincentives to work longer embedded in pension systems. The average ITAX declined from more than 20% to below 10% between 2002 and 2012, suggesting that workers have over time seen much stronger marginal incentives to postpone retirement.

FIGURE 3   IMPLICIT TAX ON WORKING LONGER, 2002 AND 2012
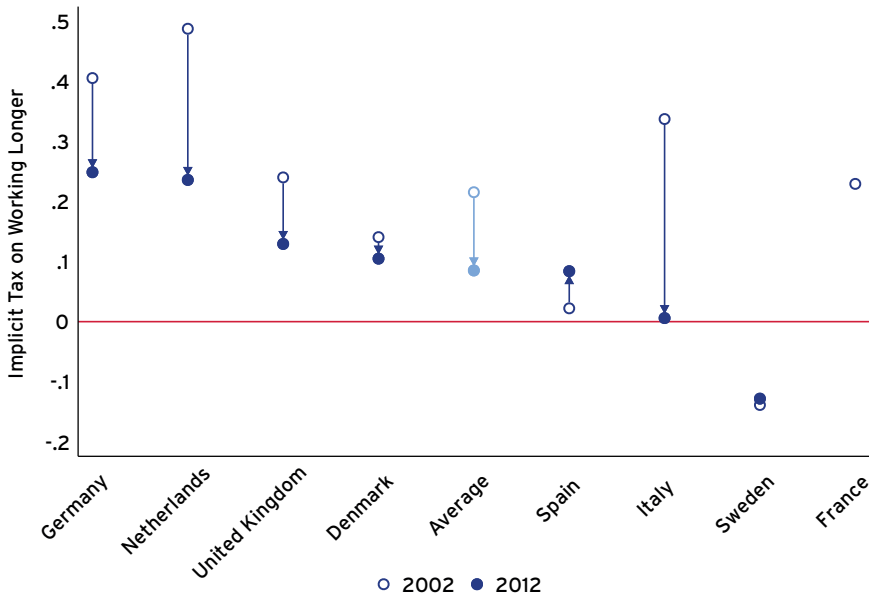
Note: The implicit tax on working longer is calculated as the change in social security wealth incurred when postponing retirement by one year divided by the after-tax earnings an individual would have realised by working that extra year.

Source: Börsch-Supan and Coile (2023).

Early retirement ages

Figure 4 shows early retirement ages for men with full careers retiring in 2002 and 2022 and for those entering the labour market in 2022, based on OECD data. On average, the ERA for full-career workers is 62.2 across the OECD. There is large variation in ERAs across countries, ranging from 60 or less in Türkiye, Lithuania and Slovenia to 65 or more in Ireland, the United Kingdom and the Netherlands. The figure also illustrates that many countries have increased their ERAs over the past 20 years and that this path is set to continue in the future. On average, ERAs have increased by 2.7 years for individuals retiring in 2022 compared to those retiring in 2002. According to OECD data, the ERA for those entering the labour market in 2022 will be 64, that is, 1.8 years higher than for those retiring in 2022.

FIGURE 4   PAST, CURRENT AND FUTURE EARLY RETIREMENT AGES FOR MEN WITH FULL CAREERS
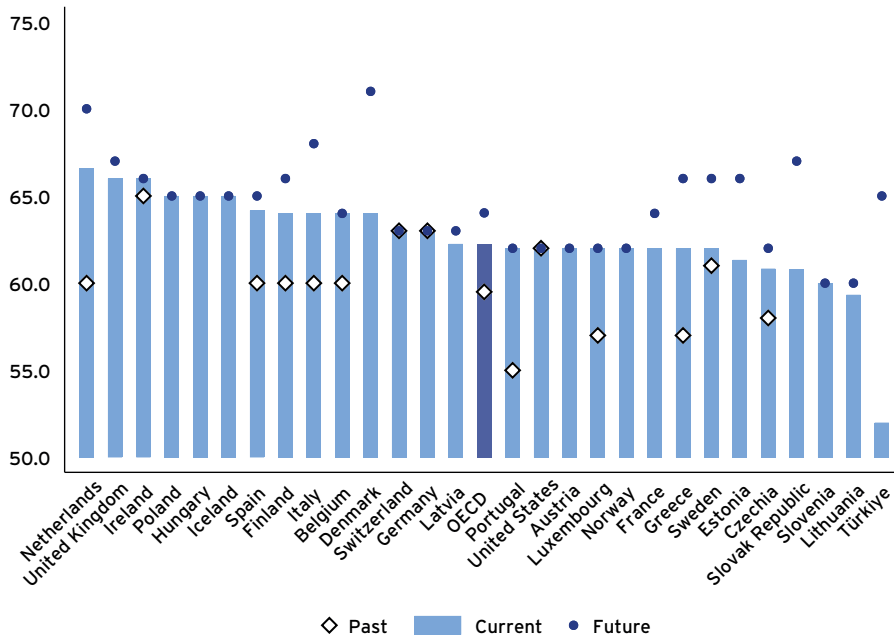
Note: The current early retirement age is for men retiring in 2022 with a full career from age 22. The past early retirement age is for men retiring in 2002 with a full career from age 20. The future early retirement age is for men entering the labour market in 2022 at the age of 22 and retiring after a full career. Values for Czechia and the Slovak Republic are taken from the Social Security Programs throughout the World Handbook to ensure comparability between past and current measures.

Source: OECD (2005, 2023); U.S. Social Security Administration (2002).

Table 3 summarises our review of pension reforms involving ERA changes. Similar to the Austrian case from above, other countries have also implemented ERA increases. For example, early retirement opportunities have been rolled back in Germany. The ERA for women, after unemployment/part-time work and for workers with an invalidity has increased from 60 to 63 or 65 since the 1990s. In the United Kingdom, the state pension age – the earliest age at which a public pension can be claimed – was increased from 60 to 65 for women and will be increased to 68 for all workers over the next decades.

A few countries have diverged from the trend of higher ERAs and created new opportunities for early retirement. The stated goal behind these policies has been typically to allow workers more 'flexibility' in their retirement choices. Switzerland introduced new early retirement options in 1997, setting ERAs between 62 and 63. Similarly, Norway set a new ERA at 62 in 2011, five years below the NRA. Italy introduced two flexible retirement schemes aimed at workers with long contributions periods and those in unemployment, with a disability or in arduous occupations. For these individuals, new ERAs were set between 62 and 63.5 years. In all these cases, expanded early retirement opportunities were accompanied by strengthened financial incentives for later retirement in order to prevent excessive uptake.

TABLE 3   REFORMS OF THE EARLY RETIREMENT AGE (ERA)

Country	Reform
Austria	Before 2000, ERA is 55 for women and 60 for men 2000: Gradual increase to 56.5 for women and 61.5 for men 2003: Gradual increase to 60 for women and 65 for men 2005: ERA for workers with at least 37.5 contribution years lowered to 62
Germany	Pension reforms of 1992 and 1999: • Women: ERA increased from 60 to 65 (implemented in 2012) • Workers with invalidity status: ERA increased from 60 to 63 for cohorts 1946 to 1948 (implemented by 2011) • Workers who are unemployed or in old-age part-time work before retirement: ERA increased from 60 to 65 (implemented in 2012)
Italy	2017: Introduction of early retirement option 'APE Sociale' for long-term unemployed, disabled, individuals caring for disabled person or working in 'heavy-work' occupations, aged 63.5 years and with 30 years of contributions 2023: Introduction of early retirement option '*Pensione anticipata flessibile*' for workers aged 62 years and with 41 years of contributions
Norway	Before 2011, no early claiming of public pensions 2011: ERA set at 62
Switzerland	Before 1997, no early claiming of public pensions 1997: ERA set at 62 for women and 63 for men
United Kingdom	Before 1980, ERA is 65 for men and 60 for women 1995: ERA increased to 65 for women (implementation by 2020) 2016: ERA increased to 67 (implementation by 2028) 2018: ERA increased to 68 (implementation by 2039)

Note: Reform years refer to the time of reform legislation and may not coincide with the time of reform implementation.

Normal retirement ages

Figure 5 shows normal retirement ages for men with full careers retiring in 2002 and 2022, and for those entering the labour market in 2022, based on OECD data. In the average OECD country, workers retiring in 2022 could receive a full pension at the age of 64.4, slightly older than workers retiring in 2002. Similar to the ERA, the NRA varies widely across countries, ranging between 52 and over 65. The countries with the highest NRAs include those where the NRA is linked to life expectancy, such as Denmark and the Netherlands. NRAs are set to increase in many countries in the future. According to OECD data, for workers entering the labour market in 2022, the NRA will be 66.3, a 1.9 year increase compared to workers retiring in 2022.

FIGURE 5   PAST, CURRENT AND FUTURE NORMAL RETIREMENT AGES FOR MEN WITH FULL CAREERS
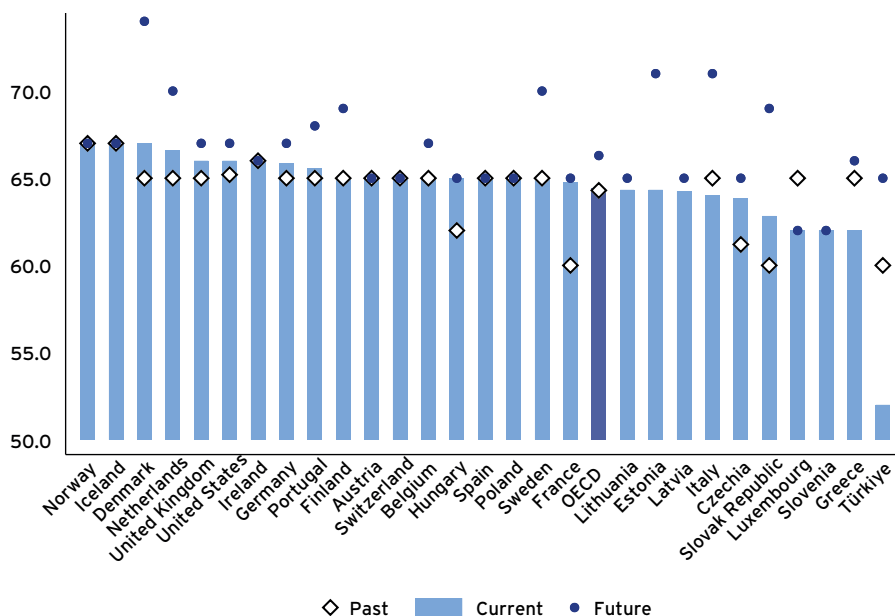
Note: The current normal retirement age is for men retiring in 2022 with a full career from age 22. The past normal retirement age is for men retiring in 2002 with a full career from age 20. The future normal retirement age is for men entering the labour market in 2022 at the age of 22 and retiring after a full career. Values for Czechia, the Slovak Republic and the United States are taken from the Social Security Programs throughout the World: Europe, 2002 and Social Security Programs throughout the World: The Americas, 2003 Handbooks to ensure comparability between past and current measures.

Source: OECD (2005, 2023); U.S. Social Security Administration (2004).

Table 4 summarises reforms to the NRA across European countries. Most countries have increased the NRA in recent decades, and many are implementing further increases over the coming years. Most reforms resemble the German and Dutch cases discussed above, increasing general NRAs as well as those of groups who were initially allowed to retire before the general NRA. For instance, France is increasing the general NRA to 67 and the NRA for workers with long contribution periods to 64. Italy implemented particularly large NRA increases from 60 for men and 55 for women to 67, with further increases scheduled as a function of life expectancy. Both Austria and Switzerland used to have a lower NRA for women of 60 and 62, respectively, which has since increased to 65. One exception to the general trend of increasing NRAs is Sweden. In the course of transitioning to an NDC system, Sweden abolished the NRA, providing no reference age for pension calculation. Interestingly, a recent Swedish reform re-introduces a 'target age' linked to life expectancy, effectively providing such a reference point again.

TABLE 4   REFORMS OF THE NORMAL RETIREMENT AGE (NRA)

Country	Reform
Austria	Before 1993, NRA is 60 for women and 65 for men 1993: NRA for women increased from 60 to 65 (implementation begins in 2024)
France	**General NRA** Before 2010, NRA is 65 2010: NRA increased gradually to 67 **Full Retirement Age for workers with long contributions ('seniority pension')** 1993: 60 years of age and 40 years of contributions 2003: 60 years of age and 41 years of contributions 2010: 61 years of age and 41.5 years of contributions 2014: 62 years of age and 43 years of contributions 2023: 64 years of age and 43 years of contributions
Germany	**General NRA** Before 2007, NRA is 65 2007: NRA gradually increased to 67 (implementation by 2031) **Group-specific Full Retirement Ages (FRAs)** Pension reforms of 1992 and 1999: • Women: FRA gradually increased from 60 to 65 (implementation by 2010) • Workers with at least 35 years of contributions: FRA gradually increased from 63 to 65 (implementation by 2004) • Workers with invalidity status: FRA gradually increased from 60 to 63 (implementation by 2007) • Workers who are unemployed or in old-age part-time work before retirement: FRA gradually increased from 60 to 65 (implementation by 2007) Pension reforms of 2007 and 2014: • Workers with at least 35 years of contributions: FRA gradually increased to 67 (implementation by 2031) • Workers with at least 45 years of contributions: FRA lowered to 63 in 2012; then gradually increased to 65 (implementation by 2031)
Italy	**General NRA** Before 1992, NRA 60 for men and 55 for women, with 15 years of contributions 1992: Age 65 for men and 60 for women, with 20 years of contributions 1995: Age 57 to 65 with 5 years of effective contributions 2004: Age 65 for men and 60 for women, with 35 years of contributions 2009: Future NRA linked to life expectancy 2011: Age 67, with 20 years of contribution and benefit level >1.5 × social assistance benefits; otherwise age 70 **Workers with long contribution periods ('seniority pension')** Before 1995, 35 years of contributions (regardless of age) 1995: 57 years of age with 35 of contributions, or 40 years of contributions (regardless of age) Seniority pension abolished for cohorts subject to NDC system 2007: Introduction of "quota" system, eligibility based on sum of age and contributions (95 in 2009, 96 in 2011 and 97 in 2013) 2011: Abolition of quota system Seniority pension requires 41 years of contributions for women and 42 years for men. For cohorts subject to NDC system, age 63 with 20 years of contribution and benefit level >2.8 × social assistance benefits Future eligibility age linked to life expectancy

Country	Reform
Netherlands	Before 2015: NRA is 65 2015: Gradual increase to 67 (implemented by 2024), NRA then linked to life expectancy
Sweden	Before 1998, NRA is 65 1998: NRA abolished, flexible retirement from age 63. 2022: NRA ('target age') re-introduced, linked to life expectancy
Switzerland	Before 1997, NRA is 65 for men and 62 for women 1997: Age 65 for men, gradual increase to age 64 for women 2024: Age 65 for men and women

Note: Reform years refer to the time of reform legislation and may not coincide with the time of reform implementation.

Pension reform in the United States

The last major reform to social security in the United States were the 1983 Amendments. The main reform measures contained in the amendments closely resemble the types of reforms we discuss here. First, the reform featured an increase in the NRA from 65 to 67, which is gradually phased in by 2027. Second, the reform strengthened marginal financial incentives for later retirement by increasing pension adjustment to 8% per year after the NRA (the so-called delayed retirement credit). Chapter 8 of this eBook provides a detailed outlook on retirement policy in the United States.

REFERENCES

Borsch-Supan, A.H. and C. Coile (eds) (2021), *Social Security Programs and Retirement around the World: Reforms and Retirement Incentives*, NBER Conference Report, University of Chicago Press.

Borsch-Supan, A.H. and C. Coile (2023), "The Effects of Reforms on Retirement Behavior: Introduction and Summary", NBER Working Paper 31979.

Italian Ministry of Economy and Finance (2024), *Le tendenze di medio-lungo periodo del sistema pensionistico e socio-sanitario 2024*.

Kolsrud, J., C. Landais, D. Reck and J. Spinnewijn (2024), "Retirement Consumption and Pension Design", *American Economic Review* 114(1): 89–133.

Lalive, R., A. Magesan, and S. Staubli (2023), "How Social Security Reform Affects Retirement and Pension Claiming", *American Economic Journal: Economic Policy* 15(3): 115–50.

OECD – Organisation for Economic Co-operation and Development (2005), *OECD Pensions at a Glance 2005*, OECD Publishing.

OECD (2023), *Pensions at a Glance 2023*, OECD Publishing.

Rabaté, S., E. Jongen, and T. Atav (2024), "Increasing the Retirement Age: Policy Effects and Underlying Mechanisms", *American Economic Journal: Economic Policy* 16(1): 259–91.

Seibold, A. (2021), "Reference Points for Retirement Behavior: Evidence from German Pension Discontinuities", *American Economic Review* 111(4): 1126–65. 6

Staubli, S. and J. Zweimüller (2013), "Does raising the early retirement age increase employment of older workers?", Journal of Public Economics 108: 17–32.

U.S. Social Security Administration (2002), *Social Security Programs Throughout the World: Europe, 2002.*

U.S. Social Security Administration (2004), *Social Security Programs Throughout the World: The Americas, 2003.*

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CHAPTER 3

How to effectively encourage later retirement? Statutory retirement ages versus financial incentives

Arthur Seibold

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Population ageing challenges the fiscal sustainability of pension systems across the developed world. To adapt social security to these demographic trends, many countries have enacted pension reforms aimed at encouraging later retirement. As we discussed Chapter 2, most of these reforms revolve around two key policy tools: statutory retirement ages and financial incentives for later retirement. In this chapter, I review empirical evidence on the effectiveness of these policies, and I discuss implications for pension reforms.

RETIREMENT INSTITUTIONS: STATUTORY RETIREMENT AGES AND FINANCIAL INCENTIVES

To begin with, it is useful to clarify key institutional features, which – as is often the case in retirement policy – can be quite complex. Statutory retirement ages are age thresholds that pension systems use to frame retirement rules and benefit calculation. Generally speaking, statutory ages can be classified into two types. First, the early retirement age (ERA) is the earliest age at which an individual can claim an old-age pension. Second, the normal retirement age (NRA) is the age at which an individual can claim their 'full' pension, i.e., without incurring penalties for early claiming. In some contexts, the NRA is alternatively referred to as the full retirement age.

Statutory retirement ages tend to feature prominently in the communication of retirement rules (Seibold, 2021). The NRA serves as an institutional *reference point*, a 'normal' time to retire. Deviations from this age are defined as 'early' or 'late' retirement. Moreover, pension adjustment is framed as a loss (penalty) or gain (reward) relative to the 'full' reference level available at the NRA. Survey evidence shows that this framing translates into a perception of the NRA as a reference point for the timing of retirement among many older workers (e.g., Lalive et al., 2023). The ERA is similarly framed as the typical age of retirement for those who wish to retire early.

As we explained in Chapter 2, reforms to statutory retirement ages typically entail changes in workers' lifetime budget constraints. This occurs because key retirement rules and benefit formulas are institutionally linked to statutory ages. The ERA determines the range of possible pension claiming ages. As 'full' benefits are available at the NRA, changing this age usually impacts individuals' pension wealth. Moreover, marginal financial rewards from continuing work and postponing retirement change at the NRA in some countries.[1] Since the NRA is ultimately an arbitrary designation, one could, in principle, envision reforms that merely relabel a particular age as the NRA without altering the underlying benefit structure. So far, however, pension reforms have largely preserved the linkage between the NRA and pension benefit schedules.

The institutional details pertaining to statutory retirement ages vary somewhat across countries. In most settings, the ERA and the NRA are separate ages. However, some countries, such as the Netherlands and the United Kingdom, do not allow early claiming of public pensions, such that there is a single statutory age that effectively combines the ERA and the NRA. Moreover, both the ERA and the NRA can either uniformly apply to all workers or be differentiated across workers. Our review of pension reforms in Chapter 2 includes many examples of such differentiated rules, most commonly by gender or contribution histories. Another important source of institutional variation is how exactly statutory retirement ages, particularly the NRA, are linked to benefit schedules.

The key type of financial incentive this chapter focuses on are *marginal* retirement incentives, i.e., financial rewards for later retirement or, equivalently, penalties for earlier retirement. Financial retirement incentives can be illustrated in a lifetime budget constraint framework like the one shown in Figure 1 from Chapter 2. Marginal retirement incentives are given by the slope of the budget constraint, which expresses the marginal financial gain an individual receives from continuing work and postponing retirement, say by one month. To obtain an intuitive scaling of financial incentives, these are often quantified through the *implicit net-of-tax rate*, i.e., the percentage of an individual's income by which they can increase their lifetime wealth through working longer. In addition to marginal incentives, the overall level of pension benefits is also important, which is explored in Chapter 4.

Pension reforms targeting marginal retirement incentives typically modify the degree to which pension benefits change with an individual's retirement age. Many pension systems include explicit benefit adjustments based on the age at which individuals retire. As explained above, these rules are often framed around statutory retirement ages. In Germany, for example, workers receive 6% higher monthly pension benefits for each year of postponing retirement beyond the NRA, and 3.6% lower pension benefits per year of early retirement below the NRA. The magnitude of actuarial benefit adjustment varies

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1   For example, the size of actuarial pension adjustment changes at the NRA in Germany and the United States. Furthermore, individuals who work beyond the NRA face lower social insurance contributions in some countries, effectively lowering the implicit tax on continuing work.

across countries (see Chapter 2). Some settings, such as the notional defined contribution systems in Italy and Sweden, feature actuarially fair pension adjustment; that is, for the average individual, postponing retirement leaves the present discounted value of pension wealth unchanged. Actuarial fairness requires quite strong adjustment of monthly pension benefits, usually around 7% to 8% per year of later retirement.[2] Such a system has been recommended by some economists because it eliminates fiscal externalities from early retirement, but this can come at distributional costs (see Chapter 5).

EMPIRICAL EVIDENCE

A substantial body of empirical evidence documents the large impact statutory retirement ages have on individual retirement behaviour. This impact becomes apparent when simply examining the distribution of individual retirement ages. Figure 1 shows the retirement age distribution in Germany, pooling across a wide range of cohorts. There are sharp, large retirement spikes at ages 60, 63, and 65, which correspond to the main statutory ages (ERAs and NRAs) faced by these workers. Overall, almost 30% of workers retire precisely in the month when they reach a statutory age. Seibold (2021) documents this concentration of retirement around statutory ages, which is surprising from the point of view of standard economic models, as many workers do not face any monetary incentive to retire at a statutory age. Similar empirical patterns were found by earlier studies based on survey data. For instance, Lumsdaine et al. (1996) document excess retirements at the NRA (and the ERA) in the United States and coin this phenomenon a 'retirement puzzle'. Gruber and Wise (1999) show similar patterns for the United States, Canada and nine European countries: in each country, excess retirements occur precisely at the respective statutory ages.

Seibold (2021) quantifies the importance of statutory retirement ages and contrasts their impact on individual retirement behaviour with that of financial incentives. In the German setting, both ERAs and NRAs vary across workers, depending on their gender, contribution histories and employment status before retirement. Moreover, statutory ages vary across birth cohorts due to a number of pension reforms enacted since the early 1990s. Importantly, statutory ages are usually linked to some change in marginal financial incentives to continue working ('discontinuities') in Germany. These local financial incentives could provide a potential reason for some individuals to retire at a statutory age. Seibold (2021) uses data on all German retirees and a bunching strategy. Intuitively, this empirical strategy measures excess retirements and translates these into implied retirement responses to statutory ages.

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2   The magnitude of actuarially fair pension benefit adjustment depends on variables such as life expectancy and interest rates.

FIGURE 1   RETIREMENT AGE DISTRIBUTION IN GERMANY
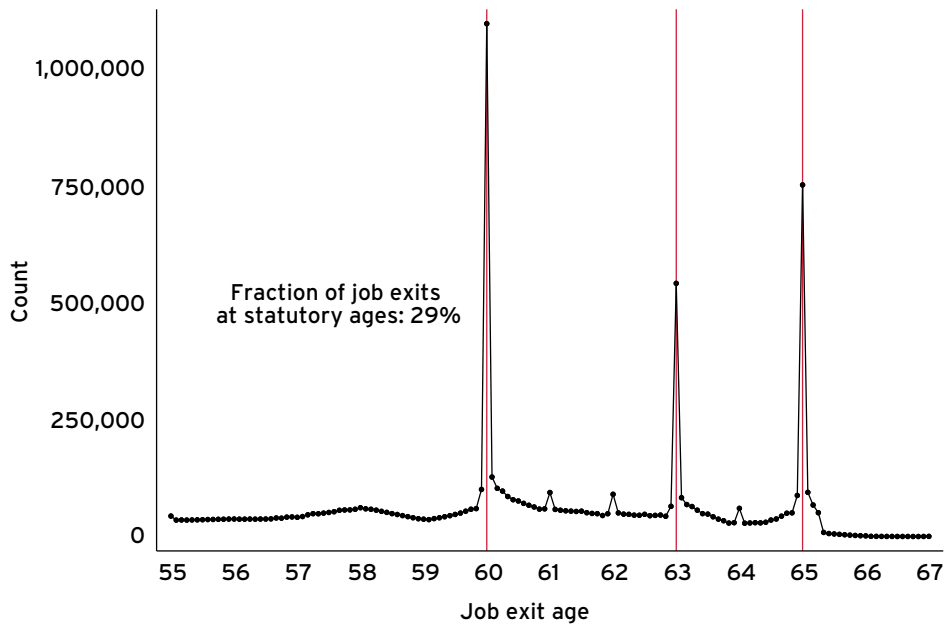
Notes: The figure shows the distribution of retirement (job exit) ages among all German private-sector workers born between 1933 and 1949.

Source: Seibold (2021).

Seibold (2021) finds that statutory retirement ages exert an enormous influence on individual retirement behaviour. The observed retirement spikes imply that individuals change their retirement age by around one to three years in order to retire at a statutory age. Two pieces of additional evidence indicate that these responses cannot be explained by financial incentives alone. First, individuals exhibit large reactions to statutory ages even when there is no financial incentive or a disincentive to retire exactly at this age. Second, individuals respond much less to 'pure' financial incentives (i.e., incentives not linked to a statutory age) of comparable size. The estimated labour supply elasticity to the implicit net-of-tax rate is only 0.05.

Why do individuals react so much to statutory retirement ages? Seibold (2021) shows that, in contrast to the predictions of standard economic models, the role of statutory ages cannot be explained by financial considerations. Instead, their impact is in line with *reference-dependent preferences* (Kahneman and Tversky, 1979). Reference dependence describes the notion that individuals evaluate an outcome – in this case, their retirement age – relative to a reference point, rather than in absolute terms. In the retirement setting, statutory ages are framed by institutions and perceived by workers as reference points; in particular, the NRA is viewed as a 'normal' time to retire. This induces workers to shift their retirement towards statutory ages in order to avoid psychological costs of 'deviating' from these reference points. Other mechanisms have received less empirical support. For instance, some of the impact of the ERA could potentially be explained by liquidity

constraints, but the evidence on this is mixed (see also Cribb et al., 2016). Furthermore, work contracts can be automatically terminated at the NRA in some countries, but this does not seem to drive much of the observed retirement spike (see also Rabaté, 2019).

What does this evidence imply for pension reforms? The answer is perhaps unsurprising: pension reforms modifying statutory retirement are highly effective in influencing retirement behaviour. Seibold (2021) shows in simulations that an increase in the NRA by one year leads to an average retirement delay by around three months. Such a reform entails a large fiscal gain of around €1.1 billion per year (in 2014 euros). In order to achieve a similar impact on retirement behaviour, pure financial incentives would have to be very large: for instance, rewards for late retirement would have to almost double from the current German level of 6% per year to 11.4% per year. Given their modest impact on individual behaviour and their large direct fiscal costs, such financial incentives can ultimately even have a negative impact on the fiscal balance of the pension system.

A multitude of empirical studies report findings similar to Seibold (2021). Despite many institutional differences, both ERAs and NRAs have been found to exert a large influence on retirement decisions in a broad set of European countries. Similar to Seibold (2021), these studies use large administrative data and quasi-experimental variation in statutory ages across workers or due to pension reforms.[3] Staubli and Zweimüller (2013) and Manoli and Weber (2018) show that increasing the ERA for men and women in Austria has large effects on individual retirement behaviour. For each year of ERA increase, workers stay employed 0.4 years longer and retire 0.5 years later. These pension reforms thus lead to a large positive fiscal impact. Similarly, Cribb et al. (2016) report large employment effects of an ERA increase for women in the UK. Rabaté (2019) documents large retirement spikes at the NRA in France and shows that firm responses related to automatic work contract termination only explain a small part of these. Gruber et al. (2022) document that a pension reform in Finland that simply 'relabeled' an age as the NRA entails "enormous and immediate" retirement responses. In Switzerland, Lalive et al. (2023) find that increasing the NRA leads to large changes retirement and pension claiming ages. They present survey evidence suggesting reference dependence as the dominant mechanism behind this effect. Rabaté et al. (2024) study a pension reform that increases the NRA in the Netherlands, which again leads to large employment effects among older workers. Dolls and Krolage (2023) demonstrate that NRA changes in the opposite direction entail symmetric effects: they find that a German pension reform that *decreases* the NRA causes a 0.3 to 0.4 year reduction in retirement ages per year of NRA change. Finally, a recent paper by Saeverud (2024) shows that the strong retirement responses to the NRA also persist in a setting where the NRA is indexed to

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3   Note that, due to their linkage to benefit schedules, pension reforms that modify statutory retirement ages often involve changes in financial incentives as well. Conceptually, the overall impact of such reforms on retirement behavior may therefore be a combination of the direct effect of statutory ages and the influence of these financial incentives. However, studies that leverage independent variation in these elements (e.g., Seibold, 2021; Gruber et al., 2022; Lalive et al., 2023) imply that the overall impact of these reforms is largely driven by the reference-point effect of statutory ages, while the role of financial incentives is relatively minor.

life expectancy. He finds that in Denmark, formulaic changes to the NRA trigger strong retirement responses among older workers, as well as significant expected retirement responses among younger workers.

Evidence from the United States points in the same direction. Mastrobuoni (2009) finds strong responses of pension claiming ages to an NRA increase in administrative data. Similar to European studies, claiming ages increase by about half a year per year of NRA increase. Behaghel and Blau (2012) study the same NRA reform and confirm large benefit claiming and retirement responses in survey data and interpret their results in a model of reference-dependent preferences. Recently, Deshpande et al. (2024) revisit the US NRA increase. They find that benefit claiming behaviour moves in lockstep with the NRA, but employment exits exhibits some 'stickiness' at the old NRA.

Studies from other settings also tend to find limited effects of pure financial incentives for later retirement. Brown (2013) studies marginal financial incentives embedded in Californian teacher pensions and finds an elasticity of lifetime labour supply with respect to the marginal return to work of 0.04 to 0.1. Manoli and Weber (2016) investigate financial incentives stemming from employer-based pensions in Austria and find a semi-elasticity of labour force participation of 0.1 to 0.3. Finally, Duggan et al. (2023) examine an increase in the financial rewards for late retirement (the 'delayed retirement credit') from 3% to 5.5% per year in the context of US social security. They find a modest impact on men's pension claiming decisions, but no effect on women and no effect on labour supply. Lalive et al. (2023) study a similar reform in Switzerland that increases penalties for early retirement from 3.4% to 6.8% per year. They report a small effect on benefit claims and no effect on retirement.

IMPLICATIONS FOR RETIREMENT POLICY

All this evidence implies a clear takeaway message for policymakers seeking to encourage later retirement. Statutory retirement ages are a highly effective policy tool to influence individual retirement behaviour. The broad set of studies discussed above yield remarkably similar quantitative results: changes in statutory retirement ages shift individual retirement ages by approximately 0.3 to 0.5 years for each year of legislated change. Interestingly, the magnitude of behavioural responses tends to be quite similar for ERA and NRA changes. However, the choice of which statutory age to change determines what types of individuals are impacted (early versus late retirees), which in turn affects the distributional properties of a pension reform (see Chapter 5).

Those studies that include fiscal calculations find that pension reforms involving statutory retirement ages have large positive effects on the fiscal balance of the pension system. This includes the abovementioned results from Seibold (2021), as well as a number of studies from other countries. For instance, Mastrobuoni (2009) discusses the positive fiscal implications of NRA increases in the United States and Staubli and Zweimüller (2013) report a large positive fiscal impact of the Austrian ERA increases. In

addition, Staubli and Zweimüller (2013) estimate spillover effects of the ERA reform onto other social insurance programs, in particular disability insurance and unemployment insurance. They find evidence in favour of such spillovers, but these are not large enough to offset the positive fiscal effects of the reform on the pension system itself (see Chapter 7). Similarly, Lalive et al. (2023) find that the Swiss NRA increases entailed large fiscal savings for the government.

Pure financial incentives, on the other hand, have limited effects on individual retirement choices. Again, this empirical result has been observed across a several countries with diverse institutional settings. Studies report quantitative effects on varying scales; however, the implied labour supply elasticities are generally small (up to 0.1) or even zero. As a consequence, the fiscal effects of pension reforms relying on marginal retirement incentives are mixed. For example, Lalive et al. (2023) find small positive fiscal effects of the Swiss reform that increased early retirement penalties to 6.8% per year. Seibold (2021) finds that a large change in late retirement rewards to 11.4% per year even leads to negative fiscal effects. The sign of these fiscal effects depends on whether the pension system is more or less than actuarially fair to begin with (see Reck and Seibold, 2023). Nonetheless, it can be concluded that the fiscal impact of purely financial incentives is, at best, modest.

From the perspective of current policy debates driven by fiscal concerns, the primary insights are these behavioural and fiscal effects of pension reforms. Beyond fiscal impacts, economists are often ultimately interested in the overall welfare effects of reforms. Measuring welfare is inherently difficult, and becomes particularly tricky when individuals exhibit non-standard behaviour, such as reference-dependent retirement behaviour. In ongoing work, Reck and Seibold (2023) show that the overall welfare effects of pension reforms tend to move in the same direction as fiscal effects. Their findings indicate that reference-dependent behaviour pushes most German workers to retire earlier: individuals who might have continued work instead retire at a statutory age. Thus, encouraging later retirement benefits individuals by increasing their own consumption and welfare. Since increasing statutory retirement ages exerts large impacts on individual behaviour and on the fiscal balance, this type of reform is likely to enhance overall welfare. The welfare effects of pure financial incentives, on the other hand, are ambiguous.

REFERENCES

Behaghel, L. and D.M. Blau (2012), "Framing Social Security Reform: Behavioral Responses to Changes in the Full Retirement Age", *American Economic Journal: Economic Policy* 4(4): 41–67.

Brown, K.M. (2013), "The link between pensions and retirement timing: Lessons from California teachers", *Journal of Public Economics* 98: 1–14.

Cribb, J., C. Emmerson, and G. Tetlow (2016), "Signals matter? Large retirement responses to limited financial incentives", *Labour Economics* 42: 203–212.

Deshpande, Manasi, Itzik Fadlon, and Colin Gray (2024), "How Sticky Is Retirement Behavior in the United States?", *The Review of Economics and Statistics* 106(2): 370–383.

Dolls, M. and C. Krolage (2023), "'Earned, not given'? The effect of lowering the full retirement age on retirement decisions", *Journal of Public Economics* 223: 104909.

Duggan, M., I. Dushi, S. Jeong and G. Li (2023), "The effects of changes in social security's delayed retirement credit: Evidence from administrative data", *Journal of Public Economics* 223: 104899.

Gruber, J. and D.A. Wise (1999), "Introduction", in *Social Security and Retirement Around the World*, University of Chicago Press, pp. 1–35.

Gruber, J., O. Kanninen and T. Ravaska (2022), "Relabeling, Retirement, and Regret", *Journal of Public Economics* 211: 104677.

Haller, A. (2022), "Welfare Effects of Pension Reforms", Working Paper.

Kahneman, D. and A. Tversky (1979), "Prospect Theory: An Analysis of Decision under Risk", *Econometrica* 47(2): 263–291.

Lalive, R., A. Magesan, and S. Staubli (2023), "How Social Security Reform Affects Retirement and Pension Claiming", *American Economic Journal: Economic Policy* 15(3): 115–50.

Lumsdaine, R.L., J.H. Stock, and D.A. Wise (Jan. 1996), "Why Are Retirement Rates So High at Age 65?", in D.A.Wise (ed.), *Advances in the Economics of Aging*, University of Chicago Press, pp. 61–82.

Manoli, D.S. and A. Weber (2016), "Nonparametric Evidence on the Effects of Financial Incentives on Retirement Decisions", *American Economic Journal: Economic Policy* 8(4): 160-182.

Manoli, D.S. and A. Weber (2018), "The Effects of the Early Retirement Age on Retirement Decisions", NBER Working Paper 22561.

Mastrobuoni, G. (2009), "Labor supply effects of the recent social security benefit cuts: Empirical estimates using cohort discontinuities", *Journal of Public Economics* 93(11): 1224–1233.

Rabaté, S. (2019), "Can I stay or should I go? Mandatory retirement and the labor-force participation of older workers", *Journal of Public Economics* 180: 104078.

Rabaté, S., E. Jongen, and T. Atav (2024), "Increasing the Retirement Age: Policy Effects and Underlying Mechanisms", *American Economic Journal: Economic Policy* 16(1): 259–91.

Reck, D. and A. Seibold (2023), "The Welfare Economics of Reference Dependence", NBER Working Paper 31381.

Saeverud, J. (2024), "The Impact of Social Security Eligibility and Pension Wealth on Retirement", CEBI Working Paper 05-24, University of Copenhagen.

Seibold, A. (2021), "Reference Points for Retirement Behavior: Evidence from German Pension Discontinuities", *American Economic Review* 111(4): 1126–65.

Staubli, S. and J. Zweimüller (2013), "Does raising the early retirement age increase employment of older workers?", *Journal of Public Economics* 108: 17–32.

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CHAPTER 4

The impact of pension benefit levels on labour supply and retirement

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PENSION DESIGN CHANGES AFFECTING THE LEVEL OF PENSION BENEFITS

One of the key policy levers that governments can use to improve the fiscal balance of the social security system is to reduce the level of pension benefits. Making pension benefits less generous has a mechanical positive effect on the fiscal balance of the system since it reduces pension payments, all else equal. In addition, changes in the level of pensions have the potential to indirectly affect the social security budget by altering individual labour supply and retirement choices via income or wealth effects. For example, according to economic theory, a reduction in pension levels should encourage individuals to increase their labour supply to achieve a higher level of lifetime income and, thus, consumption. Symmetrically, an increase in benefit levels would discourage labour supply and promote earlier retirement. Labor supply increases can take different forms: individuals can increase the number of hours worked while employed (*intensive* margin) or remain employed for longer, postponing retirement (*extensive* margin).

As discussed in Chapter 2, the level of pension benefits is not the only pension design feature that may alter the labour supply choices of individuals. Another design feature with that potential effect is marginal financial incentives, whose effectiveness has been reviewed in Chapter 3. Here, I would like to emphasise a key conceptual difference between the labour supply effect of changes in benefit levels – which operate through income or wealth effects – and of changes in marginal financial incentives – which operate though substitution effects. Marginal financial incentives capture the return to working longer or the penalty for retiring earlier and are represented by the *slope* of the lifetime budget constraint (see Figure 1 from Chapter 2). Income or wealth effects are governed, instead, by changes in the *level* of the lifetime budget constraint (see Figure 1 from Chapter 2). Upward shifts in the budget line imply that the individual is 'richer' in lifetime wealth terms and can thus afford to work less and anticipate retirement. Downward shifts in the budget line command the opposite effect.

The evidence reviewed in Chapter 2 documents a generalised trend towards making pension benefits less generous across European countries. As we have seen, this has been achieved predominantly through changes in the indexation of pension benefits and extensions of the period over which pensionable earnings are computed. Some countries

have made benefits more generous for selected groups of retirees, by either increasing minimum pension guarantees or recognising contribution periods for specific life events, such as having children.

In the following sections, I review evidence from the empirical literature on how labour supply and retirement decisions respond to changes in benefit levels, both near and far from the retirement age. As we will see, the most convincing evidence in the literature comes from the analysis of policy reforms that generated sharp variation in benefit levels across groups of otherwise very similar individuals. By and large, these analyses reveal that changes in benefit levels trigger substantial labour supply responses: benefit drops stimulate sharp increases in participation at older ages and encourage later retirement; benefit increases allow and incentivise anticipated exit, especially among disadvantaged groups.

LABOUR SUPPLY RESPONSES TO CHANGES IN BENEFIT LEVELS NEAR THE RETIREMENT AGE

Some of the most compelling evidence on the wealth effect of pension benefits comes from the analysis of the US Social Security 'Notch' (Gelber et al., 2016, 2017).[1] The 'Notch' is the largest change in Old Age and Social Insurance (OASI) benefits – the main pillar of US Social Security – in the history of US pension benefits. OASI benefits are likely to be an important determinant of older Americans' work decisions, as they are a major source of their income. Due to a policy change legislated as part of the 1977 Social Security Act amendments, a sharp change in pension benefits emerged between individuals born on or after 2 January 1917 and individuals born before that date. The former saw their lifetime pension benefits fall by more than $6,000 – a 5% reduction relative to those born just a few days before them.

Gelber et al. (2016) exploit this policy change to assess the impact of a reduction in benefit generosity on labour market participation at old age. In their analysis, they compare the labour supply choices of individuals, both men and women, born just before and just after 2 January 1917, from their early sixties to their eighties. The authors find striking evidence of pension benefits having a large income effect on participation: at the boundary, the participation rate of individuals just affected by the reform increases by 0.4 percentage points, a 3.6% increase relative to those just unaffected.[2] The implied elasticity of participation with respect to lifetime pension benefits is -0.7, meaning that

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1   The first to analyse the impact of the US Social Security 'Notch' on labour force participation at older ages were Krueger and Pischke (1992). Their work finds no evidence that OASI benefits significantly affected men's labour force participation. However, the lack of significance is likely attributable to the imprecision of the estimates due to the small sample size they could rely upon at the time using the available survey data. Gelber et al. (2016) can instead rely on high-quality and large-scale administrative data.

2   Gelber et al. (2017) replicate the analysis in Gelber et al. (2016) with a specific focus on women. As often found in the literature, women tend to be more elastic to changes in labour supply incentives, including income effects. According to the authors' estimates, the same $10,000 decrease in lifetime discounted OASI benefits causes an increase in the probability of participation at old ages of 0.55 percentage points for men and 1.24 for women.

a 10% increase in benefits leads to a 7% drop in participation and vice versa. The size of this elasticity is much larger than that found in the previous literature – a point I will return to below. Effects on participations are largest when individuals are in their mid-sixties to early seventies and fade away by the time they are in their early eighties. The likelihood of being employed – i.e., not having retired – at the normal retirement age of 65 increased by 0.8 percentage points, a 2.6% increase relative to the baseline. Based on their estimates, the authors conclude that the slowdown in the growth rate of mean OASI benefits that occurred in the United States from around 1985 could be responsible for 28% of the contemporaneous increase in the growth rate of the employment rate of those aged over 65, and 57% of the increase for those aged 65 to 69.

The large effects of pension income on labour supply that we just reviewed are echoed by studies of historical examples of the introduction of old-age support programmes, which are shown to be linked to strong reductions in old-age labour force participation. Costa (1995) documents large income effects on retirement of the introduction of the first universal disability and old-age pension programme for Union veterans in the United States in 1900. Fetter and Lockwood (2016) find similar results studying the introduction of the Old Age Assistance (OOA) in the United States in the 1930s, a means-tested programme that later became the Supplemental Security Income programme. Their results imply that OAA can explain more than half of the large drop in labour force participation of men aged 65 to 74 in the 1930s to 1940s.

STRENGTHENING PENSION LEVELS FOR INDIVIDUALS AT RISK OF POVERTY IN OLD AGE

As noted in Chapter 2, concerns about poverty in old age have triggered reforms increasing pension benefit levels for individuals with low-earnings or low-contribution histories. Typical reforms in this area are the introduction or the strengthening of minimum pension guarantees or pension subsidies. I review here evidence on the labour supply implications of examples of these programmes.

Danzer (2013) studies the impact of a large old-age poverty reduction policy in Ukraine. In early 2005, the minimum pension guarantee more than doubled, rising from around 100 Ukrainian hryvnia (UAH) per month to 250 UAH. Those figures correspond to 90 and 225 international 2005 dollars in purchasing power parity, respectively.[3] Since pension benefits were neither means-tested nor conditional on actual retirement, the policy change allows us to learn about the income effect of minimum pension guarantees on labour supply decisions. Consistent with economic theory, Danzer (2013) finds that higher pension incomes have a disincentive effect on the labour force participation of people around the pension age. The probability of retiring at the statutory retirement

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3   An international dollar would buy in the cited country a comparable amount of goods and services a US dollar would buy in the United States.

age – 55 for women and 60 for men – increased by 12.2 percentage points for women and 17.8 percentage points for men, corresponding to proportional effects of 28% and 33%, respectively. It is useful to put such effect sizes into perspective by comparing them to the size of the benefit change and to other examples in the literature. The results from the Ukrainian reform suggest that a 10% rise in benefit income increases the probability of retiring between 1.2% (for women) and 1.9% (for men). The results in Gelber et al. (2017) point to even larger effects: a 10% increase in benefits leads to a 5.4% decrease in the likelihood of working at the normal retirement age of 65.

Interestingly, in the Ukrainian case, the labour supply reductions are only detectable for the less educated and are zero among individuals at the top of the educational distribution. This result can be rationalised with low-educated individuals facing lower returns to working longer, possibly due to a combination of low levels of prospective earnings and a high utility cost of work in older ages.

Another compelling investigation of the impact of benefit levels at the bottom of the pension benefit distribution is a recent study by Ye (2022). The author analyses the implications of a pension subsidy programme introduced in Germany in 1992 to provide additional pension benefits to the most disadvantaged retirees, who are mostly women. In the sample of analysis – women born in West Germany between 1935 and 1951 – subsidy recipients had their benefits increased by €90 per month or 15%. This increase led to substantial effects on labour supply. A 10% increase in benefits reduced the employment rate at ages 55 to 65 by 5.6% and increased the retirement rate by 9.7% for the same age range. Effects are shown to be concentrated among women with low labour market attachment (defined as having fewer than 28 years of regular employment before retirement). These findings indicate that a higher pension income allows and incentivises workers – especially those with short or discontinuous careers – to anticipate exit from the labour force.

FORWARD-LOOKING LABOUR SUPPLY RESPONSES TO CHANGES IN PENSION WEALTH

So far, we have considered how changes in the level of pension benefits affect the labour supply choices of individuals close to retirement. However, to the extent that individuals may be forward-looking, those changes can also affect behaviour at younger ages. For example, more generous systems might induce workers to reduce their lifetime labour supply by working fewer hours throughout the lifecycle or shortening their careers. Evidence on the forward-looking effects of pension benefit levels is very limited.[4]

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4   Only a small number of papers have analysed forward-looking labor supply responses to changes in pension design features other than the level of benefits. Among these, Hairault et al. (2010) and Carta and De Philippis (2023) examine the role of changes in the statutory retirement age, French et al. (2022) of changes in marginal financial incentives, and Bovini (2019) of pension rules more generally.

A recent contribution in this area is work by Artmann et al. (2023), who examine the labour supply response of women aged 50 to 55 to a permanent change in their pension wealth, which would materialise in the form of higher benefit levels only later on, at the time of retirement. The authors exploit a 2014 reform of the German public pension system – the so-called *Mütterrente* ("mothers' pension") – which credited additional pension contributions to mothers for each child born prior to 1992. Women whose children were born on or after 1 January 1992 did not experience any change in the number of pension contributions. To examine the impacts of the reform, the authors compare the labour market behaviour of mothers who had their first child just before versus just after the 1 January 1992 cutoff, from before to after the 2014 policy change. The first group experienced a 4.4% increase in their pension wealth – and so their expected pension benefits – relative to second group. The pension wealth increase led to substantial reductions in labour supply at the intensive margin, in the form of shifts out of fulltime and into parttime work. No evidence is found of changes in participation over the period of analysis, when affected mothers are on average aged 50 to 55 and thus still far from the retirement age.

Becker et al. (2022) analyse the same reform but compare women who gave birth to any child before 1 January 1992 with women who gave birth *only* after that date. Consequently, their sample includes women who, in 2014, are much closer to the retirement age compared to those analysed by Artmann et al. (2023).[5] The authors document a 2% drop in participation, which is entirely concentrated among women aged 57 and older at the time of the reform and with two or more eligible births in the treatment period.

According to economic theory, the effect of an unanticipated change in benefits on labour supply behaviour should be larger when it occurs closer to retirement as opposed to earlier in life. This is because, when the change happens at older ages, individuals have less time to adjust their consumption, and therefore need to adjust labour supply more. A comparison of the results in Artmann et al. (2023) and Gelber et al. (2016) corroborates this prediction: the same 10% ($1) increase in pension wealth is found to decrease lifetime earnings by 3% ($0.54) when occurring far from retirement (Artmann et al., 2023) and by 9% ($0.61) when close to retirement (Gelber et al., 2016). At the same time, though, shocks that occur far from the retirement age are likely to affect a broader base of individuals, potentially amplifying the aggregate effects of those policy interventions.

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5   Another consequence of the different definition of treatment and control groups in the two papers is that the groups are considerably more homogeneous in observable characteristics in Artmann et al. (2023), since they consider women who gave birth in a narrow bandwidth (three months) around the 1 January 1992 cutoff. When Becker et al. (2022) focus on women who gave birth in a one-year bandwidth, they do not find evidence of extensive margin responses

INSIGHTS FROM THE SURVIVOR INSURANCE LITERATURE

The notion that changes in benefit levels can significantly affect labour supply decision is also supported by a literature on survivor insurance benefits. An important part of the social security system, survivor insurance provides pension benefits to surviving spouses of deceased retirees and workers. A series of recent papers studying the effect of changes in survivor insurance eligibility and generosity consistently finds evidence of important income effects on labour supply.

In the US context, Coyne et al. (2023) document that widows' labour supply is highly responsive to changes in survivor insurance *eligibility*. At the start of survivor benefit eligibility at age 60, widows' labour force participation sharply decreases (by 2.9 percentage points, or 5%) and the retirement rate sharply increases (by 1.8 percentage points, or 34%). In the European context, Rabaté and Tréguier (2024) estimate the medium-run effect of a considerable restriction in survivor benefit eligibility in the Netherlands. Their results point to significant increases in labour force participation, as well as in the take-up of welfare benefits (see Chapter 7 for a discussion of substitution effects across programmes and associated fiscal costs).

Giupponi (2024) provides a comprehensive analysis of the long-run income effect of changes in survivor insurance *generosity*, exploiting a 1995 reform of the Italian scheme. Consistent with the work reviewed on the income effect of old-age pension benefits, she finds that reductions in survivor insurance generosity trigger large labour supply responses by recipients. Over the 15 years following the policy reform, survivors largely offset benefit losses with increases in labour earnings. Their response is entirely driven by participation responses, in the form of lower non-employment rates at younger ages (those aged under 50 at the time of the reform) and a postponement of retirement at older ages (those aged 50 and over at the time of the reform). As in Rabaté and Tréguier (2024), reduced benefits are found to lead to higher take-up rates of other social insurance schemes.

POLICY IMPLICATIONS AND WELFARE CONSIDERATIONS

The findings reviewed in the previous sections suggest that changes in benefit levels can be an effective policy tool to increase labour supply both near and far from retirement, and to encourage later retirement. The elasticity of labour force participation to pension benefits ranges between -0.5 and -0.7 near the retirement age, and is approximately -0.3 at earlier ages. Interestingly, it was not until recently that consensus emerged around income effects potentially being large, since early findings in the literature all pointed to null or modest effects of income on labour supply. For instance, Coile and Gruber (2007) estimate an elasticity of participation to pension wealth close to retirement of -0.16. The

results that we reviewed in this chapter all rely on high-quality administrative data and compelling policy changes which, as noted in Chapter 1, have led to important advances and shifts in our knowledge of empirical phenomena.

It is important to note that the studies reviewed all exploit large and salient variation in pension benefit levels, since both are useful for a compelling estimation of income effects. At the same time, though, income shocks that are large and salient are likely to trigger larger responses compared to what would be expected for more modest and less transparent benefit changes. As discussed in Chapter 2, typical reforms of pension benefit levels operate through changes in benefit indexation or in the definition of pensionable earnings periods. If the pension wealth impact of those changes is not transparently communicated or is perceived as too small, then their effectiveness at encouraging later retirement may end up being modest.

The evidence also points to heterogeneous income effects across different socio-demographic groups. Considering that changes in benefit levels lead to shifts in the amount of lifetime resources, it is reasonable to think that, *ceteris paribus*, a benefit change of given size will have a stronger proportional resource impact on individuals with low baseline lifetime incomes. In turn, and consistent with the evidence reviewed herein, those individuals will plausibly change labour supply more strongly in response to the benefit change. More generally, we expect that individuals who *value* pension benefits the most will react more strongly to a given benefit change. Larger reactions to a given benefit change will also arise from individuals whose *cost* of adjusting labour supply is smaller, everything else equal.

When labour supply increases in response to a benefit cut, distinguishing whether that is due to high benefit valuations or low labor adjustment costs is central to welfare analysis. Public economics theory guides us in making that distinction (see, for example, Chetty, 2008; Hendren, 2017; Giupponi, 2024). It shows that large income effects relative to substitution effects – an indirect measure of the cost of working – reveal high valuations of pension benefits.[6] Intuitively, the extent to which individuals undertake costly actions to increase consumption in response to a benefit cut is a measure of the utility gain that they would get from more generous benefits. The evidence of substantial income effects reviewed in this chapter combined with that of small substitution effects in Chapter 3 suggests that people value pension benefits a lot and would work hard in the absence of pensions despite substantial costs of working.

These considerations highlight two important implications of reforms that alter pension wealth. First, accounting for the labour supply reaction that may ensue, reforms of pension benefit levels can have important distributional consequences across socio-demographic groups (see Chapter 5). Second, understanding whether labour supply reactions are due to a high utility value of pension benefits or a low utility cost of adjusting labour supply

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6   Formally, the value of benefits is a function of the ratio of income and substitution effects.

is key to assessing the welfare implications of pension policy. Cutting pension benefits to encourage later retirement can be effective and welfare improving if the cuts target individuals who can easily adjust their labour supply or can rely on extra resources. It can, however, lead to substantial welfare losses if it forces individuals facing high costs of working in old age – for example, due to health issues or care constraints – to choose between little resources and costly employment.

REFERENCES

Artmann, E., N. Fuchs-Schündeln, and G. Giupponi (2023), "Forward-Looking Labor Supply Responses to Changes in Pension Wealth: Evidence from Germany", CESifo Working Paper Series 10427.

Becker, S., H. Buslei, J. Geyer and P. Haan (2022), "The Effect of Pension Wealth on Employment", Rationality and Competition Discussion Paper 363, CRC TRR 190 Rationality and Competition.

Bovini, G. (2019), "Life-Cycle Labor Supply and Social Security Wealth: Evidence from the 1995 Italian Pension Reform", in G. Bovini (ed.), *Essays in Applied Economics*, London School of Economics and Political Science Theses.

Carta, F. and M. De Philippis (2023), "The Forward-Looking Effect of Increasing the Full Retirement Age", *The Economic Journal* 134(657): 165–192.

Chetty, R. (2008), "Moral Hazard versus Liquidity and Optimal Unemployment Insurance", *Journal of Political Economy* 116(2): 173–234.

Coile, C. and J. Gruber (2007), "Future Social Security Entitlements and the Retirement Decision", *The Review of Economics and Statistics* 89(2): 234-246.

Costa, D.L. (1995), "Pensions and Retirement: Evidence from Union Army Veterans", *The Quarterly Journal of Economics* 110(2): 297–319.

Coyne, D., I. Fadlon, S.P. Ramnath and P.K. Tong (2024), "Household Labor Supply and the Value of Social Security Survivors Benefits", *American Economic Review* 114(5): 1248–80.

Danzer, A.M. (2013), "Benefit Generosity and the Income Effect on Labour Supply: Quasi-Experimental Evidence", *The Economic Journal* 123(571): 1059–1084.

Fetter, D.K. and L.M. Lockwood (2018), "Government Old-Age Support and Labor Supply: Evidence from the Old Age Assistance Program", *American Economic Review* 108(8): 2174–2211.

French, E., A.S. Lindner, C. O'Dea and T.A. Zawisza (2022), "Labor Supply and the Pension-Contribution Link", NBER Working Paper 30184.

Gelber, A., A. Isen, and J. Song (2016), "The Effect of Pension Income on Elderly Earnings: Evidence from Social Security and Full Population Data", Working Paper, UC Berkeley Goldman School of Public Policy.

Gelber, A., A. Isen, and J. Song (2017), "The Role of Social Security Benefits in the Initial Increase of Older Women's Employment: Evidence from the Social Security Notch", in C. Goldin and L.F. Katz (eds), *Women Working Longer: Increased Employment at Older Ages*, University of Chicago Press.

Giupponi, G. (2024), "When Income Effects Are Large: Labor Supply Responses and the Value of Welfare Transfers", Working Paper.

Hairault, J.-O., T. Sopraseuth, and F. Langot (2010), "Distance to Retirement Age and Older Workers' Employment: The Case of Delaying the Retirement Age", *Journal of the European Economic Association* 8(5): 1034–1076.

Hendren, N. (2017), "Knowledge of Future Job Loss and Implications for Unemployment Insurance", *American Economic Review* 107(7): 1778–1823.

Krueger, A.B. and J.-S. Pischke (1992), "The Effect of Social Security on Labor Supply: A Cohort Analysis of the Notch Generation", *Journal of Labor Economics* 10(4): 412–437.

Rabaté, S. and J. Tréguier (2024), "Labour Supply and Survivor Insurance in the Netherlands", *Labour Economics* 88: 102527.

Ye, H. (2021), "The Effect of Pension Subsidies on the Retirement Timing of Older Women", *Journal of the European Economic Association* 20(3): 1048–1094.

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CHAPTER 5

From pension reforms to welfare: A unifying framework

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The evaluation of pension reforms has been the focus of considerable academic and policy discussion over recent decades. However, much of this discourse has concentrated on improving fiscal balance and examining labour supply responses to the pension system. Pension reforms have been primarily framed as responses to fiscal challenges, such as the increasing cost pressures from ageing populations (discussed in Chapter 1) and the goal of encouraging later retirement (as explored in Chapters 3 and 4). While these considerations are crucial, they overlook a fundamental aspect of pension systems, namely, their role in providing insurance against the inability to generate income in old age and their potential to redistribute based on lifetime income. Despite a rich literature on pension systems and retirement behaviour, a coherent and simple framework to evaluate the welfare effects of reforms, particularly their redistributive and insurance consequences, remains largely absent.

In this chapter, we present a new approach, based on the conceptual framework and empirical work of Kolsrud et al. (2024), that allows for a simple and transparent evaluation of the welfare implications of pension reforms. The central tenet of this approach is to treat pensions similarly to other social insurance or tax/benefit programmes. How are these programmes comparable to pension systems? Social insurance programmes balance providing insurance against adverse events (e.g., unemployment or health shocks) with maintaining incentives to avoid these events or mitigate their impact. Tax/ benefit programmes aim to redistribute from high-income to low-income individuals while preserving the incentive to increase income. In a similar spirit, pension systems serve a crucial role of insurance: they protect individuals against uncertainties regarding work capacity, career length and success, as well as longevity. Pension systems often also serve an important redistributive role, redistributing from individuals with high life-time earnings to individuals with low life-time earnings. But providing insurance and redistribution through the pension system comes at a cost: generous insurance against early retirement can diminish incentives to remain in the workforce, and redistribution based on individuals' life-time earnings reduces the incentive to generate these earnings. In other words, pension systems, like any other social insurance or transfer programmes, need to balance the cost of distorting incentives with the benefits of providing insurance

and redistribution. The core novelty of the approach is to show that both sides of the trade-off – costs and benefits – can be measured precisely and can thus be closely compared.

The framework we propose allows policymakers to analyse how reforms redistribute resources and impact individuals' ability to smooth consumption. By incorporating standard welfare economics principles, the framework captures the nuanced trade-offs between fiscal sustainability, work incentives, and individual welfare. Its transparency and direct applicability to data make it particularly appealing: simple empirical data, such as consumption measures, can be used to evaluate the real-world implications of pension reforms. This not only grounds the analysis in observable outcomes but also enables policymakers to understand the redistributive and insurance implications of their reforms. The framework's transparency makes it accessible and intuitive, allowing for clearer communication of policy trade-offs and outcomes.

Taking the framework to the data, in this chapter we demonstrate that reforms in many European countries have been regressive, shifting resources from individuals with fewer resources and poorer health to those who are better off. These regressive outcomes underscore the crucial trade-offs between fiscal sustainability and equity, which should be central in any pension reform debate.

A UNIFIED FRAMEWORK

The proposed framework, developed in Kolsrud et al. (2024), considers the pension system as any other social insurance or transfer programme, and its direct goal is to characterise the welfare consequences of reforms, like those presented in Chapter 2.[1] The framework shows transparently that these reforms entail a trade-off between fiscal implications and redistributive and insurance effects. We can study the two sides of the trade-off separately – fiscal effects on the one hand and redistributive and insurance effects on the other hand – and then translate them into magnitudes that can be compared.

A practical advantage of the proposed approach is that it focuses on reforms to the actual pension profile. Doing so, we move away from the widespread but often implicit vision that the ideal pension system is one that guarantees actuarial fairness, or even stronger, that provides a savings vehicle where individuals get back in pension benefits when retired what they have contributed to the system throughout their lifetime. In practice, pension systems are far from that, and the reason for this is that most systems do provide a lot of insurance and redistribution. Knowing how to evaluate the benefits provided by such insurance and redistribution is at the heart of our framework.

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1   Note that Haller (2022) develops a similar framework, closely related to ours.

Fiscal effects

Pension reforms alter the incentives for individuals to work, save, and retire. These behavioural changes, in turn, impact government fiscal outcomes by affecting tax revenues and pension outlays. These so-called fiscal externalities can be easily measured: they are fully determined by behavioural responses on the one hand, and parameters of the tax and social insurance system on the other.

Take, for instance, a reform that increases the steepness of the pension profile (Figure 1), an element typical of most reforms undertaken by European countries over the past 20 years as discussed in Chapter 2.[2] Such a reform enhances incentives to work longer: the returns, in terms of future pension benefits, of retiring later have increased. If individuals respond to these incentives by retiring later, this will tend to have positive fiscal externalities, coming both from increased tax contributions and a reduced time in retirement receiving pension benefits. This is the case illustrated in Figure 1, showing how both early retirees and late retirees respond to the reform by retiring at a later age. In general, the effects of a particular pension reform on saving, labour supply and retirement timing are a priori theoretically ambiguous: these behaviours result from a complex decision-making process, involving time, uncertainty and many (unknown) parameters such as one's health status and life expectancy, work ability, preferences, career opportunities, family situation, asset level, and so on. As a result, it is not always obvious to predict ex ante which reforms will have the largest effects on, for example, labour supply or retirement savings. Still, one can always try to evaluate ex post what the behavioural responses to a specific reform have been in order to quantify its fiscal externalities.[3] We can summarise the overall fiscal externality of a pension reform as the additional euros of fiscal resources generated because of all these behavioural responses, i.e., above and beyond each euro mechanically generated by the reform absent any behavioural response. When retirement age increases strongly in response to a reform, the fiscal externality will be large. When retirement age is quite inelastic to a reform, the fiscal externality will be small, even if the reform cuts pension benefits drastically and mechanically reduces fiscal outlays by a large amount.

A considerable body of literature has explored how changes in incentives affect labour supply and retirement decisions. Generally, reforms that raise the retirement age or encourage longer work have succeeded, with individuals delaying retirement and extending their labour supply. But, as discussed in Chapters 3 and 4, reforms that cut pension benefits the most, or provide the largest financial incentives to retire later, are not always the ones that generate the largest fiscal externality.

2   The figure also exemplifies the change in pension profile that followed the large 1998 Swedish pension reform analysed in Kolsrud et al. (2024).

3   As discussed in Chapter 7, when examining behavioural responses, it is essential to consider the spillover effects on other social insurance programs too. For instance, raising the minimum age at which individuals can access pension benefits tends to increase applications for disability and unemployment insurance. These spillovers can have a significant impact on the overall fiscal effects of a pension reform.

Insurance and redistribution

While fiscal considerations are important, pension reforms can also have significant insurance and redistributive effects. In our example of a reform steepening the profile (Figure 1), we see that the reform will hurt individuals who happen to retire early, while it will redistribute towards individuals who retire later. This redistribution would be innocuous from a social welfare perspective if the value of one euro were the same for these two groups of individuals. But it is hardly the case in practice. People who retire early may do so because they want more leisure, but they may also do so due to deteriorating health or reduced earnings capacity. The former may not suffer much from the benefits cuts, but the latter will. They are also often the least able to adjust to reduced pension benefits, forcing them to cut their expenditures the most in response to a pension cut. Conversely, individuals who can continue working and remain productive at older ages may value the extra pension benefits less.[4]

FIGURE 1 **FISCAL EFFECTS VERSUS REDISTRIBUTIVE EFFECTS OF A PENSION REFORM: A GRAPHICAL REPRESENTATION**
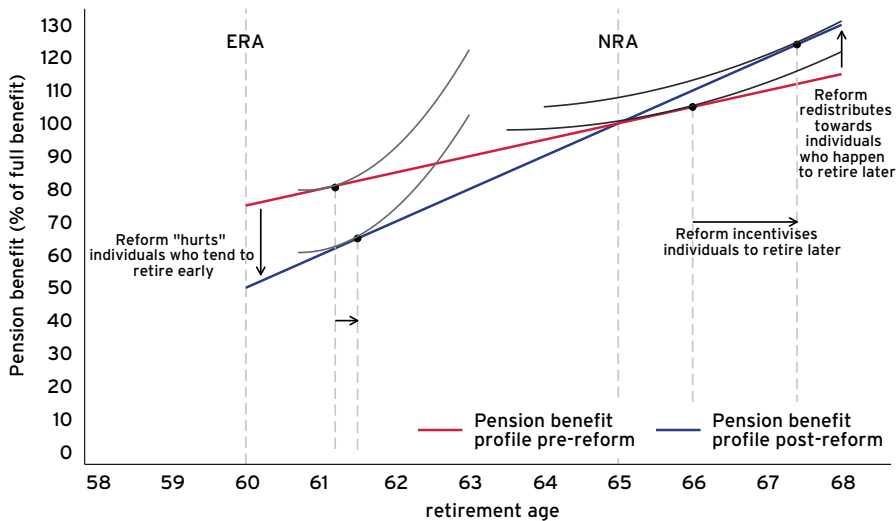
Notes: The figure shows the pension benefit profile as a function age at retirement before and after a hypothetical reform strengthening incentives to retire later (i.e. steepening of the profile). It serves to exemplify the fiscal and redistributive effects of a reform, following the framework developed in Kolsrud et al. (2024). To this effect, the graph depicts indifference curves representing graphically the implicit welfare of two individuals, one retiring early, and one retiring late. The stronger curvature of the indifference curves for the early retiree reflects her preference for retiring earlier. This might be due to the fact that her work capacity is lower, due to invalidity or health, but it could also reflect a higher value of leisure, for example due to a shorter life expectancy. Retirement age is determined for each individual by their indifference curves and by the steepness of the pension profile. The figure shows that the reform induces both individuals to work longer and retire later. But it shows that the reform also redistributes away from the early retirees (who end up on a lower indifference curve), and towards later retirees (who end up on a higher indifference curve).

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4   Individuals can indeed protect themselves against adverse implications of pension reforms by adjusting their savings and labour supply, as illustrated in Figure 1. However, a key insight from the social insurance literature (e.g., Chetty, 2006) is that to evaluate pension reforms the impact of individuals' behavioural responses on their own welfare can be expected to be small relative to the direct effects of the changes in pension benefits on their welfare. The intuition is that if individuals highly valued saving more or retiring later, they would have done so already, irrespective of the pension reform. This difference in welfare impacts is also apparent in Figure 1, where the direct effect dominates the behavioural response.

To fully assess the welfare effects of pension reforms, it is thus essential to consider who benefits and who loses from the reforms, and to quantify their respective gains and losses. In the hypothetical reform of Figure 1 for instance, we need to evaluate the value of the loss to earlier retirees relative to the gains for late retirees. This ratio can then be compared to the fiscal externality to determine whether steepening the pension profile further is worthwhile. That is, we ultimately want to compare the fiscal gain against the potential welfare loss when insurance and redistribution are reduced.[5]

USING CONSUMPTION TO EVALUATE WELFARE

How can we precisely measure the welfare gains for those who benefit from a reform and the welfare losses for those who are hurt by the reform? This is where consumption data come in. Consumption is a particularly effective metric for evaluating welfare: it reflects the resources individuals have available, including their income from labour and capital, and not only at the individual but also at the household level. Economic theory suggests that consumption is a key indicator of welfare because it is directly related to individuals' marginal utility. Lower levels of consumption are associated with higher marginal utility, meaning that a given reduction in consumption has a more significant impact on well-being for individuals with lower incomes.

Consumption also allows us to assess individuals' ability to maintain their standard of living over time. For example, if individuals face a health shock and must withdraw prematurely from the labour market, they may need to reduce their consumption more when entering retirement. Therefore, the excess sensitivity of consumption to income shocks (like, for example, entry into retirement) is also a good indicator of the welfare value of pension benefits. The better workers are insured, the smoother their consumption path into and during retirement.

To make meaningful welfare statements about the effects of pension reforms, we can compare the consumption patterns of those who lose from the reform to those who benefit. If those who lose from the reform have fewer resources or are less able to smooth their consumption into retirement, the welfare costs may outweigh the fiscal externality.

Note that while consumption is in itself a powerful measure for welfare evaluation, a comprehensive evaluation of pension reforms requires potentially more information. In particular, it requires paying attention to the differences between winners and losers above and beyond their differences in consumption levels, such as differences in health and life expectancy. Some characteristics can affect how much individuals value the changes in benefits, but other characteristics can affect the social value we attribute to transferring resources between groups. We may find it socially undesirable to transfer

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5   Note that here we are focusing on redistribution *within* a cohort. But the framework can be extended to think similarly about the redistribution and insurance provided across cohorts by the pension system. These intergenerational effects are in particular important as they impact the political feasibility of reforms.

money away from early retirees and towards later retirees, even when they enjoy similar levels of consumption, if the former have worse health and lower life expectancy than the latter. Such heterogeneity in individual characteristics of winners and losers can mitigate or exacerbate the welfare effects of reforms, making it important to account for these factors when analysing consumption data.[6]

DIFFERENCES IN CONSUMPTION PATTERNS BY RETIREMENT AGE

Kolsrud et al. (2024) illustrate the potential of this framework for evaluating pension systems by studying the 1998 pension reform in Sweden. This hallmark reform had various features, introducing notional adjustments to demographic factors and an overall reduction in benefits despite more generous minimum pensions. Importantly, it also strengthened incentives to retire later by steepening the pension benefit profile. This strengthening occurred at all ages after the early retirement age of 61, and in particular after the normal retirement age of 65, given that the profile was essentially flat beyond this age before the reform.

The reform induced a significant increase in retirement age, therefore creating positive fiscal externalities that, following the logic of our approach, we were able to precisely measure. We calculated that by reallocating one euro from early retirees to late retirees, the government saved an additional 15 cents due to delayed retirement.

So, this reform induced workers to retire later, but we should be concerned about its regressive nature too. Are early retirees hurt more by the decrease in pension benefits than late retirees gain from an increase in pension benefits? To investigate this question, we used detailed administrative data from Sweden and constructed a registry-based measure of household consumption expenditures, available for every Swedish resident over multiple years (see Kolsrud et al., 2020 for details). We compare how consumption patterns differ across workers who retire at different ages.

Panel A of Figure 2 considers individuals' consumption levels at the same age post-retirement and shows how these vary with retirement age. The consumption for each retirement age group is expressed relative to those retiring at age 65, corresponding to the normal retirement age at that time. The overall gradient of consumption with respect to retirement age is steep, with late retirees enjoying over 20% more consumption and premature retirees consuming up to 10% less than normal retirees. This suggests that

6   Differences in preferences over consumption will by definition change individuals' valuation of the changes in pension benefits. Understanding how consumption preferences differ between individuals or change over time is an important challenge for researchers, but one that perhaps has received excessive attention in the literature. A prominent literature starting in the 1990s documented large drops in consumption expenditures around retire- ment (e.g., Banks et al., 1998; Bernheim et al., 2001, Aguiar and Hurst, 2005, Stephens and Toohey, 2018). People's preferences for consumption may indeed differ when retired, and their expenditure patterns will vary due to the simple fact that some work-related expenditures are no longer due, while having more time for leisure and other activities. However, it seems too simplistic to always attribute differences in consumption patterns to differences in preferences. The literature has developed new methods to explore potential differences in preferences (e.g., Chetty, 2008; Landais and Spinnewijn, 2021), but simply studying other observable characteristics that may correlate with different consumption patterns can also be insightful.

rewarding later retirement by giving later retirees more generous pensions redistributes from low-consumption to high- consumption households. If we believe that the corresponding welfare effects are inversely related to the difference in consumption, our welfare estimates suggest a loss of just above 15 cents per euro taken from early retirees to late retirees. However, standard practice in economics is to scale this by a multiple of that, depending on how risk- or inequity-averse one is. This thus outweighs the fiscal gains from the reforms, and suggests that the overall increase in the slope has been welfare-decreasing.

While the overall consumption gradient between retirees at ages 55 to 70 is large and positive, a closer look at the data reveals a non-monotonic relationship between retirement age and consumption. Specifically, individuals retiring between the ages of 60 and 63 have similar or higher consumption on average compared to those retiring near the normal retirement age of 65. This suggests that in this small age range, rewarding later retirement comes at no regressive cost.

The differences in consumption by retirement age become most pronounced in the years immediately surrounding retirement. Leveraging the longitudinal data, we can study how household consumption changes in the years around retirement, as shown in Panel B of Figure 2. All consumption levels are expressed relative to the levels two years before retirement. We estimate that the consumption drop from two years before retirement to two to five years after retirement is much larger for very early retirees compared to later retirees. These findings suggest that individuals who retire early are less able to maintain their standard of living throughout retirement.[7] In the paper, we also examine how marginal propensities to consume out of wealth shocks differ across retirement age groups (Landais and Spinnewijn, 2021). These results further confirm our overall finding that incentivising later retirement entails a substantial cost because it takes resources away when the marginal utility of consumption is high and provides more resources when it is low.

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7   Interestingly though, we find a very similar drop in consumption expenditures exactly in the year of retirement for all
    groups, arguably reflecting differences in consumption expenditures specific to employment versus retirement.

FIGURE 2   CONSUMPTION LEVELS AND CONSUMPTION DYNAMICS AROUND RETIREMENT, BY RETIREMENT AGE GROUP: SWEDEN

a) Consumption levels in retirement
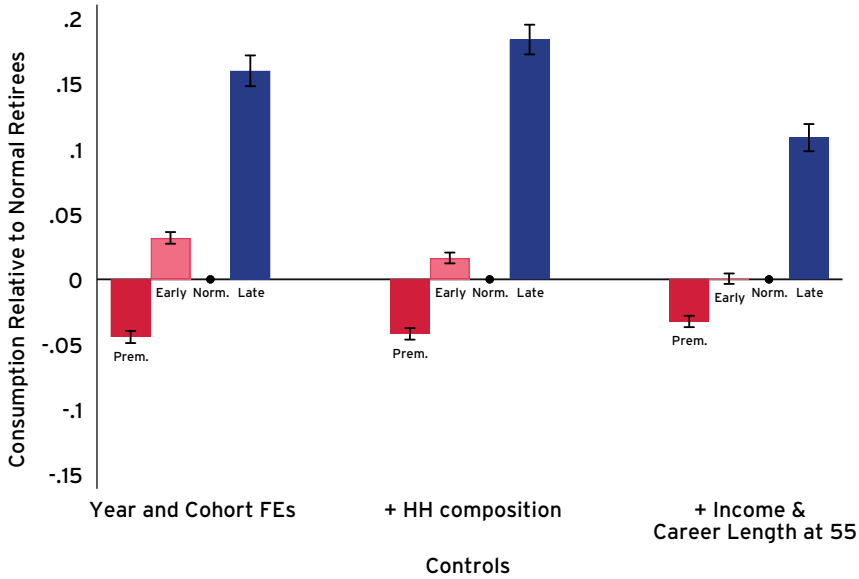
b) Consumption profiles: Event studies around retirement
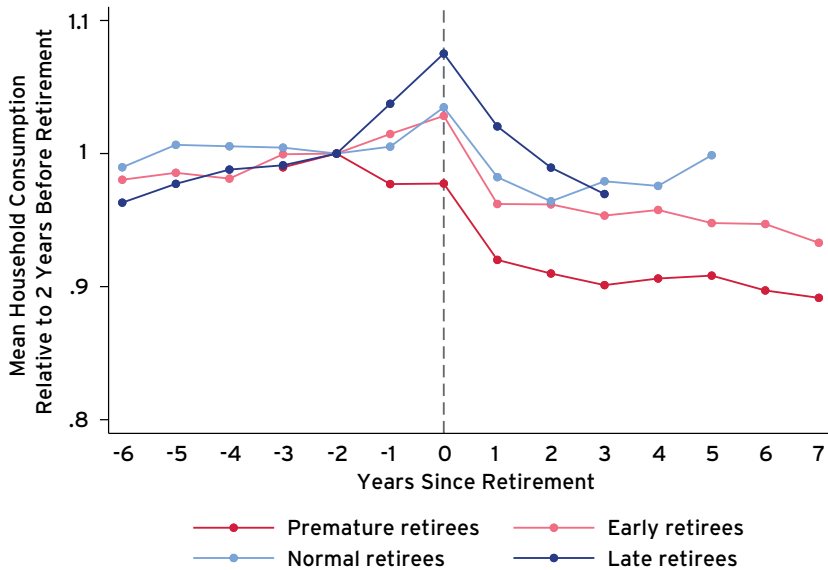
Notes: The figure documents how consumption in retirement differs across individuals who retire at different ages. Individuals are grouped into four retirement age categories: premature retirees (56 ≤ r ≤ 59), early retirees (60 ≤ r ≤ 63), normal retirees (64 ≤ r ≤ 65) and late retirees (66 ≤ r ≤ 69). Normal retirees are the reference category. In panel A, the graph reports, for all retirement age groups, the estimated average level of consumption at age 68 of individuals in that group, controlling for cohort, age, family composition, income decile and career length at 55. Panel B documents consumption dynamics around retirement. The graph plots average residualised consumption as a function of time to retirement, separately for premature, early, normal and late retirees. The graph scales residual consumption of each group by its level two years prior to retirement.
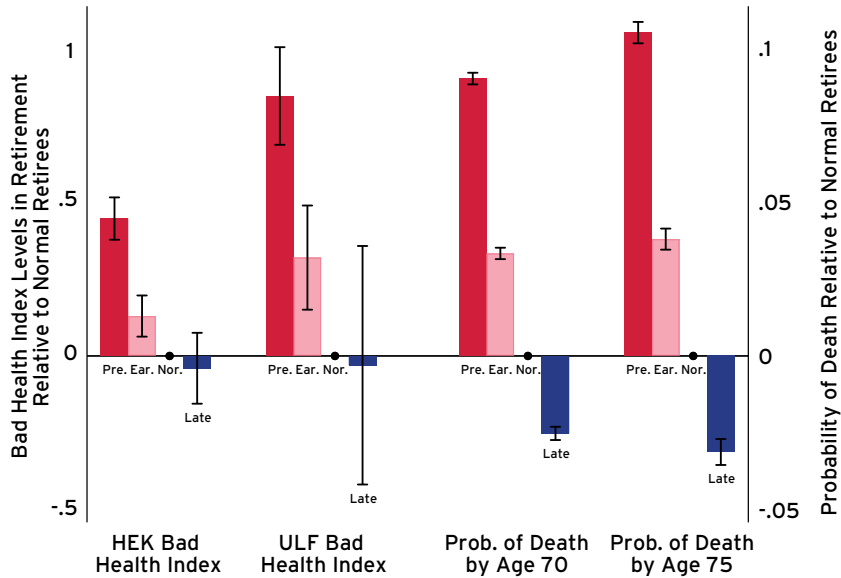
GOING BEYOND CONSUMPTION

The impact of pension reforms is not uniform across individuals, and there is significant heterogeneity in how different groups are affected. One key source of heterogeneity is health. Individuals who retire earlier tend to be in worse health, and there is limited evidence to suggest that they value pension benefits less than their healthier counterparts. This is illustrated in Figure 3. In fact, the data show that individuals who leave the labour market prematurely do so more often following a deterioration in health. These results further raise concerns about the equity of pension reforms that disproportionately affect early retirees. Those retiring prematurely often face a double burden of reduced income and worse health. Conversely, those retiring late are in better health and have substantially longer life expectancy too. From a lifetime perspective, the pension system is already more generous to them, and rewards for late retirement further increase this imbalance – an issue discussed in greater detail in Chapter 6.[8]

Wealth is another crucial factor that influences the impact of pension reforms. Individuals with higher wealth tend to have more stable consumption levels throughout retirement, as they can draw on their assets to smooth consumption. In contrast, those with lower wealth experience larger drops in consumption upon retiring, making them more vulnerable to the negative effects of pension reforms. Turning back to the differences by retirement age, we find that those retiring between the ages of 61 and 65, where the non-monotonicity appears in Figure 2, have higher household assets on average and tend to be in households where another member earns a significant income. Hence, this group is a complex mix of individuals who are forced to retire early – due to worsening health – and individuals who can afford to retire early – due to accumulated wealth and household resources. This highlights the importance of considering the wealth distribution, also at the household level, when evaluating the equity of pension reforms. It also indicates that asset tests could be effective instruments to complement the penalties that discourage early retirement in recent pension reforms. They would allow these penalties to be avoided when their welfare cost is highest.

SUMMARY OF POLICY IMPLICATIONS

The analysis presented in this chapter underscores the importance of considering both the fiscal and welfare implications of pension reforms. While ensuring the fiscal sustainability of pension systems is undoubtedly important, policymakers must also be mindful of the

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8   As discussed, the level of consumption is not the sole determinant of individual's valuation of changes in pension benefits either. However, by studying other observable characteristics in the Swedish context, we broadly reinforced our finding that a steeper pension benefit profile redistributes from those with a high value of pension benefits (earlier retirees) to those with a smaller value (later retirees). In particular, later retirees tend to have more education, more productive careers, and also more financial resources than those retiring very early. At the same time, we also find that the expenditure patterns were broadly similar across these groups and also change in similar ways at retirement, indicating that differences in consumption preferences are not important.

distributional consequences of these reforms. Reforms that disproportionately affect low-income or unhealthy individuals raise serious concerns about equity, as these individuals are often the least able to adjust to reduced benefits or longer working lives.

FIGURE 3   HEALTH AND LIFE EXPECTANCY BY RETIREMENT AGE: SWEDEN

Notes: The figure shows that individuals who retire early have much worse health and life expectancy than individuals who retire later. The evidence is drawn from Sweden and compares the average health outcomes and death probability of individuals by age at which they retire. Individuals are grouped into four retirement age categories: premature retirees (56 ≤ r ≤ 59), early retirees (60 ≤ r ≤ 63), normal retirees (64 ≤ r ≤ 65) and late retirees (66 ≤ r ≤ 69). Results are expressed relative to the level of normal retirees. The graph shows first two indices for bad health (i.e. standardized principal components extracted from all health outcomes in the HEK and ULF surveys) and two measures of "life expectancy" (dummies for being dead by age 70, or by age 75). See Kolsrud et al. (2024) for details.

The findings suggest that reforms aimed at incentivising later retirement can have significant welfare costs for early retirees. To sum up the evidence from Kolsrud et al. (2024) in simple terms, people who retire early have lower consumption in retirement, and these lower consumption levels are in large part determined by what happens just around retirement. Early retirees also have worse health and life expectancy, and early retirement strongly correlates with the incidence of negative health shocks. As a consequence, pension reforms that transfer resources from early to late retirees have significant redistributive and insurance costs.

The patterns observed in Sweden are not unique. Data from other countries, particularly from the Survey of Health, Ageing and Retirement in Europe (SHARE) and Health and Retirement Study (HRS) datasets, reveal similar patterns in consumption across retirement ages. In both the United States and Europe, individuals who retire later tend to maintain higher levels of consumption, while those who retire earlier experience

sharper declines. In many countries, we also find a non-monotonicity between early and normal retirement ages. This consistency across different contexts suggests that the issues identified in Sweden are likely to be relevant in other advanced economies as well.

In conclusion, a more comprehensive and data-driven approach to pension reform is needed – one that takes into account not just fiscal costs and benefits, but also redistributive and insurance effects. We have shown how consumption can be a key metric for evaluating these welfare effects. By adopting a transparent, welfare-based framework, policymakers can design reforms that are both equitable and sustainable, ensuring that pension systems provide adequate support for all individuals, regardless of their health, wealth, or retirement timing.

Following this logic, Kolsrud et al. (2024) suggest that some reforms may actually have both positive fiscal externalities and positive redistributive gains. We have already shown this for strengthening incentives to retire later between the early and normal retirement age - the age range where the consumption gradient with retirement age reverses. Second, we also find that at any given retirement age, individuals who retire with shorter career durations are significantly wealthier and enjoy higher levels of consumption than individuals who have longer careers (having started earlier or experienced fewer interruptions). Reforms that strengthen labour supply incentives by penalising shorter careers and/or rewarding longer careers, conditional on retirement age, are therefore unambiguously good from a social welfare perspective. They provide stronger incentives and redistribute in the desired direction. With pension reforms, surprisingly enough, you may sometimes have your cake and eat it!

REFERENCES

Aguiar, M. and E. Hurst (2005), "Consumption versus Expenditure", *Journal of Political Economy* 113(5): 919–948.

Banks, J., R. Blundell, and S. Tanner (1998), "Is There a Retirement-Savings Puzzle?", The *American Economic Review* 88(4): 769–788.

Bernheim, B.B., J. Skinner, and S. Weinberg (2001), "What Accounts for the Variation in Retirement Wealth Among U.S. Households?", *The American Economic Review* 91(4): 832–857.

Chetty, R. (2006), "A general formula for the optimal level of social insurance", *Journal of Public Economics* 90(10-11): 1879–1901.

Chetty, R. (2008), "Moral hazard versus liquidity and optimal unemployment insurance", *Journal of Political Economy* 116(2): 173–234.

Haller, A. (2022), "Welfare Effects of Pension Reforms", working paper.

Kolsrud, J., C. Landais, and J. Spinnewijn (2020), "The Value of Registry Data for Consumption Analysis: An Application to Health Shocks", *Journal of Public Economics* 189: 1040–1088.

Kolsrud, J., C. Landais, D. Reck, and J. Spinnewijn (2024), "Retirement Consumption and Pension Design", *American Economic Review* 114(1): 89 – 133.

Landais, C. and J. Spinnewijn (2021), "The Value of Unemployment Insurance", *Review of Economic Studies* 6(88): 3041–3085.

Stephens, M. and D. Toohey (2018), "Changes in Nutrient Intake at Retirement", NBER Working Paper No. 24621.

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CHAPTER 6

Inequality in life expectancy and the design of pension systems

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Pension systems were primarily designed as old-age insurance systems, i.e., insurance against the longevity risk. With such an objective, pension systems redistribute ex post from those who live short lives to those who live longer lives by providing a life annuity payment to all until death. If death risks were similar for everyone, such ex-post redistribution would not cause concern, as it would simply be the result of the insurance provided (Brown, 2002).

However, it has long been known that life expectancy is influenced by socioeconomic factors, among which one can cite gender, occupation, ethnicity, economic status, income, and wealth. This means that any pension system providing annuities is likely to redistribute ex post from those with high levels to those with lower levels of socioeconomic characteristics, and from men to women (Liebman, 2002). Until recently, measures of the life expectancy income gradient were too crude to be considered as a potential input into pension designs; the gradient was measured for broad groups by gender, ethnicity and occupation that could hardly be used in pension formulas.

But recent studies exploiting administrative data to estimate death rates by precise income levels have dramatically improved the state of knowledge on life expectancy inequality (Chetty et al., 2016). This research has shown that the scale of the gradient could be bigger than previously thought, and more importantly that it was increasing over time, at least for the few countries where we can observe it for long enough periods.

There are two implications for pension design. First, heterogeneity in life expectancy has the potential to threaten the financial balance of even those pension systems built on actuarially fair formulas. If higher pensions benefit from higher life expectancy than the average projection, the system will be unbalanced. Even without redistribution objectives, inequality in life expectancy has to be considered in the design of pension systems. Second, pension systems may additionally have the objective of redistribution, and this is likely to be undermined by the scale of life expectancy heterogeneity. Crucially, the

optimal way to design pension systems to incorporate life expectancy gradient depends greatly on the underlying cause of the gradient – i.e., whether income or other more direct characteristics of health status are a better proxy for life expectancy in retirement.

In this chapter we review the recent evidence on life expectancy inequality, then provide estimates of the implications for the redistributive aspects of pension systems, before offering some thoughts for the implications of this research for pension design.

LIFE EXPECTANCY INEQUALITY

People do not die at random; some individuals live longer than others, and better endowed individuals are more likely to do so. Differences in mortality according to different characteristics have been widely documented in the past, including demographics such as gender and ethnicities (Kitagawa and Hauser, 1973), or economic status measured by education, income or wealth (Kitagawa and Hauser, 1973; Deaton and Paxson, 1999; Attanasio and Hoynes, 2000).

Analysis of an income gradient in mortality has been on the rise following the widespread availability of administrative data on income. Combining detailed information on income with a large sample size, Chetty et al. (2016) document a strong positive relationship between income and life expectancy in the United States. Similar analyses have been carried out in many countries, including France (Blanpain, 2018), Norway (Kinge et al., 2019), Denmark (Kreiner et al., 2019), Canada (Milligan and Shirle, 2021) and Sweden (Hagen et al., 2024). They all exhibit a large gap in life expectancy between the bottom and the top of the income distribution, as depicted in Figure 1. In the case of the United States and Sweden, the evidence points also to an increase in life expectancy over time for both men and women (Chetty et al., 2016; Dahl et al., 2024; Hagen et al., 2024).

However, comparisons between countries are made difficult by the fact that studies differ in terms of their underlying data, concepts of income (individual earnings versus household disposable income), methodology, and years covered. Aubert et al. (2024) circumvent this issue by providing a consistent cross-country comparison of income gradient in life expectancy based on household disposable income. They establish two main results, which are presented in Figure 2. First, the gradients are of comparable magnitude across countries. Second, the relationship between household disposable income and life expectancy is more marked for men than for women.

FIGURE 1   RELATIONSHIP BETWEEN INCOME AND LIFE EXPECTANCY

a) Male   b) Female
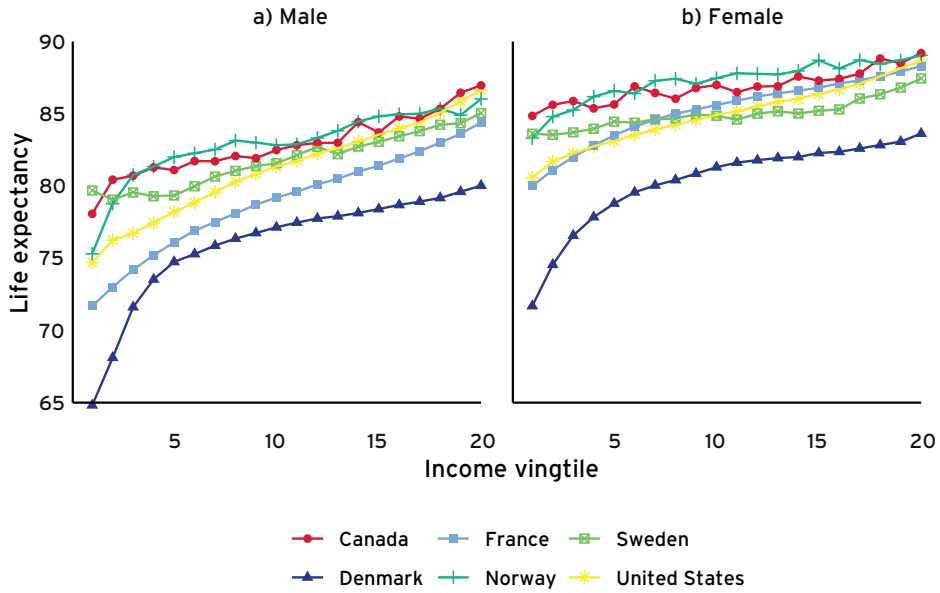
Source: Chetty et al. (2016) for the United States, Blanpain (2018) for France, Kreiner et al. (2019) for Denmark, Kinge et al. (2019) for Norway, Hagen et al. (2024) for Sweden.

FIGURE 2   CONSISTENT CROSS-COUNTRY COMPARISON
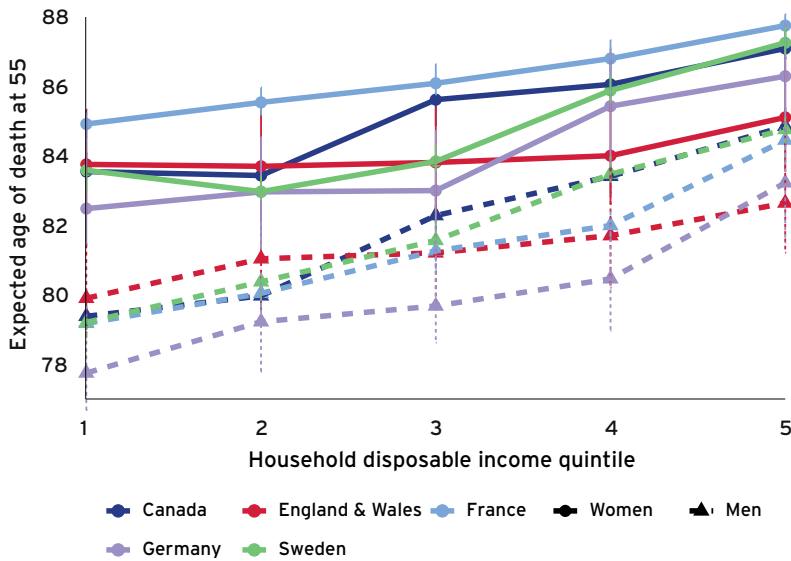
Source: Aubert et al. (2024)

Overall, the magnitude of the income mortality gap identified in recent studies is much larger than previously documented based on less granular socio-demographic variables. This difference is in part driven by the methodology used by Chetty et al. (2016) and followers, which computes life expectancy for hypothetical individuals who remain in

the same income group throughout their whole life. It therefore neglects income mobility over time and consequently overestimates the mortality gradient. In contrast, education and occupation are more stable characteristics and are less subject to such bias. However, the life expectancy gradients found when accounting for income mobility (as in Kreiner et al., 2019) or when using a fixed definition of income based on lifetime earnings (as in Milligan and Schirle, 2021, or Mélard et al., 2024) remain important and larger than for education and occupation.

Despite recent advances in the literature (Dahl et al. 2024; Kinge et al. 2019; Hagen et al., 2024), the underlying determinants of the correlation between income and life expectancy are still largely unknown. Is it driven by a direct effect of income on health; an indirect effect through correlated mediators such as preferences, lifestyle or access to health care; or the reverse effect of health on income? To assess the impact of mortality differentials on the overall redistribution in the pension system (see the next section), it is not necessary to understand the drivers of this correlation. However, they are very important for the policy implications for pension design (see the final section).

## DIFFERENTIAL LIFE EXPECTANCY AND PENSION SYSTEM REDISTRIBUTION

Regardless of the income definition used, life expectancy income gradients are substantial and have significant implications for the fairness of pension systems. Higher income is strongly correlated with longer life expectancy, and also implies higher pension benefits. This relationship makes it crucial to account for these differentiated life expectancies when analysing the redistribution effects of pension systems.

Recent studies have shed light on the implications of this phenomenon. Research by Haan et al. (2020), focusing on German men, revealed that pension systems appear to be regressive when accounting for differentiated life expectancy. This means that despite progressive pension formulas designed to benefit lower-income individuals, the actual distribution of benefits may inadvertently favour higher-income groups due to their longer lifespans.

Mélard et al. (2024) present similar findings for men and women working in the private sector in France. This is illustrated in Figure 3a, which depicts the returns on contributions, calculated as the ratio of total pension benefits over total contributions over the life cycle for the 1954 cohort of workers. The solid blue line in the graph represents the observed rate across different income levels for men. The return increases with permanent income, demonstrating the regressiveness of the pension system. The dotted line shows counterfactual return rates if life expectancy were homogeneous. For French men, absent heterogeneity in life expectancy, the pension system would be slightly progressive. The difference between the two lines clearly illustrates how life expectancy differentials offset the redistribution built into the pension formula.

FIGURE 3   REDISTRIBUTION OF THE PENSION SYSTEM WITH OR WITHOUT HETEROGENEOUS MORTALITY IN FRANCE

a) Returns on contribution by income level and gender
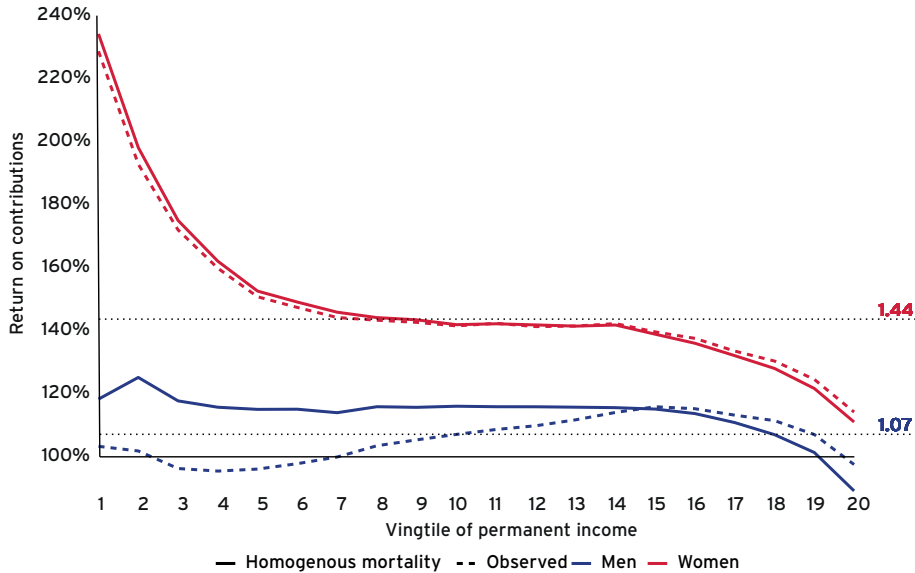
b) Returns on contribution by income level (pooled men and women)
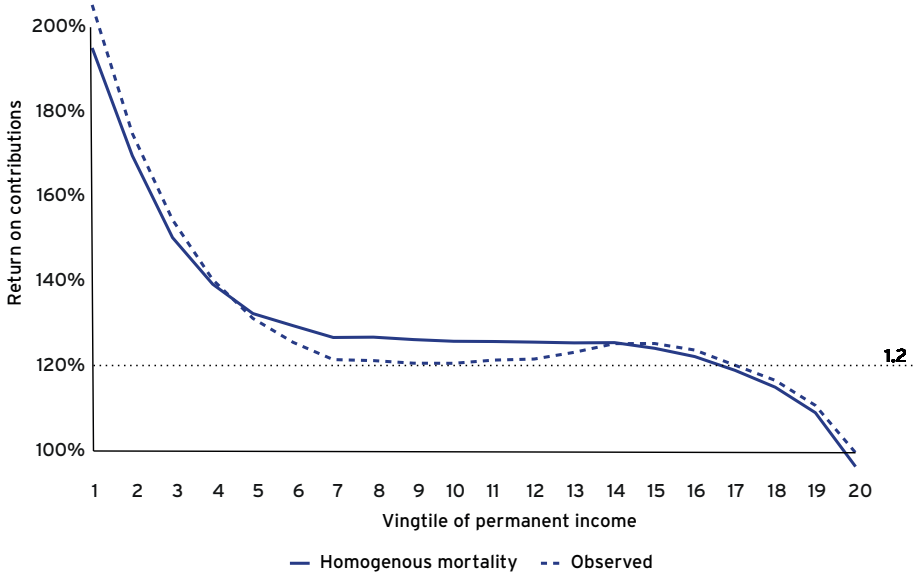
Note: This figure presents returns on contribution (RC) by vingtile of permanent income – average labour income between 40 and 54 – for all population (dark green) and by gender (red and blue lines). Income rank is defined for the whole sample – men and women pooled. RC are computed using observed contributions, pension levels, retirement age, and estimated mortality at the income vintile × gender level. It is then aggregated at the income vingtile level for the dark green line. Dotted line represents average RRC by population – by gender or both genders pooled. Discount rate equals 0.98. Dotted lines represent counterfactual RC if life expectancy were homogenous between lifetime income vingtiles. Counterfactual scenarios are obtained under the constraint that average return within gender (Figure 3a) or overall (Figure 3b) remain unchanged.

Interpretation: Average RRC among women equals 144%. On average, women below the 7th vingtile enjoy higher returns on contributions than average.

Source: Agirc-Arrco data; Mélard et al. (2024)

Interestingly, the impact of life expectancy differentials on pension system progressivity varies significantly by gender. Figure 3a also presents analogous results for women, depicted in red. While it also shows that differentiated life expectancies reduce the progressivity in the pension formula, the effect is much less pronounced. This gender disparity can be attributed to the flatter life expectancy permanent income gradient for women. When examining return rates for the overall population, including men and women, the pension system appears redistributive. This aggregate effect, illustrated in Figure 3b, is partly due to women's concentration in the lower permanent income vingtiles. As women also have a longer life expectancy, this implies important redistributions from men to women which partly compensate for labour market inequalities. More notably, in this combined analysis, the anti-redistributive role of life expectancy differentials is no longer visible. The overall analysis thus masks significant implicit within- and between-gender redistributions, adding a layer of complexity when considering the design of a fair, or progressive, pension system.

While the evidence from Figure 3 has features specific to the French pension system, such as the degree of redistribution by income, the role of the income gradient in life expectancy is likely to be common to most countries where the gradient is steeper for men and women are over-represented in the bottom of the income distribution. This calls for a discussion of the potential implications of life expectancy inequality for the design of pension systems.

IMPLICATIONS FOR THE DESIGN OF PENSION SYSTEMS

The fact that the financial balance of a pension system depends on the average life expectancy of the population covered has led to many reforms aiming to incorporate explicit rules linking either pensions rights (e.g., notional defined contribution, or NDC, systems) or retirement age to changes in average life expectancy. However, no pension system explicitly accounts for life expectancy differences between individuals, even though this potentially affects both the financial balance and redistributive properties. Here, we discuss four potential approaches to incorporating life expectancy inequality into pension design.

First, one could simply aim to compensate for the implicit redistribution carried out by life expectancy inequality through more direct redistribution from the pension formula. For instance, one can justify progressivity in replacement rates as a way to counteract the differences in expected duration in retirement (Disney 2004; Barr and Diamond 2001). In the case of more actuarially fair systems, like funded or NDC systems, one could use cohort life expectancy averages by lifetime income to compute annuities. Another option could be to adjust contribution rates so as to reflect the fact that a higher earnings level will lead to a longer period of retirement on average. While technically feasible, these options will have a limited effect if the life expectancy gradient is measured by pooling both genders.

Second, from a social insurance perspective, sharing the risk of living longer with individuals who have similar characteristics, and therefore homogenous life expectancy, may limit implicit redistribution. Occupational pensions could potentially address some of these issues by grouping individuals with similar characteristics, thereby creating more homogeneous risk pools. This approach could potentially mitigate unintended redistribution within the system. However, it is worth noting that life expectancy income gradients appear to be larger than occupational ones, potentially limiting the effectiveness of this approach.

A third approach, often advocated in many European countries, is to design pension formulas with explicit redistribution in favour of individuals with long career duration, with the argument that long careers are a proxy for lower life expectancy. The common idea is that those with a higher level of education start working later. This has been the rationale for specific retirement pathways in France and Germany, where long career duration is a condition for earlier retirement age without actuarial penalty. However, recent studies (Börsch-Supan et al. 2022; Aubert 2024) have shown that this leads to very poor targeting: individuals with long career duration actually tend to have higher life expectancy than individuals with shorter career duration, as health issues are a major cause of shorter careers and individuals with low socioeconomic backgrounds have more difficulty in entering the labour market now than they used to in the past (see also Chapter 5).

A fourth approach consists of defining pension formulas based on direct health status that leads to lower life expectancy. This strategy has already been implemented to some extent in various countries through disability insurance or incapacity pensions. In France, for instance, the pension formula is adjusted for individuals with disabilities, acknowledging their typically shorter life expectancies. These individuals are also granted earlier access to pensions. We can also mention the case of workers with a history of asbestos exposure, who face an elevated risk of cancer and are permitted to claim pensions before the statutory eligibility age. This approach, akin to tagging, has the advantage of a better targeting of individuals with objective health issues. The drawback is that it limits compensation to very severe health conditions and might not address the more general issue of life expectancy inequality.

As a concluding thought, one should keep in mind that reducing the life expectancy differential remains the first best policy option, and that this would not be addressed by changing the pension design. Understanding the underlying causes of inequality in life expectancy is thus a key input for improving both policies aiming to reduce ex-ante pension inequality as well as reducing health inequality. Moreover, the life expectancy income gradient is likely to change in the future, notably though more similar gender labour market trajectories and health behaviours. Future research will need to follow these changes closely to feed through thoughts about optimal pension design.

REFERENCES

Attanasio, O.P. and H.W. Hoynes (2000), "Differential mortality and wealth accumulation", *Journal of Human Resources* 35(1): 1-29.

Aubert, P. (2024), "Allowing Those with Shorter Life Expectancy to Retire Earlier: A Review of Reforms Since the 1970s", forthcoming in *Economie et Statistiques*

Aubert P, A. Bozio J. Cribb et al. (2024), "Does the relationship between life expectancy and income vary by gender?", working Paper.

Blanpain, N. (2018), "L'espérance de vie par niveau de vie: chez les hommes, 13 ans d'écart entre les plus aisés et les plus modestes", Insee première.

Börsch-Supan, A., T. Bucher-Koenen, N. Goll and F. Hanemann (2022), "Targets missed: three case studies exploiting the linked SHARE-RV data", *Journal of Pension Economics and Finance* 21(1): 1-21.

Brown, J.R. (2002), "Differential Mortality and the Value of Individual Account Retirement Annuities", in *The distributional aspects of social security and social security reform*, University of Chicago Press.

Chetty, R, M. Stepner, S. Abraham et al. (2016), "The association between income and life expectancy in the United States, 2001-2014", *Jama* 315(16): 1750-1766.

Dahl, G.B., C.T. Kreiner, T.H. Nielsen and B.L. Serena (2024), "Understanding the rise in life expectancy inequality", *Review of Economics and Statistics* 106(2): 566-575.

Deaton, A. and C. Paxson (1999), "Mortality, Education, Income and Inequality Among American Cohorts," NBER Working Paper No. 7140.

Disney, R. (2004), "Are contributions to public pension programmes a tax on employment?", *Economic Policy* 19(39): 268-311.

Haan, P., D. Kemptner and H. Lüthen (2020), "The rising longevity gap by lifetime earnings–Distributional implications for the pension system", *The Journal of the Economics of Ageing* 17, 100199.

Hagen, J., L. Laun, M. Palme and C. Lucke (2024) "The Income Gradient in Mortality in Sweden 1960-2020", working Paper.

Kinge, J.M., J.H. Modalsli, S. Øverland et al. (2019), "Association of household income with life expectancy and cause-specific mortality in Norway, 2005-2015", *Jama* 321(19): 1916-1925.

Kitagawa, E.M. and P.M. Hauser (1973), *Differential Mortality in the United States: A Study in Socioeconomic Epidemiology*, Harvard University Press.

Kreiner, C.T., T.H. Nielsen, and B.L. Serena (2018), "Role of income mobility for the measurement of inequality in life expectancy", *Proceedings of the National Academy of Sciences* 115(46): 11754-11759.

Liebman, J.B. (2002), "Redistribution in the current US social security system", in *The distributional aspects of social security and social security reform*, University of Chicago Press.

Mélard A., S. Rabaté and M. Tô (2024), "Hidden Redistribution in Lifetime Earnings: The Role of Differential Mortality", Working Paper

Milligan, K. and T. Schirle (2021), "The evolution of longevity: Evidence from Canada", *Canadian Journal of Economics/Revue canadienne d'économique* 54(1): 164-192.

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CHAPTER 7

Interactions of pension reforms with other social insurance schemes

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Old-age pension programmes cannot be viewed in isolation. They operate in the context of labour market institutions and social insurance programmes. From a public policy perspective, it is essential to understand the interactions between the pension system and other social insurance programmes. If increasing the retirement age leads to a massive increase in the take-up of disability benefits – i.e., workers substitute old-age pensions with disability pensions instead of working longer – the rise in the retirement age just shifts the financial burden from the pension system to disability insurance. Similarly, the effectiveness of pension reforms in prolonging working lives is limited if many older workers exit the labour market years before the early retirement age through an unemployment or disability insurance programme. Spillovers between social insurance programmes are therefore critical when evaluating pension reform alternatives.

In this chapter, we review what we know about spillovers from pension reforms to unemployment and disability insurance programmes. We then review the literature on spillovers from reforms in unemployment and disability insurance programmes on labour market exit and pension claiming. Finally, we summarise the main insights from our review and draw policy conclusions.

SPILLOVERS FROM PENSION REFORMS TO UNEMPLOYMENT AND DISABILITY INSURANCE PROGRAMMES

Pension reforms in the past decades have made old-age pensions less generous by increasing statutory retirement ages, introducing penalties for claiming early, or reducing pension levels. The hope is that these measures will induce individuals to postpone retirement and work longer. However, the presence of other social insurance programmes that offer alternative pathways to retirement could limit the effectiveness of pension reforms in prolonging working life. The key question is how much substitution we see across programmes for different pension reforms.

The literature has primarily studied programme spillovers from pension reforms that increase the early or normal retirement ages. If the early retirement age (ERA) increases from 60 to 62, for example, workers can no longer exit the labour market at age 60 by claiming an old-age pension; they need to wait two more years before becoming eligible

for the pension. Workers unable or unwilling to work beyond the age of 60 may retire via an unemployment insurance (UI) or disability insurance (DI) programme instead. Staubli and Zweimüller (2013) study an Austrian reform that increased the ERA from 60 to 62 for men, and from 55 to 58 for women. They find that while employment increased by around 11 percentage points, unemployment increased by 12 percentage points, implying substantial spillover effects to UI. At the same time, they find no spillover effects to the DI programme. In the German context, Geyer and Welteke (2021) also find that both employment (+14 percentage points) and unemployment (+5 percentage points) increased for women above age 60 who faced a three-year ERA increase. Rabaté et al. (2024) find that an increase in the normal retirement age in the Netherlands increased employment by 21 percentage points and social insurance benefit receipt (mostly DI) by 22 percentage points. Atalay and Barrett (2015), Cribb et al. (2016), and Rabaté and Rochut (2020) provide further evidence that increased retirement ages lead to both higher employment and unemployment in Australia, the UK, and France, respectively.

Programme substitution is therefore quantitatively important. While the magnitudes of the effects differ across contexts, a common theme across all the above studies is that the increase in UI and DI receipt is not due to active substitution from working into these programmes. Instead, as Rabaté et al. (2024) point out, the programme substitution is 'mechanical': when the retirement age increases, individuals simply remain in the labour market state they were in before the previous retirement age for longer. For example, if the ERA increases, individuals employed before the previous ERA continue to work until they reach the new ERA and then retire. Individuals on UI or DI before the previous ERA will stay on UI or DI benefits until they reach the new ERA. The exception to this rule of 'mechanical' programme substitution is Duggan et al. (2007). They find that an increase in the normal retirement age in the United States led to active substitution to the DI programme even before the age of 60.

The evidence on programme spillovers from pension reforms that change financial incentives without altering the retirement age is scarce. Haller (2022) finds no programme substitution effects from a reduction in pension generosity in the Austrian context. Generally, changes to financial incentives have a weaker impact on retirement decisions compared to changes to the statutory retirement age (see Chapter 3 of this eBook and Seibold, 2021). Consequently, programme substitution may be less relevant for pension reforms that alter financial incentives while leaving retirement ages unchanged. However, empirical evidence on the role of programme substitution in pension reforms unrelated to the retirement age changes remains limited.

The main takeaway from the existing evidence on programme substitution is that labour force participation before the ERA is crucial. Pension reforms will only be effective if many individuals still work before reaching the ERA. When labour force participation is low before the ERA, programme substitution will be large and the positive employment effects of pension reforms will be small.

The generosity of UI and DI programmes at older ages plays an essential role in labour force participation before the ERA. We will therefore discuss next how UI and DI reforms affect labour market exit decisions.

SPILLOVERS FROM UI/DI REFORMS ON LABOUR FORCE EXITS AND PENSION PROGRAMMES

In many countries, UI and DI are important early retirement pathways, because older workers often benefit from relaxed UI and DI eligibility rules and receive greater benefits for more extended periods than younger workers. The more generous UI and DI rules for older workers impose high implicit taxes on continued work and create an incentive to permanently withdraw from the labour market before the statutory retirement age. For example, the Austrian UI programme extends regular UI benefits from 39 weeks to 52 weeks for job losers above the age of 50, allowing workers to withdraw one year before old-age pension eligibility via regular UI benefits. In addition, the Austrian DI programme grants relaxed access to a DI pension from the age of 60 onwards.

Recently, several countries have abolished or tightened preferential rules for older workers to foster employment among older workers. An active literature studies how these changes have impacted labour supply and retirement of older workers. The first branch of this literature primarily focuses on the effect of relaxing DI eligibility rules. Countries with relaxed access to DI for older workers include Australia, Austria, Canada (until 1995), Denmark, Finland (until 2003), Sweden (until 1997), and the United States. The second branch of the literature studies how UI programmes impact older workers' labour supply and retirement decisions. Generous pathways to early retirement via UI are more common in continental Europe and less common in most English-speaking countries, where UI benefits last for shorter periods and replace a smaller fraction of pre-unemployment income.

The impact of stricter DI eligibility criteria

Existing studies have examined the impact of reforms that tightened or abolished special DI eligibility criteria for older workers in Austria, Canada, and Sweden. The special DI rules for older workers were similar in all three countries, and consisted of three elements: lower medical eligibility requirements, lower requirements to change occupations or residence, and lower requirements to participate in retraining or rehabilitation. For example, until 1996 Austrian DI applicants below the age of 55 only qualified for benefits if their earnings capacity was below 50% in any reasonable occupation the applicant could expect to carry out. In contrast, applicants above the age of 55 qualified if their earnings capacity was below 50% in a similar occupation to their current occupation. As a direct consequence, disability enrollment rose significantly at the age of 55.

The Austrian government increased the relaxed eligibility age threshold to 57 in 1996, followed by further increases to 58 in 2013, 59 in 2015, and 60 in 2017. Staubli (2011) and Haller et al. (2024) study the labour market impacts of these changes. Figure 1 (from Haller et al., 2024) summarises the main findings. It shows the change in DI benefit receipt (panel A), employment (panel B), and UI benefit receipt (panel C) for individuals with relaxed DI eligibility at age 58 relative to those with relaxed DI eligibility at age 57. DI benefit receipt drops sharply at age 57 and remains permanently lower, even though DI eligibility rules become more lenient again at age 58. Stricter eligibility rules at age 57 also lead to a permanent increase in employment. UI benefit receipt rises as well, but this effect is only temporary. Haller et al. (2024) also compare the impact of stricter DI eligibility rules to the effects of a change in DI benefit levels for older workers. They find that lowering DI benefits reduced DI benefit receipt but did not raise employment. Instead, lowering benefit levels led to a significant rise in UI benefit receipt.

FIGURE 1   LABOUR MARKET IMPACT OF STRICTER DI RULES
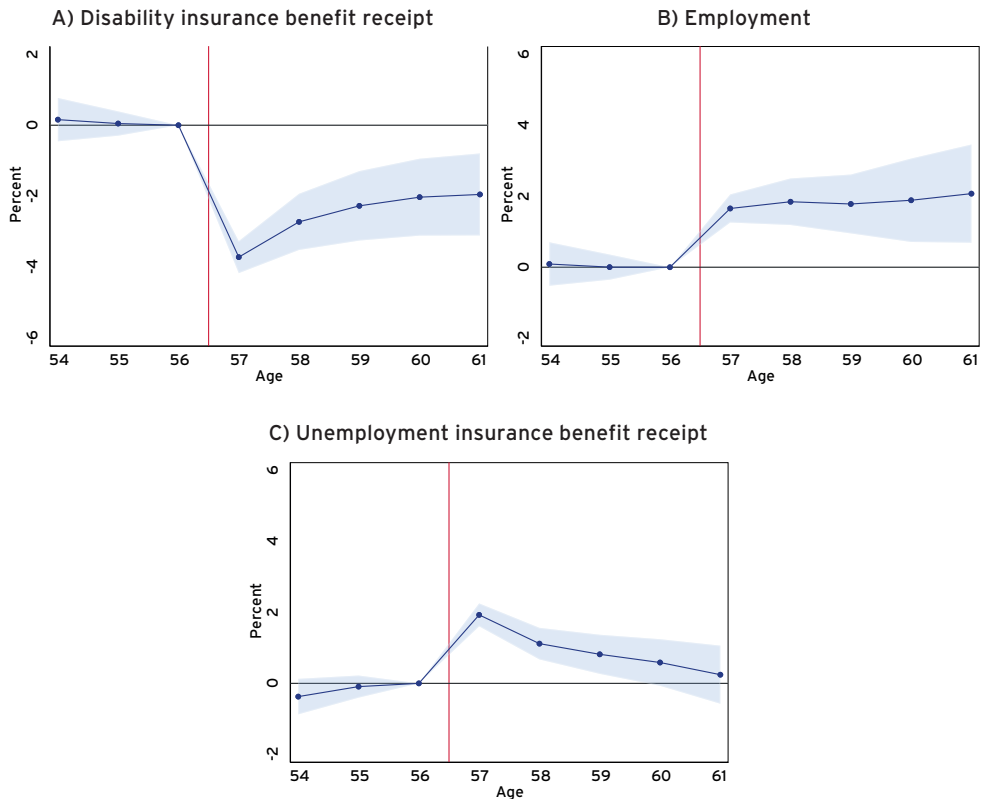
Source: Haller et al. (2024).

Milligan and Shirle (2014) study a similar policy reform in Canada which abolished relaxed DI eligibility for applicants aged 55 and older in 1996. Similar to the Austrian case, they find a significant reduction in DI benefit receipt among 55–64 year-olds. For example, DI benefit receipt among 55-59 year-old men was on an upward trend and reached about 9% in 1995, the last year with relaxed DI eligibility rules. The reform reversed the upward trend, and in 2000 DI benefit receipt of 55-59 year-old men had dropped to about 5%. At the same time, Milligan and Shirle observe an upward trend in employment rates of 55–64 year-olds that started around 1996, suggesting that stricter DI eligibility rules spurred older workers' employment.[1]

However, tightening DI eligibility criteria for older workers does not always lead to higher employment. Karlström et al. (2008) study a 1997 policy reform in Sweden that abolished favourable DI eligibility rules for workers aged above 60. They find that stricter eligibility criteria only led to a small decline in DI enrollment and had no impact on employment, but led to an increase in UI benefit receipt. The difference in findings in Sweden compared to Austria and Canada could be attributed to differences in the profile of DI applicants in Sweden. Because the Swedish reform applied only to workers aged 60 and over, affected individuals were older and potentially less healthy on average compared to Austria and Canada, where the reform affected workers aged 55 and over.

Overall, the evidence from Austria, Canada, and Sweden suggests that abolishing relaxed DI eligibility rules can significantly raise older workers' employment rates, particularly if they apply at an early age. In contrast, lowering DI benefit levels appears to have only minor employment effects, although more evidence is needed.

The impact of abolishing generous UI rules for older workers

More generous UI rules can impact older workers' labour supply through two channels. First, they can create more UI entries. The excess UI inflow can stem from voluntary job separations, as workers may use the UI programme as a bridge to retirement, or from involuntary job separation if firms use these rules to restructure their workforce. Second, more generous UI rules can induce older workers to stay unemployed longer. The existing literature provides evidence that both channels are important.

Regarding the inflow channel, Winter-Ebmer (2003) studies a programme in Austria that extended UI benefits for workers above 50 from one to four years. With the benefit extension, unemployed women and men could effectively withdraw from the labour market at age 50 and age 55, respectively, and bridge the gap until they receive an old-age pension via the UI system. Winter-Ebmer finds that the benefit extension led to a 4-11 percentage point increase in UI entry. He also provides suggestive evidence that the jump in UI entries was primarily driven by employers trying to get rid of high-tenured

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1   The evidence in Milligan and Schirle (2014) relies on time-series trends. The authors caution that the upward trend in employment after the mid-1990s could be attributed to factors other than stricter DI eligibility rules, for example raising education levels.

and more expensive workers. Moreover, Gudgeon et al. (2023) provide evidence for Germany that spikes in UI inflow occur precisely at the ages that allow workers to claim their old-age pension following UI expiration. The effects are substantial: UI inflows rise by at least 10% and sometimes by up to 25%. Similar evidence of excess UI entries has been documented in Finland (Kyyrä and Wilke, 2007), the Netherlands (Tuit and van Ours, 2010), and France (Baguelin and Remillon, 2014).

Concerning the unemployment duration channel, Lalive (2008) studies the same benefit extension reform in Austria as Winter-Ebmer (2003). He finds that the three-year extension in UI benefits increased the unemployment duration of older unemployed men and women by about 15 and 70 weeks, respectively. Inderbitzin et al. (2016) show that many older unemployed used the benefit extension in Austria to permanently withdraw from the labour market. They find that the incidence of retirement among older job losers increases by 15 percentage points, or about 60%. Other studies have found equally large effects in other countries. For example, Kyyrä and Ollikainen (2008) document that in Finland about half of the older unemployed entitled to extended UI benefits withdraw permanently from the labour market.

CONCLUSIONS AND POLICY IMPLICATIONS

Spillovers between the pension system and other social insurance programmes exist and are quantitatively important.

When retirement ages increase, we see substitution from pension-claiming to UI and DI programmes. However, this substitution is mostly not an active choice of moving from working to claiming UI or DI benefits. If the retirement age increases, individuals remain in the labour market status they were in before for longer. Put differently, the existing evidence suggests that we do not need to worry that the employed substitute old-age pensions with disability or unemployment benefits when their retirement age increases; the employed will work longer. At the same time, those individuals out of work before their retirement age will not transition back to employment when access to old-age pensions is delayed; they stay on other social insurance benefits for longer. Hence, a high employment rate before the ERA must be a key policy goal to make pension reforms more effective.

Alternative pathways to early retirement through generous social insurance programmes are critical to labour supply before the ERA. The existing literature has documented sizeable spikes in UI and DI inflow at the ages at which workers are able retire from the labour market via these programmes. The sizable inflow effects indicate that many older workers use UI and DI programmes as pathways to early retirement. Closing eased access to UI and DI programmes can meaningfully increase employment rates at older ages before the ERA.

Our review has focused on the potential effects of pension and social insurance programme reforms on labour force participation. These effects are a critical dimension of reforms, as a key policy goal is to prolong working lives. However, while restrictive pension reforms can lower spending on public pensions and boost employment, they also reduce income protection during retirement and could increase old-age poverty. When evaluating reform alternatives, we need to balance the potentially beneficial fiscal impacts against the potential losses in income protection of a reform. The existing literature studying old-age pension, UI and DI reforms has focused on quantifying the fiscal implications of different reforms. However, we know little about the value of the pension system and other social insurance programmes for older individuals (see also Chapter 5). Assessing the value of these programmes at older ages is vital to assess both the costs and benefits of pension reforms and to better understand the broader welfare impacts of different reform alternatives.

REFERENCES

Atalay, K. and G.F. Barrett (2015), "The impact of age pension eligibility age on retirement and program dependence: Evidence from an Australian experiment", *Review of Economics and Statistics* 97(1): 71-87.

Baguelin, O. and D. Remillon (2014), "Unemployment insurance and management of the older workforce in a dual labor market: Evidence from France," *Labour Economics* 30: 245-264.

Cribb, J., C. Emmerson and G. Tetlow (2016), "Signals matter? Large retirement responses to limited financial incentives", *Labour Economics* 42: 203-212.

Duggan, M., P. Singleton and J. Song (2007), "Aching to retire? The rise in the full retirement age and its impact on the social security disability rolls", *Journal of Public Economics* 91(7-8): 1327-1350.

Geyer, J. and C. Welteke (2021), "Closing routes to retirement for women: How do they respond?", *Journal of Human Resources* 56(1): 311-341.

Gudgeon, M., P. Guzman-Pinto, J.F. Schmieder, S. Trenkle and H. Ye (2023), "When Institutions Interact: How the Effect of Unemployment Insurance are Shaped by Retirement Policies", NBER Working Paper No. 31807.

Haller, A. (2022), "Welfare Effects of Pension Reforms", working paper.

Haller, A., S. Staubli, and J. Zweimüller (2024), "Designing Disability Insurance Reforms: Tightening Eligibility Rules or Reducing Benefits?", *Econometrica* 92(1): 79-110.

Inderbitzin, L., S. Staubli, and J. Zweimüller (2016), "Extended Unemployment Benefits and Early Retirement: Program Complementarity and Program Substitution", *American Economic Journal: Economic Policy* 8(1): 253-288.

Karlström, A., M. Palme, and I. Svensson (2008), "The employment effect of stricter rules for eligibility for DI: Evidence from a natural experiment in Sweden", *Journal of Public Economics* 92(10–11): 2071–82.

Kyyrä, T. and V. Ollikainen (2008), "To search or not to search? The effects of UI benefit extensions for the older unemployed", *Journal of Public Economics* 92: 2048-2070.

Kyyrä, T. and R.A. Wilke (2007), "Reduction in the Long-Term Unemployment of the Elderly: A Success Story from Finland", *Journal of the European Economic Association* 5(1): 154-182.

Lalive, R. (2008), "How do extended benefits affect unemployment duration? A regression discontinuity approach", *Journal of Econometrics* 142(2): 785-806.

Milligan, K. and T. Schirle (2014), "Option Value of Disability Insurance in Canada," in *Social Security Programs and Retirement Around the World: Disability Insurance Programs and Retirement*, University of Chicago Press.

Rabaté, S. and J. Rochut (2020), "Employment and substitution effects of raising the statutory retirement age in France", *Journal of Pension Economics & Finance* 19(3): 293-308.

Rabaté, S., E. Jongen and T. Atav (2024), "Increasing the retirement age: policy effects and underlying mechanisms", *American Economic Journal: Economic Policy* 16(1): 259-291.

Seibold, A. (2021), "Reference points for retirement behavior: Evidence from german pension discontinuities", *American Economic Review* 111(4): 1126-1165.

Staubli, S. (2011), "The impact of stricter criteria for disability insurance on labor force participation", *Journal of Public Economics* 95(9–10): 1223–1235.

Staubli, S. and J. Zweimüller (2013), "Does raising the early retirement age increase employment of older workers?", *Journal of Public Economics* 108: 17-32.

Tuit, S. and J.C van Ours (2010), "How changes in unemployment benefit duration affect the inflow into unemployment", *Economics Letters* 109: 105-107.

Winter-Ebmer, R. (2003), "Benefit duration and unemployment entry: A quasi-experiment in Austria", *European Economic Review* 47: 259-273.

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CHAPTER 8

Making Social Security sustainable: A balanced proposal for reform

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INTRODUCTION

Social Security is the largest social insurance programme in the United States, providing monthly benefits to 68.1 million retired workers, individuals with severe disabilities, and their surviving or dependent spouses and children as of August 2024. Four decades after Congress last made significant changes to the programme, Social Security faces a severe fiscal shortfall. Absent legislative action, Social Security's trust fund will be exhausted in 2034, resulting in a 23% benefit cut to all enrollees.

In this chapter, we draw on recent research to propose five levers of reform to return Social Security to a sustainable fiscal path (Duggan, 2023). Our proposals aim to insulate economically vulnerable beneficiaries and instead request the greatest sacrifice from high-income earners and beneficiaries. We simultaneously account for likely political constraints, phasing in changes gradually where possible. If implemented, these reforms would ensure that Social Security continues to provide a vital safety net for millions of elderly and disabled Americans and their dependents in the upcoming decade and beyond.

SOCIAL SECURITY IN THE UNITED STATES

Social Security is the largest government programme in the United States, with total expenditures of $1.39 trillion in 2023 (5.1% of GDP in that year). Officially titled Old Age, Survivors, and Disability Insurance (OASDI), the programme serves retired workers, individuals with severe disabilities, and their surviving or dependent spouses and children. Retired workers comprise the largest group of beneficiaries (51.3 million in August 2024) among 68.1 million total enrollees. Social Security currently provides an average monthly benefit of $1,920 to retired workers with the corresponding averages for disabled workers, widow(er)s, and children of deceased workers at $1,540, $1,785, and $1,105, respectively.

To qualify for OASDI retirement or disability benefits, an individual must have worked for at least ten years. Retired and disabled workers received 81% and 10%, respectively, of total OASDI benefits paid in August 2024. Benefits for surviving or dependent spouses

and children accounted for the remainder of OASDI payments and do not require ten years of employment. The share of Social Security benefits paid to surviving or dependent family members has steadily declined over time, driven primarily by the increase in female employment, which has caused more women to claim their own retired or disabled worker benefits rather than their spouses.

TABLE 1   SOCIAL SECURITY RECIPIENTS AND MONTHLY BENEFITS BY CATEGORY, AUGUST 2024

	Number of recipients (thousands)	Average monthly benefit (dollars)
OASDI total	68,072	1,784
Old-Age and Survivors Insurance	59,706	1,837
Retirement Benefits	53,915	1,872
Retired workers	51,346	1,920
Spouses of retired workers	1,877	910
Children of retired workers	692	893
Survivor Benefits	5,790	1,509
Children of deceased workers	2,015	1,104
Widowed mothers and fathers	104	1,286
Nondisabled widow(er)s	3,473	1,785
Disabled widow(er)s	197	928
Parents of deceased workers	1	1,620
Disability Insurance	8,366	1,403
Disabled workers	7,277	1,540
Spouses of disabled workers	87	422
Children of disabled workers	1,003	492

Source: Social Security Administration (2024a).

Social Security operates using what is essentially a pay-as-you-go system. The programme receives most (91%) of its revenue from dedicated OASDI payroll taxes on workers' earnings. Interest from investments of its trust fund in US Treasury securities (5%) and taxes on the OASDI benefits of high-income beneficiaries (4%) provide the remaining revenue. Workers and employers each pay half of the 12.4% payroll tax – self-employed workers cover the full amount – up to an annual maximum level of earnings. The tax limit was $168,600 in 2024, approximately 2.5 times the average annual earnings, and is indexed up each year with average wage growth. Notably, as income inequality has risen, the share of earnings subject to the payroll tax has fallen from a maximum of 92.0% in 1937 to 90.0% in 1982, and to 82.4% in 2022.

Social Security utilises a progressive benefit formula to convert an individual's earnings history into their primary insurance amount (PIA), which is equal to the monthly benefit for which a worker is eligible upon reaching their full retirement age or if they qualify for disabled worker benefits. The calculation of the average indexed monthly earnings (AIME) considers the 35 highest years of earnings up to the taxable maximum, indexed to the growth in average economy-wide earnings. For individuals who have worked for fewer than 35 years, zeroes are averaged into the AIME calculation. Social Security's replacement rate (the ratio of benefits to earnings) decreases as earnings rise, allowing lower-income individuals to receive a higher monthly benefit relative to their contributions. This relationship between average indexed monthly earnings and the PIA is illustrated in Figure 1. As with the tax limit, the two 'bend points' in Social Security's 90-32-15 benefit formula are indexed to average nominal wage growth, causing programme expenditures to rise over time.

FIGURE 1   SOCIAL SECURITY PIA VERSUS AIME BENEFIT FORMULA IN 2023
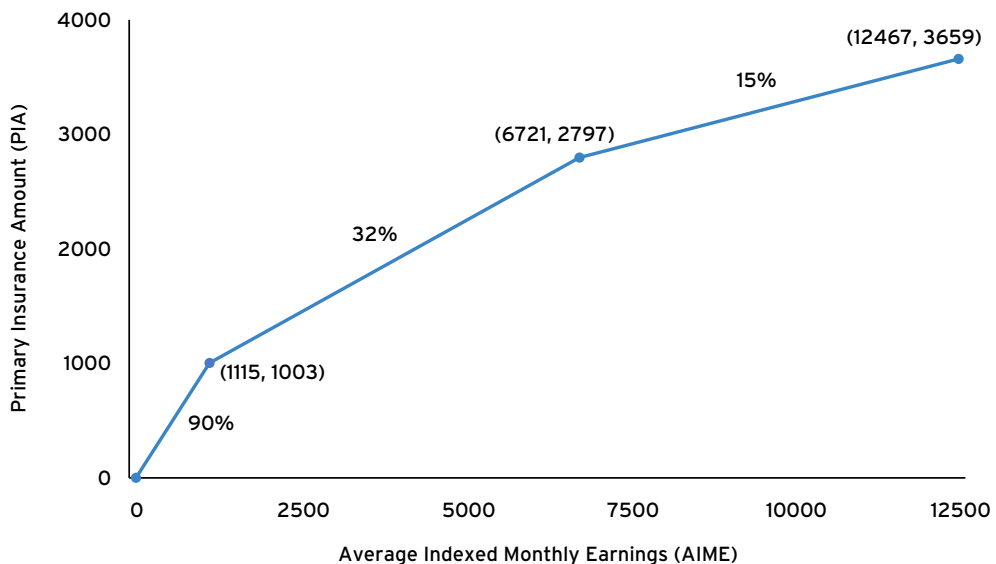
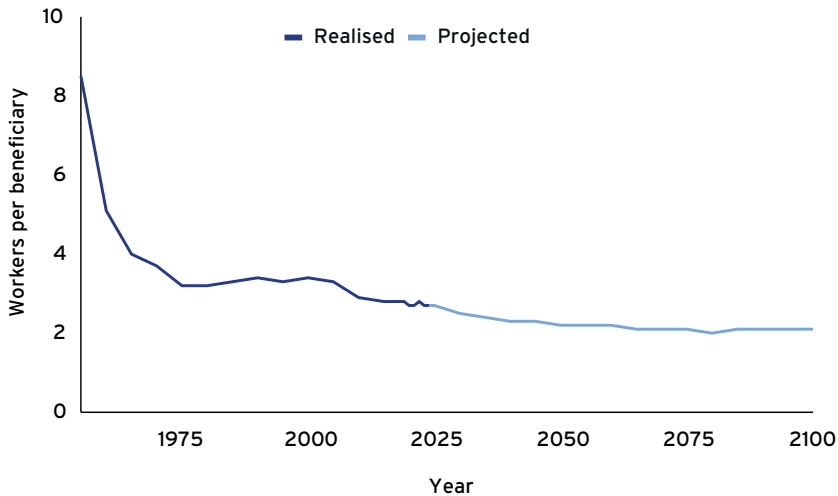Source: Social Security Administration (2023).

Qualifying individuals may claim Social Security retired-worker benefits upon reaching the early retirement age of 62. Delaying claiming results in a higher benefit, with 70% of the PIA received at age 62, 100% at age 67 (the full retirement age), and 124% at age 70.[1] The annual actuarial adjustment is 5.0% between the ages of 62 and 64, 6.67% between the ages of 64 and 67, and 8.0% between the ages of 67 and 70, and can be adjusted to a monthly basis. Individuals who claim benefits at the early retirement age tend to have lower incomes and worse health than those who delay claiming. The actuarial adjustment thus influences the extent of Social Security's progressive economic impact.

THE FINANCING CHALLENGE

Demographic changes since Social Security began in 1935 have contributed to the programme's declining financial health. Life expectancy – both from birth and upon reaching retirement age – has risen considerably, thereby increasing lifetime payments to enrollees. The general fertility rate continues to fall, reaching a historic minimum of 54.4 births per 1,000 women aged 15–44 in 2023. These trends have jointly reduced the size of the labour force relative to the number of Social Security beneficiaries in recent decades. As shown in Figure 2, the number of OASDI-insured workers per enrollee has fallen from 8.6:1 in 1955 to 3.4:1 in 1990, to just 2.7:1 in 2023. As a growing share of the large 'Baby Boom' generation (born 1946–1964) settles into retirement, the OASDI programme's finances will experience corresponding strain.

**FIGURE 2   RATIO OF COVERED WORKERS TO SOCIAL SECURITY BENEFICIARIES**

Source: Social Security Administration (2024b).

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1   These figures apply for individuals born in 1960 or later. As discussed below, individuals born before 1960 had a lower full retirement age and received a higher fraction of the PIA when claiming at age 62.

Projections estimate that the Social Security trust fund (currently $2.8 trillion) will be exhausted in 2034, the year of the programme's 99th birthday. What was a relatively modest deficit of $41 billion (approximately 3% of OASDI revenues) in 2023 is projected to exceed $331 billion in 2033, thereby depleting the fund. As current legislation mandates that OASDI benefits can only be financed from the programme's revenues or trust fund, Social Security will only be able to pay 77% of scheduled benefits, with this percentage predicted to decline further in subsequent years. Absent legislative action, the Social Security Administration would then apply an equal (in percentage terms) benefit cut to the more than 80 million projected enrollees in 2034.

Figure 3, which represents annual programme surpluses and deficits (excluding trust fund interest income) as a percentage of GDP, illustrates the gravity of this challenge. Projections for future years come from the Social Security Administration.

FIGURE 3   REALISED AND PROJECTED ANNUAL DEFICITS FOR SOCIAL SECURITY
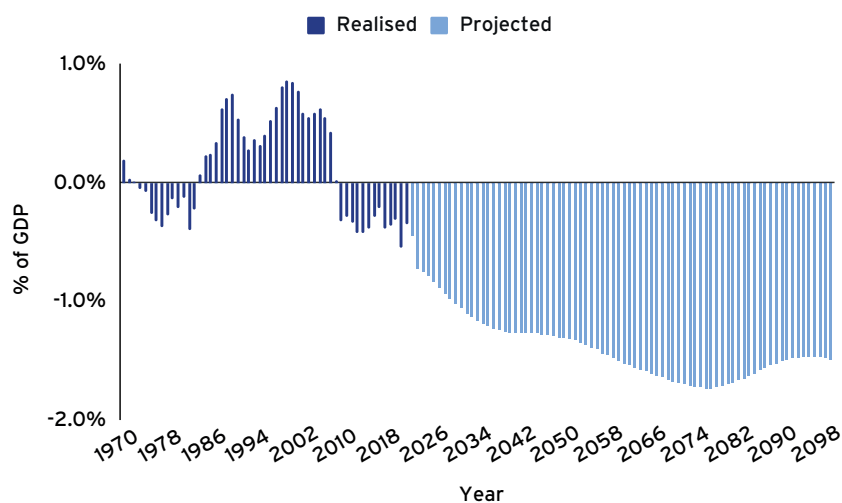
Source: Social Security Administration (2023).

If not carefully designed, reductions in the generosity of OASDI benefits could significantly harm the financial wellbeing of millions of elderly, near elderly, and disabled Americans. Analysis of nationally representative survey data indicates that most elderly Americans (defined here as aged 65 or older) receive more than half of their income from Social Security and approximately one in four receive more than 90% of their income from the programme (Dushi et al., 2017). Reliance varies substantially by age, race, and socioeconomic status. For example, more than 60% of individuals aged 80 or older receive over half their income from Social Security versus approximately 40% of those between the ages of 65 and 69. Non-Hispanic Black individuals are more likely to receive at least 90% of their income from Social Security than are respondents from other racial and ethnic groups. Approximately two-thirds of elderly adults without a high school degree receive over half their income from Social Security, compared to one-third among college

graduates. Significantly, more than 80% of individuals in the lowest two income quintiles depend on the programme for more than half their income versus just 2% of those in the top income quintile.

Previous research has demonstrated that more generous Social Security benefits lead to both lower poverty rates among the elderly and lower mortality rates among SSDI recipients (Englehardt and Gruber, 2004; Gelber et al., 2023). These findings underscore the need for swift action to ensure the programme remains on stable financial footing and that current and future Social Security recipients are prepared for potential changes in the generosity of programme benefits.

PRINCIPLES FOR REFORM

We identify two guiding principles for policymakers in the United States aiming to confront Social Security's financial decline. Balancing equity with pragmatism, we argue that reform must respond to rising income and wealth inequality while accounting for political constraints.

Income and wealth inequality

Income and wealth inequality have risen significantly since the inception of Social Security and since the last significant changes to the programme in 1983. The ratio of the incomes at the 90th to the 10th percentiles of US earners (often called the 90/10 ratio) has risen in each decade since 1980, from 9.1 in that year to 12.4 in 2023 (Guzman and Kollar, 2024). Comparisons of the Gini coefficient, another common measure, place the United States highest in income inequality among the G7 countries. While high earners have enjoyed the greatest rate of income growth in recent years, the wealth of most American families has not risen since the Great Recession (Horowitz et al., 2020).

As inequality has risen, retirement preparedness among low- and middle-income families has suffered. Just one in ten low-income households had a retirement account balance in 2019, compared to one in five in 2007 (GAO, 2023). Disparities persist by race, with white households most likely to have a retirement account balance across income groups. Inequality and economic stress are among the proposed causes of the socioeconomic longevity gap – lower incomes are associated with significantly shorter life expectancy (Chetty, 2016), with this gap increasing in recent years.

These trends, along with the programme's progressive 90-32-15 benefit formula, cause high-income individuals to depend less on Social Security and claim benefits for a longer period relative to their low- and middle-income counterparts. As such, while all beneficiaries must adapt to reform, equity considerations strongly suggest that the relatively wealthy and healthy upper class should shoulder a greater share of the burden.

Political constraints

Social Security last underwent substantial reform in 1983, when annual deficits were small (1–4% of programme expenditures) and were projected to transition to surpluses as the 'Baby Boom' generation entered its high-earnings years. As such, policymakers enacted relatively minor changes: raising the payroll tax rate from 10.6% to 12.4%, increasing the retirement age from 65 to 67, and reducing the fraction of the PIA that one could claim at 62 from 80% to 70%. Despite cutting benefits by approximately 12.5%, these changes were delayed so that those aged 46 or older experienced no reduction, and only those aged 23 or younger experienced the full reduction. This gradual phase-in was the primary reason that the changes received minimal political backlash.

There have been no significant changes to Social Security in the past four decades, despite projections since the 1990s indicating that the OASDI trust fund would become insolvent. Since President George W. Bush designated Social Security as his top domestic priority in 2004 – and was subsequently unable to establish a system of partially privatised individual accounts – no administration has meaningfully addressed the programme's financial health. Legislators in both the US Senate and the House of Representatives have, with a small number of exceptions, similarly avoided the issue, recognising the political consequences of raising taxes or cutting benefits – especially when advocating such changes alone.

However, urgent action remains necessary to uphold Social Security's critical safety net for tens of millions of elderly, near elderly, and disabled Americans. As such, we evaluate the following levers of reform for their potential to enable compromise.

LEVERS OF REFORM

We propose five distinct policy changes – a combination of tax increases and benefit cuts – to approach Social Security's financing challenge in line with the principles above. Drawing on Congressional Budget Office (CBO) estimates and related research, we estimate that these adjustments would restore Social Security's long-term financial sustainability. However, the magnitude and implementation of each change may vary; our goal is simply to present a balanced Social Security reform approach to inspire legislative action.

Moreover, even if the proposed reforms are implemented immediately, the OASDI trust fund will likely be exhausted in the short term. As such, we advocate a temporary loan from the US Treasury to Social Security (as with state unemployment insurance programmes during and after recessions) alongside our proposals. The loan can be paid off in the future as the financial benefit of the proposed reforms leads to annual programme surpluses.

Raise the payroll tax rate

The Social Security payroll tax rate has been constant at 12.4% for 34 years, with the most recent increase from 10.6% gradually phased in between 1983 and 1990. We propose a 1 percentage point increase, bringing the payroll tax rate to 13.4%. This change alone would cover approximately one-quarter of the fiscal gap that Social Security will face in 2034.

We propose an increase smaller than the estimated 4 percentage points necessary to close the gap entirely to avoid overburdening low- and middle-income workers. However, the substantial increase in the present value of Social Security benefits, driven by rising life expectancy and the indexation of benefits to earnings growth, provides the rationale for a payroll tax increase. Research suggests that past increases in the Social Security payroll tax rate did not significantly reduce labour supply (Liebman and Saez, 2006), though the increase would still reduce disposable income for workers and raise employer costs.

Increase the taxable wage base

When the 1983 amendments were enacted, the Social Security payroll tax applied to 90.0% of total earnings. Although the taxable maximum has risen with average annual earnings (from $35,700 in 1983 to $168,600 in 2024), rising income inequality has reduced the share of earnings at or below the taxable wage base. In 2022, only 82.4% of workers' total earnings fell below the taxable maximum.

We propose annually adjusting the taxable maximum such that 90.0% of earnings remain subject to the payroll tax. Estimates from the Joint Committee on Taxation indicate that the cap would have to be raised to about $300,000 in 2023 to cover 90.0% of earnings. This reform would provide significant additional revenue for the programme, though high-income workers would earn a higher primary insurance amount (PIA) and receive correspondingly higher benefits.

Data from the CBO and Social Security Administration suggest that this reform would eliminate approximately one-fifth of the programme's projected annual deficit in 2033. However, an immediate and significant payroll tax increase could disrupt employment and earnings for millions of high-income earners, while sparking political resistance. Accordingly, we propose phasing in this change by raising Social Security's taxable maximum by 2.5 percentage points more than earnings growth annually. If the income distribution remains stable in the years ahead, the Social Security payroll tax would again cover 90.0% of earnings after 25 years.

Levy a small payroll tax on earnings above the taxable maximum

Social Security payroll taxes are not presently levied above the taxable maximum, which is set at $168,600 in 2024 and rises with average earnings growth. Aiming to increase revenue while minimising backlash, we propose a 3.0% tax rate on earnings

above the taxable maximum. This adjustment would fill approximately one-eighth of the programme's fiscal gap in 2033. In contrast with the previous proposal, this tax would not increase high-income workers' future Social Security benefits.

Levying a payroll tax above the annual maximum would reduce the after-tax income of high-income workers. However, high-income workers have experienced the greatest increases in earnings and life expectancy since the 1983 amendments, providing justification for this differential burden. Moreover, Medicare applied its 2.9% payroll tax to all earnings above the same cap used by Social Security in 1994, with little evidence of reduced earnings or employment.

Strategically raise the full retirement age

The last major reforms to Social Security in 1983 increased the full retirement age from 65 to 67, while decreasing the percentage of the PIA received at the early retirement age of 62 from 80% to 70%. As described previously, this change was phased in gradually, resulting in a substantial benefit reduction for individuals born in 1960 or later. Current research demonstrates that these reforms caused many people to work longer and to delay claiming their Social Security benefits, reducing the strain on the OASDI trust fund (Mastrobuoni, 2009).

One potential concern was the hardship this change imposed on low-income individuals or those in poor health, who tended to claim benefits at the early retirement age of 62 (Phillips and Ghilarducci, 2023). To address this issue, we propose increasing the full retirement age from 67 to 68 while maintaining the generosity of benefits for individuals claiming between ages 62 and 64. Table 2 displays the generosity of retirement benefits by age under the current and proposed systems.

While this reform would inevitably affect the timing of retired workers' benefit claiming, a back-of-the-envelope calculation suggests that it would cover approximately 15% of the long-term OASDI funding gap. The reform would result in a 5–8% reduction in benefits for those claiming at or beyond the age of 67, a group that tends to consist of high-income workers. This targeted reduction seems appropriate, given the significant financial pressure on the programme and increased life expectancy among high-income individuals.

TABLE 2   CURRENT AND PROPOSED GENEROSITY OF RETIRED-WORKER BENEFITS BY AGE AT CLAIMING

Claiming age	Current percentage of PIA	Proposed percentage of PIA
62	70	70
63	75	75
64	80	80
65	86.7	85
66	93.3	90
67	100	95
68	108	100
69	116	108
70	124	116

Source: Social Security Administration (2024b) and authors' proposal.

Reform the benefit formula

The Social Security benefit formula (displayed in Figure 1) allowed individuals to claim a maximum benefit of $4,540 in 2023, if they earned more than Social Security's taxable maximum throughout their career and delayed claiming benefits until age 70. Our final reform component would freeze the second 'bend point' in the 90-32-15 formula so that benefits increase more slowly for high-income workers, while introducing an additional third 'bend point' to reduce the incremental benefits earned from the increase in the taxable maximum described above (from 15% percent to 5%).

This reform would have little impact on initial benefit generosity, while replacing an increasing fraction of earnings at a lower rate (15% versus 32%). Most retired-worker beneficiaries would be unaffected by this change for at least 25 years, while the highest-income recipients would only face a lower growth rate for benefits – not a cut. The introduction of a third 'bend point' would moderate the increase in benefits that high-income workers would receive from the increase in the taxable maximum described above. Together, these changes would cover approximately one-fourth of Social Security's long-run fiscal gap.

There are three significant advantages of this benefit adjustment over potential benefit cuts. First, it would allow individuals sufficient time to plan and adjust their savings and employment decisions, as the effects on future benefit generosity would be gradual. Second, it would insulate low- and middle-income workers from benefit reductions,

whose incomes have grown more slowly than their high-income counterparts. Finally, its beneficial effects on the OASDI trust fund would grow substantially each year, allowing the programme to eventually generate annual surpluses and replenish the trust fund.

CONCLUSION

Taken together, the reforms outlined in this chapter would ensure that Social Security remains on a sustainable fiscal path. It would maintain the programme's critical safety net for the 80 million projected beneficiaries in 2034 – and for generations to come.

Our proposals foreground the rising income and wealth inequality since 1983, when Congress last made significant reforms to Social Security. As such, we aim to insulate the economically vulnerable from benefit reductions while asking high-income workers to shoulder the greatest burden of reform. We nonetheless seek to satisfy practical and political constraints, phasing in changes gradually where possible to allow workers to plan and adapt.

For decades, policymakers have neglected Social Security's rapidly declining financial health. The challenge of saving the programme, however, will only intensify as the OASDI trust fund approaches depletion. We offer our proposals as a starting point for reform, and urge the next president and Congress to move quickly to prevent significant benefit cuts for tens of millions of retired and disabled workers and their families.

REFERENCES

CBO – Congressional Budget Office (2022), *Options for Reducing the Deficit, 2023 to 2032—Volume I: Larger Reductions*, 7 December.

CBO (2024), *CBO's 2024 Long-Term Projections for Social Security*, 28 August.

Chetty, R., M. Stepner, S. Abraham, S. Lin, B. Scuderi, N. Turner, A. Bergeron, and D. Cutler (2016), "The Association Between Income and Life Expectancy in the United States, 2001–2014", *Journal of the American Medical Association* 315(16): 1750–66.

Congressional Research Service (2022), *Social Security: What Would Happen If the Trust Funds Ran Out?*, 28 September.

Duggan, M. (2023), "Reforming Social Security for the Long Haul", in M.S. Kearney, J. Schardin, and L. Pardue (eds), *Building a More Resilient US Economy*, Aspen Economic Strategy Group.

Duggan, M., I. Dushi, S. Jeong, and G. Li (2023), "The Effects of Changes in Social Security's Delayed Retirement Credit: Evidence from Administrative Data", *Journal of Public Economics* 223: 104899.

Dushi, I, H.M. Iams, and B. Trenkamp (2017), "The Importance of Social Security Benefits to the Income of the Aged Population", *Social Security Bulletin* 77(2).

Engelhardt, G.V., and J. Gruber (2004), "Social Security and the Evolution of Elderly Poverty", NBER Working Paper No. w10466.

GAO – U.S. Government Accountability Office (2023), "Older Workers: Retirement Account Disparities Have Increased by Income and Persisted by Race Over Time", 27 July.

Gelber, A., T. Moore, Z. Pei, and A. Strand (2023), "Disability Insurance Income Saves Lives", *Journal of Political Economy* 131(11).

Horowitz, J.M., R. Igielnik, and R. Kochhar (2020), "Trends in Income and Wealth Inequality", in *Most Americans Say There Is Too Much Economic Inequality in the U.S., but Fewer Than Half Call It a Top Priority*, Pew Research Center.

Liebman, J.B. and E. Saez (2006), "Earning Responses to Increases in Payroll Taxes", NBER Working Paper No. RRC NB04-06.

Mastrobuoni, G. (2009), "Labor Supply Effects of the Recent Social Security Benefit Cuts: Empirical Estimates Using Cohort Discontinuities", *Journal of Public Economics* 93(11–12): 1224–33.

Phillips, D. and T. Ghilarducci (2023), "Older Workers Claim Social Security While Working, Upending Beliefs About Raising the Retirement Age," Policy Note Series, Schwartz Center for Economic Policy Analysis.

Social Security Administration (2023), Annual Statistical Supplement, 2023".

Social Security Administration (2024a), "Monthly Statistical Snapshot, August 2024".

Social Security Administration (2024b), *The 2024 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds.*

US Census Bureau (2024), "Income in the United States: 2023", 10 September.

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CHAPTER 9

From evidence to pension policy: What have we learned?

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The chapters in this eBook offer a wealth of new insights into pension reforms, driven by a recent wave of groundbreaking research. A new generation of scholars is bringing fresh perspectives and innovative methods to long-standing pension policy questions. The field has evolved significantly, combining advanced empirical tools and conceptual frameworks to better understand the complex interactions between fiscal sustainability, labour supply, and redistribution. This eBook draws on these advances to provide a clearer understanding of how pension reforms can balance these competing objectives. In this concluding chapter, we summarise the main takeaways.

A first critical contribution of this eBook is the introduction of a new framework to think about pension reforms. While the institutional context of pension policies, with all its complexities and intricacies, is hard to master, a similar concern could be raised about the dynamic, heterogeneous agent models economists have been using to provide insights, integrating labour supply, intertemporal consumption and other household decisions in combination with stochastic productivity and health processes, and allowing for heterogeneity in preferences, endowments, and so on. The new framework, building on the 'sufficient statistics' insights in the modern public finance literature, is clear in its conceptual guidance, allowing policymakers and researchers to visualise and compare different reform options effectively. It offers new clarity by linking policy reforms directly to empirical data, making it easier to connect theoretical models with real-world outcomes.

This new framework does more than visualise reforms – it improves our ability to account for both fiscal and redistributive effects. Traditionally, the focus has been on the fiscal sustainability of pension systems, especially as populations age. However, this framework stresses that pension reforms should be evaluated not just for their budgetary impacts but also for their ability to provide insurance against old-age poverty and to redistribute fairly across different socioeconomic groups. The ability to integrate both fiscal and welfare considerations is a major improvement over previous approaches and ensures a more holistic evaluation of pension policies.

NEW INSIGHTS ON FISCAL EFFECTS

A large literature has related the implicit taxes that the pension system entails to labour supply, especially around the age of retirement. Recent work has started to separate the underlying responses, whether they are to changes in financial incentives, to changes in financial resources, or driven by statutory changes. Several new insights have emerged regarding the fiscal impacts of pension reforms.

Lesson 1: Statutory rules dominate financial incentives

The evidence is clear that strengthening financial incentives – such as increasing the returns to delayed retirement – has not been particularly effective in encouraging later retirement. In contrast, statutory retirement ages, which specify when individuals can start to access pension benefits or when they become eligible for 'normal' benefits, have shown a much stronger impact on retirement behaviour. As discussed in Chapter 3, raising the statutory retirement age induces a clear delay in retirement decisions, suggesting that such policy levers are more predictable and effective than relying on financial incentives alone. However, the precise mechanisms through which statutory ages prove so effective are still unclear. Whether these statutory rules provide information, set a social norm, or become a reference point in individuals' preferences needs to be understood better.

The effectiveness of statutory ages in increasing labour supply in old age does not imply that financial incentives are irrelevant, and that pension benefits should be the same irrespective of when people retire or claim their pension.[1] Indeed, two types of financial incentives need to exist: (i) pension systems should compensate via higher benefits those individuals who contribute more (i.e., work longer); and (ii) pension systems should compensate via higher benefits those individuals who claim later (for a given amount of contributions) as they will be collecting benefits for a shorter period of time. Note that there is no particular reason for the profile of incentives to be the same along these two dimensions (retirement age and claiming age). Yet, many pension systems still do not make this distinction and inefficiently push individuals who want to access their benefits but could continue to work into early retirement.

Lesson 2: Cutting pension benefits induces later retirement

From a fiscal perspective, cutting pension benefits is the most effective intervention to reduce expenditures, also because cutting pension benefits encourages individuals to retire later. However, simply reducing resources – rather than providing steeper incentives – comes at a significant welfare cost. Reductions in benefits directly impact individuals' financial security, particularly among vulnerable groups. The question remains whether the fiscal gains achieved by pushing people to work longer outweigh the welfare losses experienced by those with reduced pensions (and whether concrete

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1   Unfortunately, because almost all systems display statutory retirement ages, we still do not have a good understanding of how effective financial incentives would become in the absence of any statutory ages or of any form of guidance.

redistributive tools exist to channel these fiscal gains back for compensating these losers). This issue is particularly important when considering the potential hardships imposed on low-income individuals (see Chapter 4).

Lesson 3: Programme spillover effects matter too

Any pension reform interacts with other insurance programmes offered to individuals at old age and without employment. The spillover effects, however, seem to be largely mechanical. Workers who are unable to continue working often substitute unemployment or disability benefits for old-age pensions when statutory retirement ages are raised.

However, this substitution typically occurs only for individuals who were already enrolled in these programmes. As discussed in Chapter 7, while reforms can shift financial burdens from pension systems to disability or unemployment insurance and vice versa, they do not seem to extend or reduce the working lives of older individuals as much. It is individuals who are out of the labour market that decide whether to transition to retirement through unemployment, disability or early retirement benefits. Still, policymakers should consider the broader social insurance landscape, ensuring that reforms do not simply shift burdens between programmes without achieving the desired increase in workforce participation.

NEW INSIGHTS ON REDISTRIBUTION AND INSURANCE

The insurance and redistributive aspects of pension systems are critical to their role in providing social protection. Policymakers should carefully consider the redistributive costs of reforms that induce individuals to retire later.

Lesson 4: Cutting (*increasing*) pensions benefits for early (*late*) retirees is regressive

A key finding in Chapter 5 is that reforms that steepen pension profiles – offering stronger financial incentives for delayed retirement – carry significant redistributive costs. These reforms disproportionately affect individuals with fewer resources and worse health, as they are least able to work longer or take advantage of higher pension benefits. This creates a regressive effect, where the most vulnerable individuals bear the brunt of the reform. And vice versa, individuals who are able to work at older ages are in better health and tend to have more resources. Individuals' consumption can be a useful metric to evaluate how individuals fare through retirement. The consumption patterns suggests that individuals who retire early value pension benefits more at the margin than those retiring late.

Lesson 5: Disparities in life expectancy worsen the fairness of pension systems

Pensions try to insure and redistribute towards individuals with lower life-time earnings – either induced by early retirement or by lower income. The strong relationship between health and ability to earn also translates into strong life-expectancy gradients.

Individuals earning higher income and at later ages can expect to live longer lives and thus benefit more from pension benefits. This life expectancy gradient leads to unintentional redistribution, where higher-income individuals effectively receive more from the system than their lower-income counterparts (see Chapter 6).

To be clear, the payment of pension benefits as an annuity provides essential insurance against longevity risk. As a result, individuals who end up living longer will have received more benefits relative to those who happen to live shorter lives. There is clear value to this 'ex-post' insurance, and we do not propose to change the logic of the annuity system. But given the large disparities in longevity that are predictable 'ex-ante', we should wonder whether we can ask the same contributions from individuals who expect to live a shorter life. An appealing and transparent fairness criterion is that these individuals should have a similar ability to enjoy retirement at old age. While they can decide to retire later, they should be allowed to retire earlier with expected life-time resources that are proportional to their contributions. In other words, the expected ratio of pension benefits to contributions should arguably be equalised across groups with different life expectancy. This is the metric proposed in Chapter 6. Note that this 'bang for the buck' criterion that individuals should get the same total pension benefits per euro of contribution is much more limiting than the broader welfare view that we apply in our general framework in Chapter 5, where we also consider the insurance and redistributive value of pensions.[2] But adopting our broader welfare view one would also make a case for compensating individuals with shorter life expectancies.

Lesson 6: Well-targeted measures can provide fiscal space and redistribution

In Chapter 5, we identified reforms that can induce later retirement and entail desirable redistribution. In particular, on average, individuals retiring at the early retirement age (i.e., in their early 60s in most countries) are more resourceful than individuals retiring at the normal retirement age (i.e., in their late 60s).[3] Hence, we can steepen incentives between these two ages. This will have positive fiscal externalities, while offering desirable redistribution. Similarly, individuals with longer careers at any given retirement age tend to have fewer household resources and could thus be compensated without distorting their labour supply. Finally, individuals with fewer assets have a harder time to smooth their consumption into retirement. Generous minimum pensions with an asset test could effectively provide these individuals with valuable protections.

In identifying these opportunities, we must recognise the roles of health and gender as key markers for ensuring that pension systems are equitable. Targeted measures are necessary to protect individuals with lower lifetime earnings and worse health. Disability benefits can provide complementary insurance by ensuring that individuals leaving the

2   This 'bang for the buck' criterion is often invoked to justify increasing benefits for later retirement. Under this fairness view, compensating later retirement and compensating shorter life expectancies is equivalent, and should be equally supported.
3   This fact results from the wealth effect on labour supply: leisure being a normal good, wealthier individuals demand more. They tend to retire earlier, as they can afford it.

labour market early due to health shocks or disability continue to have some income. However, the challenge is that disability insurance only operates up to the retirement age, meaning that pension systems must be designed to allow for the accumulation of pension rights even during periods when individuals are receiving disability benefits. Reforms must also account for gender disparities, ensuring that women, who often have lower lifetime earnings but tend to live longer, are not disproportionately disadvantaged.

FURTHER IMPLICATIONS AND DISCUSSION

The fiscal sustainability of our pension systems is under pressure. All prognoses suggest that we cannot afford to wait, and have to act. This is also the case in the United States, as detailed in Chapter 8. The insights presented in this eBook offer a comprehensive understanding of pension reforms, balancing fiscal sustainability with insurance and redistribution effects.

Still, there are several additional areas where further research and policy attention are needed. An essential question is how pension benefits are valued and which beneficiaries value them most. New methods have been developed in the social insurance literature where individuals cannot reveal how much they value the social insurance through prices that they are willing to pay or not (e.g., Chetty, 2008; Landais and Spinnewijn, 2021). If people are very responsive to a reduction in resources, for example in their decision to retire, so-called income effects are likely large. However, if they do not respond much to incentives to retire later, so-called substitution effects are likely small. The two combined suggests that cuts in pension benefits come at a large cost and this is what the evidence, across different studies, seems to suggest. Similarly, Kolsrud et al. (2024) find that the marginal propensity to consume is particularly high for individuals retiring early or with low wealth, indicating that pension transfers are especially valuable for these group. This suggests that any reductions in benefits disproportionately harm low-wealth retirees or those forced to retire early. Evaluating how these responses relate to the value of pension transfers is a crucial area for future research.

As mentioned, another important consideration that is often overlooked is the distinction between retiring and claiming benefits and the separate role pension systems can play on either dimension. Central in this eBook is the idea of inducing individuals to work longer and of balancing this with the redistributive or insurance role pension systems play – a traditional trade-off between efficiency and equity. A related, but distinct question is whether to help smoothing consumption into retirement and how to handle the need for liquidity before retiring – a more nuanced trade-off between commitment and flexibility.

Finally, as policymakers think about how to handle disparities in life expectancy, we should also think about how to extend healthy life expectancy. Ensuring that people can not only live longer but also remain healthy and capable of working at later ages is vital to making retirement reforms that encourage delayed retirement both sustainable and humane.

Future pension reforms can adopt the new framework proposed here, ensuring that fiscal, insurance, and redistributive considerations are all addressed in tandem. This holistic approach will be crucial for designing pension systems that are both financially sound and socially fair in the decades to come.

REFERENCES

Chetty, R. (2008), "Moral hazard versus liquidity and optimal unemployment insurance", *Journal of Political Economy* 116(2): 173–234.

Kolsrud, J., C. Landais, D. Reck, and J. Spinnewijn (2024), "Retirement Consumption and Pension Design", *American Economic Review* 114(1): 89 – 133.

Landais, C. and J. Spinnewijn (2021), "The Value of Unemployment Insurance", *Review of Economic Studies* 6(88): 3041–3085.

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CENTRE FOR ECONOMIC POLICY RESEARCH

Population ageing is exerting unprecedented fiscal pressure on social security systems around the world. In response, many governments are implementing or planning pension reforms, often aimed at encouraging later retirement. A long-standing literature in public economics and labour economics investigates how the design of pension systems affects individual labour supply and retirement choices. In recent years, this literature has seen a revival, with a wave of new studies from Europe and the US combining high-quality administrative data, rigorous empirical methods, and conceptual innovations. This body of work has substantially advanced our knowledge of the effectiveness of various policy tools in encouraging later retirement and their welfare implications.

This book reviews insights from these new advances in research on retirement policy. Its primary objective is to distill policy lessons that can inform the intense ongoing policy debates and reform efforts in this area. The book begins by demonstrating that most major pension reforms in the last decades fall into a few common categories, and their effects on labour supply can be analysed within a simple framework. The authors then examine recent empirical evidence on the effectiveness of various reform options in impacting retirement behaviour and on social security finances. Beyond fiscal considerations, the book highlights the importance of assessing pension reforms by their ability to provide insurance against old-age poverty and to distribute resources fairly across socioeconomic groups. Moreover, the authors discuss interactions between pension reforms and other social insurance schemes.

Drawing on the expertise of a set of leading academics, the book provides fresh perspectives on how to rethink pension reforms.