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Christina Benita Wilke (Ed.)

Pension Reforms in the Nordic Countries and Germany

Conference Proceedings of the 2024 Annual Meeting of the German Society for Demography (DGD) by the Working Group on Demographic and Social Developments

FOM Hochschule | KCV

KCV KompetenzCentrum
für angewandte Volkswirtschaftslehre
der FOM Hochschule für Oekonomie & Management

Matthias Diermeier / Martin Drees / Ilari Ilmakunnas / Jari Kannisto / Satu Nivalainen / Ruth Maria Schüler / Mika Vidlund

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Contact Information

Prof. Dr. Christina Benita Wilke
FOM University of Applied Sciences
Professor of Economics
Scientific Director of the Competence Center for Applied Economics
(KCV KompetenzCentrum für angewandte Volkswirtschaftslehre)
Head of Academic Studies, FOM University Center Bremen
christina.wilke@fom.de

Foreword by the Chairs of the Working Group on Demographic and Social Developments of the German Society for Demography (DGD)

Dear readers,

This volume documents excerpts from our session on pension reforms in the Nordic countries and Germany at the Annual Meeting of the DGD at the University of Hamburg in March 2024.

Pension systems in Germany as well as the Nordic countries have been subject to substantial pension reforms in the past decades, foremost in order to respond to the demographic challenges these nations face. Both regions are experiencing aging populations, which puts pressure on public pension systems and requires innovative reform strategies to ensure sustainability. Although Germany and the Nordic countries share a history of strong welfare states, their approaches to pensions vary – offering valuable lessons in policy design, from the Nordic countries' rather flexible pension ages to Germany's evolving multipillar system. Looking forward, there is a need for further reforms that adapt to evolving demographic trends, ensure intergenerational fairness, and maintain fiscal sustainability, while also addressing new challenges such as digitalization and changing work patterns.

Empirical research has received many new impulses from debates on demographic challenges like those on pension systems. Our Working Group on Demographic and Social Developments of the German Society for Demography (DGD) is aimed at experienced scientists, doctoral students, and practitioners from administration, politics, and business. If you are interested in joining us, please have a look at our website: https://dgd-online.de/arbeitskreise/demografische-und-gesellschaftliche-entwicklungen/. We are always happy to welcome new members.

We would like to thank the FOM University as well as the Competence Center for Applied Economics (KCV KompetenzCentrum für angewandte Volkswirtschaftslehre) for the opportunity to publish the conference contributions to our session in this anthology. A special thank you goes to the FOM Publication Team and in specific to Ms. Sarah Berndsen for the thorough formal revision of all papers.

We wish you a stimulating and exciting read!

Bremen and Cologne, October 2024

Prof. Dr. Christina Benita Wilke (Editor)
DGD Working Group Chair
FOM University of Applied Sciences,
Essen and Bremen

Dr. Philipp Deschermeier
DGD Working Group Chair
German Economic Institute,
Cologne

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About the Editor

Prof. Dr. Christina Benita Wilke has been Professor of Economics at the FOM University of Applied Sciences since 2016. She is also Head of Academic Studies at the FOM University Center Bremen and Scientific Director of the KCV Competence Center for Applied Economics. Previously, she worked as a senior researcher and managing director at the Mannheim Research Institute for the Economics of Ageing (MEA) as well as senior expert and managing director of the Bremen branch of the Hamburg Institute of International Economics (HWWI). Her research focuses on demographic change, social and labour market policy and health economics.

About the Authors

Dr. rer. pol. Matthias Diermeier is head of the research unit Democracy, Society, Market Economy since 2022, and since 2024 managing director of IW Gesellschaftsforschung gGmbH. He obtained his Bachelor's degree in economics at the University of St. Gallen and the Universidad de San Andrés, Argentina. He completed his Master's in Economics at the University of Zurich and the Sciences Po Paris. From 2015 to 2022 he was personal assistant to the director at the German Economic Institute. He completed his Doctorate at the Institute of Political Science of the University of Duisburg-Essen (NRW School of Governance) in 2021.

Martin Drees started his PhD in Mathematics at the University of Bonn in the area of Chip Design in 2022. He has studied mathematics at the University of Bonn. As a private project, he is working on pension system design with a theoretic focus.

Dr Ilari Ilmakunnas is currently working as a senior researcher at the Finnish Centre for Pensions. His current research focuses on the evaluation of pension reforms, partial retirement, the adequacy of pensions, and the measurement of poverty. He obtained a PhD from the University of Turku in 2019.

Jari Kannisto (Lic. Phil.) works with statistics at the Planning Department of the Finnish Centre for Pensions (ETK). He started in ETK in 1986. For the last 25 years he has worked as a development manager, and before that as a statistician. The focus has always been on examining pensioners, retirement, and working careers.

Dr Satu Nivalainen is currently working as an economist at the Finnish Centre for Pensions. She has a long and many-sided experience in pension-related research. Her areas of expertise include retirement on an old-age pension, continued working, working careers, partial old-age pension, and behavioral effects of pension reforms. She obtained a PhD from the University of Jyväskylä in 2011.

Dr. rer. pol. Ruth Maria Schüler is economist for social security systems and income and wealth distribution with a research focus on pension security at the German Economic Institute since 2021. She holds a Master's degree in Economics from the University of Münster and a Master's degree in Economic History from the University of Lund, Sweden. She obtained her Bachelor's degree in Governance and Public Policy at the University of Passau. From 2012 to 2018 she was researcher at the ifo Institute Munich Centre for Educational Economics. She obtained her Doctorate in Economics at the Ludwig Maximilian University of Munich in 2016. From 2018 to 2021 she worked as an economist for education and political participation at the German Economic Institute.

Mika Vidlund (Lic.Soc.Sc.) works as team leader of the International Analysis Team within the Planning Department at the Finnish Centre for Pensions (ETK), which produces services needed in the implementation and development of earnings-related pensions. He has worked at the ETK since 1999, first as a Researcher and Special Adviser focusing on comparative pension research. He has also worked as an expert for Finland supporting the work of the European Commission DG Employment, Social Affairs, and Inclusion in 2010-2014. He has graduated (M.Soc.Sc) from the University of Turku in 2000 and has a Licentiate degree on Social Sciences from 2006.

Expected Effective Retirement Age and Exit Age in the Nordic Countries

Jari Kannisto / Mika Vidlund

Contact Information

Lic.Soc.Sc Mika Vidlund
Liaison Manager, Finnish Centre for Pensions, Planning Department, Helsinki
E-Mail: mika.vidlund@etk.fi

Preface

This article is based on our presentation at the annual conference of the German Society for Demography (DGD) in March 2024 at the University of Hamburg, held in cooperation with the demographic societies of the Nordic countries. We express our gratitude for the organizers of the conference and especially Dr. Christina Wilke and Dr. Philipp Deschermeier for the possibility to share our findings of the effective retirement age in the Nordic countries under a special session on Pension Reforms in the Nordic Countries and Germany.

We also want to thank the following national pension experts from the other Nordic countries who have also been responsible for the country specific data of this article: Alma Masic and Hanna Linnér (Swedish Pensions Agency, Sweden); Atle Fremming Bjørnstad and Ole Christian Lien (Norwegian Labour and Welfare Administration, Norway); Guðmundur Hjaltalín and Haukur Eggertsson (The Social Security Administration, Iceland); Michael Jørgensen, Amalie Woel, Jeppe Eir and Karen Skriver Lauger (ATP Group, Denmark).

July 2024

Mika Vidlund and Jari Kannisto, Finnish Centre for Pensions

Abstract

In recent years, one main objective of the reforms carried out in pension schemes has been to postpone effective retirement. The key question is whether the reforms have worked in line with the objectives and raised the effective retirement age. Official pensionable ages have been globally increased, but what has actually happened to the effective retirement age?

In this article we are looking for an answer to this question by examining the effective retirement age focusing on the Nordic countries by using three complementary indicators: employment rate, the labour market exit age, and the expected effective retirement age. The data for the employment rate and labour market exit age is based on Eurostat employment statistics (Labour Force Survey). The data for the expectancy is based on national data on retirees.

Since the indicators are closely related, they tell us mainly the same story. Policy measures have sought to delay retirement and indicators show that this has also happened. Although there are still some clear differences between countries within these indicators, they have narrowed during the review period covering years 2013-2022.

Despite an overall positive trend, the results are not that straightforward. For example, even though the old-age pension reform 2011 in Norway has led many seniors to work longer, Norway has also witnessed a strong growth in the number of seniors who are receiving their pension. After the 2011 reform, far more people, particularly men, work beside receiving a pension. This can also be seen comparing the difference between the exit age and the expected effective retirement age.

Countries can be divided into two groups when calculating the difference between exit age and expected effective retirement age for 50-year-olds. The difference between these two indicators in Iceland and Norway is two to three years higher than in Denmark, Finland, and Sweden. Higher exit age illustrates that continued work after retirement is more common in the former group of countries.

In this article, we have also calculated the retirement period based on life expectancy statistics published by Eurostat. The average length of retirement is between 16 and 21 years when the calculation is based on the exit age. In all countries the time spent in retirement was shorter for men than for women.

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1.1 Introduction

Nordic countries have carried out significant pension reforms, especially in the 2000s, to strengthen the financial sustainability of pension schemes and to secure pension adequacy in a context of increasing life expectancy. The countries have been linking benefits or retirement ages, or both, to life expectancy while restricting or closing routes to early retirement. The reforms aim to increase the effective age of retirement which, together with increased labour participation of older workers, would alleviate the burden of an ageing population. The key question is whether the reforms have worked in line with the objectives and raised the effective retirement age.

This article provides cross-national comparison on the development of the effective retirement age and exit age in the Nordic countries based on statistical analysis. Note that retirement is defined as withdrawing a pension, regardless of whether the person continues to work. To measure labour market withdrawal as well, three complementary indicators – employment rates, the labour market exit age, and the expected effective retirement age– are used in this paper. These indicators are calculated in the same way in all countries. The survey is done for the years 2013-2022.

It is worth to notice that Finland and Denmark have been countries with several pathways to early retirement, but these have been reduced together with the increase in retirement ages. Whereas in Sweden, Iceland, and Norway, people have traditionally worked longer than in other Nordic or EU countries and can well be described as persistent late retirement countries.

Simultaneously, the current trend in pension system design seems to lean towards flexible retirement solutions by increasing individual choices and options for pension take-up. According to a Eurofound study (Dubois et al., 2016), it appears that Sweden, Norway, and Finland are among the forerunners of this evolution and ahead of many European countries. All three Nordic countries have established decoupled systems, in which people can draw early old-age pensions regardless of whether they stop working or not (Vidlund, 2017; 2023).

This article is structured as follows. Section 2 presents frames for retirement in the Nordic countries This is followed by a description of data and a definition of the indicators in section 3. Results are presented in section 4. Section 5 describes the time spent in retirement based on labour market exit age and life expectancy statistics. Finally, conclusions are provided in section 6.

1.2 Frames for retirement in the Nordic countries

Retirement age is the single most important factor in retirement. Changes in pension acts have, among other things, raised the retirement age and closed early exit routes in an attempt to postpone retirement, even though reforms may have long transition periods.

The statutory earning-related old-age pension systems in Finland, Norway, and Sweden are flexible in terms of the retirement age, and the system gives individuals more choice in their retirement decisions. Individuals have a right to choose when they will retire on an old-age pension, after they have reached the lowest possible retirement age (Figure 1).

Possibility to retire flexibly on the earnings-related pension was established in Sweden in the 1999-2002 structural pension reform and in Finland in the 2005 pension reform (see e.g., Barr, 2013a; 2013b). In Sweden the lowest retirement age was then set at 61 and in Finland at 63 years of age. The process of increasing the retirement ages within the Finnish pension system was initiated in 2017 and in the Swedish pension system in 2020. Both countries have linked retirement age to life-expectancy (e.g., OECD, 2023; Andersen, 2021b).

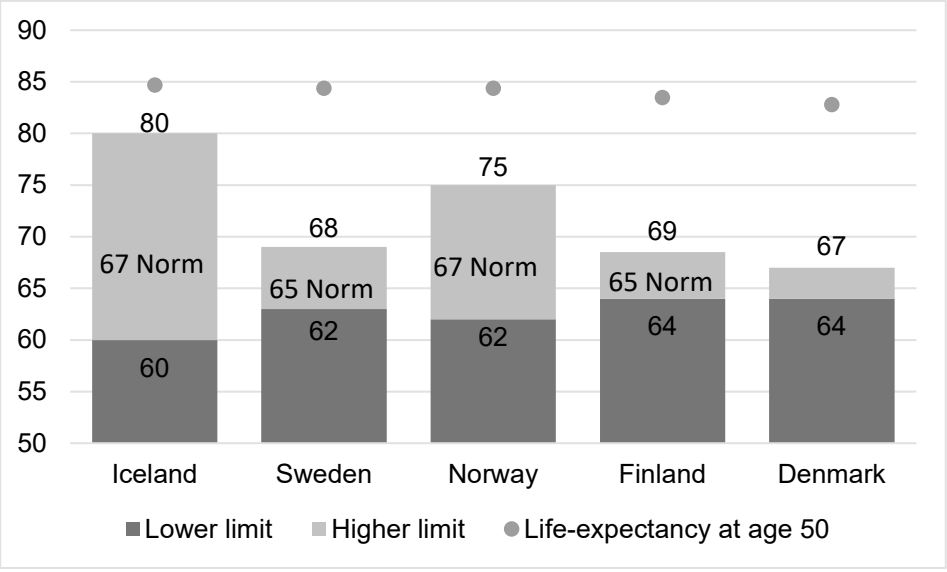
In Norway the 2011 pension reform introduced a flexible withdrawal age between ages 62 and 75. In the old system the withdrawal age was fixed at 67 years. Retirement at the age of 62 is an option for those with pension entitlements at least as high as the minimum pension. Before the reform only certain groups had access to early retirement from age 62, and one had to withdraw completely from the labour market to receive an early retirement pension (e.g., Andersen 2021a; European Commission, 2024). After 2010 one could continue working full-time and still withdraw a pension at age 62. This has turned out to be a popular option. One goal of the reform was to provide good work incentives for pensioners. Forthcoming reform in 2026 will link the lowest retirement age to the development of life-expectancy (Ministry of Labour and Social Inclusion, 2023a).

In Denmark the most important reform has been to link the retirement age of 67 to life expectancy in 2011. Early retirement is provided by a specific voluntary early retirement scheme (i.e., VERP, efterløn). The retirement age for the VERP was raised from 2013 and onwards, and the length of time that it was possible to receive VERP before the retirement age for old-age pension was reduced from five to three years. Another important reform was the reform of the disability pension scheme in 2012 (Kannisto & Vidlund, 2022).

In Iceland general retirement age has been fixed for decades to 67 with a possibility to retire early at the age of 65. However, under the act-regulated mandatory occupational pension scheme early retirement rules may vary between funds. The normal retirement age is 67 but the supplementary pension savings can be claimed earliest from the age of 60 (see e.g. IPFA 2024; Danielsson et al. 2023). Retirement age is 60 years also for seamen if they have been working in this occupation for at least 25 years.

In all the Nordic countries retirement age for minimum pension sets a kind of norm for retirement. Many social insurance benefits are also paid up to this age. For example, in Sweden there has been a strong tendency to claim pension at age 65 regardless of the flexibility in the reformed earnings-related pension system. In Finland and Sweden retirement age for minimum pension was 65 whereas in Iceland, Norway and Denmark it was 67 in 2022. These ages are linked to the development of life-expectancy in Sweden, Finland and Denmark.

Figure 1: Retirement ages and life-expectancy in 2022



Source: Finnish Centre for Pensions; Lifeindenmark; Norwegian Labour and Welfare Administration; Social Insurance Administration Iceland; Swedish Pensions Agency.

1.3 Data and methods

1.3.1 Definition of employment rates

The employment rate is the percentage share of employed persons in the population of the same age. The review is based on the annual average values of the labour force survey by Eurostat covering years 2013-2022. A person is considered employed, when, during the survey week, they received a monetary salary or fringe benefits or profit for at least an hour of gainful employment, or someone who has been temporarily off work. More detailed definitions are available from the workforce research of Eurostat (2024).

1.3.2 Definition and calculation of the labour market exit age

The labour market exit age measures the average age of exit from the labour market. The calculation is based on individuals who are in the labour force at the age of 50. The calculation is made by comparing the labour force participation for every following age group after the age of 50 with the labour force participation at 50 years of age. By doing so, an expected exit age from the labour force is obtained.

50-year-old individuals are used as a baseline for the calculations because of the assumption that the labour force participation is at its peak at the age of 50.

The calculation of the exit age is performed by using a static method that includes data for only one year rather than comparing two years. The basis of the calculation is the changes in labour force participation between successive ages in the given year.

A static method says nothing about the average age when a certain cohort withdraws from work; it shows a snapshot given the current characteristics of the labour market. The result from the static method shows the age at which people who are 50 years old would exit the workforce if the labour force patterns remained the same as in the given year.

The data is based on Eurostat employment statistics (Labour Force Survey). A minimum of one hour of work per week is required to be included in the labour force. The labour force also consists of persons who are unemployed but available for employment. In these statistics pensioners are also employed if they do a little work. Exit age measures the endpoint for work. Therefore, the retirement age in calculation of exit age usually rises higher than effective retirement age,

because it also includes the working time at retirement. It also makes comparisons between countries more difficult, as the importance of work in the livelihoods of pensioners varies from country to country.

Results are obtained by interpolating labour force participation rates in one-year age groups from five-year age groups data. If we used one-year age groups instead of interpolation, the random variability in the results could be greater.

The mathematical description for the calculation of exit age can be found from the Appendix 1.1.

1.3.3 Definition and calculation of expected effective retirement age

The expected effective retirement age is calculated in a way that is similar to the method used in calculating average remaining life expectancy. The indicator describes the effective retirement age, assuming that the retirement risk and mortality for each age group remains at the level of the year of observation. A key point is that the indicator is not affected by the age structure of the population.

The expected effective retirement age can be calculated for persons at any age. This article presents the estimated effective retirement age in each country for 50-year-olds based on coherent data. The data for the expected effective retirement age has mainly been obtained from the employment data of each country's statistics office, and they include the statutory (or public) pensions for the persons resident in the country. For Norway, the data has been obtained from the Norwegian Labour and Welfare Administration (NAV). Mode of calculation is presented more detailed in the Appendix 1.2.

1.4 Results

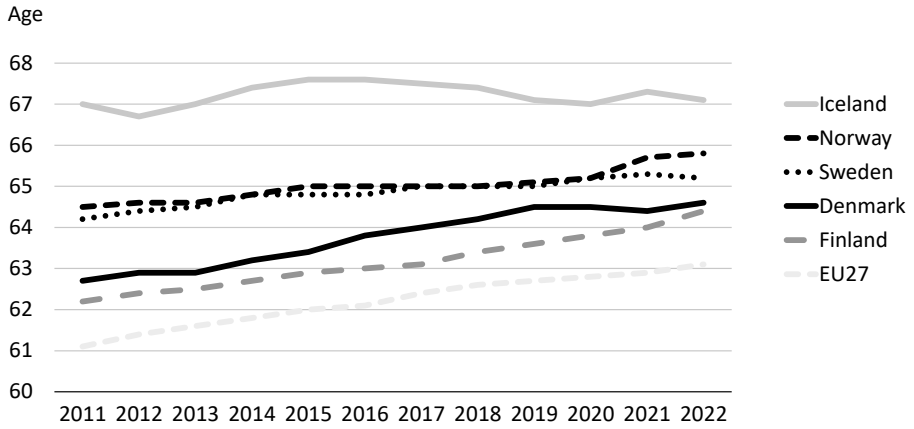
1.4.1 Employment rate of 55-64-year-olds has progressed favourably

A common target in pension policy for at least 20 years or more has been to increase employment rates of those aged 55 to 64 years. Employment rate for the younger part of this age group, meaning 55 to 59-year-olds, has already successfully increased to the same level as general employment rate. Employment has also improved significantly among the 60 to 64-year-olds.

Iceland has the highest employment rate in the Nordics (Figure 2). Denmark has clearly approached the level of the leading countries but not as rapidly in 2022 as before. At the same time, Finland has narrowed the gap to Denmark.

The employment rates in these two countries are still clearly below Sweden and Iceland. In general, the level in the Nordic countries is higher than the EU-average.

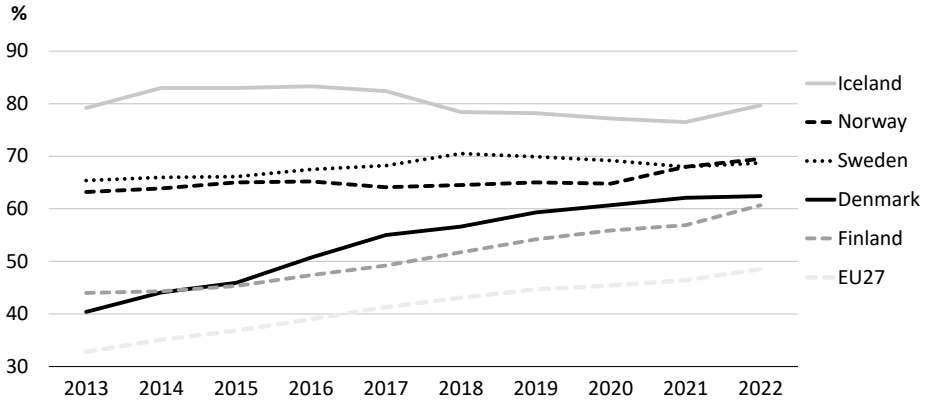
Figure 2: 55-64-year-olds employment rate in the Nordic countries and EU



Source: Eurostat, Employment, Labour Force Surveys

At present, the focus should be increasingly on the over-60-year-olds. The over-60s are even more interesting because they are often the target of current pension policy measures and there is still more to be achieved. The employment rate among the 60 to 64-year-olds is lower than for younger age groups but a positive trend can be observed here as well (Figure 3). Pension reforms have been one of the key drivers contributing to the increased labour force participation of ageing people. Of course, it is important to realize that the reforms of pension policy are only one enabling factor to encourage longer work careers. Much depends on the economic growth but also on the reforms in working life and quality of work life.

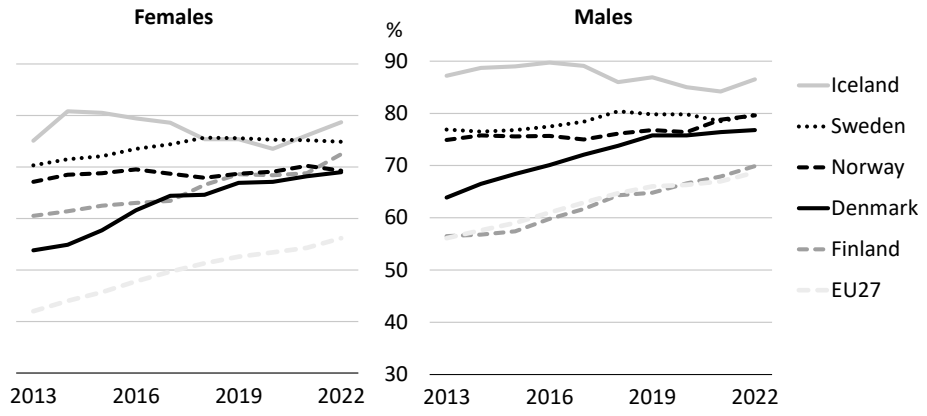
Figure 3: 60-64-year-olds employment rate in the Nordic countries and EU



Source: Eurostat, Employment, Labour Force Surveys

Employment rate for men is generally higher than for women. Women can be seen to be at the level at which men were a decade ago (Figure 4). In general, men have a five to ten percentage points higher employment rate than women. This difference has slightly decreased in last ten years. However, there is one exemption in comparison. In Finland older women have higher employment rate than men which is also globally quite exceptional. The employment rate of older men in Finland is hardly at the level of EU-average and much lower than in the other Nordic countries.

Figure 4: 55-64-year-olds' employment rates by gender in the Nordic countries and EU



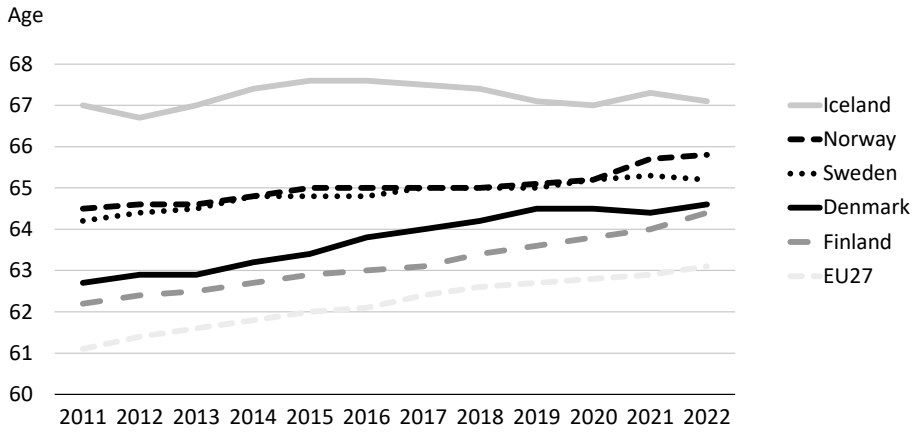
Source: Eurostat, Employment, Labour Force Surveys

1.4.2 Labour market exit age is highest in Iceland

The exit age has risen in the Nordic countries and throughout the EU (Figure 5). Only in Iceland the exit age has not increased in the 2010s, but there the exit age has been clearly higher than in the other countries already a decade ago, and still is. Although the differences between countries are still clear, they have narrowed. Denmark and Finland belong to a group with a lower exit age than the other Nordic countries. But they are still more than one year higher than the EU-average.

Between 2011 and 20222 Finland has experienced the largest increase in the exit age of more than two years, followed by Denmark with an increase of almost two years. In Norway the rise has been 1.2 years and in Sweden less than a year. The average increase in the exit age for the whole of the EU has been two years.

Figure 5: Labour market exit age for 50-year-olds

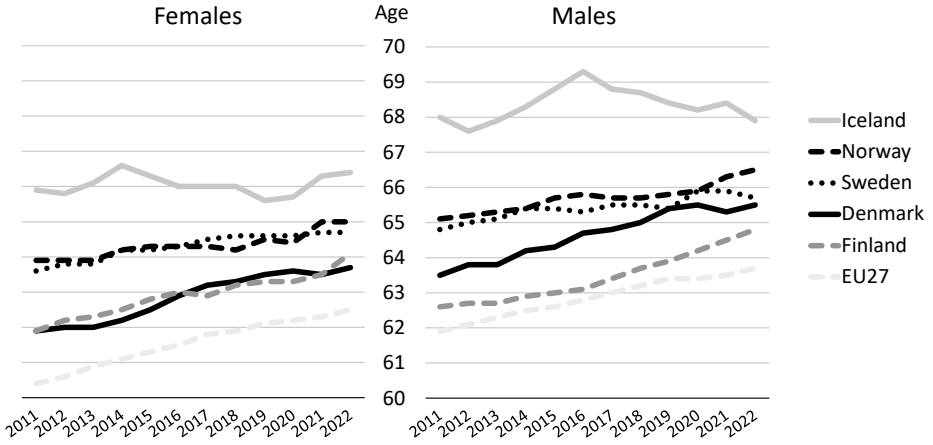


Source: Own computation

The exit age has increased during the period under review for both men and women. Exit age is clearly higher for men than for women. In Iceland exit age is very high, especially for men – it is even higher than general retirement age 67.

In 2022, the average difference in favour of men was more than one year. In Denmark, it was almost two years and in Iceland and Norway a year and a half. In Sweden the difference was one year and in Finland less than a year.

Figure 6: Difference of the exit age between males and females



Source: Own computation

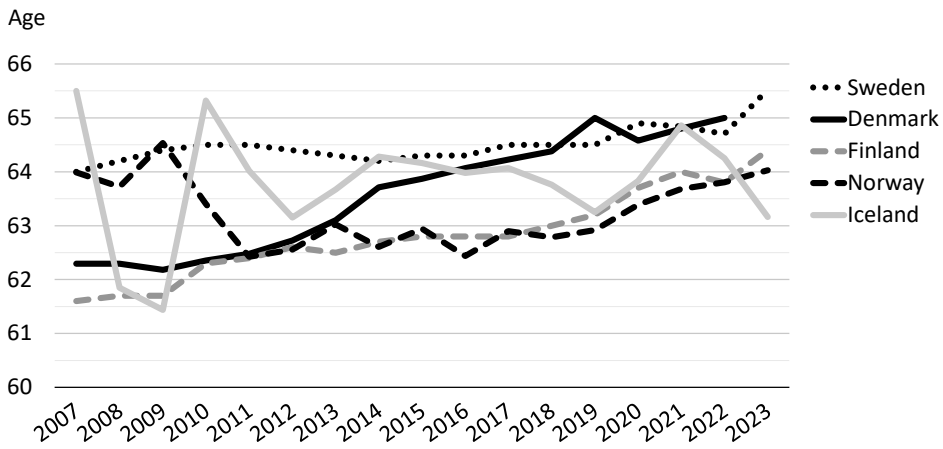
1.4.3 Expected effective retirement age – Sweden at the top

Three main points can be observed when focusing on the expected effective retirement age for 50-year-olds. First, Sweden has remained on a high level with minor changes and has the highest effective retirement age. Secondly, Denmark and Finland have a significant rise in this indicator in 15 years. Thirdly, in Norway and Iceland the expectancy has decreased; in Norway mainly because of the 2011 pension reform which decreased the retirement age. However, after that it has increased.

In Iceland, there is a high degree of fluctuation, which is partly explained by a comparatively small size of population and the yearly statistics on mortality and number of pensioners may therefore undergo substantial random variation. However, the state of the economy is strongly reflected in the effective retirement age. In addition to the 2008 financial crisis, Iceland suffered from an internal bank crisis in the early 2010s, which is seen in the swaying figures depicting the country's effective retirement age. The consequences of the fall of the banks were more or less immediate in late 2008, and people could either retire immediately or stay on unemployment benefits for up to two and half years (see also Danielsson et al., 2023).

Recent decline after COVID-19 is related to the fact that senior citizens have started taking payments earlier from pension funds before they start receiving a pension from social security system. Figures from Statistics Iceland (2024) show an increase in the number of old-age pensioners who claim early pension instead of normal retirement age 67. For example, about a quarter of people aged 65-66 had started drawing a pension in 2007, but this proportion had risen to 43% in 2022. The figures also show that the majority of this group only draws pensions from pension funds, and there are indications that many who do so are still in the labour market (see also Danielsson et al., 2023).

Figure 7: Expected effective retirement age for 50-year-old*



* Finland: provisional data for 2021-2023.
Source: Own computation

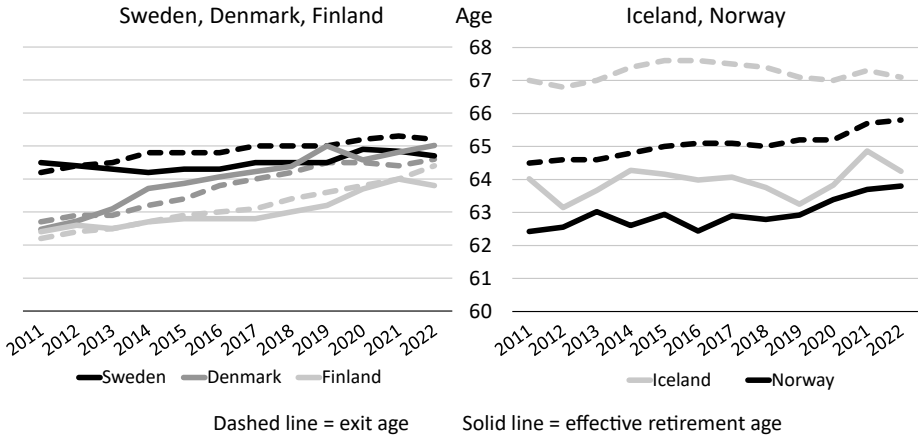
1.4.4 Difference between the effective retirement age and the labour market exit age

When we compare the labour market exit age to the effective retirement age, we notice that the difference between these two indicators varies greatly between the compared countries. In this respect, the Nordic countries are divided into two groups.

In the first group, Finland, Sweden, and Denmark, the difference is small: only around half a year. In the second group, Norway and Iceland, there is a clear gap between indicators, about two years or even more. This means that in the first

group working in retirement is not as common as in the second group. In Finland, Sweden and Denmark work ends usually when you retire, but in Norway and Iceland it is usual to continue working after retirement.

Figure 8: Labour market exit age and expected effective retirement age for 50-year-olds in 2011-2022



Source: Own computation

In general, the exit age is higher than the expectancy, though in Denmark the situation has been somewhat different. There are probably several underlying reasons for the difference between the exit age and the expectancy, and the phenomenon can be approached from different directions. Different reasons underly the various behaviour in the countries of comparison, including flexible labour markets, pension levels, and other safety nets, as well as employment opportunities for retirees. As a rule, pension in the Nordic countries secure a basic income for retirees, meaning people are not forced to work in retirement.

Traditionally, part-time working has been extensive in Sweden. This has helped people continue working until their retirement age. Pension legislation also plays a central role. The pension reforms in Finland and Denmark have reduced the opportunities for early retirement and raised the retirement age.

In Norway the new, flexible retirement age allows for retirement at an earlier age than before. Many have taken this opportunity to retire at an earlier age although they have continued working. It is common, especially among men, to withdraw the mandatory pension as soon as possible (at age 62) and still continue working. According to statistics from NAV (2024) over 60 per cent of new old age pension-

ers in Norway were still working one year after retirement. For those who continued working, the average working hours exceeded 30 hours a week one year after retirement, which illustrates that it is common to combine a full pension with full-time work (see also Ministry of Labour and Social Inclusion, 2023b).

The Icelandic society focuses strongly on working and entrepreneurship. Many work in retirement or at least until reaching their retirement age which has been the highest in the Nordic countries for a long time. Traditionally, the employment rate in Iceland is high, also among those approaching the retirement age. During financial crises, it has been possible to retire more easily. Despite that, many older people have worked, if work has been available.

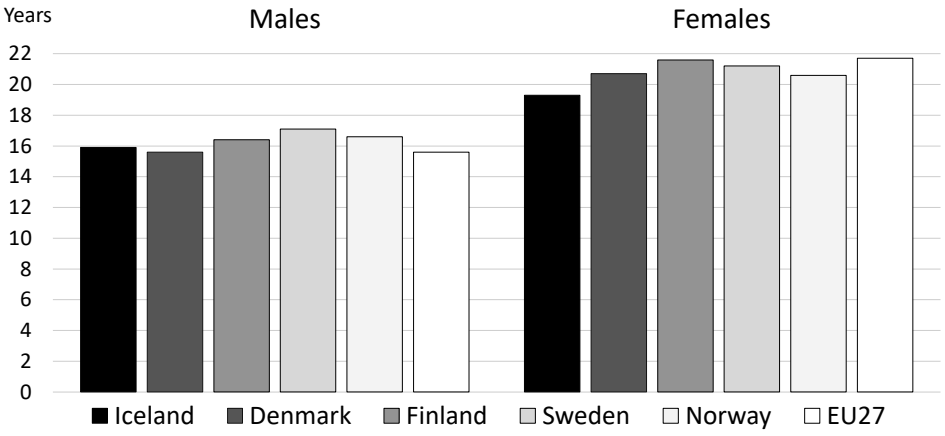
1.4.5 Life expectancy and years in retirement

Once the exit age from the labour market or the expected effective retirement age has been calculated, we can also compare how much the length of retirement varies between countries. In the following, the time of retirement has been obtained by calculating the difference between life expectancy for 50-year-olds and the labour market exit age. This indicator demonstrates how pension systems interact with labour market exit and reveals the financial pressures on the pension system in the context of an ageing population.

In general, the length of time spent in retirement for men seems to be shorter than for women in every country (Figure 9). The gap between men and women is about four to five years. Men spend on average 16 years and women 21 years in retirement. There are two main reasons behind this gap: women retire earlier, and they live longer.

Among men, the shortest time in retirement is in Denmark and the longest in Sweden. For women, the shortest time in retirement is in Iceland, whereas Finnish women spend the longest time in retirement: as long as women in the EU-27 on average.

Figure 9: Calculated length of the time after work* by gender in 2022



*Obtained using exit age (2022) and life expectancy (2021) for 50-year-old.

Source: Own computation

Nordic countries, with the exception of Iceland, have implemented reforms that link retirement age to changes in life expectancy to ensure sustainability of the pension systems. Denmark has chosen ambitious retirement age indexation, where the statutory retirement age will gradually increase, targeting the age at which remaining life expectancy after retirement should be constant at 14.5 years. Currently, there is a large cap for reaching this target even though calculation method is somewhat different than the one expressed above. Projections indicate that the statutory retirement age will reach from 67 to 74 by 2070 and be the highest planned retirement age across OECD countries (OECD, 2023).

1.5 Conclusions

Instead of a single indicator, we have used three different indicators to answer the question of when people retire. There are differences in the definitions of the indicators which affect the results. However, in conclusion, we can remark that indicators show the impact of pension reforms. Reforms have postponed successfully effective retirement ages in the Nordic countries.

Use of multiple indicators is necessary because retirement can no longer be seen as a cliff-edge at which work stops and retirement begins. Nordic countries have introduced models to eliminate cliff-edge retirement policies, to encourage part-time and flexible working, and to defer retirement.

Lessons from Norway reveal that the desire to start cashing in pension rights is powerful, but it does not mean that people want to stop working as soon as they reach their earliest possible retirement age or get the money. In Norway development is thus two-folded: effective retirement age has decreased because of possibility to take pension earlier – but exit age from the labour market has increased when people continue working at retirement.

A source of worry in this context, as also noted in the European Commission's (2024) report, is that older workers expose themselves to a very significant reduction in the annual benefits they will receive over the retirement phase and end up with very low incomes in the later stages of their retirement. Thus, flexibility in retirement can come at a price. This is also one of the reasons why the earliest retirement age is to be increased in Norway and has already been raised in Sweden and Finland.

In general, indicators reveal that there are still significant differences between the genders. Women have clearly lower exit ages from the labour market than men. The employment rates have risen but women are still lagging behind men, except in Finland which is quite unique even in global comparison.

Appendix 1.1: Mode of calculating labour market exit age

u^x = *Exit age*

$$u^x = \left(\sum_{j=51}^{74} a_j^x / a_{50}^x \right) + 50.5$$

where a_j^x = labour force participation rate during year *x* at age *j.*

Appendix 1.2: Mode of calculating the expected effective retirement age

x = year of observation,

z_j^x = persons resident in the country at the end of year *x*, whose age at the end of year *x* is *j*,

p_j^x = retired persons (at the end of year *x*), whose age at the end of year *x* is *j*,

v_j^x = non-retired persons (at the end of year *x*), whose age at the end of year *x* is *j*,

${}^*e_j^x$ = persons who have retired during year *x* (obtained as the difference between stocks of pensions)

whose age at the end of year *x* is *j*,

y_j^x = mortality (risk of death) year *x* for persons whose age at the end of year *x* is *j*,

f_j = mortality factor in age group *j* = $\begin{cases} 9, when\ \ j < 50, \\ 3, when\ \ 50 \leq j < 60, \\ 1, when\ \ j \geq 60. \end{cases}$

Mortality for the whole population and for those who are retired differs. This high mortality for those who are retired is taken into account through the mortality factor f_j.

In which case:

$$^{*}e_j^x := p_j^x - p_{j-1}^{x-1} \cdot (1 - f_j \cdot y_j^x)$$

In this case the retirement risk, i.e., retirement risk in year *x* at age *j*, is:

$$e_j^x := {}^{*}e_j^x \,/ v_{j-1}^{x-1}$$

and the probability of retirement at age *j* is derived from the formula

$$A_j^x := e_j^x \prod_{k=30}^{j-1} (1 - e_k^x - y_k^x)$$

The expected effective retirement age for 30-year-olds is the age average of figure A_j^x:

$$E_{30}^x := \left(\sum_{j=30}^{70} j\, A_j^x\right) / \sum_{j=30}^{70} A_j^x$$

At the Nordic level the development of the expectancy for 30-year-olds and for 50-year-olds

is monitored.

The retirement probability used for 70-year-olds is 1.

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Labor Market Effects of Increasing Statutory Retirement Age: The 2017 Pension Reform in Finland

Satu Nivalainen / Ilari Ilmakunnas

Contact Information

Dr Satu Nivalainen
Economist at the Finnish Centre for Pensions, Helsinki, Finland
E-Mail: satu.nivalainen@etk.fi

Abstract

We study the labor market effects of the 2017 pension reform in Finland. The statutory retirement age of the studied cohorts increased from 63 years for the 1954 cohort to 63 years and six months for the 1956 cohort. Using total register data recorded at a monthly level and a differences-in-differences approach, we estimate the effect of this reform on retirement, employment, unemployment, disability, sickness, and inactivity. We find an increase in the employment rate of 19 percentage points between the old and the new retirement age, but also a notable increase in unemployment, inactivity, and disability. For the most part – but not entirely – this is explained by the persistence of the previous labor market state. There are no large gender differences, but the effects vary considerably by education and employment sector.

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2.1 Introduction

In response to rapidly aging populations, many countries have reformed their pension systems in recent decades. In most cases, the reforms have included rising pension eligibility ages. The aim has been to secure the financial sustainability of pension systems by extending working lives and increasing the employment rate of older persons (Hinrichs, 2021).

Finland is no exception: the Finnish pension system underwent a reform in 2017. There are no early retirement ages (ERA) in the Finnish pension system, and before the reform the statutory retirement age (SRA; often referred to as the Normal Retirement Age, NRA), the minimum age at which full pension benefits could be claimed, was 63 years. It was believed that financial incentives would encourage people to continue at work after reaching their SRA. However, the financial incentives did not have the desired effect (e.g., Gruber et al., 2022). Therefore, in the 2017 reform it was agreed that the SRA will increase by three months for each birth cohort until it is at 65 years. The first cohort affected was that born in 1955. For those born in 1962-1964, the SRA is 65 years, after which it will be linked to changes in life expectancy. Only if the reform succeeds in postponing retirement and extending working lives can the sustainability of the pension system be secured.

Understanding individuals' behavioral response to pension reforms raising the eligibility age for the old-age pension is crucial for determining their success. In this study, we investigate the effects of the rising SRA on employment and other labor market outcomes of older individuals in Finland. We utilize the cohort-based changes in retirement age resulting from the 2017 pension reform and study the cohorts born in 1954–1956. For those born in 1954, the SRA was 63 years (control group), and for those born in 1955 and 1956, it was 63 years three months and 63 years six months, respectively (treatment groups). We exploit the exogenous variation that the reform has induced in the retirement age and identify the impact of the rising retirement age on labor market outcomes by comparing cohorts who face different retirement ages. We use a differences-in-differences design, which allows us to isolate causal effects that manifest between the old and new statutory retirement age.

Our analysis relates to the literature examining behavioral effects of changes in the retirement age on labor market outcomes. Due to numerous pension reforms in Europe and other countries in recent decades, the research interest towards the effects of pension reforms has increased. First studies investigated the effects

of rising NRA in the US and mainly focused on the retirement decision (Mastrobuoni, 2009; Behagel & Blau, 2012), but nowadays a growing literature especially in Europe has evaluated the effects of the rising retirement age on employment and other labor market outcomes (e.g., Staubli & Zweimüller, 2013; Atalay & Barret, 2015; Manoli & Weber, 2016; Cribb et al., 2016; Rabaté & Rochut, 2020; Atav et al., 2019; 2021; Geyer et al., 2020; Geyer & Welteke, 2021; Soosaar et al., 2021; Morris, 2021; 2022). The overall conclusion is that the rising retirement age postpones retirement and positively affects the employment rate, but the size of the effect varies greatly between studies. This is due to, for example, differences in age limits for the old-age pension, financial incentives of the pension system, pre-reform employment rates and bunching at the ERA/SRA.

We build on previous studies in several ways. Many of them have focused on changes in the ERA, and due to the nature of the reforms, the effects have been estimated among women (Atalay & Barret, 2015; Cribb et al., 2016; Geyer et al., 2020; Geyer & Welteke, 2021; Morris, 2021; 2022). Therefore, examining the impacts separately for men and women has not been possible. We provide an evaluation of the labor market impacts of the rising SRA in a Nordic welfare state – Finland – where men and women have the same retirement age. Finland makes an interesting case since, unlike in most European countries and the US, the employment rate of 55-64-year-old Finnish women is as high as that of men (66 per cent vs 67 per cent), and older women are significantly more often highly educated than men (50 per cent vs 36 per cent) (Eurostat, 2024). While many existing studies have relied on samples or surveys, we use individual-level total population register data including all Finns born in 1954–1956. Information on retirement and several other labor market outcomes is available at a monthly level, and we can precisely follow individuals' labor market trajectories from the month they turn 60 until the month they turn 64. Hence, we can isolate the effect of increasing SRA on different labor market outcomes more comprehensively and with greater accuracy than most previous studies. We are also able to investigate the effect of increasing SRA on the use of alternative pathways to retirement. In addition to gender differences, our rich data allows us to study socioeconomic differences in the effects of increasing SRA, an issue disregarded in most studies analyzing the effects of pension reforms.

We estimate the effect of the reform on multiple labor market outcomes: retirement, employment, unemployment, disability, sickness, and inactivity. By focusing on several labor market outcomes, we can gain insight into these effects in more detail than most previous studies. Even though the aim of the reform is to

extend working lives and increase employment, it is also likely to impact the use of alternative pathways to retirement, as all individuals are not able or willing to work until the higher retirement age. In that sense the reform has some potential adverse effects, which are called substitution effects (e.g., Rabaté & Rochut, 2020; Geyer & Welteke, 2021). Importantly, substitution effects may stem from passive or active substitution. Passive substitution effects occur, for example, if individuals who are already out of employment stay longer in their current labor market state due to the increased retirement age. On the other hand, as the retirement age increases, the time window during which transitions between different labor market states are possible extends. For example, someone who is employed may become unemployed before reaching their new retirement age. These transitions are called active substitution effects. We inspect the reform-induced persistence of the previous labor market state as well as transitions between labor market states. Our study hence also relates to the strand of literature which investigates the substitution between social insurance programs (e.g., Duggan et al., 2007; Karlström et al., 2008; Staubli, 2011; Inderbitzin et al., 2016). A general finding in these studies is that tightening the criteria of one pathway leads to substitution effects into alternative early exit pathways such as unemployment, disability, or sickness benefits. In the context of rising retirement age, the use of alternative routes to retirement has rarely been thoroughly examined (see however Rabaté & Rochut, 2020).

Our study also contributes to the literature concerning socioeconomic inequalities in the labor market. We investigate the effect heterogeneity not only according to gender, but also by level of education. When designing and reforming the pension system it is important to understand how different groups respond to these reforms. In case of rising retirement age, the possibilities to work until old-age pension depend on the employment opportunities and individual abilities to continue to work longer (Ebbinghaus & Hofäcker, 2013; Oude Hengel et al., 2021). As mentioned earlier, Finland makes an interesting case for studying gender differences. Moreover, it is known that there is a social gradient in the labor market exit: low-educated workers leave the labor market earlier than high-educated workers, and often this is involuntary (Mäcken et al., 2022). This is not only due to more demanding working conditions and weaker health which increase the risk of disability, but also to unemployment (Polvinen et al., 2013; Robroek et al., 2015; OECD, 2015). As a result, low-educated workers are likely to have more difficulties in reaching their new retirement age, which may lead to increasing social and economic inequalities between different socioeconomic groups. Earlier evidence on the effects according to gender or education is limited. Atav et al.

(2019) found a larger employment effect for men, and Geyer et al. (2020) found that for women with low or medium education, the employment effect of the ERA increase was accompanied by equally large substitution effects to other labor market states.

Our results show that the SRA increase resulted in a large employment effect of 19 percentage points between the old and the new retirement age. Employment response is quite substantial, as the employment effect represents 60 per cent of the decrease in the retirement rate induced by the reform. We also find a large increase in unemployment, inactivity and disability, and a smaller increase in the use of sickness benefits. For the most part, this is due to passive substitution, but we also evidence active substitution from employment to other labor market states. Even though transitions from unemployment and sickness to employment also occur, the transitions out of employment clearly outweigh the transitions towards employment. There are practically no differences in the effects according to gender. For the low-educated individuals, the substitution effects to labor market states outside employment are larger than for the high-educated individuals, which means that the increase in the SRA is less efficient in terms of employment for this more vulnerable group in the labor market.

The remainder of this paper proceeds as follows. Section 2 describes the institutional setting and the reform of 2017. The data and the empirical methodology are presented in section 3. Section 4 provides descriptive evidence on how employment and other labor market states developed at the time of the reform. The regression results are presented in section 5, and section 6 concludes.

2.2 Institutional setup and the 2017 pension reform

The Finnish pension system consists of three pillars. The statutory pension system (first pillar) includes the employment-based earnings-related pension and residence-based national and guarantee pensions. The national and guarantee pensions aim at ensuring a basic income security. The earnings-related pension system is a defined benefit system where the pension level is determined by the length of work history and the amount of past earnings. The earnings-related system is mandatory and covers all workers and virtually all earnings. Pension accrues throughout working life with contributions paid by employees and employers. Statutory pensions are broad in scope, and there is no ceiling to the pensionable earnings or the pension amount. Contrary to what is the case in many other countries, the role of second-pillar or third-pillar supplementary pensions is minor

in Finland. In the private sector, earnings-related pensions are mainly provided by pension insurance companies. The public sector has its own pension provider.

The Finnish earnings-related pension system was reformed in 2017. Before the reform, the statutory retirement age (SRA) was 63 years for all, independent of cohort. Like the US and a couple of other countries, Finland has a flexible retirement age, which means that an individual can take out their pension within a certain age range. The SRA is the minimum age at which the full pension benefits can be claimed (often referred as the NRA). There are no ERAs in the Finnish pension system.[1] In the 2017 reform, it was agreed that the SRA will be increased by three months for each cohort. The first cohort affected by the reform was that born in 1955. Its SRA increased to 63 years and three months. Those born in 1956 had an SRA of 63 years and six months, and so on. The retirement age increases by three months until it reaches 65 for the cohort born in 1962. For those born in 1963–1964, the threshold is also 65 years. As of those born in 1965, the old-age retirement age will be linked to life expectancy. After that, the rise in the retirement age can be two months per cohort at most. The key aspects of the Finnish pension system before and after the 2017 reform are given in Table 1.

[1] Partial old-age pension allows to take out 25 per cent or 50 per cent of accrued earnings-related pension at age 61 (with an actuarial adjustment).

Table 1: Changes in pension rules in 2017 pension reform

	Before 2017	Starting from 2017
Old-age retirement age	Flexible retirement age. Lowest age limit for full old-age pension: 63 years. Upper age limit for insurance obligation: 68 years.	Flexible retirement age. Lowest age limit for full old-age pension raised three months per cohort (starting from the cohort 1955) until the limit is 65 (for cohorts 1962–1964). After that the lowest age limit is tied to changes in life-expectancy. The upper age limit for insurance obligation will increase to 70 years.
Pension accrual rate, by age	18–52: 1.5 per cent of annual earnings 53–62: 1.9 per cent of annual earnings	From 17 to upper age limit of insurance obligation: 1.5 per cent of annual earnings.
Pension accrual after the lowest retirement age	4.5 per cent of annual earnings between ages 63–68. Delayed retirement credit 4.8 per cent per year of accrued pension after age 68.	Accrual rate 1.5 per cent of annual earnings. Delayed retirement credit 4.8 per cent per year of accrued pension after the lowest retirement age.
Life-expectancy coefficient	Yes	Yes

Source: Own computation

In Finland, an individual can claim the old-age pension in the month following the month in which they reach their retirement age. In practice this means that if the retirement age is, for example, 63 years and three months, the old-age pension can begin at the earliest at the beginning of the month in which the individual turns 63 years and four months.

The accrued pension is central in determining post-retirement income. The earnings-related pension is calculated annually based on gross annual earnings from employment and self-employment. Before 2017, pension accrued at the following rates: 1.5 per cent at ages 18-52, 1.9 per cent at ages 53-62, and 4.5 per cent at

ages 63-68.[2] Since 2017, the pension accrual rate has been 1.5 per cent of annual earnings, regardless of age. Periods of social security benefits, such as unemployment and sickness, as well as periods of family leave also count towards the pension. An individual's accrued pension hence reflects both the level of earnings and the length of their career.

One of the key elements of the Finnish pension system is the life expectancy coefficient which reduces accrued pension benefits. This is an automated mechanism designed to limit the growth of pension expenditure due to rising life expectancy and to encourage people to extend their working lives. The life expectancy coefficient is determined annually for each cohort at the age of 62. It is applied when the level of the pension benefit is determined; no changes are made once the pension has started. When life expectancy increases, the cuts to pensions will also be increased for future cohorts.

Even though the SRA sets the minimum age at which the full pension benefit can be claimed, it is possible to postpone retirement past this age. After the 2017 reform, those who do not claim their pension at the lowest retirement age have received a 4.8 per cent increase in accrued pension for every subsequent year (0.4 per cent for each month). At the same time, new pension rights are accrued from employment (1.5 per cent of annual earnings). As a result of the reform, the upper age limit for the insurance obligation will rise from 68 to 70 years. This means that new pension rights can be accrued from employment until this age.

While the reform is applied to all, public sector employees form a special group because, due to historical reasons, some of them have a fixed occupational or personal retirement age that differs from the SRA. Occupational retirement ages are below the SRA. A person with an occupational retirement age is entitled to a full pension at the occupational retirement age. The personal retirement age is between 63 and 65, and a person with a personal retirement age is entitled to additional pension that has accrued to them in the 1990s. Employees with a personal retirement age higher than the SRA may retire at the SRA, but in that case their additional pension is cut, which creates a significant incentive to continue working until the personal retirement age. Personal retirement ages concern only those born before 1960. There is also a small number of individuals in the private sector who have an SRA of 63 years, independent of their cohort. These ages

[2] Before 2005, the pension accrual rate was 1.5 per cent before age 60 and 2.5 per cent after that age.

are based on collective labor agreements dating back prior to 2017 and are quite rare.

As for early retirement options, full-time retirement before the SRA is possible only via the disability pension (with some exceptions for public sector employees, see above). The highest eligibility age is tied to the retirement age, which means that a worker can transition to a disability pension until reaching the SRA. The (full) disability pension requires that the working capacity is permanently reduced by at least 60 per cent. Retirement on a partial disability pension is also an option if the working capacity is reduced by at least 40 per cent. For older workers over age 60, the stringency of medical screening is more lenient in that their working capacity is evaluated against their current job or occupation. For younger persons, the eligibility for disability pension is evaluated against any possible job. Most disability pensions awarded to persons over the age of 60 are full disability pensions (66 per cent in 2019; Finnish Centre for Pensions' statistical database). Persons receiving a disability pension are allowed to work (for the fraction of "remaining working capacity"), but it is rare for them to work while receiving a full disability pension (as a 60 per cent reduction in working capacity is required). The disability pension automatically transitions into an old-age pension at the SRA. However, disability pensions where the disability/sickness has started before 2017 transition into an old-age pension at age 63 (the pre-reform SRA).

For the long-term unemployed, a so-called unemployment pathway to retirement is available. This is an arrangement in which the long-term unemployed receive earnings-related unemployment benefits for an extended period until they are entitled to a full old-age pension. For the long-term unemployed born before 1958, the full old-age pension is available at age 62. However, the long-term unemployed can also postpone retirement and stay on the unemployment benefit until age 65. For some unemployed, the earnings-related unemployment benefit can be larger than the full old-age pension, which creates an incentive to collect unemployment benefits until age 65. Some of the unemployed make use of their right to a full pension at age 62, while a larger proportion retire at their cohort's SRA, and a minority postpone retirement to a later age (see Figure 3). Those who are not eligible for the unemployment pathway to retirement are able to collect earnings-related unemployment benefits for a maximum of two years, after which they can receive only the basic unemployment benefit paid by the Social Insurance Institution of Finland (Kela).

When it comes to sickness benefits, there is no eligibility condition linked to the pension system. An individual's main source of income is the sickness benefit if

they have been on a sickness leave for a long period. Depending on the employer, this period varies from two weeks to three months. During this period, Kela pays the sickness benefit to the employer, and the employee receives the wage they would receive if they were working. After this period, the sickness benefit is paid directly to the worker. The maximum duration of sickness benefit is one year, and eligibility for the disability pension is typically considered after one year of receiving the sickness benefit.

2.3 Data and empirical methodology

2.3.1 Data

To examine the impact of the increase in the SRA on labor market behavior, we utilize rich administrative data compiled from the registers of the Finnish Centre for Pensions. The registers include all individuals who have accrued social security in Finland. The data contain detailed information on individuals, including gender, date of birth, date of death, nationality, and municipality of residence. Moreover, the registers provide individuals' labor market history and versatile information regarding pensions. The data include information on educational attainment which has been merged from registers provided by Statistics Finland.

Our study population includes all individuals born between 1954 and 1956, and we further restrict the sample to Finnish citizens residing in Finland at the end of the year they turned 59. At that point we also define which sector (private or public) the individual represents. Here we utilize the so-called principle of the last insurer, according to which the last pension insurance company where an individual has been insured, or the provider of public sector pensions, will pay the (potential) pension. The last insurer (and hence the pension act) is recorded at the registers of the Finnish Centre for Pensions. For this reason, we can designate the sector also to individuals who are unemployed or outside the labor force. We also use career length and the highest educational level (basic, secondary, lower tertiary, higher tertiary)[3] as control variables. Likewise, the type of the municipality of residence (urban, semi-urban, rural) and gender is controlled for. All above listed variables are measured at the end of the year in which the individual

[3] We use register information on the highest educational attainment. The categories for the level of education used in this study correspond approximately with the following number of years in education: basic education means up to nine years of education, secondary education up to twelve years of education, lower tertiary up to 15 years of education and higher tertiary education 16+ years of education.

turns 59. In each cohort, there are 700–800 individuals who lack information on sector or municipality of residence.[4] Also 4,236 individuals who died before getting an old-age pension are excluded. The final sample comprises 213,583 individuals. The cohort-wise number of individuals and observations are presented in Table 2.

Table 2: Number of individuals in each cohort and total number of observations in data

Cohort	Individuals	Person-month observations
1954	71,465	3,501,785
1955	70,905	3,474,345
1956	71,213	3,489,437
Total	213,583	10,465,567

Source: Own computation

When investigating the effect of the SRA increase on labor market outcomes, we utilize information on employment, as well as recipiency of unemployment benefits, sickness benefits, disability pension benefits and old-age pension benefits recorded at a monthly level. The inspections are performed according to age, and individuals are followed from the month they turn 60 until the month they turn 64 years old. This means that there are a total of 10,465,567 person-month observations in the data.

The labor market states we study include “retired”, “on sickness benefit”, “employed”, “unemployed”, “on disability pension” and “otherwise inactive”. The states are defined in this order and are mutually exclusive. The states reflect the situation at the end of each month. The state “on sickness benefit” is second in order because an individual can be on sickness benefit at the same time as they are employed, unemployed or otherwise inactive. We only consider sickness benefits that are paid directly to the individual. The state “employed” is third in order, which means those who are employed cannot simultaneously be unemployed or on a disability pension.

Those born in 1954 are the control group and those born in 1955–1956 form the treatment group. Table 3 presents the descriptive statistics for the cohorts we consider. When it comes to career length, gender, sector and type of municipality

[4] In practice, most of these persons have no work history.

the cohorts show quite similar characteristics. There are small differences regarding education so that a slightly higher share of those born in 1954 have only a basic level education, while other education levels are somewhat more common among those born in 1955 and 1956. However, the overall picture is that all three cohorts are similar.

Table 3: Descriptive statistics by cohort

	1954	1955	1956
Age, years	62.0	62.0	62.0
Length of career, years	32.2	32.2	32.4
Men	48.3	49.1	49.3
Women	51.7	50.9	50.7
Basic education	23.2	21.6	20.6
Secondary education	43.2	43.8	43.9
Lower tertiary education	24.4	25.0	25.7
Higher tertiary education	9.2	9.6	9.8
Private sector	68.8	68.5	68.3
Public sector	31.2	31.5	31.7
Urban municipality	64.5	64.6	64.8
Semi-urban municipality	17.7	17.7	17.8
Rural municipality	17.8	17.7	17.4

Source: Own computation

2.3.2 Empirical methodology

Following Staubli and Zweimüller (2013) and others, we estimate the effect of the increase in the SRA by comparing the labor market states at the same age in cohorts facing a different SRA. All cohorts reach the SRA at a certain point, but

due to the rising SRA, one cohort has already reached the SRA at a certain age while the other cohort has not. We estimate the following differences-in-differences model:

$$y_{iact} = \beta_0 + \lambda_c + \theta_a + \gamma_t + \beta_1 UnderSRA_{iact} + X_i'\beta_2 + \varepsilon_{iact} \quad (1)$$

where y_{iact} is a labor market state dummy equal to 1 if the individual *i*, at age *a*, from cohort *c*, at time *t* is in the relevant state. The labor market states under inspection are "retired", "employed", "unemployed", "on disability pension", "on sickness benefit", and "otherwise inactive".

In this specification, λ_c are cohort dummies, θ_a are age dummies (age in months) and γ_t are time effects. X_i includes a set of individual controls (gender, education, sector, length of career and type of municipality).

The key explanatory variable is a dummy, $UnderSRA_{iact}$, which is equals to one if the individual is below the SRA applicable within their cohort, and zero otherwise. Because the increase in the SRA affects individuals at different ages depending on their cohort, the value of this variable changes with age, cohort, and time. For those born in 1954, this variable is equal to one until age 63, and zero after that. For those born in 1955, it is equal to one until age 63 years three months, and zero after that. For those born in 1956, it is equal to one until age 63 years six months, and zero after that.

The main parameter of Interest is β_1 which captures the SRA increase-induced difference in the probability of being in a certain state between different cohorts. In practice we compare the probability of a certain state at the same age for persons belonging to different cohorts with a varying SRA. The central identifying assumption is that, without the increase in the SRA, the probability to be in a certain state at the same age would be similar across cohorts, controlling for the cohort- and age-fixed effects, individual-level variables, and time effects (so-called common trends assumption). If this assumption holds, β_1 can be interpreted as the causal effect of the SRA increase. We estimate this parameter with a linear probability model and, as a result, β_1 can be interpreted as a percentage point difference in the probability that an individual is in a certain state in the cohort that has not yet reached its SRA (treatment group) compared to the cohort that has already reached its SRA (control group).

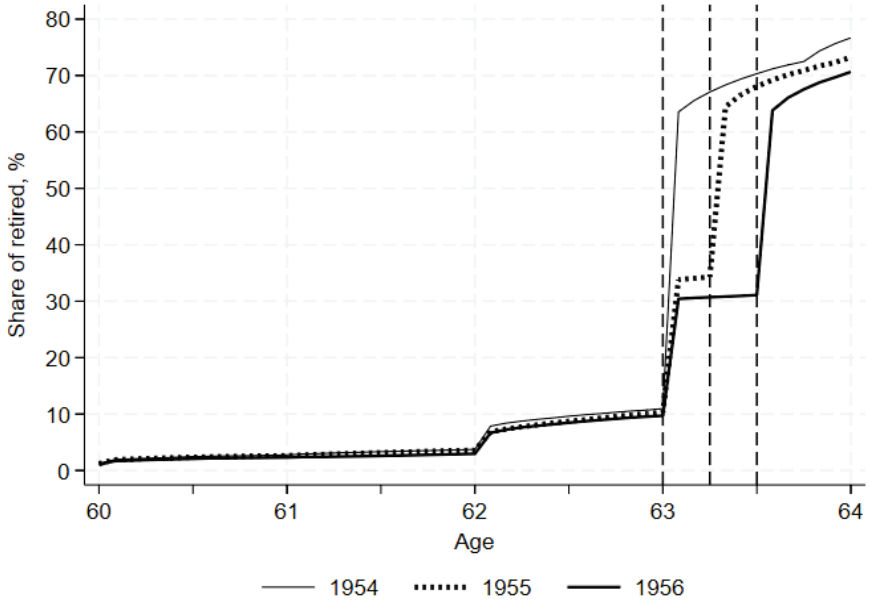
The reform of 2017 has affected different cohorts at different ages, and different cohorts reach a certain age at different points in time. Therefore, we also want to control for the time effects (or the business cycle) to minimize their impact on

labor market states. To circumvent the identification issue of perfect linearity between age, period, and cohort, we use different time steps in each. We measure cohort at a yearly level and age at a monthly level, and we control for the business cycle at a quarter-year level. This means that we assume that the business cycle effects are the same for individuals observed in the same quarter.

2.4 Descriptive evidence

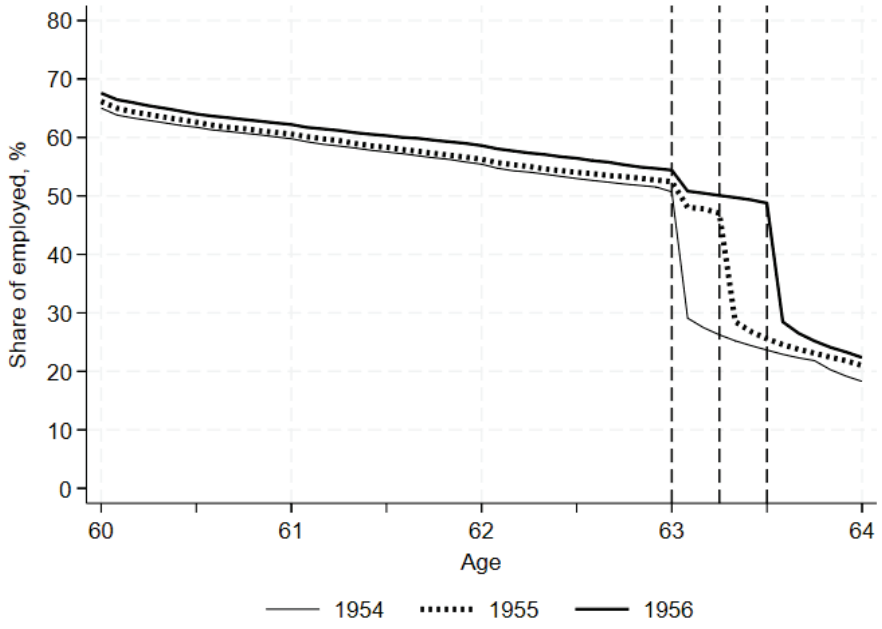
Figures 1 and 2 present the share of retired and employed individuals from the month the individuals turned 60 to the month they turned 64. The SRA for the control cohort 1954 was 63, and the SRAs for the treatment cohorts 1955 and 1956 were 63 years and three months and 63 years and six months, respectively. This means that individuals born in 1954 can claim their pension in the month after they turn 63 and those born in 1955 and 1956 in the month after they turn 63 years and three months and 63 years and six months, respectively. The vertical lines in the Figures mark the SRAs of the different cohorts.

Figure 1: Share of retired individuals in different cohorts by age, %. Vertical lines indicate the SRA of different cohorts.



Source: calculations based on register data of the Finnish Centre for Pensions.

Figure 2: Share of employed individuals in different cohorts by age, %. Vertical lines indicate the SRA of different cohorts.



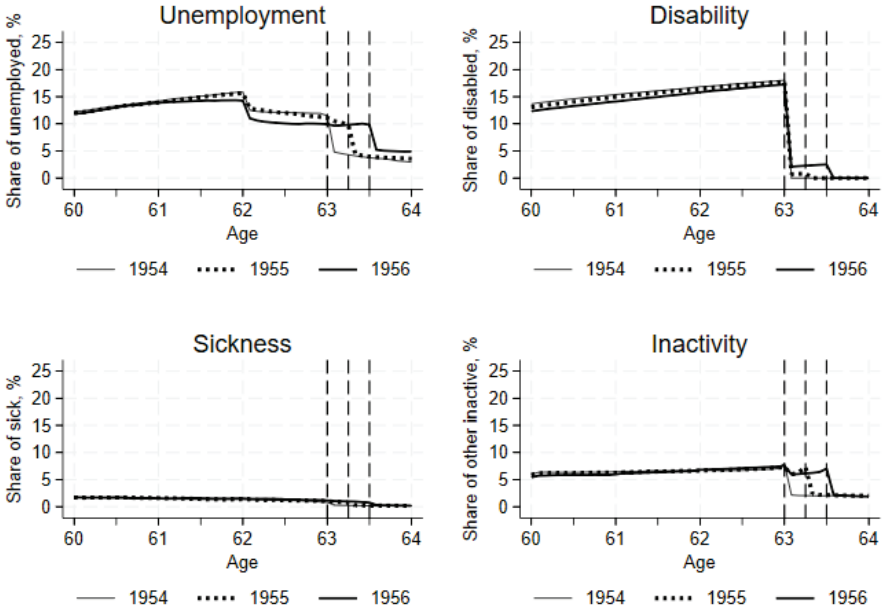
Source: calculations based on register data of the Finnish Centre for Pensions.

We observe a clear parallel trend in both retirement and employment before age 63. Due to occupational retirement ages in the public sector, some individuals have retired before age 62. There is also a small jump in the retirement rate at age 62, partly due to the occupational retirement ages in the public sector, and partly due to the entitlement of the long-term unemployed to a full old-age pension at age 62. After age 63 we see a considerable increase in retirement and decrease in employment among individuals born in 1954. For individuals born in 1954, bunching at the SRA is around 22 percentage points (hazard rate, the drop in the share of employed persons at the SRA over the share of employed persons just before the SRA, is 0.43). It should be noted that the share of retired individuals increases right after age 63 also among those born in 1955–1956. This is for the most part due to disability pensions where the disability has started before 2017, as these pensions automatically transition into an old-age pension at age 63 (see Figure 3). Furthermore, there is a small drop in employment at age 63 also among those born in 1955–1956. This is mainly due to two factors: some

public sector employees have a personal retirement age of 63 years, and a small number of private sector employees have an SRA of 63 years due to collective labor agreements. After age 63 the development in cohorts facing different retirement ages diverges. The increase in retirement and the drop in employment shift to the right corresponding with the increase in the SRA, that is, by three months for the cohort of 1955 and again by three months for the cohort of 1956.

In Figure 3, we also observe a rather parallel trend in the proportion of individuals in unemployment, disability, sickness, and inactivity before age 63, and a clear drop after this age for those born in 1954. There are small differences in the share of unemployed around age 62 and thereafter especially between those born in 1956 and other cohorts, but these differences are fairly small, at most 2 percentage points. In case of disability, due to pre-reform disability pensions, there is a considerable drop after age 63 also for those born in 1955 and 1956. It should be noted that after age 63, the share of individuals on disability pension reflects those disability pensions where the disability has started in 2017 or later. The period from 2017 to the new SRA is shorter for those born in 1955, and the share on disability pension among those born 1955 has only increased modestly. The share among those born in 1956 has increased more. Otherwise for those born in 1955, the largest drop in these states occurs after age 63 years and three months, and for those born in 1956, after age 63 years and six months.

Figure 3: Share of unemployed, disabled, sick and otherwise inactive individuals in different cohorts by age, %. Vertical lines indicate the SRA of different cohorts



Source: calculations based on register data of the Finnish Centre for Pensions.

The Figures give an initial idea of the effects we aim to analyze. They also support the assumption of common trends for different cohorts before the increase in retirement age, which is at the center of our identification strategy.

2.5 Regression results

2.5.1 Main results

Table 4 presents linear regression estimates of the impact of the increase in SRA on retirement, employment, unemployment, disability, sickness, and inactivity using equation (1). We only present the differences-in-differences coefficients. All estimates are significant at the 0.1 per cent level. We observe that the SRA increase has decreased retirement by 32 percentage points on average for the months between the old and new SRA. Before the reform 64 per cent were re-

tired. The SRA increase is accompanied by a rise in employment of 19 percentage points. Compared to the pre-reform baseline (29 per cent), the relative increase in employment rate amounts to nearly 70 per cent.

At the same time, the SRA reform has increased unemployment by 6 percentage points on average. This is a large effect given that the proportion of unemployed individuals before the increase in the SRA was under 5 per cent. Likewise, there has been an increase in disability pension recipiency of 2 percentage points. The fraction of otherwise inactive persons has increased by over 4 percentage points, which means that this share has almost tripled because of the reform. Sickness plays a minor role as it has increased by only 0.5 percentage points (but again, compared to the pre-reform baseline, the increase is quite large).

Table 4: Average effect of increase in SRA on different labor market states, percentage points

	Retirement	Employment	Unemployment	Disability	Sickness	Inactivity
Under SRA	-32.13***	19.37***	6.01***	2.06***	0.48***	4.20***
	(0.205)	(0.149)	(0.069)	(0.075)	(0.029)	(0.096)
Pre-reform, %	63.66	29.08	4.80	0	0.30	2.16
Observations	10,465,567	10,465,567	10,465,567	10,465,567	10,465,567	10,465,567

Pre-reform: those born in 1954 at age 63 years and one month. Linear regression including cohort dummies, age dummies, quarter dummies and sociodemographic and regional controls (gender, education, sector, career lengths, region), standard errors clustered by month of birth. Robust standard errors in parentheses. Coefficients and standard errors are multiplied by 100 and should be interpreted as percentage points. ***p<0.001
Source: Own computation

Employment represents 60 per cent of the decrease in the retirement rate (19.4/32.1), which means that this share of those individuals who delay claiming pension benefits as a response to the SRA increase are working. At the same time, 19 per cent of those who would have already retired in the absence of the SRA increase are unemployed and 7 per cent are on a disability pension. In total, 15 per cent are on sickness benefits or otherwise inactive due to the reform.

The SRA reform has hence increased employment considerably but, at the same time, it has generated large substitution effects from retirement to other labor market states. We can expect that part of these effects is due to passive substitution: when the SRA increases, individuals that would have otherwise retired, stay longer at their respective states, for example unemployed. Another part of the effects may derive from active substitution, which means that, for example, some employed individuals may end up as unemployed before reaching the new retirement age. We will investigate substitution effects in more detail later in Section 5.2.

Next, we will present robustness tests for our results. We first test the sensitivity of the employment effects to alternative specifications. The results are presented in Table 5. In the first specification there are no controls and no clustering of standard errors. In the second specification, the standard errors are clustered by month of birth. The third specification includes quarter dummies to control for the business cycle. In the fourth specification, sociodemographic and regional control are added to the model. This is the preferred specification that was used in Table 5. The fifth specification presents the employment effect only for the first increase in the SRA, that is, when only those born in 1954 and 1955 are included. The estimated effects of the change of the employment rate remain very similar independent of the specification used. A further test of the validity of our model is to conduct a placebo test – that is, to test whether there is an effect when we would not expect to see one. Therefore, we estimate the same specification as in column 4 using those born in 1953 and 1954 and assume (incorrectly) that the increase in the SRA started from the cohort of 1954 (specification six). The estimate of this pseudo reform is negative and very small in magnitude.

Table 5: Sensitivity tests for the employment effect of the increase in SRA

	No controls, no clustering (1)	No controls, clustering by month of birth (2)	2+ Quarter dummies (3)	3+ Socio-demographic and regional controls (4)	4+ Only those born in 1954 and 1955 (5)	4+ Pseudo reform (6)
Under SRA	20.18***	20.18***	19.39***	19.37***	18.58***	-0.89***
	(0.094)	(0.203)	(0.148)	(0.149)	(0.234)	(0.162)
R2	0.077	0.077	0.077	0.222	0.224	0.219
Observations	10,465,567	10,465,567	10,465,567	10,465,567	6,976,130	5,462,939

Coefficients and standard errors are multiplied by 100 and should be interpreted as percentage points. Pseudo reform includes those born in 1953 and 1954 and assumes that the SRA started to increase from the cohort of 1954. ***p<0.001
Source: Own computation

2.5.2 Passive or active substitution?

As mentioned earlier, the employment and substitution effects shown in Table 4 can result either from the persistence of a certain labor market state (passive substitution) or from a transition between states (active substitution) due to an increase in the SRA. To investigate this issue in more detail, we estimate equation (1) conditioning by the initial labor market state at age 62 years and six months. At this age, 54 per cent of the study population was employed, 11 per cent unemployed, 17 per cent on a disability pension and 1 per cent on sickness benefit. Linear regression results are presented in Table 6. To inspect the sensitivity of the choice regarding the initial state, we estimated the models measuring the initial state also at age 62 years and nine months. The results are very similar to those reported here.

Table 6: Average effect of increase in SRA on labor market transitions from employment, unemployment, disability and sickness, percentage points

	Retirement	Employment	Unemployment	Disability	Sickness	Inactivity
Employment						
Under SRA	-39.42***	34.53***	1.58***	0.46***	0.70***	2.14***
	(0.253)	(0.188)	(0.074)	(0.040)	(0.026)	(0.076)
Pre-reform, %	44.54	53.90	0.68	0	0.43	0.45
Observations	2,210,859	2,210,859	2,210,859	2,210,859	2,210,859	2,210,859
Unemployment						
Under SRA	-44.82***	1.97***	40.17***	0.22***	0.39***	2.07***
	(0.413)	(0.089)	(0.388)	(0.039)	(0.043)	(0.265)
Pre-reform, %	60.76	2.34	35.81	0	0.16	0.92
Observations	462,498	462,498	462,498	462,498	462,498	462,498
Disability						
Under SRA	-5.95***	0.05	0.01	5.90***	0.00	-0.01
	(0.449)	(0.034)	(0.011)	(0.454)	(0.004)	(0.006)
Pre-reform, %	99.98	0	0.01	0	0	0.02
Observations	691,923	691,923	691,923	691,923	691,923	691,923
Sickness						
Under SRA	-67.72***	20.02***	4.54***	35.76***	5.37***	2.04***
	(1.662)	(0.940)	(0.283)	(1.240)	(0.978)	(0.413)
Pre-reform, %	81.45	12.29	1.81	0	3.98	0.48
Observations	50,160	50,160	50,160	50,160	50,160	50,160

Pre-reform: those born in 1954 at age 63 years and one month. Original status measured at age 62 years and six months. Linear regression including cohort dummies, age dummies, quarter dummies and sociodemographic and regional controls (gender, education,

sector, career lengths, region), standard errors clustered by month of birth. Robust standard errors in parentheses. Coefficients and standard errors are multiplied by 100 and should be interpreted as percentage points. ***p<0.001
Source: Own computation

We notice that the rising SRA has increased employment persistence on average by 35 percentage points. This means that about 88 per cent (34.5/39.4) of those employed individuals who would have retired given the option continue to work due to the reform. At the same time, active substitution has also taken place, as we see an increase in transitions from employment to inactivity (2.1 pp) and unemployment (1.6 pp) and, to a smaller degree, to sickness (0.7 pp) and disability (0.5 pp). The share of originally employed individuals who are outside work has increased in total by 5 percentage points between the old and new SRA. This means that, due to the reform, in total around 12 per cent (4.9/39.4) of employed individuals who would have already retired were it not for the SRA increase are inactive, unemployed, on sickness benefit, or on a disability pension.

In the case of unemployment, the decrease in the retirement rate induced by the reform has mostly translated into continuation of unemployment. As a result of the SRA increase, unemployment persistence has grown by 40 percentage points. This indicates that 90 per cent (40.2/44.8) of those unemployed who delay claiming pension benefits due to the SRA increase stay unemployed longer because of the reform. A small portion of unemployed have returned to employment or become inactive. The increase in the SRA has also impacted disability pension or sickness enrolment among unemployed individuals to some degree.

Disability is a very absorbing state, as there are practically no transitions from a disability pension to any other labor market states following the reform. Receiving sickness benefits, on the other hand, seems to be a less absorbing state; the increase in persistence in this state due to the rising SRA is only less than 6 percentage points, which accounts for 8 per cent (5.4/67.7) of the decrease in the retirement rate. Then again, a considerable part (53 per cent) of those on a sickness benefit who would have retired without the reform end up on a disability pension. Due to the SRA increase, 30 per cent of individuals on sickness benefit return to employment instead of retiring.

Since the number of employed individuals is significantly larger than the number of individuals that are unemployed or on sickness benefit, transitions from employment to other labor market states clearly outweigh the transitions from unemployment or sickness to employment. This means that the SRA increase results in more negative (out of work) than positive (towards work) active substitution.

2.5.3 Heterogeneity of effects by gender and socioeconomic group

Next we split our data into several subgroups to evaluate whether the reform had heterogenous effects and estimate equation (1) separately for each group: men and women, the low- and high-educated, and the private and public sector.

Table 7 presents the employment rate just before the SRA, bunching at the SRA, and the hazard rate at the SRA in different groups (for the 1954 cohort). There are no large differences in pre-SRA employment rates of men and women, even though a slightly larger share of women is employed before the SRA and men's hazard rate is somewhat higher than women's. When considering education, income, and sector, employment rates are clearly lower for individuals with a basic education, and in the private sector. It can be seen that the hazard rate is clearly higher in the groups with lower employment rates (around 50 per cent) than in the other groups (23-37 per cent). Overall, the proportion of people retiring at the SRA is lower in the groups where the pre-SRA employment rate is higher: among the high-educated and in the public sector.

Table 7: Employment rate just before the SRA, bunching at the SRA and the hazard rate by subgroup, cohort 1954

Subgroup	Employment rate, %	Bunching, %-points	Hazard rate
All	51	22	0.43
Men	49	23	0.47
Women	53	21	0.39
Basic education	41	21	0.52
Higher tertiary education	69	16	0.23
Private sector	47	24	0.50
Public sector	59	17	0.29

Employment rate measured just before the SRA. Bunching measures the share retiring at the SRA. Hazard rate is the share retiring at the SRA relative to employment rate just before the SRA.
Source: Own computation

Table 8 presents linear regression estimates of the impact of the increase in the SRA on retirement, employment, unemployment, disability, sickness, and inactivity by gender. We observe that there are no large differences between men and women when it comes to the effects of the SRA increase. Among men, the rising SRA has increased employment by 21 percentage points on average for the months between the old and the new SRA. For women, the equivalent increase is 18 percentage points. For both genders, there are also large substitution effects towards unemployment and inactivity, followed by disability, and a minor increase in sickness. Around 60 per cent of both men (60 per cent; 20.1/34.5) and women (61 per cent; 18.3/29.9) who would have retired given the option were working due to the reform.

Table 8: Average effect of increase in SRA on different labor market states by gender, percentage points

	Retirement	Employment	Unemployment	Disability	Sickness	Inactivity
Men						
Under SRA	-34.48***	20.56***	6.58***	2.28***	0.51***	4.55***
	(0.271)	(0.132)	(0.119)	(0.126)	(0.041)	(0.121)
Pre-reform, %	67.28	26.04	4.14	0	0.28	2.27
Observations	5,084,877	5,084,877	5,084,877	5,084,877	5,084,877	5,084,877
Women						
Under SRA	-29.92***	18.26***	5.48***	1.86***	0.44***	3.88***
	(0.244)	(0.226)	(0.120)	(0.112)	(0.039)	(0.091)
Pre-reform, %	60.30	31.91	5.42	0	0.32	2.06
Observations	5,380,690	5,380,690	5,380,690	5,380,690	5,380,690	5,380,690

Pre-reform: those born in 1954 at age 63 years and one month. Linear regression including cohort dummies, age dummies, quarter dummies and controls, standard errors clustered by month of birth. Robust standard errors in parentheses. Coefficients and standard errors are multiplied by 100 and should be interpreted as percentage points. ***p<0.001
Source: Own computation

The differences in the effects of the SRA increase are noticeable between the low- and the high-educated (Table 9). Among the low-educated (qualification from basic education) employment has increased by 19 percentage points on average due to the SRA increase. This is a large relative increase as the pre-reform baseline employment rate was 19 per cent. We also notice a significant rise of 7 percentage points in unemployment and a somewhat smaller increase in inactivity (4pp) followed by an increase in disability (3pp). In total, 56 per cent of the low-educated who delay claiming pension benefits as a response to the SRA increase are working. At the same time, 21 per cent of the low-educated individuals who would have retired without the reform are unemployed, 13 per cent are inactive, and 8 per cent are on a disability pension.

Among the high-educated (higher tertiary education), the increase in the SRA has raised the employment rate by 15 percentage points, which is both absolutely and relatively less than among the low-educated. This is partly explained by the fact that, in this group the pre-SRA employment rate is higher and the hazard rate at the SRA is lower than among the low-educated. Consequently, a considerable share of the high-educated individuals (53 per cent) is already working past the SRA before the reform. In this group, employment accounts for 61 per cent of the decrease in retirement. This means that the substitution effects to other labor market states among the high-educated are smaller than those observed among the low-educated. Regarding states outside work, inactivity has increased the most (5 pp), followed by unemployment and disability (3 and 1 pp, respectively).

Table 9: Average effect of increase in SRA on different labor market states by education, percentage points

	Retire-ment	Employ-ment	Unemploy-ment	Disability	Sickness	Inactivity
Basic educa-tion						
Under SRA	-33.56***	18.76***	7.15***	2.67***	0.62***	4.38***
	(0.202)	(0.196)	(0.155)	(0.179)	(0.058)	(0.137)
Pre-reform, %	71.39	19.36	5.46	0	0.29	3.50
Observa-tions	2,259,439	2,259,439	2,259,439	2,259,439	2,259,439	2,259,439

Higher tertiary education						
Under SRA	-24.47***	15.04***	3.43***	0.91***	0.27**	4.83***
	(0.302)	(0.225)	(0.243)	(0.143)	(0.076)	(0.164)
Pre-reform, %	41.83	52.97	3.31	0	0.15	1.75
Observations	1,007,587	1,007,587	1,007,587	1,007,587	1,007,587	1,007,587

Pre-reform: those born in 1954 at age 63 years and one month. Linear regression including cohort dummies, age dummies, quarter dummies and controls, standard errors clustered by month of birth. Robust standard errors in parentheses. Coefficients and standard errors are multiplied by 100 and should be interpreted as percentage points. ***p<0.001
Source: Own computation

There is also heterogeneity in the effects of the SRA reform according to sector (Table 10). In the private sector, the reform has increased the employment rate by 22 percentage points on average. The pre-reform baseline was 23 per cent. There is a significant increase of almost 8 percentage points in unemployment, 5 percentage points in inactivity, and 2 percentage points in disability. In total, in the private sector, 58 per cent of those who would have retired were it not for the SRA increase were working. At the same time, 21 per cent of the decrease in retirement stems from increased unemployment, 14 per cent from inactivity, and 6 per cent from disability.

In the public sector, the rising SRA has increased employment by 14 percentage points on average, which is both absolutely and relatively less than in the private sector. The reasons for this are similar to the difference between the low- and high-educated: high pre-SRA employment rate and low hazard rate at the SRA, and hence higher share continuing at work past the pre-reform SRA (42 per cent) already before the reform. In the public sector, 69 per cent of those who would have retired given the option were working due to the reform. Substitution effects on labor market states outside work are much lower compared with the private sector. Unemployment and inactivity have increased the most with equal shares of around 2 percentage points and disability by 1 percentage point.

Table 10: Average effect of increase in SRA on different labor market states by sector, percentage points

	Retire-ment	Employ-ment	Unemploy-ment	Disability	Sickness	Inactivity
Private sector						
Under SRA	-37.37***	21.67***	7.69***	2.37***	0.56***	5.08***
	(0.209)	(0.115)	(0.083)	(0.089)	(0.040)	(0.116)
Pre-reform, %	68.21	23.26	5.60	0	0.33	2.61
Observa-tions	7,150,129	7,150,129	7,150,129	7,150,129	7,150,129	7,150,129
Public sector						
Under SRA	-20.75***	14.43***	2.38***	1.33***	0.30***	2.31***
	(0.352)	(0.328)	(0.068)	(0.149)	(0.047)	(0.080)
Pre-reform, %	53.67	41.87	3.06	0	0.23	1.17
Observa-tions	3,315,438	3,315,438	3,315,438	3,315,438	3,315,438	3,315,438

Pre-reform: those born in 1954 at age 63 years and one month. Linear regression including cohort dummies, age dummies, quarter dummies and controls, standard errors clustered by month of birth. Robust standard errors in parentheses. Coefficients and standard errors are multiplied by 100 and should be interpreted as percentage points. ***p<0.001
Source: Own computation

2.6 Conclusion

In this paper, we examined the effect of the increase in the SRA on multiple labor market outcomes: retirement, employment, unemployment, disability pension, sickness, and inactivity. Evaluating the effects of a reform that raises the SRA is important. Many countries have increased either their statutory retirement age or early retirement age due to pressure caused by an aging population and the need to contain pension expenditure. If those facing a higher SRA exit employment later, a rising SRA could be an effective tool to extend working lives and to secure the financial sustainability of the pension system. However, a rising SRA could also mean that workers are not able or willing to work longer and may end up receiving other social security benefits instead. In that sense, the pension reform potentially has adverse effects.

Our results show that because of the SRA increase the employment rate among the cohorts affected has increased by 19 percentage points on average between the old and new SRA. This corresponds to an increase of about 70 per cent compared to the pre-reform employment rate. Rather than the absolute increase in employment, a more meaningful measure for assessing the effectiveness of the increase in the SRA is the proportion of the reduction in retirement that has translated into employment. Measured this way, employment response is quite substantial, as employment represents 60 per cent of the decrease in retirement rate induced by the reform. These effects are of the same size or higher than found in the previous studies. For example, in the Netherlands the employment effect of the SRA increase was 19 percentage points, which represented 32 per cent of the decrease in retirement rate (Atav et al., 2021) and the comparable figures in France were 21 percentage points and 44 per cent (Rabaté & Rochut, 2020). Further analysis showed that the increase in employment is mainly due to employed individuals continuing working.

The employment effect of the SRA increase in Finland is large, but we also found large substitution effects to unemployment, inactivity, and disability. As a result of the reform, the proportion of individuals in these states has increased by 6, 4 and 2 percentage points, respectively, between the old and new SRA. Sickness has increased by 0.5 percentage points. This means that savings in retirement benefit payments (due to decreased retirement) and additional tax revenues for the government (from increased employment) are partly attenuated by the increasing costs of other social support programs.

Further analyses showed that the observed substitution effects are mostly caused by passive rather than active substitution. That is, those facing a higher SRA stay longer in their respective labor market states rather than retire. Sickness forms an exception: majority of those on sickness benefits transition to other labor market states, most frequently to disability pension but also to employment. As a whole, the results indicate that for a considerable part of the population, the increase in SRA means that unemployment or disability persists. Increased employment thus comes with the social cost of those in a weaker position remaining in that position for an extended period.

However, we also found increased entry to inactivity, unemployment, sickness benefits and disability pension among originally employed individuals. In other words, there has been some active program substitution from employment to other labor market states due to the increase in the SRA. In total, 12 per cent of employed individuals who would have retired were it not for the reform exited work before reaching their new retirement age. The result indicates that in the case of rising SRA some employed individuals end up using alternative pathways to retirement. This can be voluntary or involuntary. Even though transitions from unemployment and sickness to employment also occurred, the transitions out of employment clearly outweigh the transitions towards employment.

The ability to work longer may vary according to, for example, socioeconomic status. To reveal potential heterogeneous behavioral effects, we examined the effect of the SRA increase separately by gender, education, and sector. We did not find large differences between men and women. This is a new finding in the literature and most likely reflects gender equality in employment rates in Finland. In addition, we found that, for the low-educated individuals, the substitution effects to labor market states outside work were larger than for the high-educated. The same applies to the private vs the public sector. The results indicate that, among the low-educated, the SRA increase is less efficient in terms of employment in that employment represents less of the decrease in the retirement rate induced by the reform. The low-educated individuals use unemployment and disability as alternative pathways to retirement more often. This may lead to rising social and economic inequalities between the low- and high-educated individuals via negative effects on their financial position, their pension accrual and, consequently, their old-age security, not to mention potential adverse effect on their mental wellbeing (e.g., Barschkett et al., 2022). It is also worth pointing out that when the SRA increases, individuals who die earlier lose a higher proportion of

their lifetime pensions. This effect is particularly pronounced among individuals with a lower socioeconomic status, as their life-expectancy is shorter.

Our results reveal important information on the effects of the rising SRA and complement the existing literature on this subject. It is worth pointing out, however, that a limitation is that in this study we investigated the short-term effects of the SRA increase, that is, a situation in which the SRA has not yet increased much. Then again, the largest effect of the SRA increase seems to manifest itself exactly at the point when the SRA increases so, in this sense, even a short-term inspection provides relevant insights into the effects of the 2017 pension reform. Keeping that in mind, it seems that in Finland, raising the SRA has generated an employment effect that is among the largest found in the literature, and has also so far been a more efficient way to improve employment than in many other countries. However, it should be noted that the reform-induced decrease in the retirement rate in Finland has been until now attenuated in the cohorts under inspection because disability pensions where the disability had started before 2017 automatically changed into an old-age pension at age 63, the pre-reform SRA. This means that the proportion of employment over the reform-induced decrease in retirement will most likely decrease in the future. This effect will be pronounced in the groups where the incidence of disability is high: among individuals in lower socioeconomic position.

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Reforming the Pension System in Germany – An Empirical Study of Reform Aversions

Matthias Diermeier / Ruth Maria Schüler

Contact Information

Dr. Ruth Maria Schüler
Economist for Social Security Systems and Income and Wealth Distribution at the German Economic Institute in Cologne
E-Mail: schueler@iwkoeln.de

Abstract

The German pension system is under enormous pressure to reform due to demographic change. Despite considerable concern, no reform of insurance system mechanisms enjoys majority support among the German population. In a factorial survey experiment conducted as part of a population survey by the German Economic Institute (IW) 2023, contribution rate, pension level and retirement age are examined in relation to each other, and potential reform adjustments are simulated. Even the explicit presentation of reform scenarios is unable to overcome the existing aversion to reform. The status quo receives major support, but in theory it would only be financially sustainable by increasing tax subsidies, which would place a considerable burden on the state budget. In a direct comparison of reform options, an increase in contribution rates is opposed the least. Pension cuts are seen as the most painful. Delaying retirement by one year is viewed as negatively as an increase in the contribution rate of around three percentage points or a reduction in pension levels of around 4 per cent.

The lowest acceptance of reforms was to be found among those whom they would least affect: the over-50-year-olds. Among those under the age of 50, who are most concerned about their pensions, the rejection of all reform options is considerably weaker. The fact that the visible pressure on the pension system is pushing younger people in particular to be more flexible should serve as an argument to target the over-50s and highlight the consequences of inaction for society as a whole. Failure to act would either require a greater commitment to occupational and private pension provision or, while guaranteeing a constant level of pensions, lead to an immense burden on the state budget. Delaying the reform further risks reinforcing the public's expectation of a constant level of pensions without their having to contribute, reducing the scope for manoeuvre and intensifying the debate on pensions.

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3.1 Ageing and pension insurance

The statutory pension insurance system in Germany is organised as a pay-as-you-go system. This means that today's contributors finance the pensions of current pensioners. However, due to the ageing of German society, there are increasingly fewer contributors compared to the number of pensioners. This is reflected in the development of the old-age dependency ratio. In 2021, there were 32 people aged over 67 for every 100 people in the typical working age group of 20-67 (Statistisches Bundesamt, 2023). In 2035, the old-age dependency ratio will exceed 40 for the first time. This means that the pension system's expenditure will not be covered by its revenue under current conditions.

In the German pay-as-you-go system, three inherent mechanisms are designed to balance the pension system's revenues and expenditures:

- Increasing the contribution rate can generate more revenue.
- Lowering the pension level can reduce pension insurance expenditure.
- Raising the retirement age means that people retire later and therefore receive a pension for a shorter period and contribute for a longer period as they remain in the labour force longer.

However, all these inherent reform options are not supported by the majority of the German population (Forschungsgruppe Wahlen, 2018; Boeri et al., 2002). The fierce debate on pension reform and the strong protests against the recent increase in the statutory retirement age from 62 to 64 in France illustrate the social tensions inherent in such reforms. To identify a reform option for the German pension system that has a realistic chance of being implemented within the German political system, it is important to understand the attitude of the German population towards these three mechanisms. This involves explicitly explaining to respondents the interrelationship between these three mechanisms and the consequences of inaction, and motivating them to weigh up the three options. This study analyses a factorial survey experiment conducted as part of a population survey by the German Economic Institute (IW) in 2023 (for information on the survey and the sample, see Diermeier et al., 2023).

3.2 Pension reform preferences according to a population survey

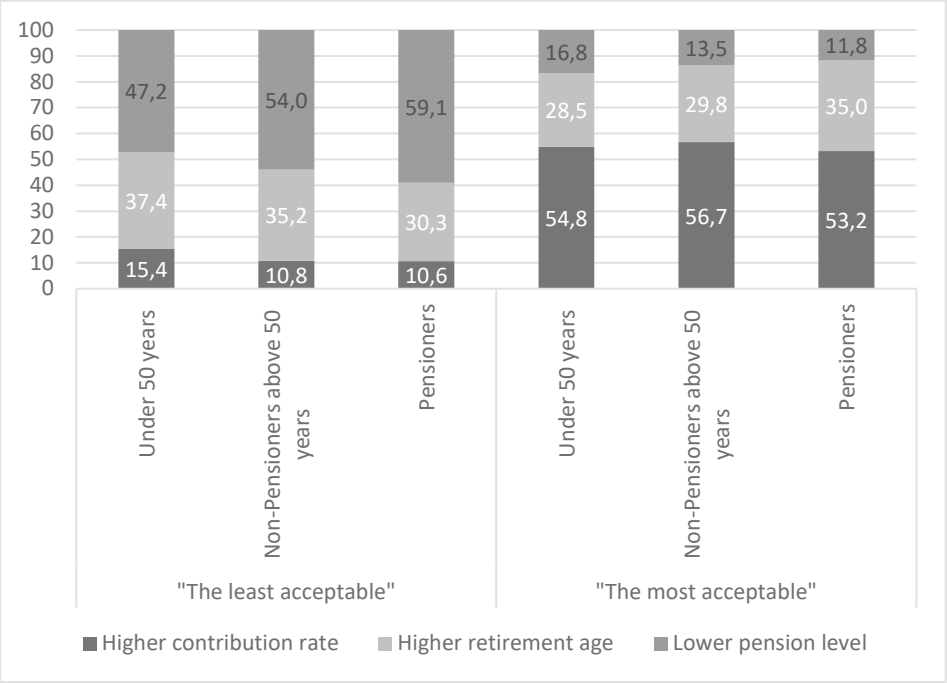
As part of a population survey by the German Economic Institute 2023, respondents were asked in which of the three dimensions a change would be most or

least acceptable from a social perspective. Respondents were asked to rank the three mechanisms – higher contribution rate, higher retirement age and lower pension level – according to their perceived "acceptability". In the introduction to the experiment, respondents were informed about the financing difficulties of the pension system in the context of demographic change. Via an online access panel provided by Bilendi & respondi, between 27 February and 6 March 2023, the survey received 4,899 valid responses from individuals aged 18 and over on their preferences regarding pension insurance. The survey was representative and stratified by gender, age (cross-tabulated), place of residence by federal state and net monthly household income (Diermeier et al., 2023). The number of respondents who identified themselves as pensioners in the statutory pension insurance system was 28.2 per cent and 3.1 per cent in civil service respectively. The percentage of pensioners was thus slightly lower than the percentage of people in Germany who receive a pension from the statutory pension insurance system, which is 30 per cent. The number of pensioners was 2 per cent.

Overall, about 35 per cent of the adult German population expressed great concern over their own retirement provision. The descriptive analyses (Figure 1) also show a clear hierarchy in terms of which dimensions of the deterioration in the pension insurance situation are perceived as particularly painful. 52.7 per cent of respondents in Germany said that a lower pension level would be the least acceptable. 54.8 per cent of respondents considered a higher contribution rate to be the most acceptable. According to the extent to which it would affect them, 59.1 per cent of pensioners said a pension cut would be the least acceptable.

The percentage of those who find a higher retirement age most acceptable is highest among pensioners not affected by this reform option, at 35 per cent. Interestingly, the views of those over the age of 50 who do not identify themselves as pensioners are only slightly different. However, those under the age of 50 have a very different perspective. They are more likely to accept a lower pension level. They are most opposed to a higher retirement age. An initial descriptive finding suggests that preferences vary according to generational affiliation and are thus partly related to individual concerns.

Figure 1: Ranking of dimensions of pension reform in Germany, percentage of respondents



Question from a population survey by the German Economic Institute (IW) in 2023: "If you weigh up the three dimensions – retirement age, contribution rate and pension level: Which adjustment would be most acceptable to you from a social perspective, and which would be least acceptable? Please rank the three dimensions according to this criterion." Number of observations=4,899, of which pensioners: 1,537; non-pensioners above 50 years: 1,260; under 50 years: 2,102
Source: German Economic Institute

In general, the ranking of the dimensions according to a population survey by the German Economic Institute reflects the approval of the individual reform options as determined by Forschungsgruppe Wahlen (2018). There, 38 per cent of respondents were in favour of increasing contributions, 13 per cent were in favour of raising the retirement age and only eight per cent were in favour of reducing the pension level. While none of the system's inherent adjustments achieves a majority in the population, increasing contributions seems to be the most tolerated, while reducing the pension level is met with the strongest resistance.

3.3 Factorial survey experiment

The individual assessment of pension policy dimensions does not take into account the interaction between contribution rate, retirement age and pension level. Furthermore, it is unclear what changes respondents envisage if they reject higher contribution rates less strongly than a higher retirement age or a reduction in pension levels. It is conceivable that the population might expect a moderate increase in contribution rates, but fear falling below the poverty line with a lower pension level. A factorial survey experiment (vignette experiment) can be used to test the resistance to specific reform options in different generations – measured in terms of years of age for start of retirement, percentage points of contribution rate and percentage change in pension level – and how these can be weighed against each other (Auspurg, 2009).

The advantage of this empirical design is that the importance of the dimensions for the evaluation of reforms can be clarified by their controlled variation. By assigning specific values, the mechanisms are quantitatively related to each other. Moreover, heterogeneous effects for subgroups, such as different preferences among different generations, can be identified, although this is not a unique feature of a factorial survey experiment. Especially in a politically deadlocked situation such as the pension issue, this approach is particularly promising for identifying reform options that are most likely to be implemented (Häusermann et al., 2019). Given the generally high level of opposition to pension reform, the aim is to determine which mechanisms meet with the least resistance.

Figure 2: Example for a vignette

Current regulations on the statutory pension system in Germany:

Employees can currently retire at the age of 66, and from 2031 at the age of 67. Currently, the contribution rate for the statutory pension insurance is 18.6 per cent of gross wages, i.e., wages before deduction of taxes and social security contributions. Employees pay half of the pension contribution. The other half of the pension contribution is paid by employers.

How do you rate the following reform proposal for designing the statutory pension system in Germany against the background described above?

Employees should work until the age of **69 years**.

The contribution rate will be **25 per cent in the future**.

When they retire, employees will receive a pension that is **20 per cent lower** than the pension of comparable pensioners today.

Consent is given on a scale from 1 to 7. 1 depicting full rejection while 7 depicts full support.

Source: German Economic Institute

Specifically, a factorial survey experiment was conducted in a population survey by the German Economic Institute in 2023, in which respondents were asked to evaluate hypothetical reform scenarios randomly assigned to them (see example in Figure 2). For the three dimensions – contribution rate, pension level and retirement age – three levels were defined that varied across the individual reform options. This resulted in 27 different reform scenarios to be evaluated. The design of the vignettes implies that the options differ in their stabilising effect on the pension system. However, the aim of a factorial survey experiment is not to evaluate realistic reform scenarios, but to determine the importance of individual mechanisms for the respondents. This is achieved by altering the levels. The respondents were divided into three groups, called “decks”. Each deck evaluated nine different reform scenarios. Each reform scenario was rated by around 1,600 respondents. Thus, a total of 44,091 reform evaluations were collected from the 4,899 respondents. Table 1 shows the levels of the factorial survey experiment. Respondents rated the reform scenarios on a seven-point scale, where 1 means “strongly disagree”, 4 means “neutral” and 7 means “strongly agree”.

Table 1: Dimensions and levels of the factorial survey experiment on pension reforms

	Contribution rate	**Pension level**	**Standard retirement age**
	The contribution rate …	When they retire, employees will receive a pension that is … the pension of comparable pensioners today.	Employees should work until the age of …
Level 1	**… remains at 18.6 per cent.**	**… the same as …**	… 65 years.
Level 2	… will be 22 per cent in the future.	… 10 per cent lower than …	**… 67 years.**
Level 3	… will be 25 per cent in the future.	… 20 per cent lower than …	… 69 years.

The current status quo is shown in bold, with "67 years" referring to the standard retirement age of 67 that will apply from 2031. The standard retirement age in 2023 is 66 and will be gradually raised to 67 by 2031.
Source: Own computation

Before the experiment began, respondents were informed about the need to reform the statutory pension system with the following text: "Germany's population is ageing. In future, more people will draw a state pension. Simultaneously, however, fewer people will be contributing to the pension system. Experts and policy makers are therefore discussing possible reforms to the statutory pension system." Before the evaluation of each reform option, the respondents were also given information about the current rules for the state pension system in Germany (see Figure 2).

The levels chosen for a factorial survey experiment are hypothetical, i.e., they do not necessarily correspond to reform proposals or forecasts. In this case, however, an attempt has been made to align them as closely as possible with a reform aimed at sustainable financing of the pension system. Of the 27 reform scenarios, 25 represent a deterioration for the respondents in at least one of the three dimensions with respect to the current situation. One vignette describes the status quo in 2031 (when the standard retirement age reaches 67) and one vignette describes an improvement compared to the current status quo by proposing a

retirement age of 65 while preserving the pension level and keeping the contribution rate constant.

3.4 Aversion to impositions in the pension debate

In line with the well-known aversion to impositions in the pension debate (Häusermann et al., 2019; Forschungsgruppe Wahlen, 2018; Boeri et al., 2002), the analyses (Table 2) show that, with the exception of three reform scenarios, all other 24 variants are (mostly) rejected on average (agreement <4). Only the scenario representing an improvement to the status quo, the status quo itself and the reform scenario in which the contribution rate rises to 22 per cent with the pension level remaining constant and the retirement age set at 65, are rated with an average score above 4.

Table 2 also shows a consistent ranking of the respondents' evaluations. The only reform scenario that represents an improvement to the status quo with a constant contribution rate of 18.6 per cent, a constant pension level and a retirement age of 65 receives the highest approval rating with an average of 5.0 (on a scale of 1 to 7). The reform scenario that involves the greatest deterioration for all three mechanisms – an increase in the contribution rate to 25 per cent, a 20 per cent lower pension and a retirement age of 69 – receives the lowest support, with an average score of 1.9. Even if we take the median, i.e., the score given by the respondent in the middle, the ranking is similar. This suggests a rational order of preference from an individual perspective. The negative implications (higher contributions, later retirement, lower pension) consistently weaken support for reform.

Table 2: Ranking of reform scenarios considering the German pension system

Ranking	Contribution rate	Pension level	Retirement age	Mean	Standard deviation	Median
		In years	In per cent	Scale[1)]		
1	18.6	same	65	5.0	1.7	5
2	22.0	same	65	4.3	1.8	5
3	18.6	same	67	4.1	1.8	4
4	22.0	same	67	3.8	1.8	4
5	25.0	same	65	3.7	1.8	4

6	25.0	same	67	3.4	1.7	4
7	22.0	-10 %	65	3.3	1.8	3
8	18.6	-20 %	65	3.2	1.7	3
9	18.6	-10 %	65	3.1	1.7	3
10	18.6	same	69	3.1	1.9	3
11	18.6	-10 %	67	3.0	1.6	3
12	25.0	-10 %	65	3.0	1.7	3
13	22.0	same	69	2.7	1.7	2
14	22.0	-10 %	67	2.7	1.5	3
15	25.0	same	69	2.6	1.7	2
16	25.0	-20 %	65	2.6	1.7	2
17	18.6	-20 %	67	2.5	1.6	2
18	18.6	-10 %	69	2.5	1.5	2
19	25.0	-20 %	67	2.5	1.6	2
20	25.0	-10 %	67	2.5	1.5	2
21	22.0	-20 %	65	2.4	1.6	2
22	22.0	-20 %	67	2.3	1.5	2
23	18.6	-20 %	69	2.2	1.5	2
24	22.0	-10 %	69	2.2	1.5	1
25	25.0	-10 %	69	2.2	1.5	1
26	22.0	-20 %	69	2.1	1.4	1
27	25.0	-20 %	69	1.9	1.3	1

1) Consent is given on a scale from 1 to 7. 1 depicting full rejection while 7 depicts full support. 4 indicates “neither nor”. 4.899 observations.
Source: German Economic Institute

Although the need for a pension reform is recognised in view of demographic developments – 40 per cent of 25–44-year-olds even expect the pension system to collapse (DFPA, 2020) – there is little willingness to compromise for the sake of a sustainably financed pension system. The results in Table 2 show in which dimension of reform a change is most strongly rejected: as soon as it involves a reduction in pension entitlements. It also shows that in a comprehensive pension reform the focus should not be solely on which reform proposal is ultimately more politically viable among the population, but rather on which configuration triggers the least pronounced defence reflexes.

3.5 Strong status quo bias

A factorial survey experiment allows a direct comparison of different dimensions through the approval of reform scenarios, as well as a distinction of effects between different generations. It is true that results to date have indicated a clear prioritisation – increasing contributions is the least painful; cutting pensions is particularly unpleasant. However, they have not taken into account that the levels of the dimensions are expressed in different units – such as increasing the retirement age in two-year increments and reducing the pension level in 10 per cent increments.

A regression with reform consent as the dependent variable and the three dimensions of retirement age, contribution rate and pension level as independent variables provides an insight into their relative importance. The most favourable level of each dimension is defined as the reference category and compared to the other two levels. As a large part of the variance can be explained by different response patterns among respondents, a multilevel model is estimated. The multilevel models are specified separately for pensioners, the group of non-pensioners over the age of 50 and those under the age of 50.

Figure 3 shows the coefficient plots of the regressions. Overall, increasing the contribution rate and retirement at 67 meet with the least resistance. Pension cuts and retirement at 69 meet with the strongest resistance. On the agreement scale from 1 to 7, a 20 per cent reduction in pensions leads to the strongest rejection in all three groups, which is statistically significant. While the approval of reform decreases by more than 1.3 scale points for respondents over the age of 50 in the case of a 20 per cent reduction in pensions, the effect for those under the age of 50 is statistically significantly lower, at 1.17 scale points. It is noteworthy that raising the retirement age to 69 is the second most rejected option among the two groups over the age of 50, even though they would not be affected or only partially affected (non-pensioners over the age of 50). Of the three groups, the non-pensioners who have not yet reached retirement age are most opposed to retirement at 67 – for this group the standard retirement age is already at least 66. An increase in the contribution rate to 22 per cent is the least opposed of all age groups. Despite the greater impact on the younger age cohort, an increase in the contribution rate to 25 per cent also meets with the least resistance.

Figure 3: Coefficient plots for reform satisfaction; Multilevel random effects (GLS) and clustered respondent-level standard errors

A multilevel model controls the hierarchical data structure of a dataset – in this case, the nine vignettes rated by the 4,899 respondents. Such a model was specified because, at 38 per cent, a significant proportion of the variance can be explained by different response patterns between respondents (intra-class correlation coefficient: 0.38). Only 62 per cent of the variance can be explained within each respondent's nine answers. Basis: 4,899 observations from a population survey by the German Economic Institute in February and March 2023.

Source: German Economic Institute

Comparisons of the effect sizes show that a retirement age of 69 would have a similarly negative impact on those under the age of 50 as a 10 per cent reduction in their pension. For older generations, however, a retirement age of 69 would be significantly worse. Assuming a linear relationship, an increase in the retirement age by one year would be rejected by all three demographic groups in a similar way as an increase in the contribution rate of around 3 percentage points or a reduction in pensions of around 4 per cent. This relationship remains consistent, with small variations, even when controlling for socioeconomic characteristics (education level, income, gender, children, age) and the residential location of the respondents (East vs. West).

3.6 Inevitable cuts

People under the age of 50 are the most concerned about their pensions and at the same time the least resistant to pension reform. It is therefore important to determine how to use the window of opportunity for reform created by rising retirement concerns among younger people before demographic trends shift majorities further towards the older population.

The majority of Germans remain opposed to any changes that would make the pension system more sustainable. The desire to maintain the status quo is deeply ingrained. Respondents are most willing to accept a higher contribution rate, while at the same time stressing the importance of maintaining a constant pension level. Specifically, delaying retirement by one year is about as painful as increasing the contribution rate by about 3 percentage points or reducing the pension level by about 4 per cent.

This is a very uncomfortable situation for policymakers. While demographic pressures undoubtedly require a high price to be paid to satisfy the desire for high pension payments, any adjustment within the insurance logic of the statutory pension system would require the uncovered expenses to be financed from the federal budget or other sources. The current study shows that a reform would alienate various population groups. However, the least objectionable path of increasing the contribution rate may turn out to be misguided for several reasons.

Firstly, it is unclear whether people reject an abstract increase in the contribution rate simply because it is less tangible than a later retirement age or a pension cut. Once the financial burden becomes tangible, rejection of the reform may follow. There is evidence that people who can precisely estimate the contribution rate are much more likely to reject its increase.

Secondly, higher contribution rates also affect companies, some of which are currently operating at capacity. The resulting higher labour costs for employers could lead to negative employment effects and reduced investment activity by companies. For example, Beznoska et al. (2017) show that an equal division of additional contributions to statutory health insurance between employees and employers would lead to a decline in gross domestic product and an increase in the unemployment rate.

Finally, demographic ageing will require not only an increase in the contribution rate to statutory pension insurance, but also an increase in contributions to health

and long-term care insurance. The implications of these indirect effects are probably not taken into account by most people in their considerations, but they hold considerable potential for disappointment.

To some extent, the entitlement mentality of the German population has been reinforced by political promises. The introduction of non-deductible early retirement for particularly long-serving employees, the so-called “retirement at 63”, as well as the mothers’ pension and the often-voiced demands for fixing the pension level and the contribution rate – and their active implementation through the double stabilisation lines – gave the impression that the status quo could be maintained or even improved without additional financial burdens. This is not the case. If contribution rates and retirement ages are not adjusted, the German population’s priority wish for a constant level of pensions for the current generation of pensioners will lead to enormous burdens. It is necessary to explain to the public that this would result in reduced public services or higher taxes for the population as a whole, possibly at the expense of the net income development of younger cohorts. In addition, the pension guarantee ensures that pensions will not be cut. The priority wish of the German population is already enshrined in current law. It is therefore important to emphasise and clarify that decreasing the statistical pension level does not mean that the pensions paid will decrease. The statistical pension level simply compares the standard pension, i.e., the pension of a hypothetical pensioner who has received the average wage of all pensioners for 45 years and paid the corresponding contributions, to the current average wage of all pensioners. The statistical pension level thus only serves to compare the performance of the pension system over time.

To promote understanding of the fundamental reforms of the German pension system, more emphasis should be placed on the multiple challenges of demographic change and the consequences for individuals should be illustrated with examples. This requires both clearly identifying the individual and collective burdens of reform and highlighting the trade-offs between different mechanisms in the pension system. In particular, the opportunity costs of inaction should be clearly highlighted (Enste et al., 2009). Maintaining the status quo would require higher tax subsidies, limiting opportunities for investment and other government functions. With regard to the retirement age, for example, it should be conveyed that later retirement benefits each individual in the form of a higher pension (Pimpertz, 2023). Finally, pension payments depend on the amount and duration of contributions.

The current analyses suggest that the key to pension reform with majority support may lie in older people taking the preferences of younger people seriously. After

all, the latter are particularly affected but are nevertheless more willing to accept the cuts.

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Nonfinancial Defined Return (NDR) Pension Framework and a New Perspective on Pension System Sustainability

Martin Drees

Contact Information

Martin Drees
PhD student in mathematics at the University of Bonn
E-Mail: mail@mdrees.de

Abstract

We propose Nonfinancial Defined Return (NDR) as a novel abstract framework for pension systems, building upon the Nonfinancial Defined Contributions (NDC) scheme. NDC has been implemented in several countries, including Sweden. It shares key features with the German pension system. NDR emphasizes a direct link between contributions and benefits, with each unit of contribution corresponding to one expected unit of benefit. Participants accumulate index points according to specific contribution rules. These index points are then converted into annual pensions via an insurance mechanism. Balancing rules manage the difference between contribution revenues and pension expenses.

NDR-GDP represents the special case where the indexation method is tied to GDP, balanced through government transfers by default. We further introduce the concept of delta-sustainability. A pension system is called delta-sustainable if the sum of unfunded liabilities relative to GDP remains constant over time, and government transfers reduce liabilities by the amount of the transfer. NDR-GDP is delta-sustainable, justifying the balancing via government transfers.

The NDR framework and the concept of delta-sustainability offer fresh perspectives on pension system sustainability, with NDR-GDP presenting a novel approach to address demographic challenges in pension reforms.

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4.1 Introduction

Pension systems constitute a critical component of social welfare programs, providing financial support to retirees after they leave the workforce. Pension systems serve as a safeguard against poverty among the elderly and contribute to the overall stability of society. However, with demographic shifts and economic challenges becoming increasingly prevalent, questions surrounding the sustainability of pension systems have come to the forefront of public discourse.

While it is commonly argued that a declining contribution base, driven by demographic shifts, poses a threat to the sustainability of public pay-as-you-go (PAYG) pension schemes, we propose a new perspective on this issue. Traditionally, to maintain sustainability, adjustments such as increasing contributions or decreasing benefits, including implicit measures like raising the retirement age, are considered necessary. This perspective is supported by the existence of automatic adjustment mechanisms[1] in several countries, such as Sweden and Germany (OECD, 2021). However, in this paper, we challenge this popular view by introducing the concept of *delta-sustainability*, which offers a new perspective on pension system viability. Delta-sustainability allows to incorporate government transfers as a means to address demographic challenges. In fact, delta-sustainability provides an argument for why this approach can be viewed as sustainable.

In essence, delta-sustainability suggests that declining contributions also lead to a reduction in pension claims. From a holistic state perspective, even if an increase in government debt is required to finance rising transfers to the pension system, this can be seen a sustainable due to a corresponding decrease in pension debt. The concept of delta-sustainability focuses on examining implicit debt over time. However, implicit debt itself has been discussed by various authors, for example Holzmann et al. (2004).

Nonfinancial (or Notional) Defined Contributions (NDC) schemes have played a pivotal role in shaping pension reforms. These schemes have been implemented in various countries including Sweden, Latvia, Poland, and Italy. Furthermore, there is a wealth of literature on NDC schemes, most notably the anthologies of the World Bank edited by Holzmann et al. (2006; 2012; 2013; 2020a; 2020b), providing a theoretical foundation of pension schemes and offering practical guidelines based on empirical experience.

[1] These are automatic in the sense that pension system parameters, such as benefit rates, are adjusted automatically when indicators, in this case demographic, change.

The generic theoretical NDC scheme incorporates a rate of return based on an automatic balancing mechanism. However, the practical implementation of this concept is challenging; currently, only Sweden has implemented automatic balancing, and even then, it relies on an approximation (Holzmann, 2017).

We propose a generalization of the generic NDC scheme into an abstract framework termed Nonfinancial Defined Return (NDR). This framework encompasses the fundamental elements of a public unfunded pension system while adhering to the equivalence principle.[2] Furthermore, to illustrate the implications of delta-sustainability, we introduce NDR-GDP, a different pension scheme that also conforms to the NDR framework. We will subsequently compare NDR-GDP with the traditional NDC scheme, which aligns with the conventional perspective on pension system sustainability.

NDR-GDP closely resembles an NDC scheme that does not employ an automatic balancing mechanism. Therefore, NDR-GDP and the concept of delta-sustainability provide a theoretical foundation for pension systems that are already used in practice.

The remainder of the paper unfolds as follows:

Firstly, we will provide a brief, simplified description of the NDC scheme and elucidate the concept of financial balance within the context of NDC schemes. Following this, we will delve into the abstract NDR framework, which serves as a generalized extension of NDC schemes.

A key principle of the NDR framework is the equivalence principle. To underscore the implications of adopting the NDR framework, we will compare it with the participation equivalence principle,[3] a fundamental principle in the German pension system. This comparison highlights the underlying value judgments inherent in the NDR framework.

Subsequently, we will introduce NDR-GDP, a pension scheme grounded in the principles of delta-sustainability. We will define delta-sustainability, demonstrate its applicability to NDR-GDP, and compare the perspectives of financial balance and delta-sustainability on pension system sustainability. We will outline the high-level reform strategy implied by NDR-GDP, emphasizing its reliance on invariants and flexibility as guiding principles. Lastly, we will describe the crucial

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2 Roughly, the equivalence principle states that contributions equal expected benefits.

3 Participation equivalence also relates benefits to contributions, but in a much less restrictive manner compared to the equivalence principle.

differences between NDC and NDR-GDP, particularly in terms of their respective notions of sustainability.

The following are our key contributions:

- The NDR framework provides a clearer picture of pension systems due to its abstraction mechanisms. In particular, the introduction of index points and the segregation of the insurance mechanism greatly simplify notation and clarify concepts. For instance, the framework facilitates the formulation of notions such as the equivalence principle and participation equivalence with greater precision. Furthermore, the nature of abstraction allows for more flexibility and choice. For example, NDR does not mandate that contributions are linked to wages.
- The concept of delta-sustainability introduces a precise new definition, providing an approach for analyzing pension system sustainability within a broader economic context.
- The proposed NDR-GDP scheme offers a novel pension reform strategy, particularly valuable in demographically challenging situations. Comparing it to the NDC model enhances understanding of the different strategic choices made in pension system design.

Given the intricate nature of pension systems, it is essential to acknowledge their complexity. In this paper, while exploring various aspects of pension sustainability and reform, we will intentionally simplify certain elements that are not central to our main focus. For instance, we will set aside discussions on the insurance aspect and distributional concerns for social reasons, allowing us to concentrate on the core themes “high-level system design” and “sustainability”. By narrowing our scope in this manner, we aim to provide a clearer and more focused analysis of the key issues at hand.

4.2 Simplified description of NDC

For a detailed technical understanding of the Nonfinancial Defined Contributions (NDC) scheme, Palmer (2005) provides an exhaustive analysis, while Holzmann (2017) offers a comprehensive non-technical overview.

The NDC scheme, implemented in countries like Sweden, Latvia, Poland, and Italy, bears economic similarities to the German point system (Börsch-Supan, 2003).

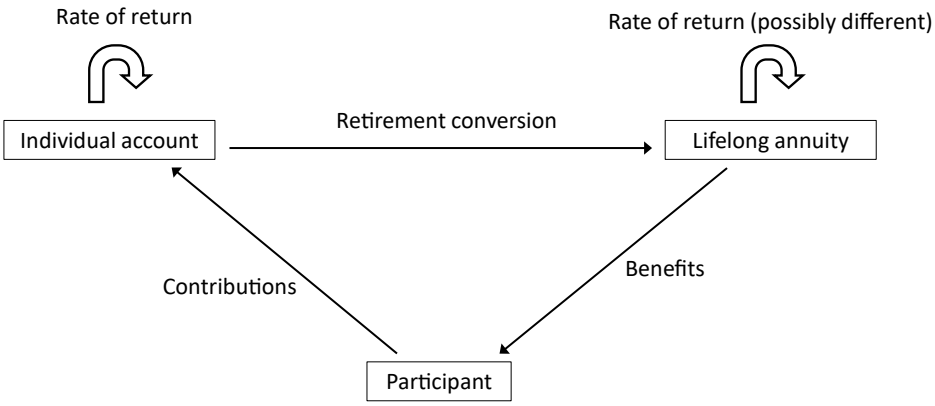
NDC functions as a PAYG pension scheme with fixed or externally determined contribution rates. Contributions are allocated to individual accounts but are not invested in financial market assets. Instead, they are used to cover pensions for other participants, hence the designation “nonfinancial” or “notional”.

Over time, the values in individual accounts accumulate with a specified rate of return. For example, if the rate of return is 2 per cent per year, then without further contributions, the value in the individual account of every participant grows by 2 per cent every year. Contributions can, of course, increase the value of individual accounts further. We will discuss later how the rate of return is chosen.

Upon reaching the minimum retirement age, participants have the option to convert any portion of their individual account balance into a lifelong annuity. The conversion factor adheres to actuarial principles based on life expectancies, and the annuity can be adjusted over time with a potentially different rate of return. Alternatively, or in addition, one can allow direct lump-sum payouts of benefits from the individual accounts.

An illustration of the basic mechanics of NDC from a single participant’s point of view is given by Figure 1.

Figure 1: Schematic of an individual account-based pension system from a single participant’s point of view



Source: Own computation

The revenue from contributions may differ from pension expenses, necessitating a balancing mechanism. Measures such as a reserve fund and the selection of rates of return are employed to achieve balance.

For simplicity, we neglect the insurance aspect for now and assume that only direct payouts from the individual accounts are allowed. Consequently, there is also only one rate of return. A more sophisticated approach instead of this simplification, the separation of the insurance mechanism, will be introduced in Section 3.2.

Financial balance in an NDC scheme

In an NDC scheme where individual accounts are not backed by real assets, understanding financial balance is crucial. Financial balance in this context refers to a state where assets and liabilities within the scheme are equal.

Liabilities in an NDC scheme encompass the values associated with individual accounts and the lifelong annuities. In the simplified setting without annuities, the liabilities are the values on individual accounts. The rate of return is not considered which can be justified by choosing the rate of return such that the system is in balance.

Assets, on the other hand, consist of funded reserves and the PAYG asset, which represents expected future contributions. In Sweden, for instance, the PAYG asset is determined by multiplying total contributions by the turnover duration (Settergren, 2020) – a metric reflecting the expected average duration that a unit of contribution remains within the system.

To give a better intuition for the concept of future contributions and the turnover duration, we offer a simplified example:

Consider government bonds with a running time of ten years and no interest rates. Suppose that the total debt is ten monetary units, but every year one monetary unit can be taken as new debt. If the remaining running time of the ten monetary units is spread evenly, this can run indefinitely. The liabilities in this case are ten monetary units, and the turnover duration is ten years because every unit of taken-up debt remains within the system for ten years. The PAYG asset is the product of the contributions per year multiplied by the turnover duration, which is ten monetary units in total. The system is in financial balance, capturing the meaning that the system can run indefinitely. This calculation provides only an approximation because future contributions do not have to be stable at one monetary unit, and the remaining running time of liabilities is not considered.

Financial balance does not imply that contributions and benefits are equal every year. For this reason, a reserve fund is used to cushion temporary imparities.

For this paper, a basic understanding of the concept of future contributions, as illustrated by the above example, is sufficient. The key point is that future contributions are conceptually integrated into the consideration of financial balance. Settergren and Mikula (2005) provide a comprehensive definition of the turnover duration and the future contributions.

Rate of return and automatic balancing mechanism (ABM)

By leveraging the concepts of liabilities and assets, an automatic balancing mechanism (ABM) can be implemented within an NDC scheme. When assets and liabilities are unequal, adjustments to the rate of return can restore equilibrium.

In theory, one could directly manipulate the value of liabilities to maintain parity with assets, thereby implying a continuous change of values in individual accounts. However, in practice, an a priori choice of the rate of return is made — for instance, tied to changes in the wage sum. If the disparities between liabilities and assets become significant, the ABM intervenes to adjust the rate of return accordingly.

In this paper, NDC refers to a scheme where the rate of return is determined by financial balance, similarly to what Palmer (2005) refers to as generic NDC.

4.3 Nonfinancial Defined Return framework

Within this section, we present the novel abstract pension framework Nonfinancial Defined Return (NDR). Similar to the NDC scheme, the NDR framework employs the concept of notional individual accounts. However, unlike the NDC scheme, it does not require fixed contribution rates or a rate of return induced by financial balance; instead, it only necessitates the existence of what we call contribution rules and any rate of return. Before delving into the intricacies of the NDR framework, we will first introduce two fundamental components of abstraction: the concept of index points and the separation of the insurance mechanism.

4.3.1 Index points

Instead of representing a notional value directly on individual accounts, the framework utilizes *index points*. These index points possess a fixed value at any given time. Rather than applying the rate of return directly to the monetary value

within individual accounts, it is applied to the value of an index point. While this approach is equivalent in outcome, the number of index points remains constant when the rate of return is applied. Consequently, this method captures what remains constant when no contributions are made.

Subsequently, we will describe contributions noted on individual accounts as the process of buying index points.

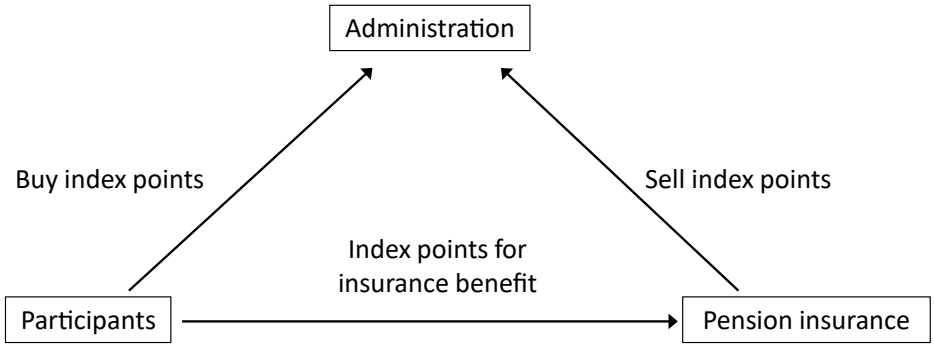
4.3.2 Separating the insurance mechanism

In a pension system, a key function is to insure individuals against the risk of outliving their savings by providing lifelong income upon retirement. It is worth noting that there exists the possibility to separate the accumulation of pension claims from this insurance aspect. Given that insurance naturally entails the possibility of generating surpluses or deficits, the idea is to segregate this aspect from the broader pension system. Rather than allowing for the conversion of value from the individual account into a lifelong annuity within the pension system, a dedicated pension insurance mechanism is introduced.

The pension insurance is responsible for disbursing lifelong annuities, while any surpluses or deficits within the insurance mechanism are internally managed.

For a visual representation of these mechanics, refer to Figure 2. The administration handles the buying and selling of index points, a process that may potentially result in imbalances, a topic we will explore further.

Figure 2: Separating the insurance mechanism



Source: Own computation

4.3.3 Description of NDR

The NDR framework[4] puts a strong emphasis on the contribution-benefit link, ensuring that every unit of contribution results in one unit of pension insurance benefit. These units are represented by index points, the value of which changes according to an *indexation method*.

Contribution rules delineate how participants contribute to the system, involving the purchase of index points at their current value, which are then recorded on individual accounts.

Through an *insurance mechanism*, participants have the option to exchange index points for pension benefits, such as a lifelong annuity. Subsequently, the pension insurance sells index points to cover the cost of these benefits.

Similar to the NDC scheme, the revenue from contributions is not invested in financial market assets but is utilized to pay pensions for other participants, albeit indirectly through the pension insurance.

The total revenue from contributions may differ from the expenses of the pension insurance, resulting in a discrepancy between the numbers of index points bought and sold, respectively. *Balancing rules* are employed to address such situations.

Examples of balancing rules include the establishment of a reserve fund, the formulation of contribution rules and indexation methods, and the provision of government transfers.

In summary, the NDR framework comprises the following components:

- Contribution rules
- Indexation method
- Insurance mechanism
- Balancing rules

It is important to note that the NDR framework remains abstract, as it, for example, does not prescribe specific contribution rules. Rather, it mandates that any concrete pension system following this framework must define its contribution rules.

[4] A discussion on the terminology of the NDR framework can be found in Appendix 4.1.

Later on, we will delve into how NDC aligns with the NDR framework. Additionally, we will introduce NDR-GDP, which also conforms to the framework but implements different choices than NDC.

4.3.4 Equivalence principle versus participation equivalence

The NDR framework operates on the core principle that one index point of contribution corresponds to one unit of (expected) pension benefit, a principle termed the *equivalence principle*. In contrast, the German pension system relies on the principle of (participation equivalence), where every unit of contribution at the same point in time must lead to the same expected pension claim.

To illustrate the concept of participation equivalence within the NDR framework, we utilize the notions of index points and the separated insurance mechanism. Participation equivalence entails that at time t, a contribution of one index point leads to a pension benefit of x_t index points, where x_t is equal for all participants. Unlike the equivalence principle, x_t may vary over time, and it may differ from 1. It is important to note that the equivalence principle directly implies participation equivalence.

The call for the equivalence principle represents a stronger claim than advocating for participation equivalence. While the former demands an exact correspondence between contributions and benefits, the latter only requires proportionality, with the factor possibly varying over time. However, statements about the implications of participation equivalence are a stronger claim than those about the equivalence principle. This is because any statement implied by participation equivalence is also covered by the more specific equivalence principle.

The possibility of changing x_t over time can of course have effects on intergenerational redistribution. Furthermore, even if x_t remains constant but differs from 1, there are effects on intragenerational redistribution. For instance, if $x_t = 1.2$ for all t, the total rate of return per year is higher for contributions held for shorter periods because the bonus of 20 per cent is spread over a shorter period of time. This redistributes income intragenerationally from early to late earners. Additionally, one can argue that a proportional factor different from 1 affects redistribution, irrespective of this temporal perspective. In the special case where $x_t = 0$ for all t, there are no pension claims at all and those with larger contributions pay more but receive nothing in return. Conversely, if $x_t = 1000$ for all t, doubling the contribution has a significantly smaller impact than dou-

bling the benefit. These effects are much less pronounced but still present if x_t is close to 1 but different.

While both the equivalence principle and participation equivalence have implications for redistribution, the dynamic valuation over time and different life expectancies complicate assertions about redistribution under either principle.

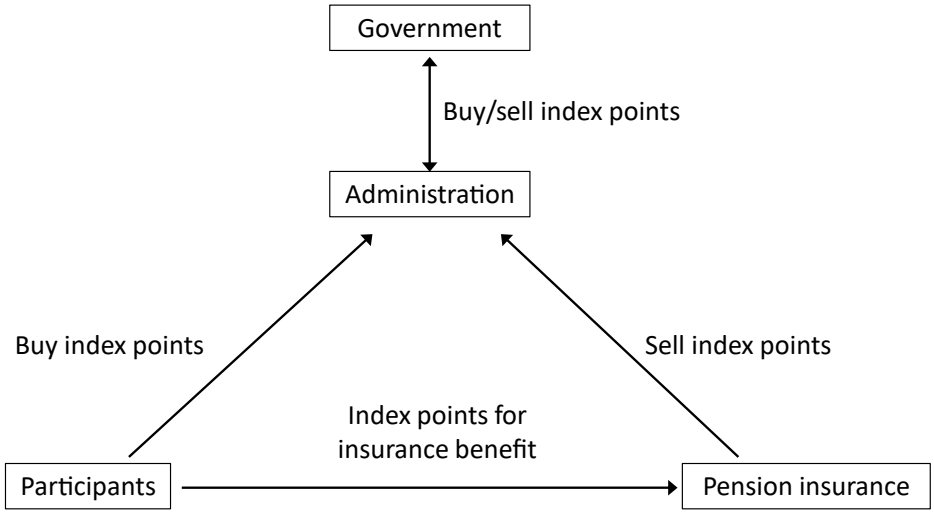
4.4 NDR-GDP

In this section, we will describe NDR-GDP, a pension scheme that adheres to the NDR framework, and compare it with the NDC scheme.

4.4.1 Description

NDR-GDP adopts GDP as the indexation method, where the value of index points is determined by a constant factor times the current GDP. Unlike NDC, NDR-GDP offers complete flexibility in contribution rules and imposes no restrictions on the insurance mechanism. This flexibility extends to the ability to change contribution rules, making NDR-GDP particularly adaptable to evolving circumstances. Balancing within NDR-GDP is achieved through government transfers, where the government buys and sells index points to ensure the total number of bought and sold index points remains equal (see Figure 3). The administration thus never holds index points. An initial amount of index points is given by existing pension claims.

Figure 3: Schematic of NDR-GDP



Source: Own computation

For simplicity, we assume that the government always holds a nonnegative balance of index points. This can be practically achieved by combining the system with a funded system or utilizing forced payout mechanisms.

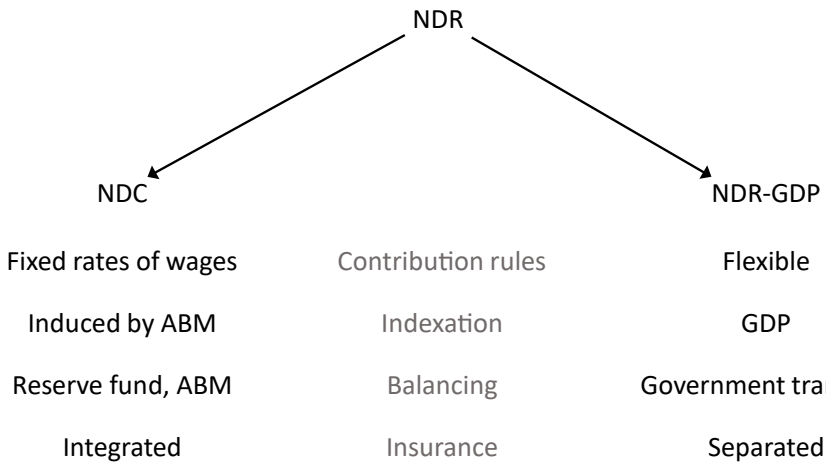
A fundamental characteristic of NDR-GDP is that the total sum of index points across participants, the pension insurance, and the government remains constant over time. This property ensures that the number of index points held by the government is bounded by the initial amount in the system, limiting the total transfers relative to GDP.

The justification for government transfers is provided by delta-sustainability, which we will introduce in Section 5.

4.4.2 NDR-GDP and NDC within the context of NDR

Figure 4 illustrates the different choices made by NDC and NDR-GDP for the core components of the NDR framework.

Figure 4: Choices of NDC and NDR-GDP



Source: Own computation

NDC typically employs a fixed rate of wages as its contribution rule, ensuring that contributions are set to allow for the computation of the contribution asset. In contrast, NDR-GDP offers flexibility in contribution rules.

Regarding indexation, NDC relies on the automatic balancing mechanism, while NDR-GDP opts for GDP-based indexation. Long-term balancing in NDC is achieved through the automatic balancing mechanism, while shorter-term balancing is often facilitated by a reserve fund. Conversely, NDR-GDP relies on government transfers for balancing.

In many descriptions of NDC, the insurance mechanism is portrayed as an integrated component, whereas in NDR-GDP, it is entirely separated and accounted for independently. It is possible to also separate the insurance aspect in NDC schemes.

This comparison highlights the technical disparities between NDC and NDR-GDP. In Section 7, we will delve into the critical conceptual difference between NDC and NDR-GDP, particularly focusing on the notion of pension system sustainability.

4.5 Delta-sustainability

In this section, we introduce the central concept of this paper: delta-sustainability. We begin by presenting its definition. Subsequently, we demonstrate that NDR-GDP adheres to the principle of delta-sustainability. Furthermore, we undertake a comparative analysis, contrasting delta-sustainability with other notions of pension system sustainability, in particular with the concept of financial balance prevalent in NDC schemes.

4.5.1 Definition

A pension system is termed *delta-sustainable* if the sum of unfunded liabilities[5] relative to an economic indicator does not increase over time. Additionally, any transfer of value x into the system must lead to a decrease in the sum of unfunded liabilities by x. Similarly, in the case of a negative x, an increase by $|x|$ is permitted.

When the economic indicator is not explicitly designated, it defaults to GDP, given its prevalence as the primary indicator for relative public debt.

Delta-sustainability does not provide a snapshot of the current status but instead focuses on how the pension system's status evolves over time.

4.5.2 NDR-GDP is delta-sustainable

We will demonstrate that NDR-GDP, with an insurance mechanism that is separately accounted for, adheres to delta-sustainability.

Recall that the total sum of index points held by the participants, the pension insurance, and the government remains constant.[6] Without any transfers, as index points are indexed via GDP, the total value of index points of participants and the pension insurance relative to GDP remains constant. These index points represent the unfunded liabilities of the system. Thus, without transfers, the sum of unfunded liabilities relative to GDP remains constant.

When the government makes a transfer of value x, it purchases an amount of index points of total value x. As the total sum of index points is constant, the

[5] These are liabilities not backed by financial assets, for example index points that are not held by the government.

[6] The administration does never hold index points in NDR-GDP.

number of index points held by participants and the pension insurance decreases by that amount. Consequently, the value of unfunded liabilities decreases by x.

In summary, NDR-GDP fulfills both conditions of delta-sustainability. Note that NDR, when employing an arbitrary indexation method alongside government transfers as a balancing rule, maintains delta-sustainability relative to the chosen indexation method. Consequently, NDR-GDP holds a distinct position, with GDP assuming a fundamental role in assessing relative debt levels.

4.5.3 Comparison with similar notions of pension system sustainability

Various notions of pension system sustainability exist in the literature, each offering a unique perspective. We will focus on a comparison of delta-sustainability with the closest ones suggested before and to financial balance. Devesa-Carpio and Devesa-Carpio (2010) provide a comprehensive overview of notions of pension system sustainability for typical PAYG pension systems that are not NDC. An important concept related to delta-sustainability mentioned in their paper is the sum of unfunded liabilities, often referred to as implicit debt. For instance, Herd and van den Noord (1993) have computed implicit debt for several large economies.

However, Devesa-Carpio and Devesa-Carpio (2010) note that solely measuring implicit debt does not provide a comprehensive definition of pension system sustainability, as it remains unclear what the maximum level of implicit debt should be. To address this, they introduce the concepts of actuarial imbalance and unitary pension cost. These concepts compare the total benefits received by a group of participants to their total contributions. This idea resembles the notion of delta-sustainability in that the sustainability of the running system is considered. Nevertheless, their approach assumes a closed system and does not directly account for changes in unfunded liabilities.

Holzmann et al. (2004) emphasize the importance of measuring implicit debt and suggest assessing pension reforms by considering explicit debt and implicit debt jointly, but do not provide an explicit tool to do so. The notion of delta-sustainability constitutes a way to implement this suggestion.

Financial balance, as defined within NDC schemes, is a critical metric used to evaluate pension system sustainability. It reflects the equilibrium between future contributions and pension benefits. More precisely, the notion of financial balance suggests that the system, under predetermined contribution rates, can

potentially operate autonomously without necessitating transfers. In essence, achieving financial balance indicates that contributions are projected to sufficiently cover pension benefits over the long term.

Financial balance, however, does not imply that having a pension system in financial balance absolves the state from overall liabilities. A state lacking such a pension system could introduce one and effectively allocate the resulting unfunded pension claims to itself. Hence, having the pension system in financial balance at least represents an “opportunity liability”. Indeed, the liability can also be understood as the obligation to maintain the set contribution rates.

Additionally, assuming no funded reserves, proportionally increasing pension benefits and contribution rates does not alter whether an NDC scheme is in financial balance. This scenario effectively generates additional pension claims without increasing financial assets.

In contrast, delta-sustainability offers a different perspective. It does not treat the pension system as a closed entity and explicitly permits government transfers. Delta-sustainability considers the holistic liabilities of the pension system and focuses solely on changes over time. When transitioning from a legacy pension system to a new one, delta-sustainability does not hold the new system accountable for existing liabilities. Instead, it evaluates whether the new system introduces further liabilities over time.

In summary, financial balance and delta-sustainability address distinct aspects of pension system sustainability. While financial balance pertains to the self-sufficiency of the system given predetermined contribution rates, delta-sustainability offers a broader evaluation, considering the system’s evolution over time and its impact on overall liabilities.

4.6 High-level reform strategy: Invariants and flexibility

In this section, we explore the overarching reform strategy implied by the NDR-GDP scheme. As previously mentioned, the implementation of NDR-GDP involves converting existing pension claims into index points. However, the specifics of this process are complex and contingent upon the nuances of the current pension system. Determining existing pension claims involves political considerations, such as whether they should be computed based on past contributions or promised benefits.

As a fundamental characteristic, NDR-GDP integrates invariants with flexibility. It upholds the equivalence principle, guaranteeing that participant contributions, measured in GDP terms, directly correspond to the total pension insurance benefits provided. Furthermore, NDR-GDP maintains delta-sustainability as a systemic guarantee. Notably, these aspects remain unchanged irrespective of real-world conditions, although their implications may vary based on contextual factors. Despite these unchanging invariants, NDR-GDP boasts considerable flexibility, primarily stemming from the possibility to implement arbitrary contribution rules. This feature allows policymakers to adjust contribution rates in response to demographic shifts, ensuring the system's adaptability to evolving circumstances.

4.7 Crucial difference of NDC and NDR-GDP

In this section, we delve into the primary distinction between NDC and NDR-GDP and explore its implications.

The fundamental variance lies in the concept of pension system sustainability each scheme follows. While the generic NDC scheme aligns with the principles of financial balance, NDR-GDP prioritizes delta-sustainability. The different perspectives of these notions have already been elaborated on in Section 5.3.

An evident consequence of this disparity emerges in how each scheme responds to demographic challenges. In the case of NDC, diminishing contributions compelled by demographic shifts mandate corresponding reductions in pension benefits to uphold a financial equilibrium. Conversely, NDR-GDP, guided by delta-sustainability, operates without necessitating such adjustments, albeit indirectly through the influence of demographic changes on GDP. Instead, government transfers are allowed, but they are regarded as sustainable because they directly reduce liabilities.

However, it is crucial to note that due to the possibility of government transfers, NDR-GDP is not engineered to function independently and self-sufficiently.

Both NDC and NDR-GDP adhere to the NDR framework and uphold the equivalence principle. However, a crucial divergence exists in their indexation mechanisms. While generic NDC relies on the automatic balancing mechanism, directly linked to financial balance, NDR-GDP's indexation is anchored to the economic indicator GDP.

Transitioning from a legacy pension system to NDC presents a notable challenge, notably the issue of transition costs. This challenge becomes especially pronounced if the system lacks financial balance upon introduction due to substantial existing pension claims (Holzmann, 2017). However, as delta-sustainability primarily focuses on temporal changes, this issue is not relevant to NDR-GDP, although the initial sum of unfunded liabilities might indeed be significant.

Furthermore, the concept of financial balance, inherent to NDC, necessitates predetermined future contributions. In contrast, delta-sustainability and NDR-GDP allow for greater flexibility in this regard.

In summary, despite their structural similarities, the differing notions of pension system sustainability between NDC and NDR-GDP represent a significant divergence in their design philosophies.

4.8 Conclusion and outlook

In this paper, we introduced the abstract NDR framework, encapsulating the essential components of an individual account-based nonfinancial pension system. Within this framework, we considered two pension schemes: NDC and NDR-GDP. The primary distinction between these schemes lies in the notion of sustainability they fulfill. While NDC adheres to financial balance, NDR-GDP aligns with the novel concept of delta-sustainability, which takes into account the broader context and evolution over time.

It is important to recognize that pension systems are inherently complex, and our analysis in this paper has focused on simplifying many core components. We acknowledge that factors such as the insurance aspect of pension systems and variations in life expectancies, particularly among different socioeconomic groups, are crucial considerations (Kinge et al., 2019; Chetty et al., 2016). Additionally, the equivalence principle does not guarantee sufficient pensions.

However, the difference between NDC and NDR-GDP may not be as significant when considering these additional complexities of pension systems. Many implementations of NDC do not incorporate an automatic balancing mechanism, and even when they do, future contributions are often approximated. In cases where the rate of return is aligned with GDP and no balancing mechanism is utilized, NDR-GDP essentially mirrors the respective implementation of NDC.

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Appendix 4.1: Terminology of Nonfinancial Defined Return framework

The term “nonfinancial” is chosen because contributions within this framework are not directed towards financial market assets. Instead, individual accounts and index points represent notional values. One could alternatively use the term “notional”, similar to how NDC schemes are often referred to as nonfinancial or notional.

The term “defined return” is selected because it signifies that the benefit per contribution is fixed, expressed in index points. This property is inherently tied to the use of individual accounts. This concept has also been referred to as “Defined Contributions”, for example by Góra and Palmer (2019):

> The DC design builds on a foundation of individual accounts, the accumulation of savings (through contributions) on these accounts, and the creation of a life annuity at retirement based on the individual’s account balance and life expectancy at retirement.

However, the term “Defined Contributions” has also been used with a completely different meaning in PAYG pension systems. For example, Börsch-Supan (2007) uses the term “defined contributions” in the sense that contributions are fixed, and benefits of current pensioners are determined by these contributions.

The crucial difference is that in the first definition, benefits are determined by the individual’s contributions. In the second definition, benefits are determined by the current contributions of other participants.

Moreover, “Defined Contributions” can also refer to defining contribution rules, such as fixing contribution rates, without necessarily implying benefits. For instance, in the generic NDC scheme, defining contribution rules is essential for computing future contributions.

Therefore, in the NDC scheme, both the contribution-benefit link and the definition of contribution rules are crucial. However, in the abstract NDR framework, the emphasis is only on the contribution-benefit link.

We also note that the NDR framework does not prescribe any specific decisions regarding risk-sharing, as both the insurance mechanism and the indexation method remain abstract. In accounting, the terms “Defined Contributions” and “Defined Benefit” denote how the risk of an insurance is allocated.[7]

[7] See International Accounting Standard 19.

Given the overloaded nature of the term “Defined Contributions”, we introduce the term “Defined Return” to encapsulate the contribution-benefit link and the concept of individual accounts.

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