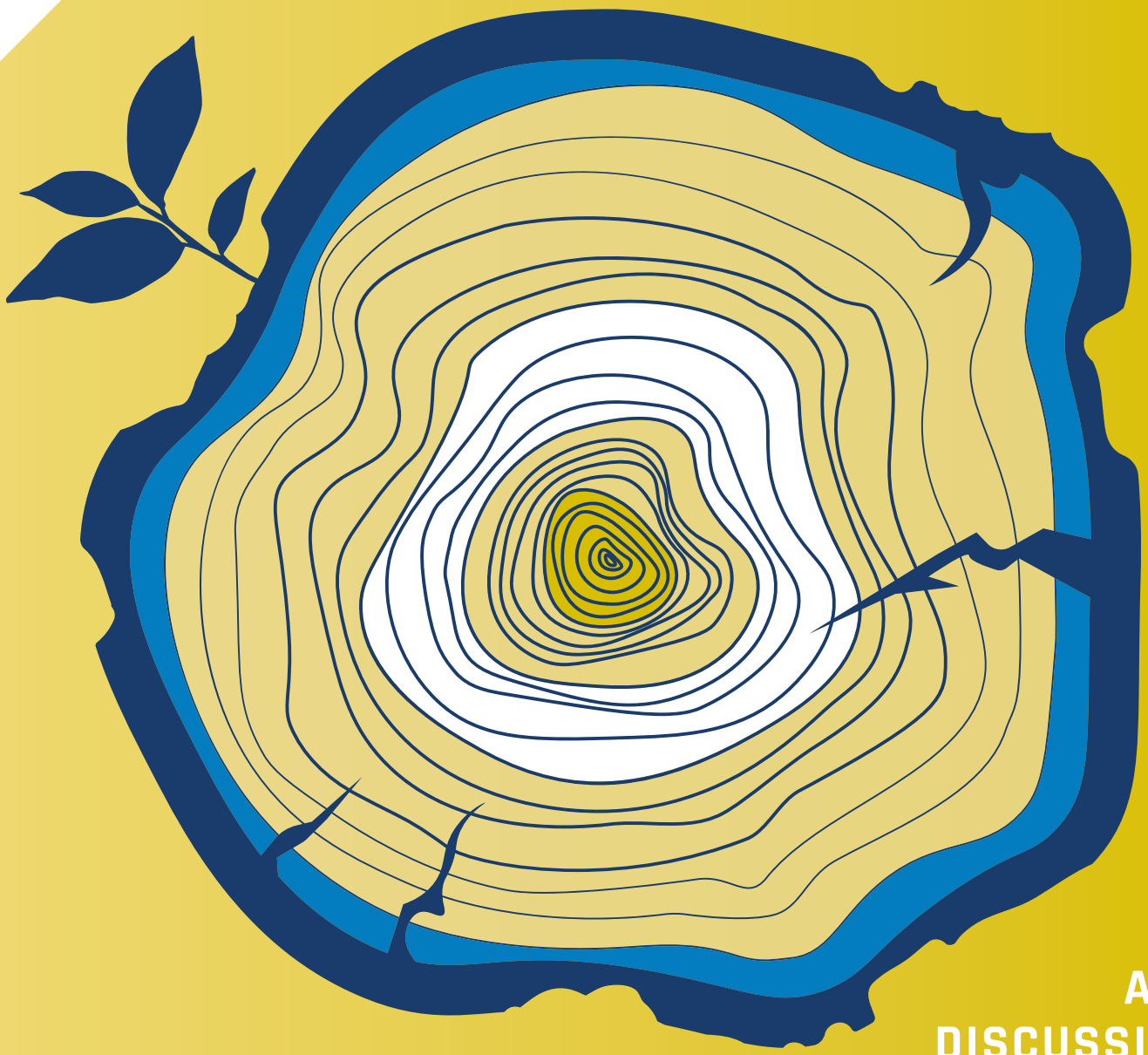

AAE
DISCUSSION
PAPER

THE NEW 'AGE' FOR SOCIAL SECURITY
AND HOW WE CAN GET THERE

SEPTEMBER 2025

AAE ACTUARIAL ASSOCIATION OF EUROPE

SEPTEMBER 2025

This discussion paper explores the complex demographic, economic, and institutional challenges facing European social security systems, as outlined in the European Commission's 2024 Ageing Report and Pension Adequacy Report. It provides an actuarial perspective on declining fertility, increasing longevity, migration trends, labour market transformation, and shifting societal norms. Emphasising both adequacy and sustainability, the paper highlights the relevance of education, intergenerational risk sharing, and environmental accountability in shaping future pension policies. It advocates for a more holistic, transparent, and forward-looking role for actuaries in supporting policy development across Europe, offering insights into risk mapping, enterprise risk management, and the diversity of national pension concepts.

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The Sub-Committee also recognises the valuable contribution of the European Commission's recent work — in particular, the 2024 Ageing Report (DG ECFIN) and the 2024 Pension Adequacy Report (DG Employment) — which provided an important analytical foundation for this paper.

FOREWORD

Every three years, the European Commission's Directorate-General for Economic and Financial Affairs (DG ECFIN), in collaboration with the Ageing Working Group of the Economic Policy Committee of the EU Council, publishes comprehensive projections of age-related public expenditure for all EU Member States and Norway. The 2024 Ageing Report (hereafter AR24) was released in April 2024, accompanied by Council conclusions on age-related spending[1]. Its primary focus is on fiscal sustainability over the period to 2070.

This analysis is complemented by a concurrent triennial study into Pension Adequacy, overseen by the EU Commission Directorate-General for Employment (DG Employment), in collaboration with the Working Group on Ageing Issues of the Social Protection Committee of the Council (SPC WG-AGE). The 2024 Pension Adequacy Report 2024, (hereafter PAR24[2]), was published in June 2024, and looks at similar issues over a long time-frame but from 'the other end of the telescope', seeking to measure the success of EU pension systems in meeting objectives of relieving poverty and achieving income replacement at retirement.

The actuarial profession in Europe welcomes the comprehensive analysis presented in both the AR24 and PAR24.

The present paper from the Actuarial Association of Europe (AAE) addressed key issues highlighted in the Commission's recent publications.

1 The 2024 Ageing Report.

2 The 2024 Pension Adequacy Report.

MANAGEMENT SUMMARY

Key messages from the Actuarial Association of Europe

- Attitudes toward childbearing and family life are changing across Europe. Broader cultural shifts – including the rise of non-traditional family structures, family breakdowns, and evolving career patterns – have contributed to persistently low birth rates.

- Old-age life expectancy is improving more rapidly than active-age life expectancy. This highlights the need for profound labour market reforms, including equal opportunities for men and women and better employability for older workers, to enable more people to work, and to work for longer.

- Migration can help relieve pressure on traditional pay-as-you-go pension systems by expanding the labour force and strengthening the base of contributors. However, its effectiveness depends on various factors, including the skillset of migrants, their employment rates, and their integration in the host country's economy.

- Education plays a vital role in preventing the intergenerational transmission of poverty. Increased support should be given to educational institutions, and policymakers should adopt more flexible approaches to distributing educational resources across the life course.

- Sharp and increasing differentiation between employment statuses presents a challenge for national social security systems. Strategies should take account of diverse labour market entry points, career breaks for caregiving, varying contract types, and differing levels of physical strain across occupations.

- It is crucial to take into account how nationally constructed ideas and local institutions frame and shape the different logics and justifications due to the existing underlying pension concepts. Understanding the various pension concepts will enable us to understand better why different countries opt for different types of reforms. In addition, it will enable us to contribute more effectively to social dialogue in raising public awareness about pensions.

- The general principles of Enterprise Risk Management can be applied to pension systems, acknowledging the distinct features of social security schemes. Social security actuaries are well placed to support the adoption of a holistic risk management approach that enhances both governance and outcomes for beneficiaries.

- From an actuarial perspective, fairness and adequacy should be considered alongside sustainability and intergenerational risk-sharing. A system that is sustainable is not necessarily fair, and a system that provides adequate pensions is not necessarily sustainable—regardless of whether it is pay-as-you-go or funded scheme.

- Long-term projections of social security plans should be considered within the context of climate change and other global environmental challenges. The ISSA–ILO Guidelines recommend incorporating natural environment accounting as part of a broader commitment to sustainability and social justice.

- Effective tracking, monitoring, and evaluation of pension scheme implementation are essential to maintaining pension promises. These practices support evidence-based policymaking and prepare governments for regular scheme reviews with the help of actuaries and other expert advisers.

- Actuarial reporting aligned with the International Social Security Association (ISSA) guidelines is a key element of sound governance. Cash-flow-based modelling enables integrated assessments of the short- medium- and long-term effects of pension policies and reforms on both adequacy and sustainability of pension systems.

CONTENTS

INTRODUCTION

How can we build a Europe that is resilient, prosperous, and sustainable in the face of growing uncertainty and an accelerating pace of change?

Long-term thinking currently seems quite vital, as the enormity of the challenges we face, and the scale of the solutions we must design are now a reality.

Concerns about the future of a 'longevity society' should not, in our view, be interpreted as evidence of crisis, at least not in the sense that there are no better alternatives available.

Demographics are not a fate – policies and institutions matter.

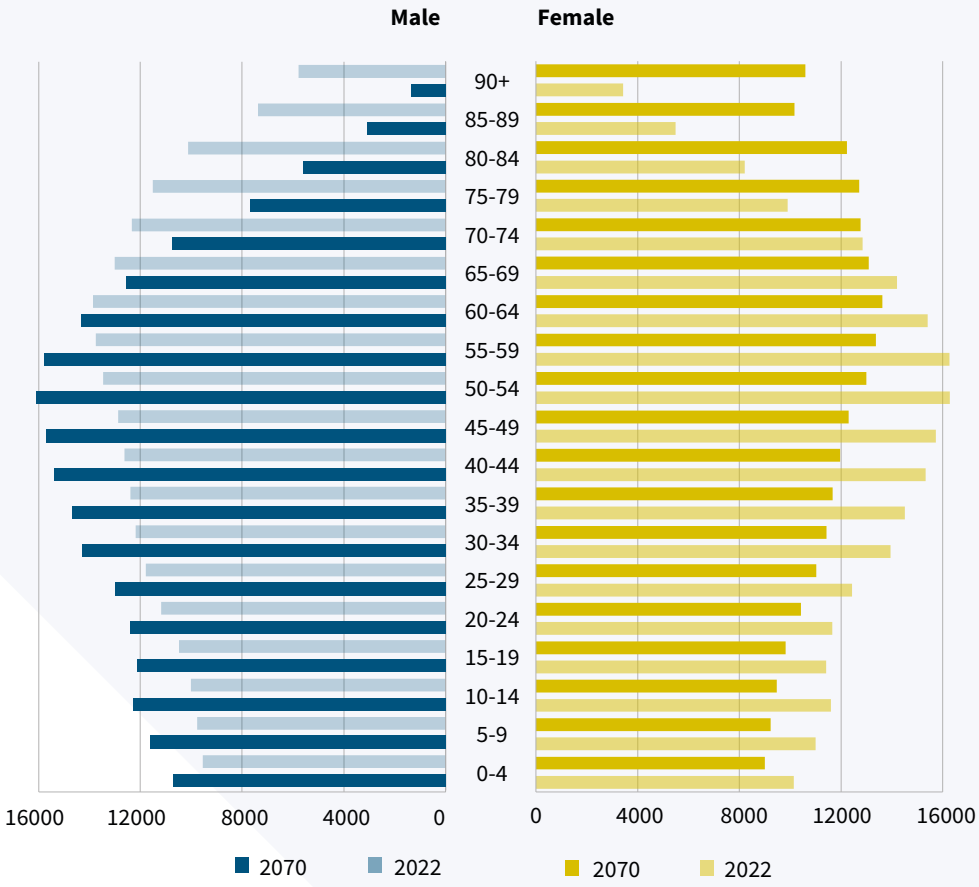
As social security actuaries, we do not claim to offer ready-made answers – let alone solutions – for society's well-being. But we need to ask the right question:

Where would we like the world to be in 2070?

1 A DEMOGRAPHIC TRANSITION – FEWER DEATHS AND EVENTUALLY FEWER BIRTHS

Population ageing is landed in Europe, and globally, testing the resilience of social security systems. The total EU population is expected to decline from 449 million people in 2022 to 432 million in 2070 (a 4% reduction). The old age dependency ratio[3] rose from around 29% in 2010 to 36% in 2022, and is projected to reach 59% by 2070.

FIGURE 1: EU – POPULATION BY AGE GROUP AND SEX, 2022 AND 2070 (IN THOUSANDS)[4]



Source: European Commission, EPC

Demographic changes have a profound impact on our lives. As social security actuaries, we emphasise the importance of understanding population trends and anticipating demographic changes as essential components of national development planning.
Demographic projections are a cornerstone for government budgeting of expenditure items, notably (in the perspective of this paper) pensions, healthcare and long-term care.

3 The ratio of the old-age population to the working-age population.

4 2024 Pension Adequacy Report Pensions Adequacy Report.

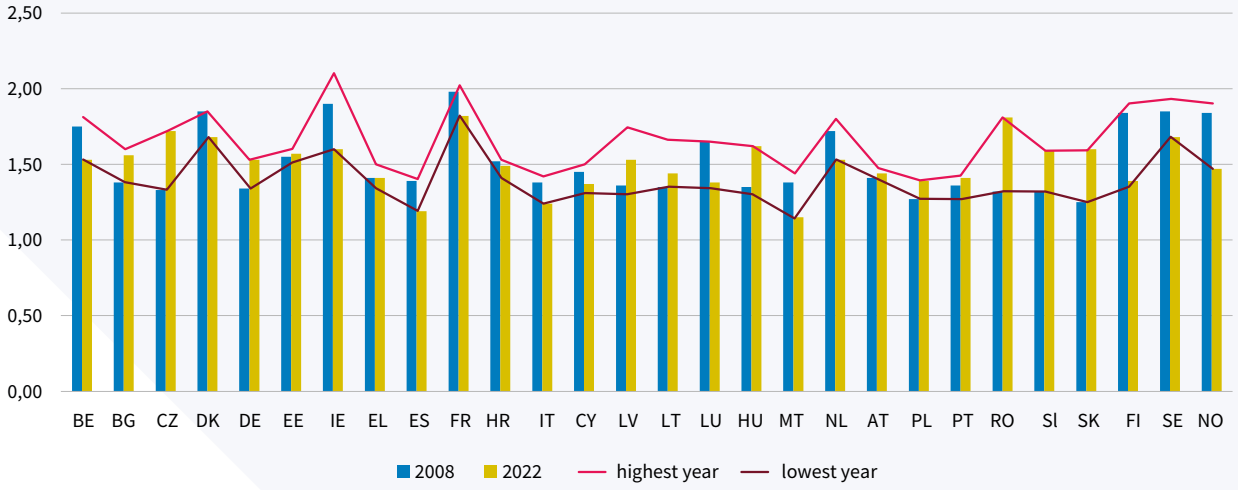
1.1 HOW LOW WILL IT GO?

Demographic ageing continues to be a central challenge with particular attention paid to the declining birth rates during the 2010s and the role of increasing uncertainty.

According to the Ageing Reports, the fertility rate in the EU and Norway rose from an average of 1.52 in 2008 to 1.58 in 2010, but subsequently declined to 1.51 in 2022. The actual development of the fertility rates between 2008 and 2022 on the basis of the Ageing reports data are presented in Table 1.

To illustrate the trend in fertility rates across countries, the figure below compares values in 2008 and 2022, highlighting the highest and lowest rates:

FIGURE 2: DEVELOPMENT OF THE FERTILITY RATES BETWEEN 2008 AND 2022 IN EUROPEAN UNION AND NORWAY



Source: Ageing reports' data: 2009 to 2024

TABLE 1: DEVELOPMENT OF THE FERTILITY RATES BETWEEN 2008 AND 2022 IN EUROPEAN UNION AND NORWAY

COUNTRIES	2008	2010	2013	2016	2019	2022
BE	1,75	1,80	1,81	1,73	1,58	1,53
BG	1,38	1,60	1,51	1,51	1,58	1,56
CZ	1,33	1,50	1,52	1,62	1,71	1,72
DK	1,85	1,80	1,74	1,79	1,72	1,68
DE	1,34	1,40	1,40	1,49	1,53	1,53
EE	1,55	1,60	1,57	1,58	1,51	1,57
IE	1,90	2,10	2,01	1,89	1,78	1,60
EL	1,41	1,50	1,34	1,39	1,34	1,41
ES	1,39	1,40	1,32	1,31	1,27	1,19
FR	1,98	2,00	2,02	2,01	1,85	1,82
HR (*)	1,52	1,51	**1,53**	1,41	1,43	1,49
IT	1,38	1,40	1,43	1,33	1,31	1,24
CY	1,45	1,50	1,40	1,31	1,33	1,37
LV	1,36	1,30	1,50	1,74	1,58	1,53
LT	1,35	1,50	1,61	1,66	1,61	1,44
LU	1,65	1,60	1,59	1,40	1,34	1,38
HU	1,35	1,30	1,38	1,48	1,51	1,62
MT	1,38	1,40	1,44	1,41	1,14	1,15
NL	1,72	1,80	1,72	1,66	1,58	1,53
AT	1,41	1,40	1,45	1,47	1,45	1,44
PL	1,27	1,40	1,32	1,37	1,36	1,39
PT	1,36	1,30	1,27	1,34	1,43	1,41
RO	1,32	1,40	1,65	1,54	1,65	1,81
Sl	1,32	1,50	1,59	1,58	1,55	1,59
SK	1,25	1,40	1,28	1,40	1,56	1,60
FI	1,84	1,90	1,80	1,60	1,35	1,39
SE	1,85	1,90	1,93	1,86	1,71	1,68
NO	1,84	1,90	1,85	1,70	1,53	1,47
EA	**1,52**	**1,58**	**1,57**	**1,56**	**1,51**	**1,51**

Source: Ageing reports 2009 to 2024

(*) HR data first published in the Ageing report of 2015.
The source of 2008 and 2022 data is: United Nations – World population prospects

It is worth noticing the sharp decline in the Nordic countries,[5] where traditionally the fertility rates were above the EU average due to more generous social security and childcare benefits for families (Appendix B). The sudden change has puzzled demographers, and the underlying reasons have been under study.

One theme in demographic theory, according to Caldwell,[6] suggests that, as society changes, fertility remains high due to outdated 'props'[7] rooted in earlier social conditions. Social upheavals can disrupt these conditions, triggering declines in fertility.

Examining thirteen social crises, ranging from the seventeenth-century English Civil War to the fall of communism in Eastern Europe in the late twentieth century, Caldwell observed that all showed marked falls in fertility arising from deferred female marriage, declining marital fertility, or both. The evidence is weak that this change constituted an adjustment of fertility to immediately preceding social conditions but stronger that there was a temporary adjustment to a new period of uncertainty about the future and a continuing adjustment to new socioeconomic and legislative conditions.

1.1.1 The Baby Boom – What happened?

In their macroeconomic analysis of the baby boom and World War II, Doepke et al[8] argue that one major cause of the U.S. postwar baby boom was the increased demand for female labour during World War II – *a one-time demand shock with long-term implications*. For the war generation, the shock led to a persistent increase in female labour supply due to the accumulation of work experience. In contrast, younger women who entered adulthood after the war, faced increased labour-market competition, which impelled them to exit the labour market and start having children earlier.

In their article, Sarygulov and Arslanagic-Wakefield[9] highlight that marriage rates in Europe also increased between 1930 and 1960, in some cases dramatically, while the average age at first marriage declined. In England and Wales, 26 percent of women aged 20 to 24 were married in 1930; this percentage rose to 58 percent by 1960.

5 0.51 decrease in Finland, 0.43 in Norway, 0.22 in Sweden.

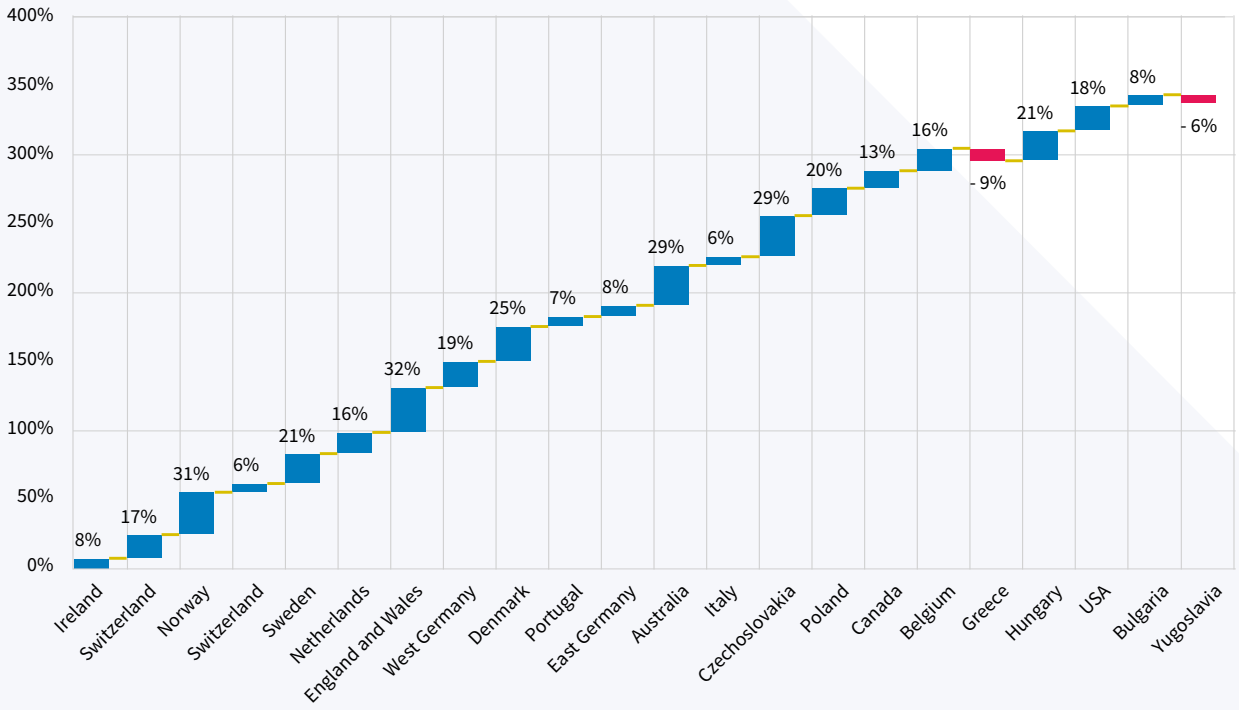
6 Caldwell, John (2004), 'Social Upheaval and Fertility Decline', Journal of Family History, 29(4):382-406.

7 Props: slang terms for 'proper respect', or 'just dues'.

8 The Baby Boom and World War II: A Macroeconomic Analysis Matthias Doepke, Moshe Hazan, and Yishay Maoz. NBER Working Paper No. 13707 December 2007 JEL No. D58, E24, J13, J20.

9 Anvar Sarygulov & Phoebe Arslanagic-Wakefield Understanding the Baby boom.

FIGURE 3: MARRIAGE RATES ROSE ACROSS THE DEVELOPED WORLD. SHARE OF WOMEN MARRIED (%) AMONG THOSE AGED 20-2



Source: Anvar Sarygulov & Phoebe Arslanagic-Wakefield Understanding the Baby boom

According to the article, *'In the countries that it touched, the Baby Boom created generations massive in size.'*

Today, a fifth of both the UK's and the USA's population are baby boomers and we live in the world they created. According to the specialists, the baby boom was not the result of people making up for lost time during the war. In many countries, including the US, UK, Sweden and France, the rise in birth rates began years before the war had even started, while neutral Ireland and Switzerland experienced booms that began during the war, in 1940.

In the years following 1930 and up to 1960, advances in household technology, progress in medical technology, and improved access to housing sharply reduced the cost of having children.

However, it took over a quarter of a century after the Baby Boom began for the first substantive theory attempting to explain it to arrive from economist Richard Easterlin in 1961 – what we will refer to as the Easterlin Hypothesis. Easterlin's explanation rests on the idea that the decisions individuals make in terms of whether and how many children they will have are strongly influenced by the difference between what they had expected their adult income to be while growing up, their 'expected income', and what it actually is once they join the labour market, which he called 'relative income'. He argued that people form an expectation of their income based on a range of social and economic signals, primarily those they receive growing

up: the current average standard of living; the standard of living they experienced during their childhood; the sense of their own prospects.

It is worth mentioning though that, according to the article, *'even the strongest research* showing a robust relationship between relative income and fertility, finds that at best, it can only explain *a small* fraction, such as 12%, of the rise in fertility during the Baby Boom, reinforcing that other factors were *at play'.*

'The strange thing with fertility is that nobody really knows what's going on. The policy responses are untried because it's a new situation. It's not primarily driven by economics or family policies. It's something cultural, psychological, biological, cognitive'.[10]

1.1.2 Are family friendly policies no longer enough?

Childlessness has increased in many European countries. Partnerships and parenthood are obviously closely related, but there is relatively little knowledge on how childlessness is linked to contemporary union dynamics that involve high rates of separation and unmarried cohabitation.

According to Professor Markus Jokela,[11] modern life has changed traditional life paths where having children was once a given. Freedom of choice can increase conscious decisions of childlessness but also uncertainty about parenthood.

The primary finding, after drawing on repeated representative surveys collected between 2007 and 2018 by the Family Federation of Finland, was that people born in more recent cohort reported a lower ideal number of children than those born earlier. 25% and 26% of men aged 25 and born in 1985–1989 and 1990–1994, respectively, stated that their ideal number of children was zero, in contrast to 4% and 5% of men aged 25 and born in 1975–1979 and 1980–1984, respectively. The corresponding percentages for women were 22% and 21% compared to 2% and 9%.

Broader cultural changes, including the rise of non-traditional family structures and family ruptures, along with shifting career patterns, contribute to reduced birth rates. In addition, Increased urbanisation increases the education and childcare expenses. This can deter family formation as the costs of raising children may become high or prohibitively high.

Researchers suggest that these trends reflect deeper cultural change rather than temporary effects from events like the 2008 economic crisis.
Attitudes toward childbearing and family life seem to change in Europe.

10 Anna Rotkirch: Financial Times (29.1.2024) Birth rates are falling in the Nordics. Are family-friendly policies no longer enough?

11 Declining fertility ideals? Young people more often prefer having no children | University of Helsinki.

1.2 THE 100 YEARS OF LIFE

In 2023, the life expectancy at birth[12] in the EU was 81.4 years, up by 0.8 years from 2022. Over two decades, since 2002, the highest value was recorded in 2019 when life expectancy at birth reached 81.3 years (up 3.7 years compared with 2002). However, after the outbreak of the COVID-19 pandemic, this indicator declined to 80.4 in 2020 and to 80.1 years in 2021. In 2022, life expectancy at birth in the EU increased again but figures remained lower than in 2019 for all countries.

Most demographic projections by international and national statistical institutes suggest that gains in life expectancy will slow in the future compared with historical trends. This is because mortality rates at younger ages are already very low and future gains in life expectancy would require improvements in mortality rates at older ages, which statistically have a smaller impact on life expectancy at birth.

In particular: sustainability is dependent on the retired/active dependency ratio.[13] If old age life expectancy is improving more than active age life expectancy then, the dependency ratio will deteriorate; *we know it does*. Old age life expectancy has increased largely due to improved healthcare. However, how these gains apply to the working-age population remains a question.

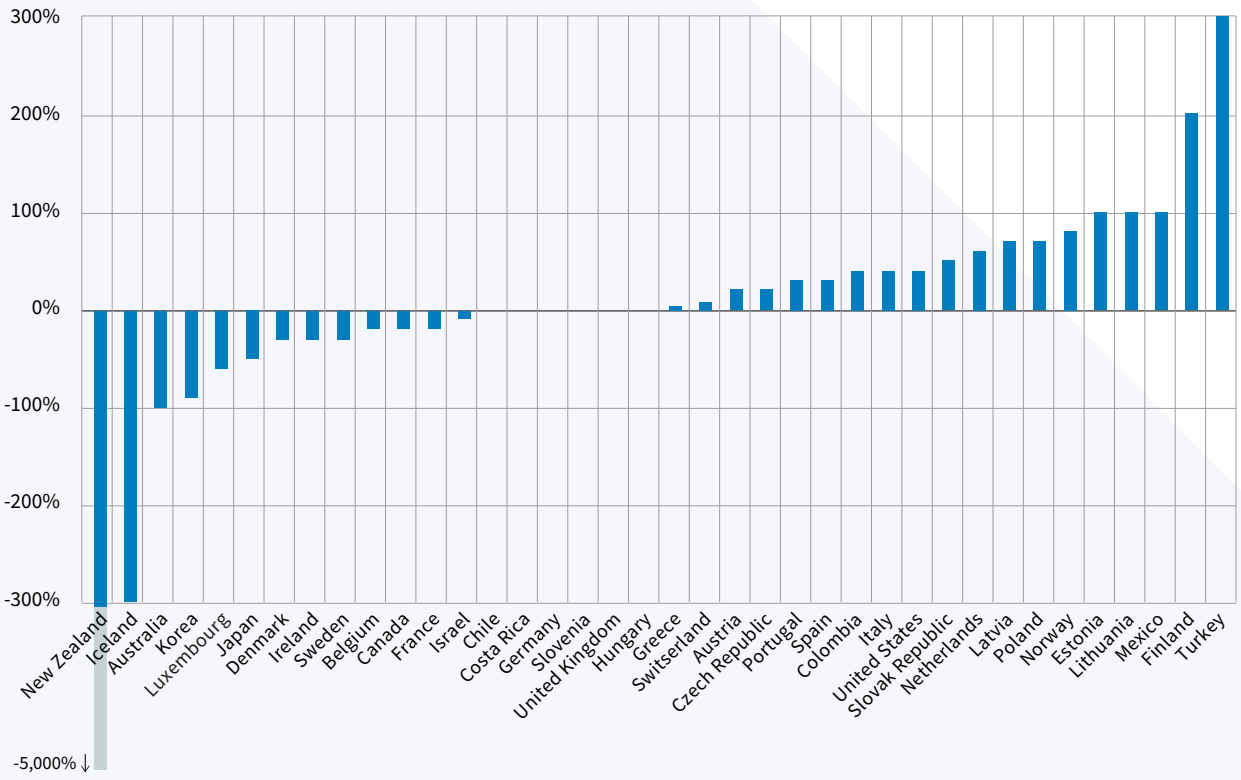
The COVID-19 pandemic has left its mark on populations worldwide raising mortality especially among older people. Across OECD[14] countries, excess mortality reached about 13% for the population aged 65+: the actual number of deaths exceeded the expected number of deaths based on 2015-19 figures by 13%, as this is described in the figure below.

12 Mortality and life expectancy at death, March 2025.

13 The dependency ratio relates the number of children (0-14 years old) and older persons (65 years or over) to the working-age population (15-64 years old).

14 OECD Pensions at a Glance 2023.

FIGURE 4: EXCESS MORTALITY RELATIVE TO OFFICIALLY REPORTED COVID-19 DEATHS, 2020-21



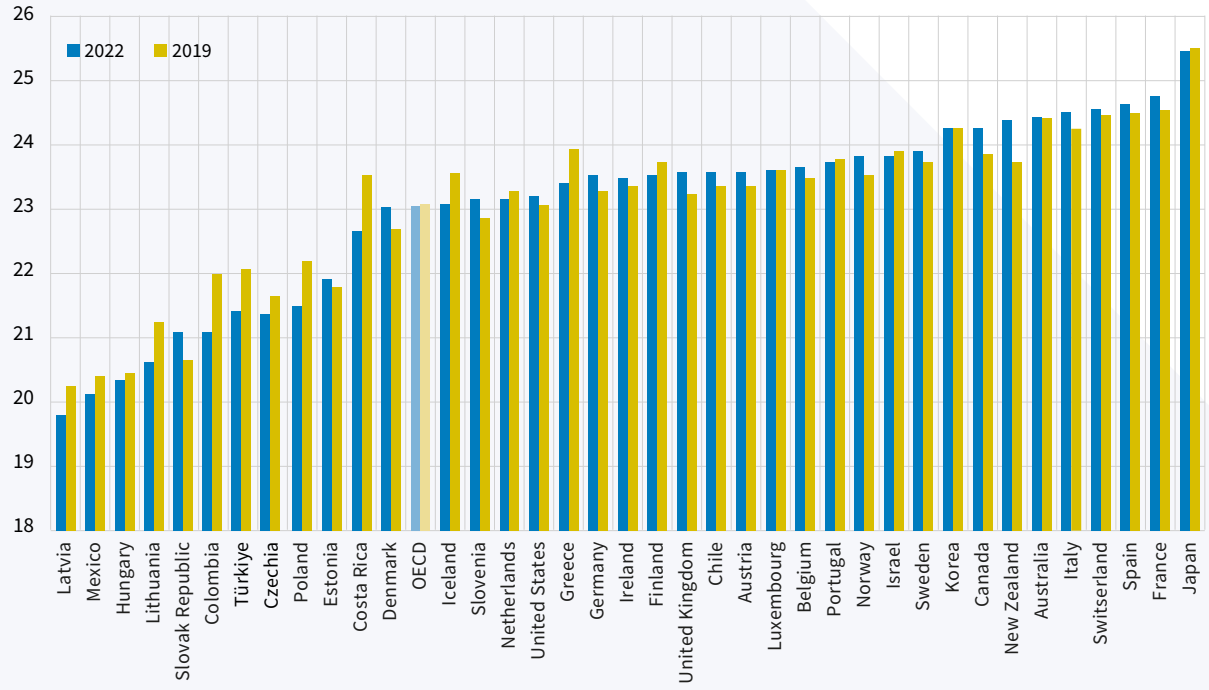
Source: Mortality and the Provision of Retirement Income, OECD (2023)

Following COVID 19 impact, Eurostat demographic projections show increases in life expectancy both at birth and at the age of 65 for both males and females over the period 2022-2070. For the EU, life expectancy at birth would increase by 7.7 years for males and by 6.4 years for females, with the largest increases in Member States that currently have the lowest life expectancy.[15] New long-term projections of old-age life expectancy remain broadly consistent with pre-COVID expectations. The United Nations' 2022 projections of life expectancy at age 65 for the period 2050-55 are broadly consistent with pre-COVID projections across OECD countries, as this is described in the figure below.[16]

15 2024 Ageing Report Underlying Assumptions & Projection Methodologies, institutional paper 257 November 2023.

16 OECD Pensions at a Glance 2023.

FIGURE 5: PROJECTED REMAINING LIFE EXPECTANCY AT 65 FOR THE PERIOD 2050-55 IN YEARS, COMPARING PROJECTIONS IN 2019 AND 2022



Source: United Nations, Department of Economic and Social Affairs (2022). World Population Prospects, Online Edition

Population aging demands societal responses that are more than a simple focus on pension entitlements.[17] These include modifying the surroundings to be more senior-friendly, encouraging healthy living, and ensuring that the older individuals have access to both health care and social care.

In addition, to respond to these demands, the fiscal implications of population aging should be considered, such as the decreasing labour market-related contributions to social currencies.[18]

Due to changing legislation regarding retirement age thresholds as well as collective labour agreements, organisations should actively implement age management.[19] If implemented, innovative policy development guided through stakeholder networks and partnerships or collaborations can play an essential role in changing the market landscape and ensuring that age-friendly environments exist at the marketplace for tackling the diversity of socioeconomic

17 Rowe, J. (2011). Successful Societal Adaptation to the Aging of America. Public Policy & Aging Report, 21(4), 11.

18 Williams, G et al (2019). Sustainable Health Financing with an Ageing Population.
Social currency refers to the actual and potential resources from presence in social networks and communities, including both digital and offline. The concept derives from Pierre Bourdieu's social capital theory and relates to increasing one›s sense of community, granting access to information and knowledge, helping to form one›s identity, and providing status and recognition.

19 Fabisiak, J., & Prokurat, S. (2012). Age Management as a Tool for the Demographic Decline in the 21st Century: An Overview of its Characteristics. Journal of Entrepreneurship Management and Innovation, 8(4), 83.

environments.[20] Additionally, policies that encourage lifelong learning and skills development can allow older workers to continue participating in the labour force longer, contributing to economic productivity and the sustainability of pensions.[21]

Governments need to address challenges such as income insecurity, lack of access to healthcare, social isolation and neglect, which older adults face in many countries.[22] Policymakers, service providers, and researchers should align around strong frameworks that promote solutions to population aging challenges,[23] that focus on ensuring the adequacy (advancement) of older persons' development, health & well-being together with supportive environments.

1.3 IS EDUCATION THE PANACEA?[24]

A long-standing literature has shown that patterns of mortality can drastically differ between groups. Less-educated groups tend to have lower life expectancy.

Differences in mortality rates can be observed across socio-economic groups in all countries. Education, income, and occupation can all serve as explanatory variables. For simplicity we refer to education as a proxy for entry age, occupation, and income. Life expectancy at age 65 by educational background varies across EU Member States and is projected to decline over time by approximately one month per year (on average).[25] Men aged 65 with a tertiary education degree can expect to live 1.6 years longer than men who did not attain an upper-secondary education. For women aged 65 the average educational gap in life expectancy is 0.4 years. Social security and, in general, social programs should aim to avoid the 'poverty trap'. We consider education as an important part of the solution to not reproducing poverty.

The figure below[26] describes the gap in life expectancy at the age of 65 between 'tertiary'[27] and 'less than upper secondary'[28] educational levels, men and women, in EU-27 Member States and Norway; *data available 2017 or latest*.

20 Illario, M et al (2019). Health tourism: an opportunity for sustainable development. HAL (Le Centre Pour La Communication Scientifique Directe), 19, 109.

21 Thang, L. L. (2011). Population aging, older workers and productivity issues: the case of Singapore. Journal of Comparative Social Welfare, 27(1), 17.

22 Sidani, M. et al (2017). Geriatric Care Issues [Review of Geriatric Care Issues]. Primary Care Clinics in Office Practice, 44(1). Elsevier BV.

23 Thinley, S. (2021). Health and Care of an Ageing Population: Alignment of Health and Social Systems to Address the Need. Journal of Health Management, 23(1), 109.

24 Panacea: an answer or solution for all problems or difficulties. In Greek mythology and religion, Panacea (Greek Panakeia) was the goddess of universal remedy.

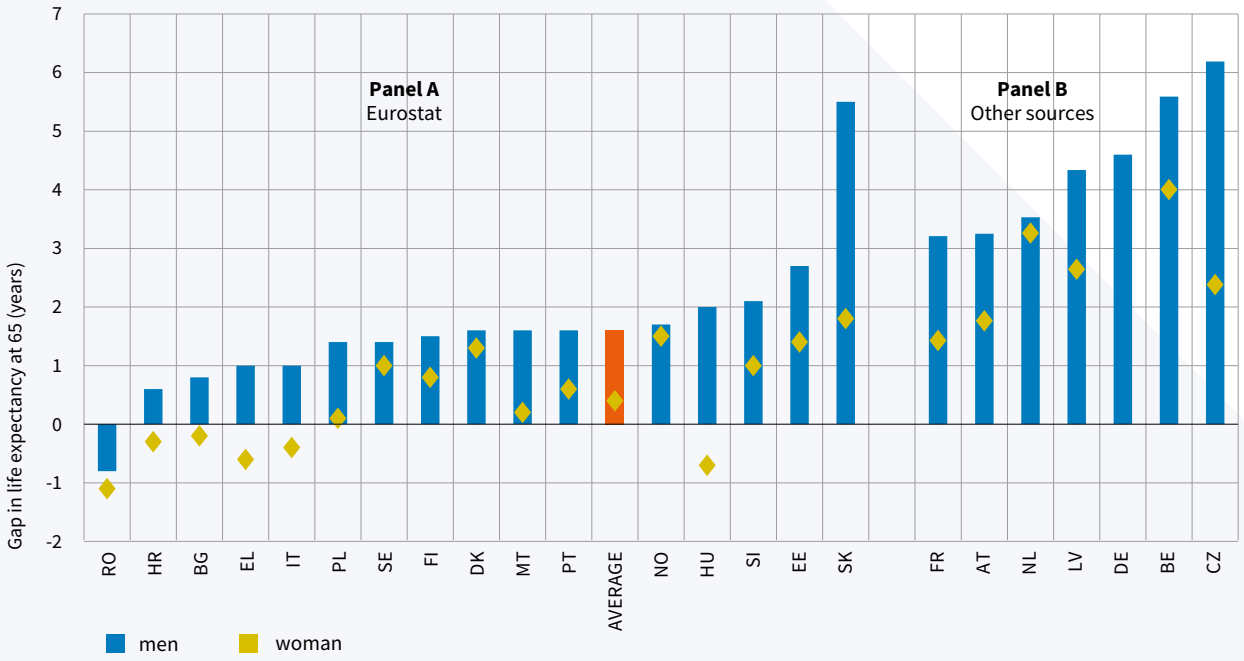
25 Data available for 17 EU Member States and NO.

26 2024 Pensions Adequacy Report.

27 Tertiary education or post-secondary education is the educational level following the completion of secondary education.

28 Secondary education typically takes place after six years of primary education and is followed by higher education. Level 2 or lower secondary education is considered the second and final phase of basic education, and level 3 upper secondary education is the stage before tertiary education.

FIGURE 6: GAP IN LIFE EXPECTANCY AT THE AGE OF 65 BETWEEN 'TERTIARY' AND 'LESS THAN UPPER SECONDARY' EDUCATIONAL LEVELS, MEN AND WOMEN, IN EU-27 MEMBER STATES AND NORWAY – PANEL A EUROSTAT ESTIMATIONS & PANEL B OTHER SOURCES ESTIMATION



Sources: Eurostat (2020b); OECD (2017); Gheorghe et al. (2016); Grigoriev and Doblhammer (2019)

Murtin et al, showed in their paper[29] on educational inequalities in longevity across education and gender groups in 23 OECD countries that, on average, the gap in life expectancy between high and low-educated people is 7.6 years for men and 4.8 years for women at age 25 years, and 3.6 years for men and 2.6 years for women at age 65. Differences between countries can be large: at the age of 25, the gap in life expectancy between high and low-educated people varies between 4.1 years (in Canada) and 13.9 years (in Hungary) for men, and between 2.5 years (in Italy) and 8.3 years (in Latvia) for women.

Among the main findings of the study of Julia Hellstrand, Jessica Nisén & Mikko Myrskylä[30] (2024) is that the extent of the fertility decline was associated with uncertainty measures: fertility declined more strongly in fields associated with higher economic uncertainty such as higher unemployment, lower income, and lower public sector employment. *It is worth noticing that, according to the main findings of the study, the uncertainty measures explained together one-fourth of the decline in the total fertility rate and two-fifths of the decline in first births.*

The findings of their study demonstrated elevated first birth declines among the least educated in the Nordic countries.

29 Murtin, F., Mackenbach, J. P., Jasilionis, D., and Mira d'Ercole, M. (2022). Educational inequalities in longevity in 18 OECD countries. Journal of Demographic Economics, 88(1):1–29.

30 Julia Hellstrand J, Nisén J, Myrskylä M, Stronger fertility declines in educational fields associated with higher economic uncertainty Stronger fertility declines in educational fields associated with higher economic uncertainty - Flux Consortium.

Jalovaara and Miettinen[31] (2022) find that in Finland highly educated men and women are more likely to have exactly two children. Childlessness has increased among men and women with lower (low or medium) education. Especially for men the differences between educational groups are remarkable. Of low-educated men born in the beginning of the 1970s, over a third (35%) were childless at the age of 45. For their medium-educated peers this figure also approached one third (31%). In contrast, the childlessness level for highly educated men stood at one fifth and has not increased in recent times. Among women of the same cohorts one fifth of all women and one fourth of the lowest educated were childless at age 40.

In general, the means by which individuals may upgrade their education status reflect the learning opportunities which are of equal importance across the age spectrum. At this point, we highlight the value of learning opportunities for those, increasing in numbers, who in their later career years decide to dedicate time to studying for an academic degree.

As social security actuaries we strongly recommend increased support for the educational institutions of Member States. Policymakers should adopt increasingly flexible approaches to distributing educational resources throughout the life course.

1.4 DESTINATION EUROPE

The financial health of the pension system is intrinsically tied to the level and composition of the working-age population. Birth rates are falling and increasing life expectancy is familiar to policymakers of the EU member states. Both result in a decreasing number of contributors to the pension system and a growing number of pensioners.[32]

Due to declining birth rates and growing shortages of skilled workers, migration has an increasing impact on the financial sustainability and societal adequacy of pension systems. The demographic shift puts tremendous strain on traditional pay-as-you-go pension models, which pay out for current retirees with current contributions. Migrations can counterbalance this by growing the size of the labour force and strengthening the contributors' base.

Migrants — typically of working age — can provide new dynamism to the labour market, filling crucial skills gaps and boosting economic growth. However, the potential of migration to redress pressure in pension systems is contingent on many factors, including the skill-set of migrants, their employment rates, and their integration into the host country's economy.[33]

31 Jalovaara and Miettinen In Finland, the highly educated most likely to have two children – among the lower educated both lifetime childlessness and greater numbers of children increasingly common – Flux Consortium.

32 Amran et al (2019). Demographic scenarios for the EU : migration, population and education. In EUR. Publications Office of the European Union.

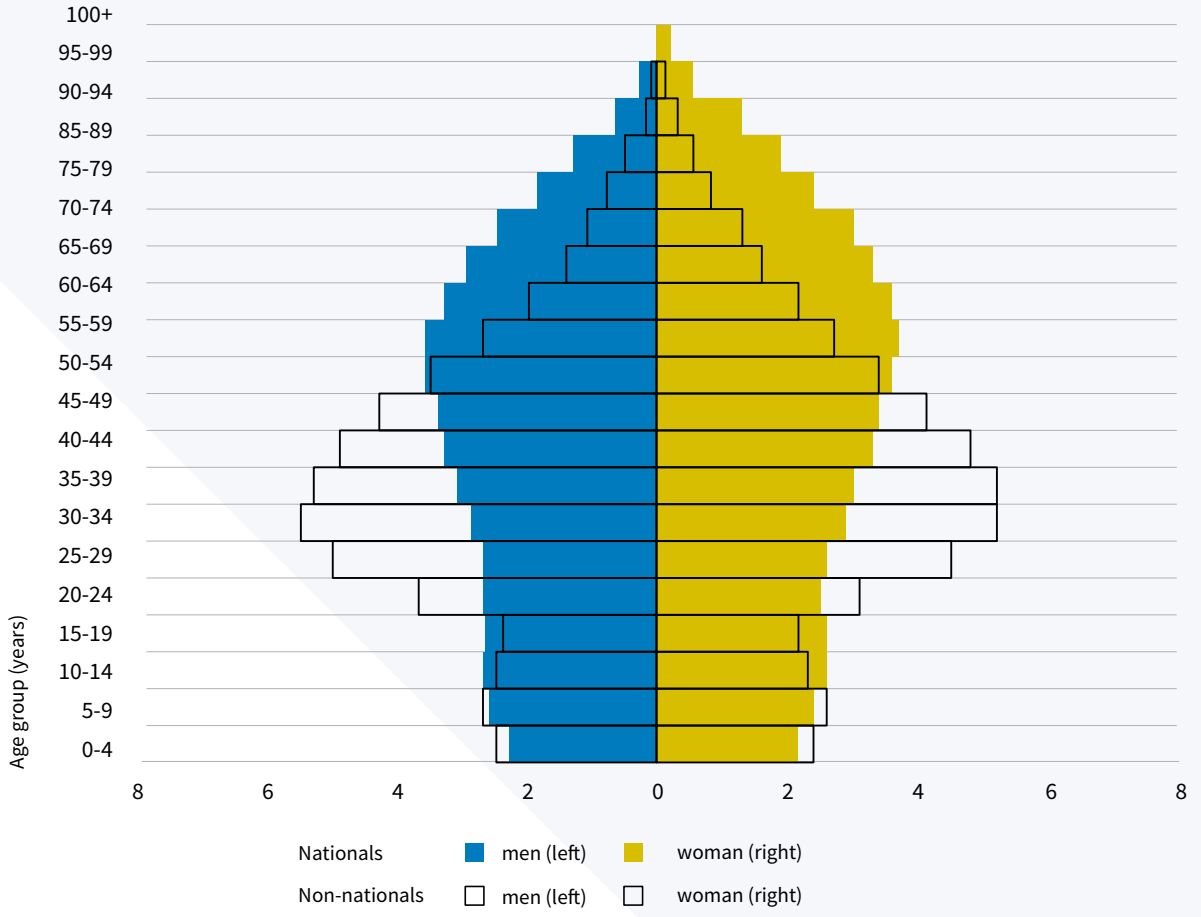
33 Zaiceva, A., & Zimmermann, K. F. (2016). Migration and the Demographic Shift. In Handbook of the economics of population aging (p. 119). Elsevier BV.

The age distribution of the immigrant population similarly matters, with older migrants potentially burdening pension systems without having paid much.

The relationship between migration flows and the pension systems in EU member states is constantly changing over time, owing to new generations joining the system and the evolution of these systems.[34]

Policymakers and stakeholders alike need to understand these dynamics to ensure adequate retirement income for future generations, but this is an issue that must be addressed as part of comprehensive policy frameworks that recognise the complexity of the interrelated forces at work.[35] The figure below presents the age structure of nationals and non-nationals at the end of 2022.

FIGURE 7: AGE STRUCTURE OF NATIONAL AND NON-NATIONALS IN THE EUROPEAN UNION AS AT JANUARY 1ST 2023



Source: Eurostat

34 Jimon, Ștefania A., Balteș, N., & Dumiter, F. C. (2020). Empirical Approaches Upon Pension Systems in Central and Eastern European Countries. Triangle Assessment: Free Movement of People, Labor Market and Population Health Features. Studia Universitatis 'Vasile Goldis' Arad – Economics Series, 30(1), 1.

35 Liu, S. (2018). The Current Situation of the Reform on World Public Pension and Its Enlightenment to China. Journal of Finance Research, 2(1), 16.

Another challenge in order for migration to contribute to pension sustainability lies in emigration from some EU countries. Young labour out migration from Eastern European countries causes the brain drain of young workers, mainly from Eastern European countries, which can worsen the already existing demographic problems and put more pressure on pension systems.[36] Addressing these challenges requires an in-depth reflection on migration policies, integration policies and pension reforms.

This demographic challenge is complex and threatens Europe in several ways: (a) population shrinkage or at best stabilisation which reduces Europe's global weight in the world, (b) shrinking workforce which limits Europe's economic ambitions, (c) ageing population which endangers welfare systems.[37]

On the social and political face of migration as a solution to demographic aging and a declining workforce,[38] due to those economic effects, migration can help to relieve some of the economic stress associated with aging populations. Still, at the same time, it contributes to alleviate concerns that include social cohesion, to the progress of culture within the integration strategy and to the increased competition between the two populations in the same state for resources and services.

Active ageing has long been a priority in European employment policy and is featured in the Europe 2020 strategy. To maximise immigrants' contributions to pension systems, it is essential to integrate them effectively into the labour market to ensure long-term sustainability of pensions.[39] This action should include removing barriers to employment, language barriers, nonrecognition of foreign qualifications and discrimination. Skills development, vocational training and access to employment opportunities policies, all play a key component in ensuring that migrants are fully included in the economy and can contribute to pension funds.[40] Successful migrant integration and enhanced economic contributions require appropriate economic policies and policies that address language barriers and discrimination.

36 Atoyan, R., Christiansen, L. E., Dizioli, A., Ebeke, C., Ilahi, N., Ilyina, A., Mehrez, G., Qu, H., Raei, F., Rhee, A., & Zakharova, D. (2016). Emigration and Its Economic Impact on Eastern Europe. IMF Staff Discussion Note, 16(7), 1.

37 Fargues, P. (2011) International Migration and Europe's Demographic Challenge.

38 Bloom, D. E., & Sousa-Poza, A. (2013). Ageing and Productivity: Introduction. RePEc: Research Papers in Economics.

39 Marois, G et al (2020). Population aging, migration, and productivity in Europe. Proceedings of the National Academy of Sciences, 117(14), 7690.

40 Kocsis et al. (2019). Smart Work. 435.

2 THE NEW 'AGE' FOR SOCIAL SECURITY

Well-developed social security systems in Europe play a pivotal role in protecting large segments of the population against life cycle and labour market risks. Implementing reforms, designing new policies, achieving ambitious goals, and adapting to shifting geopolitical realities

A fundamental challenge is indeed the future of the welfare state – a defining European achievement that proved to be an unsung hero during recent crises and a cornerstone of social cohesion and development.[41]

As Social security actuaries we are proud – with good reason - of our role in the development of theory and practice in this field as we strongly believe that social security systems are essential social and economic stabilisers, and crucial to a well-functioning and just society.

2.1 RISK MAPPING FOR SOCIAL SECURITY SYSTEMS[42]

Risk management and social security are both complex concepts. Regarding Social security, we are all thinking of a mandatory system covering the entire working population and retirees, bound together by an intergenerational social contract. Risk management on the other hand has become an integral aspect of all organisational governance and operations. The intersection of these two areas is particularly crucial for entities tasked with ensuring the financial stability and long-term sustainability of their operations for the sake of their beneficiaries.

In a step-by-step approach pension funds, which are financial institutions entrusted with safeguarding the financial security of many individuals in their retirement years, are often perceived as similar to insurance products or savings plans. However, when they serve as a pillar of the social security system, their complexity and societal importance are far greater. Pension funds though as financial institutions, trade in risk and money, collecting contributions and paying pensions upon retirement.

The general principles of Enterprise Risk Management[43] may be interpreted as applicable to pensions as financial institutions, while also recognising the unique characteristics of social security pension schemes. *In Appendix A we present an example of Risk mapping using data from the 2021 Ageing Report*.

41 High Level group on the future of social protection and of the welfare state in the EU report, Luxembourg: Publications Office of the European Union, 2023

42 Parniczky Tibor, *Risk Mapping for Social Security Pension Systems.* Actuarial Association of Europe, 2024.

43 Enterprise risk management (ERM) in business includes the methods and processes used by organizations to manage risks and seize opportunities related to the achievement of their objectives.

A universally applicable, comprehensive risk management framework tailored specifically to social security pension systems still requires greater attention from the actuarial profession.

Our outline as Social Security Actuaries, for a generalised Risk Management Framework for social security systems aims to identify current gaps and initiate broader discussion within the actuarial profession.

Establishing a Risk Management Function in the organisation and preparing regular Own Risk Assessment reporting framework involving actuaries, would be beneficial for social security administration's systems.

Social security actuaries can contribute positively to the adoption of a holistic approach to risk management for the improvement of the management social security systems and of the retirement outcomes for their beneficiaries.

2.2 FROM LABOUR SUPPLY TO LABOUR PRODUCTIVITY[44]

As highlighted in the 2024 Ageing Report,[45] the composition of the labour force has changed fundamentally in recent decades. Younger cohorts tend to enter the labour market later, and women and older people have steadily increased labour market participation. These dynamics have several drivers: Demographic factors, Sociocultural factors, Institutional factors, Economic factors.

Labour force participation is projected to rise, driven by older workers and women, but not enough to compensate for the decline in the working-age population. Employment rates are also projected to increase, though total hours worked would decline because of population ageing.

Amid a decline in hours worked, labour productivity will become the sole driver of GDP growth.

2.2.1 Main trends and developments regarding pension reforms

In recent years, national social security reforms in Europe have been driven by the need for sustainable and adaptable social security systems that respond to shifting demographics and socioeconomic realities.

The majority of recent social security reforms in Europe have focused on old-age pensions, in line with challenges related to population ageing and higher dependency ratios. These reforms fall into two broad groups, discussed below in 2.2.1.1 and 2.2.1.2.

44 A detailed analysis on this item including its impact on the society is discussed in the AAE paper From Labour Supply to Labour Productivity, AAE May 2022.

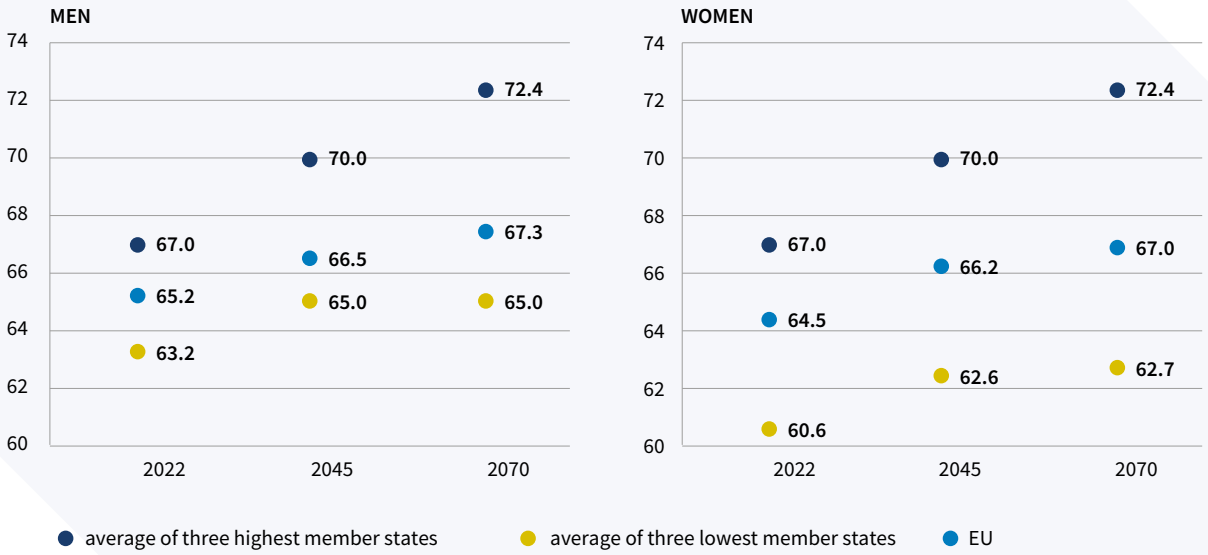
45 2024 Ageing Report Underlying Assumptions & Projection Methodologies, institutional paper 257. November 2023.

2.2.1.1 Ensuring the long-term financial sustainability and adequacy of pension systems

Member States have combined action to increase statutory retirement ages, curb early retirement and offer incentives to work longer with efforts to foster employability, job mobility and labour demand for older workers.

Nearly all Member States have already increased their early and statutory retirement ages or are in the process of doing so in the coming years. The average statutory retirement age is expected to rise from 66.5 and 66.2 years in 2045, and to 67.3 and 67 years in 2070 for men and women respectively. The pattern is similar for the minimum early retirement age.

FIGURE 8: LEGISLATED CHANGE IN STATUTORY RETIREMENT AGES



Source: 2024 Pension Adequacy report

Incentives were offered to defer retirement and work beyond the pensionable age or making it easier to combine pension and employment and extending the qualifying period for the pension entitlement.

In most countries the statutory and actual retirement ages are different due to early retirement and bonus/penalty schemes, as described in the table below. The presence of bonuses and penalties also influences individuals' retirement behaviour.[46]

46 Despite the fact that from an individual's perspective it is a bonus/malus system, it might be neutral from actuarial or funding perspective. Actuarial decrease/increase is not considered a penalty/bonus.

TABLE 2: STATUTORY RETIREMENT AGES, EARLY RETIREMENT AGES AND INCENTIVES TO POSTPONE RETIREMENT

	STATUTORY RETIREMENT AGE				EARLY RETIREMENT AGE				INCENTIVES**	
	MALE				FEMALE					
	2022	2030	2050	2070	2022	2030	2050	2070	penalty	bonus
BE	65 (63)	67 (63)	67 (63)	67 (63)	65 (63)	67 (63)	67 (63)	67 (63)		X
BG	64.4 (63.4)	65 (64)	65 (64)	65 (64)	61.8 (60.8)	63.3 (62.3)	65 (64)	65 (64)	X	X
CZ	63.9 (60)	65 (62)	65 (62)	65 (62)	62.2 (59.2)	64.7 (61.7)	65 (62)	65 (62)	X	X
DK*	67 (63.5)	68 (65)	71.5 (68.5)	74 (71)	67 (63.5)	68 (65)	71.5 (68.5)	74 (71)		
DE	65.9 (63)	66.9 (63)	67 (63)	67 (63)	65.9 (63)	66.9 (63)	67 (63)	67 (63)	X	X
EE*	64.2 (59.2)	65.5 (60.5)	67.7 (62.7)	69.8 (64.8)	64.2 (59.2)	65.5 (60.5)	67.7 (62.7)	69.8 (64.8)	X	X
IE	66 (66)	66 (66)	66 (66)	66 (66)	66 (66)	66 (66)	66 (66)	66 (66)		
EL*	67 (62)	68.5 (63.5)	70.5 (65.5)	72.5 (67.5)	67 (62)	68.6 (63.6)	70.5 (65.5)	72.5 (67.5)	X	
ES	66.2 (64.2)	67 (65)	67 (65)	67 (65)	66.2 (64.2)	67 (65)	67 (65)	67 (65)	X	X
FR	67 (62)	67 (63.6)	67 (64)	67 (64)	67 (62)	67 (63.6)	67 (64)	67 (64)	X	X
HR	65 (60)	65 (60)	65 (60)	65 (60)	63 (58)	65 (60)	65 (60)	65 (60)	X	X
IT*	67 (64)	67.3 (64.3)	69.2 (66.2)	70.8 (67.8)	67 (64)	67.3 (64.3)	69.2 (66.2)	70.8 (67.8)		
CY*	65 (65)	65.6 (65.6)	67.6 (67.6)	69.4 (69.4)	65 (65)	65.6 (65.6)	67.6 (67.6)	69.4 (69.4)	X	X
LV	64.3 (62.3)	65 (63)	65 (63)	65 (63)	64.3 (62.3)	65 (63)	65 (63)	65 (63)		
LT	64.3 (59.3)	65 (60)	65 (60)	65 (60)	63.7 (58.7)	65 (60)	65 (60)	65 (60)	X	X
LU	65 (57)	65 (57)	65 (57)	65 (57)	65 (57)	65 (57)	65 (57)	65 (57)		
HU	65 (65)	65 (65)	65 (65)	65 (65)	65 (65)	65 (65)	65 (65)	65 (65)		X
MT	63 (61)	65 (61)	65 (61)	65 (61)	63 (61)	65 (61)	65 (61)	65 (61)		X
NL*	66.6 (66.6)	67.3 (67.3)	68.5 (68.5)	69.8 (69.8)	66.6 (66.6)	67.3 (67.3)	68.5 (68.5)	69.8 (69.8)		
AT	65 (60)	65 (60)	65 (60)	65 (60)	60 (55)	63.5 (60)	65 (60)	65 (60)	X	X
PL	65 (65)	65 (65)	65 (65)	65 (65)	60 (60)	60 (60)	60 (60)	60 (60)		
PT*	66.6 (60)	66.9 (60)	68.1 (60)	69.2 (60)	66.6 (60)	66.9 (60)	68.1 (60)	69.2 (60)	X	X
RO	65 (60)	65 (60)	65 (60)	65 (60)	61.8 (56.8)	63 (58)	65 (60)	65 (60)	X	
SI	65 (60)	65 (60)	65 (60)	65 (60)	65 (60)	65 (60)	65 (60)	65 (60)	X	X
SK*	62.8 (60.8)	64 (62)	66.1 (64.1)	68.3 (66.3)	62 (60)	63.2 (61.2)	65.4 (63.4)	67.7 (65.7)	X	X
FI*	64.5 (61)	65.4 (62.4)	66.9 (63.9)	68.3 (65.3)	64.5 (61)	65.4 (62.4)	66.9 (63.9)	68.3 (65.3)	X	X
SE*	65 (62)	67 (64)	68 (65)	70 (67)	65 (62)	67 (64)	68 (65)	70 (67)		
NO	67 (62)	67 (62)	67 (62)	67 (62)	67 (62)	67 (62)	67 (62)	67 (62)		

Source: 2024 Ageing Report

*Countries where the statutory retirement age is legislated to increase in line with life expectancy.
Reported retirement ages are calculated based on life expectancy in the Eurostat population projections.
**Actuarial equivalence is not considered a penalty/bonus.

The good news is that progress in the labour force participation of older workers across the OECD has been impressive. The employment rate of 55–64 years old in the OECD reached a record 64% in the second quarter of 2023, almost 8 percentage points higher than a decade ago. However, more needs to be done. Perceptions of age discrimination remain common despite the fact that it is banned by legislation in virtually all OECD countries.[47] Moreover, older workers are potentially exposed to the risk of skills obsolescence in a rapidly changing labour market and need to adapt their skills. Yet participation in formal and informal training among older workers remains less than half of that of prime-aged workers, on average.

Working longer but what to do about hazardous or arduous work?

The traditional way in which pension policy has recognised the difficulties of hazardous or arduous jobs is to systematically grant those workers access to early retirement, either through specific pension schemes for certain occupations, or through special rules within the general pension scheme. But this approach is increasingly challenged by the evidence. Many jobs that were previously considered arduous have evolved thanks to technological progress and changes in to work practices. Many industries supported by hard labour (such as mining) have declined significantly. This is not to say that hazardous or arduous work no longer exists but that broad-stroke policies are no longer appropriate. The focus today should be on specific individual cases of workers, on their health conditions and their ability to work, including in other jobs.

2.2.1.2 Expanding access to pension benefits

Over the past three years, a number of countries in Europe have introduced new rules for early retirement, offering certain people the flexibility to claim pension benefits before reaching the standard pensionable age.

In particular, Denmark and Slovakia have introduced early retirement pensions for workers with long-careers, who tend to work in lower-skilled occupations and in more physically demanding jobs.

Ireland introduced in 2021 a new early retirement benefit, allowing unemployed residents who meet certain contribution requirements to retire at age 65, one year before the standard pensionable age; *for all State Pensions (contributory and non-contributory)*. The early retirement benefit mirrors Ireland's social insurance unemployment benefit (Jobseeker Benefit) but requires that individuals cease employment.

Belgium and Ireland have also taken steps to credit contributions for carers. In Belgium, as of 2023, contributions are proportionately credited for home-based childcare providers who have reached or will reach pensionable age between 1 January 2023 and 2 January 2033, based on the number of years worked between 2003 and 2022. In Ireland, as of 2023, people who leave the labour force to provide long-term care will be credited with contributions counting toward their State Pension. To qualify, people must be at least 16 years old, provide full-time care, and live in the same household as the individual for whom care is provided.

47 OECD Pensions at a Glance 2023.

Access to benefits was eased by improving eligibility conditions, such as granting pension credits for career breaks due to unemployment or family caregiving responsibilities.

TABLE 3: CAREER BREAK CREDITS: CHILDCARE AND UNEMPLOYMENT IN EU 27 MEMBER STATES AND NORWAY
The table below summarises the career break credits provided by the Member States

REASON FOR BREAK	FORMULA	COUNTRIES
Childcare	Credited if allowance granted	BE, EE, IE, EL, FR, IT, LV, LT, LU, HU, MT, PT, RO, SE, FI
	Credited	DK, NL
	Credited up to maximum age	(6 mo) HR; (1 yr) SI; (1.5 yrs) LV; (3 yrs) BG, DE, ES, CY; (4yrs) CZ (4 yrs), NO, AT; (6 yrs) SK
	Credited up to maximum time	PL (12 months)
	Unemployment	None
Unemployment	Credited	BG, CZ, DK, EL, FR, CY, NL, AT, PT
	Credited if allowance granted	BE, DE, EE, ES, HR, IE, IT, LV, LT, LU, HU, MT, NO, PL, RO, SI, SE, FI
	Credited up to maximum time	None
	Not credited	SK

Source: 2024 Pension Adequacy Report

2.2.2 Shared Responsibility / Shared Risk

Increasing life expectancy and concerns about the long-term sustainability of pension systems led Eurogroup Member States in 2016 to agree on four common principles for strengthening pension sustainability. The first guideline 'Safeguard against demographic and macroeconomic risks', called for the introduction of Automatic Balancing Mechanisms (AAMs).

Automatic adjustment mechanisms (AAMs) are defined as:[48]

- Pre-determined measures **[automatic]**
- Applied to selected system parameters in coordination with each other and over time in line with system objectives **[systemic approach]**
- Triggered based on internal or external indicators related to the system's status **[conditionality, triggering]**
- Designed to adjust present and future pension values based on sustainability, adequacy, intergenerational fairness **[subject to an explicit objective]**

More broadly, AAMs are systemic features that use coordinated indicators, trigger rules, and automatic adjustments at intervention points. These may also include predefined but non-automatic measures.[49]

Several countries have introduced automatic adjustment or balancing mechanisms or sustainability factors. Such instruments are effective tools for risk-sharing and, promoting intergenerational equity. However, recent pension reforms were reversed

Examples include:

- **Automatic balancing mechanisms** (e.g. DE, ES, LT and SE in 2021; ES changed in 2024), which reduce pension indexation to avoid long-term deficits.

- **Sustainability factors** (e.g. FR, FI, ES, IT, LV, PL, PT, SE, NO), which adjust initial pension levels based on life expectancy.

A third adjustment mechanism involves linking the legal retirement age to gains in life expectancy. Linking the retirement age to increasing life expectancy can take several forms. In some cases, automatic stabilisers adjust contribution rates according to demographic indicators, distributing the burden across generations.

In FI the contribution rate is set to cover the funded part of the public scheme and keeps buffer funds at their target level. In DE, the contribution rate is adjusted to maintain the sustainability fund, and a factor is used to share the risk associated with the dependency ratio.
As social security actuaries, we recommend that AAMs are explicitly used as intergenerational risk-sharing mechanisms.

48 Párniczky Tibor: Pension sustainability, adequacy and automatic adjustment mechanisms in the European Union.

49 Some papers (e.g. the Eurogroup Notes, see below) also refer to automatic balancing mechanisms as individual stabiliser mechanisms, activated on trigger mechanisms.

A synopsis of the automatic adjustment mechanisms is presented below:

TABLE 4: AUTOMATIC ADJUSTMENTS MECHANISMS IN THE MEMBER STATES

	AUTOMATIC BALANCING MECHANISM	SUSTAINABILITY FACTOR [4]	RETIREMENT AGE LINKED TO LIFE EXPECTANCY	LEGISLATED
IT		X	X	1995 & 2010
LV		X		1996
SE[1]	X	X	X	1998, 2001 & 2021
PL		X		1999
FR[2]		X		2003
DE	X			2004
FI		X	X	2005 & 2015
PT[1]		X	X	2007 & 2013
EL			X	2010
DK[3]			X	2011
CY			X	2012
LU	X			2012
NL[1]			X	2012
LT	X			2016
EE			X	2018
SK			X	2023

Source: 2024 Ageing Report Underlying Assumptions & Projection Methodologies, institutional paper 257 November 2023

(1) Only two thirds of the increase in life expectancy is reflected in the retirement age.
(2) Pension benefits evolve in line with life expectancy through the 'proratisation' coefficient; it has been legislated until 2028.
(3) Subject to Parliamentary decision.
(4) Benefit linked to life expectancy. In NDC systems, this is done through the annuity factor.

2.2.3 Modelling future adequacy

Our view as social security actuaries, taking into account the future challenges posed by ageing, is that an '*adequate pension*' should be considered in terms of a measure of how far a pensioner is able to maintain his/her economic well-being, in the light of what needs the pension income is expected to cover.[50]

In addressing this issue, the Pension Adequacy Report[51] refers to the income maintenance measure of the so-called Theoretical Replacement Rates (TRRs).

TRRs calculate the retirement benefit of a so-called representative '*model person*' as the ratio of his/her expected pension income in the first year after retirement to his/her earnings immediately before retirement. The model person represents a different group each time with specific career and income patterns. This makes it possible to test longevity assumptions, individual career life patterns and earnings. For these simulations, benefit formulas and parameters are kept *as legislated* across the EU Member States.

Current (2022) TRRs are calculated for the base case (Ageing Working Group -AWG- case and some career breaks) and are used as a baseline to assess future adequacy by comparison with the projected 2062 TRRs.

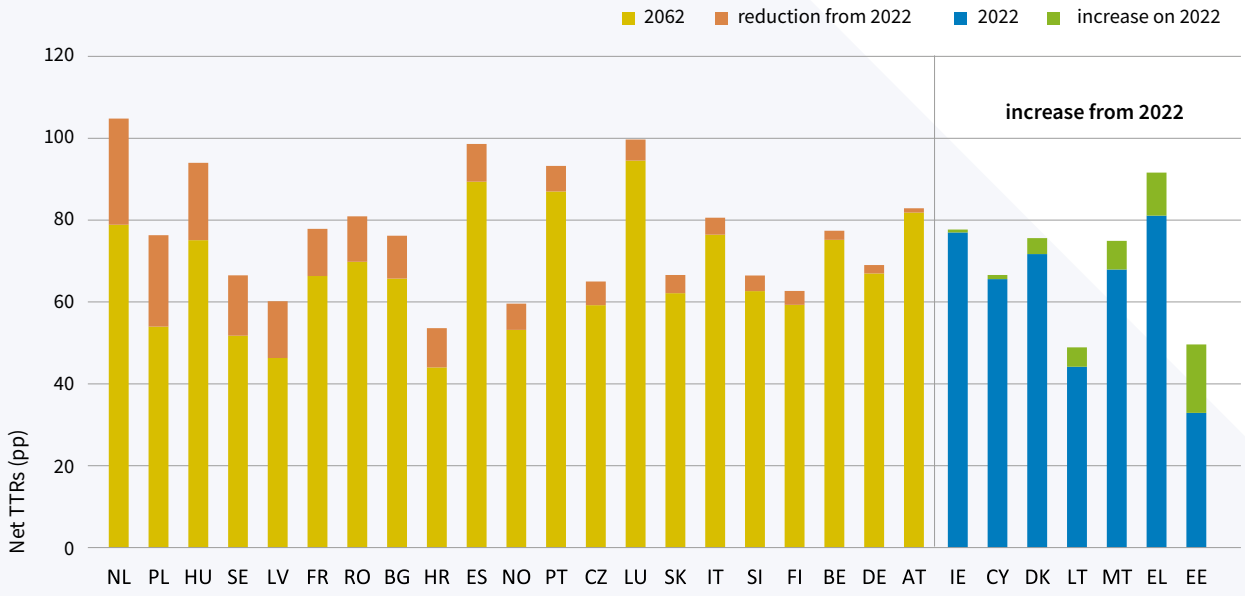
In both the current and the projected TRRs, the 'base-case' career assumes a worker who is employed uninterruptedly for 40 years until the standard pensionable age (SPA) under three career income profiles: average, low and high.

According to the output projections, declining replacement rates compared with the rates of 2022 are expected over the next four decades in most countries (21 out of 28). A fall larger than 10 percentage points is projected in the NL, HU, PL, SE, LV, RO and BG. Increases are projected in DK, LT, MT and EL, with the highest (16.7 percentage points) in EE.

50 'From Labour Supply to Labour Productivity', AAE May 2022.

51 2024 Pension Adequacy Report.

FIGURE 9: NET TRRS, BASE CASE (40 YEARS TO SPA), AVERAGE-EARNER, 2022 AND 2062, MEN, PP, EU- 27 MEMBER STATES AND NORWAY



Source:2024 Pension Adequacy Report

The issue of measuring the level of *'adequate pension'* can also be addressed by considering the projected cashflow of future pension income. Indeed, while TRRs rates provide an indication of the pension amount relative to individual pre-retirement earnings, they are not a comprehensive measure of the total future pension payments; they reflect only at the benefit level at the point of retirement in relation to earnings.

The so-called *'Pension wealth'* indicator represents the discounted value of the lifetime stream of total retirement income at the point of retirement age, expressed as a ratio of annual pre-retirement earnings. It takes into account life expectancy and pension indexation, offering a comprehensive picture of the adequacy of lifetime benefits relative to individual earnings at retirement. It can be interpreted as the lump sum that would be required at retirement to purchase an annuity providing the same flow of pension payments as that promised by the mandatory retirement-income scheme.

TABLE 5: GROSS PENSION WEALTH BY INDIVIDUAL EARNINGS, GENDER AND NATIONALITY, MULTIPLE OF ANNUAL EARNINGS

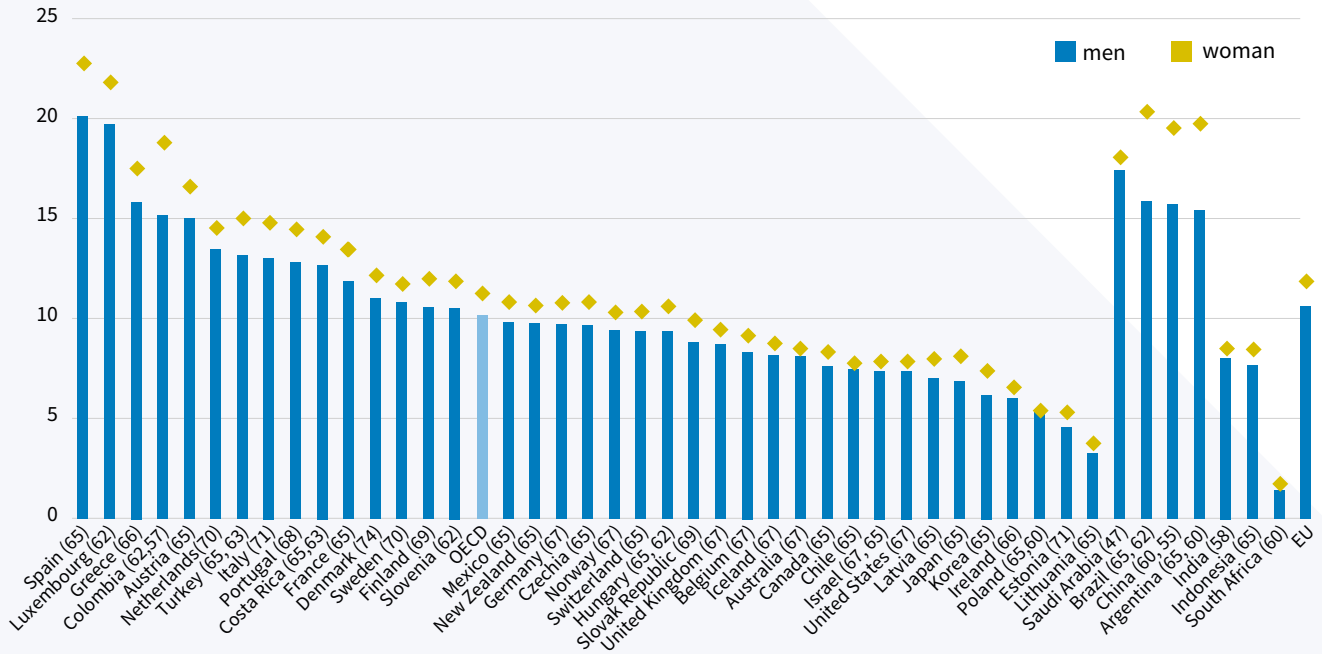
	Individual earnings, multiple of average wage					
	0.5	1	2	0.5	1	2
	Men			Women		
Australia	14.8	8.1	5.6	15.8	8.5	5.7
Austria	15.0	15.0	11.3	16.6	16.6	12.5
Belgium	13.0	8.4	6.0	14.2	9.1	6.6
Canada	9.5	7.6	3.8	9.5	7.6	3.8
Chile	9.9	7.5	5.8	10.3	7.7	6.1
Colombia	23.6	15.2	15.2	30.3	18.8	18.5
Costa Rica	12.9	12.7	11.9	14.3	14.1	13.2
Czechia	16.0	9.7	6.5	17.8	10.8	7.3
Denmark	18.0	11.0	7.8	19.9	12.2	8.6
Estonia	7.9	4.6	2.9	9.1	5.3	3.4
Finland	10.6	10.6	10.6	12.0	12.0	12.0
France	11.9	11.9	10.2	13.5	13.5	11.6
Germany	10.6	9.7	7.5	11.8	10.8	8.3
Greece	18.5	15.8	14.5	20.4	17.5	16.0
Hungary	9.8	9.4	9.2	11.2	10.6	10.3
Iceland	13.1	8.2	8.2	14.1	8.7	8.7
Ireland	12.0	6.0	3.0	13.1	6.5	3.3
Israel	10.3	7.4	3.7	11.0	7.8	3.9
Italy	13.0	13.0	13.0	14.8	14.8	14.8
Japan	9.2	6.9	5.7	10.9	8.2	6.8
Korea	9.5	6.2	3.7	11.3	7.4	4.5
Latvia	9.7	7.0	7.0	11.1	8.0	8.0
Lithuania	5.2	3.3	2.3	5.9	3.7	2.6
Luxembourg	22.9	19.7	18.1	25.2	21.8	20.0

	Individual earnings, multiple of average wage					
	0.5	1	2	0.5	1	2
	Men			Women		
Mexico	13.0	9.8	8.0	14.3	10.8	8.1
Netherlands	16.3	13.5	12.0	17.6	14.5	13.0
New Zealand	15.5	9.8	4.9	16.9	10.6	5.3
Norway	12.8	9.4	5.9	14.0	10.3	6.5
Poland	5.6	5.4	5.3	7.0	5.4	5.3
Portugal	13.1	12.8	12.1	14.8	14.4	13.5
Slovak Republic	10.6	8.8	7.7	11.9	9.9	8.7
Slovenia	15.5	10.5	10.3	17.5	11.9	11.7
Spain	20.1	20.1	12.4	22.7	22.7	14.0
Sweden	10.8	10.8	13.4	11.7	11.7	14.5
Switzerland	12.3	9.4	4.8	13.5	10.3	5.2
Türkiye	13.2	13.2	13.2	15.0	15.0	15.0
United Kingdom	13.2	8.7	5.8	14.2	9.4	6.2
United States	9.3	7.4	5.3	10.0	7.9	5.6
OECD	12.8	10.1	8.3	14.4	11.2	9.2
Argentina	21.4	15.4	12.4	27.0	19.7	16.1
Brazil	15.9	15.9	14.8	20.3	20.3	19.3
China	20.2	15.7	13.4	25.2	19.5	16.7
India	8.0	8.0	4.6	8.4	8.4	4.6
Indonesia	7.7	7.7	7.6	8.4	8.4	8.3
Saudi Arabia	17.4	17.4	17.4	18.0	18.0	18.0
South Africa	2.8	1.4	0.7	3.4	1.7	0.9
EU27	12.6	10.6	9.3	14.1	11.8	10.3

Source: OECD pension models

While this indicator accounts for gender-specific mortality rates, it does not reflect differences in life expectancy across income levels. It is calculated for three wage scenarios: low, average, and high—where low earnings are defined as 50% of the average, and high earnings as twice the average. For men earning half the average wage, pension wealth is, on average, 12.8 times their annual earnings; for women, it is 14.4 times. Luxembourg records the highest values for low earners, at 22.9 and 25.2 times individual earnings for men and women, respectively.

FIGURE 10: PENSION WEALTH FOR AVERAGE EARNERS BY GENDER, MULTIPLE OF ANNUAL EARNINGS



Source: OECD pension models

2.2.3.1 The curse of Inequality

Inequalities in outcomes, such as income and wealth, and inequalities in opportunities go hand in hand, largely because wider inequality curbs social mobility and limits opportunities for people from disadvantaged backgrounds.

Collective bargaining plays a key role in achieving adequate minimum wage protection across the European Union, as well as in ensuring a fair distribution of productivity gains. In doing so, it helps maintain labour's share of national income and reduces wage inequality and in-work poverty.

Socio-economic groups are defined by demographic, educational, and professional characteristics, which shape the career paths and income trajectories. I*nequalities accumulated over working lives have a direct impact on retirement income*.
Socio-economic groups provide a more granular perspective than overlapping generational cohorts. Even within the same generation—whether active or retired—responses to pension reforms may vary. In fact, persistent socio-economic inequalities can fuel resistance to reform. Sharp and increasing differentiation between employment statuses presents a serious challenge for national social security systems. Strategies must therefore be designed with objectives that extend beyond improving conditions for the *'best off'* or a notional *'average'* older person.[52]

52 'From Labour Supply to Labour Productivity', AAE May 2022

In this context, it is worth highlighting the category of employees injured at work, who may face a sharp decline in income upon entering retirement. An injury at work—whether accident or illness—typically results in physical or mental harm that can compromise the ability to maintain pre-injury income levels. These cases often entitle workers to financial compensation. If this compensation is considered a form of *'earned income'* (as it is strongly correlated with employee's work activity), it becomes possible to analyse its impact on the worker's economic well-being during the transition to retirement—and to assess the effectiveness of the worker protection system.[53]

As actuaries we strongly recommend increased attention to the diversity of individual profiles covered by social security. In addition, adequate social benefits (notably pension and unemployment protection) should be accessible to all (employed and self-employed) workers.[54]

2.2.2.2 Enabling gender equality

It is increasingly understood that, despite some slight improvements the gender pay gap remains significant. According to general gender wage gap statistics,[55] women earn on average 16% less than men. This is despite wide variations between individual Member States and the overall improvements that have occurred at least up the Covid-19 pandemic); *women are still being penalised by gender inequalities*. This is particularly worrying given the rising share of single-person households and single-parent families, the vast majority of which are headed by women. Even though more women hold tertiary[56] education degrees than men, the EU-wide unadjusted pay gap has changed only slightly over the years.[57] In some cases, narrow pay gaps are observed alongside wide gender employment gaps. This may reflect a 'selection effect', whereby women with the highest earnings potential are more likely to be in employment – skewing the average and concealing broader disparities.[58]

To understand the full extent of the gender wealth gap – particularly as it accumulates over a working life –the Wealth Equity Index (WEI) is used. The WEI measures gender differences in accumulated wealth at retirement. It is a number between 0 and 1, with 1 indicating no difference in accumulated wealth between genders while index values closer to 0 indicate the highest differences.[59]

53 Raffaello Marcelloni, National Institute for Insurance against Accidents at Work

54 AAE discussion paper: Meeting the challenge of Ageing in the EU, March 2019

55 https://www.forbes.com/advisor/business/gender-pay-gap-statistics

56 Tertiary education or post-secondary education is the educational level following the completion of secondary education.

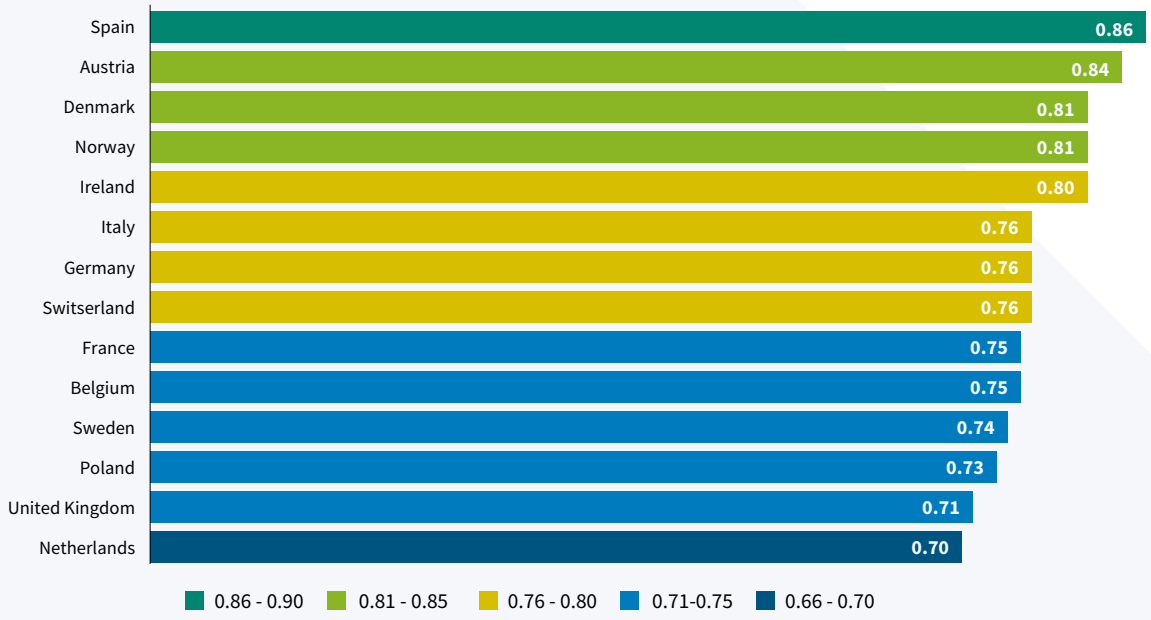
57 High Level group on the future of social protection and of the welfare state in the EU report, Luxembourg: Publications Office of the European Union, 2023.

58 Boll Christina, Lagemann Andreas, Gender pay gaps in EU countries based on Structure of Earnings Survey, European Union 2018.

59 2022 Global Gender Wealth Equity Report, prepared by WTW – The role of gender in wealth equity.

The results of the WEI index measured in 14 countries in Europe, is shown in the figure below:

FIGURE 11: WEI MEASURED IN 14 COUNTRIES IN EUROPE



Source: 2022 Global Gender Wealth Equity Report, prepared by WTW

The principle of equal pay for work of equal value is part of the Treaty of Rome and is embedded in EU Law. Recently, there has been further legislation including the EU directive on pay transparency. However, despite this, and even though the situation has improved over the last decade, there is still a significant gender pay gap in the EU of 13%.

The gender pensions gap in old age results from gender-related differences in employment histories – women have shorter careers than men, take more career breaks, and are more likely to work part-time because of caring responsibilities – on top of the gender pay gap itself. This pension gap is usually wider than income gaps observed during women's working lives.

Social security pension schemes must pay attention to the need for fair and equitable treatment of women compared to their male counterparts.
Narrowing the pension gap for women will require family policy and labour market measures (see previous sections), in addition to compensatory pension measures, such as care credits or child-related bonuses.
As social security actuaries, we emphasise that long-term solutions require effective recognition and redistribution of unpaid care work – not only between men and women, but also between families and the State.[60]

60 AAE discussion paper: Meeting the challenge of Ageing in the EU, March 2019.

2.2.3 Sustainable or Adequate?

The realisation of the issues around population ageing is now testing the resilience of social systems which consequently face serious challenges that may affect benefit levels.

It is essential that the issues of pension adequacy and financial sustainability be considered jointly, not separately. If pensions are at risk of being inadequate, there may be pressure for ad-hoc increases in pensions or higher demand for other benefits, jeopardising sustainability. Likewise, an unsustainable pension system will ultimately prove inadequate in the long run when abrupt correction measures become necessary[61]. A comparison of pension expenditure and contribution projections reveals the financing gap in pension systems, largely driven by the generosity of system-wide benefits; *see table 6*. The financing gap indicates imbalance in the system, which would need reserve funds or central government transfers.

Luxembourg is projected to face a deficit of 8% of GDP by 2070, following a 9 percentage point deterioration compared to 2022, primarily due to rising expenditure. Hungary, Slovakia, and Slovenia will also have to manage sustainability risks of about 5% of GDP in 2070, the financing gap widening by 4 percentage points since 2022. In Bulgaria, Italy, and Romania, the deficit will be similar, between 5-6% of GDP, though reached via different developmental paths during the projection period.

61 AAE discussion paper: The ageing of the EU – implications of pensions, March 2016.

TABLE 6: PENSION CONTRIBUTIONS AND BALANCE OF THE PUBLIC SCHEME (% OF GDP)

	CONTRIBUTIONS				PENSION SYSTEM BALANCE				
	2022	2045	2070	change	2022	2045	2070	lowest	
				2022-2070				value	year
BE	:	:	:	:	:	:	:	:	:
BG	4.7	5.1	5.1	0.4	-4.8	-4.2	-4.4	-6.0	2025
CZ	8.2	7.7	7.7	-0.6	-0.5	-2.4	-2.8	-3.4	2058
DK	:	:	:	:	:	:	:	:	:
DE	9.9	10.5	10.8	0.9	-0.3	-0.5	-0.5	-0.7	2025
EE	6.1	6.1	6.0	-0.2	-1.3	-1.4	-0.8	-1.7	2028
IE	2.7	3.5	4.8	2.1	-0.2	-1.0	-1.1	-1.1	2070
EL	12.5	12.4	10.4	-2.1	-2.0	-1.6	-1.6	-2.0	2022
ES	12.9	14.4	14.0	1.1	-0.2	-2.5	-2.7	-3.1	2053
FR	11.1	11.0	11.0	-0.1	-3.3	-2.9	-2.5	-3.4	2028
HR	5.7	6.6	6.6	0.9	-3.3	-2.8	-2.2	-4.4	2024
IT	10.9	11.2	11.3	0.4	-4.7	-5.3	-2.4	-6.0	2036
CY	8.2	9.9	10.0	1.9	0.0	-0.9	-1.8	-2.4	2065
LV	7.9	7.2	7.1	-0.8	0.8	0.9	1.7	0.4	2028
LT	6.8	7.8	7.6	0.8	0.3	-1.8	-2.1	-2.4	2060
LU	9.8	9.4	9.4	-0.4	0.6	-2.4	-8.0	-8.0	2070
HU	6.8	6.9	6.8	0.0	-0.9	-3.3	-5.2	-5.2	2070
MT	7.6	7.9	7.2	-0.4	1.4	2.3	-3.4	-3.4	2070
NL	6.9	8.3	8.7	1.9	0.3	0.4	0.2	0.2	2068
AT	9.8	9.7	9.8	0.0	-3.6	-4.0	-3.8	-4.9	2032
PL	8.0	8.5	8.4	0.4	-2.2	-2.1	-1.6	-3.2	2027
PT	14.2	14.6	10.3	-3.8	1.9	-0.6	-0.1	-0.6	2045
RO	6.0	5.2	5.2	-0.7	-2.6	-5.4	-2.4	-5.4	2047
SI	9.1	9.1	9.1	0.0	-0.7	-3.7	-4.5	-4.7	2057
SK	7.4	6.8	6.4	-1.0	-1.1	-4.5	-5.0	-5.6	2061
FI	13.4	14.4	14.9	1.5	0.7	2.1	0.8	0.7	2022
SE	5.4	5.9	5.9	0.5	-0.7	0.9	1.0	-0.7	2022
NO	11.5	11.3	11.3	-0.1	0.6	-0.7	-1.2	-1.2	2070
EA	10.2	10.6	10.7	0.4	-1.6	-2.0	-1.7	-2.1	2036
EU	9.8	10.0	10.0	0.2	-1.6	-2.0	-1.7	-2.1	2036

Source: 2024 Pension Adequacy Report

Pension system balance = contributions – gross pension expenditure.
BE: pensions are financed through a global social security contribution.
DK: public pension scheme is financed through general taxes.
IE: employer and employee contributions also fund other benefits, e.g., jobseekers' benefit, health and safety benefit, maternity benefit.
EL: 2022 includes the impact of retroactive benefit payments.
AT: figures exclude the Ausgleichszulage and Rehabilitationsgeld.

Benefits that reflect contributions based on earnings from work are set to constitute a significantly larger proportion of the overall pension package. Actuarially fair incentives should thus be introduced to ensure that working longer and delaying pension take-up will be rewarded. Increasing emphasis on actuarial fairness in pensions – implying a closer relationship between pensions and contributions –entails increased exposure to the risks associated with labour market instability.
Basing eligibility for pension benefits on contribution periods may be fairer than using retirement age alone. The main reason is that retirement age does not account for systematic differences in life expectancy linked to varying working conditions.

Although most countries provide poverty relief, means-tested social assistance that requires older people to parade their poverty is no substitute for the dignity and security of an unconditional pension.

As stated in the PAR 2021:
'From a collective and solidaristic point of view, the evaluation of social fairness in relation to pensions may also include the rules on the basis of which pensions are granted, such as pensionable age and minimum length of service. Moreover, different entries into the labour market, career breaks for the care of children or relatives, different typologies of contracts and different levels of physical strain associated with different jobs also have to be considered.'

The fundamental challenge is to find the right balance between actuarial fairness and *social justice*. This can be achieved by transparent, socially agreed and accepted *redistribution*. The role of actuaries is crucial in securing transparency by measuring generosity and redistribution.

2.2.3.1 Evolution of supplementary pensions

Supplementary pensions are an important source of income for many Europeans.
This trend has attracted much attention in recent years as adverse labour market conditions have placed downward pressure on private pension coverage.

Robust funding of second- and third- pillar pension arrangements could potentially enhance adequacy, contributing towards the key policy objective of maintaining standards of living post-retirement.[62]

The extension of supplementary pension provision should be based on a proper measurement of pension adequacy, and carried out in a manner that is both consistent with and fully integrated into financial sustainability assessments.

To fully evaluate the role of supplementary pensions, a clear picture of long-term financial outcomes should be developed as soon as possible, in a way that is consistent with and can be integrated into the regular actuarial review of the social security pension systems.

62 AAE discussion paper: Meeting the challenge of Ageing in the EU, March 2019.

The decline in the working-age population has a negative impact not only on first pillar unfunded schemes but also on the funded schemes. In both defined benefit and defined contribution plans, a reduced number of participants contributes to lower economic growth and lower investment returns.
Regular actuarial reviews of the long-term financial development of social security pension schemes is an essential tool of financial governance.

2.3 SOLIDARITY ACROSS GENERATIONS

In her 1987 report, Brundtland[63] identifies as ***sustainable*** a *'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.*

Pensions are inherently a generational issue just because of its time frame. That said, intergenerational fairness is a subject which actuaries cannot ignore. It is inextricable from the long-term nature of pension provision and financing. Whether in the broad framework of occupational and personal provision, or in the broad framework of social security, the close relationship between pensions and intergenerational dynamics means that such analysis cannot be adequately undertaken without an actuarial perspective.
During the active and retirement stages of pension provision, external factors shift and crises occur – regardless of generation. Recognising this, pension risk management can help smooth the impact of sudden adverse changes through risk-sharing tools, thereby also supporting intergenerational equity

Concerns about intergenerational fairness have steadily grown in importance over the past decade. Such concerns typically arise when one group perceives itself as carrying an unfair burden or receiving fewer benefits that it deems appropriate. The intergenerational aspect encompasses all efforts to address this imbalance.

Discussions on fairness have never questioned the requirement of adequacy.
However, most of pension reforms aim to respond to economic and demographic sustainability risks and may trigger reform reversals – resulting in cycles that overlook generational impacts. The absence of long-term incentives within the structure of pension reforms is a systemic risk to intergenerational justice.

From an actuarial perspective, fairness and adequacy must be discussed together alongside sustainability and intergenerational risk-sharing. Without this, a sustainable pension system is not necessarily fair and a system that ensures adequate pensions is not necessarily sustainable – whether it is pay-as-you-go, partially funded, or fully funded.

63 Brundtland 1987, Our Common Future.

2.3.1 Redistribution and progressivity

Social security provides by far the most important framework within which the issues of fairness across generations can be addressed. Social security systems are inherently redistributive in their nature and are most likely to achieve their objectives if the mechanisms of redistribution operate in a balanced way and are based on a high level of social accord, or *'social solidarity'.*

In this sense, systems may aim to achieve fairness on a primarily collective rather than individual basis. A basis, that, in any case, respects the broader objective of preventing widespread poverty, which in the long term would be detrimental to economic health.
The less redistribution is built into a pension system, the more labour market income inequality translates into pension inequality. Redistributive elements can be incorporated at system level – such as minimum guarantees or social allowances – or within the benefit formula itself, through specific parameters or algorithms used in calculating benefits.[64]

To comprehensively assess redistribution in pension systems, the OECD developed a progressivity index. The index is higher in those countries where less income inequality is carried over into pensions.

The OECD progressivity index measures the redistributive capacity of a pension system.[65]
The index is designed to produce:

a) a value of 1 (or 100%) if the system is fully redistributive –for example, in case it consists only of a flat-rate basic scheme;

b) a value of 0 (or 0%) if the system is non-redistributive - for example, a defined contribution scheme without any sustainability factor.

In OECD terms, these two extremes illustrate the balance between the redistributive and insurance functions of pension systems. The countries with the highest progressivity index, greater than 0.50, are NO, DK, CZ, BE and IE. That is, in these countries, less than half of lifetime income inequality is transmitted to pensions. The countries with the lowest progressivity index, less than 0.10, are CR, HU, LV, PL, PT, RO and SE. That is, in these countries, earnings inequality is transferred into pension inequality.

64 The effect of pension credits is difficult to assess. On one hand it is financed similarly to social allowances from general taxation and therefore it is redistribution. On the other hand, these periods represent lower earnings than the normal career in the average salary calculation, leading to lower earnings-related pensions.

65 Preventing Ageing Unequally. OECD 2017.

TABLE 7: MAIN DETERMINANTS OF THE OECD PENSION PROGRESSIVITY INDEX

	Progressivity Index	Qualitative progressive index	TRR difference between low- and high- earners	Non- contributory safety-net level
AT	0.18			+
BE	0.54	++	++	++
BG	0.14	-	-	
HR	0.08	--	-	--
CY	0.12	-	--	
CZ	0.58	++	++	-
DK	0.64	++	++	++
EE	0.44	+	++	
FI	0.11	-	--	
FR	0.22		-	
DE	0.29			+
EL	0.20		+	
HU	0.03	--	-	--
IE	0.51	+	++	+
IT	0.10	-	-	
LV	0.09	--	--	-
LT	0.33	+	++	--
LU	0.24	+	+	++
MT	0.35	+		+
NL	0.40	+	+	++
PL	0.07	--	--	--
PT	0.07	--	--	
RO	0.09	--	--	-
SK	0.20			-
SI	0.28			+
ES	0.31	+	+	
SE	0.07	--	--	
NO	0.73	++	++	++

Source: 2024 Pension Adequacy report

Note: Qualitative signs indicate differences compared with the EU average: ++ means much higher, + (substantially) higher, - (substantially) lower, and – much lower. In FI, at 0.11 the pension progressivity index is (substantially) lower than the EU+NO average of 0.26, due to the difference between the TRRs of low- and high-earners being much lower than in the EU on average, while the old-age safety level is similar to the average.

2.4 THE PLANET WE LEAVE BEHIND

The climate crisis is creating an increasingly uncertain future for people in most parts of the world. It is a change that makes it hard to draw a bright line between one era and the next. Life is changing but we are still trying to get our head around[66] an entirely different paradigm. Countries' efforts to build a green economy in Europe, together with experts' collaboration in developing science-based solutions, offer an optimistic vision of a better future. But the tragic human cost of climate change, long warned about by scientists, are getting worse.

Appropriate consideration of population composition and distribution is critical in understanding the vulnerability of different groups of people. The environmental and health consequences of climate change disproportionately affect low-income countries and poor people in high-income countries, while profoundly affecting human rights and social justice. Climate change is already a driver of migration patterns, and this will increase in the future. Significant questions of social justice may arise in connection with adaptation solutions, particularly as socially marginalised groups often experience disproportionate exposure to risk and affordability problems. A recent UK assessment of future flood risk found that those living in deprived areas, as measured by income distribution, will suffer disproportionately as flood risk worsens.[67]

Key climate-related risks to the financial stability of social security programmes include:

a) the fiscal impact to extreme weather events (e.g., droughts, floods) that damage infrastructure;

b) the health impact resulting from climate shocks;

c) migration waves caused by rising sea levels or persistent droughts displacing people from their homes.

In addition, in certain sectors of the labour market, productivity may be reduced, consequently affecting employment rates and wages.
In Europe, climate change is raising temperatures faster than in any other region of the world, posing risks to groups such as the elderly and those with chronic health conditions.[68]

There is a significant relationship between ambient temperature and mortality. In healthy individuals, there is an efficient heat regulation system which enables the body to effectively handle thermal stress. However, in vulnerable groups, especially in elderly over the age of 65 years, infants, and individuals with co-morbid cardiovascular and/or respiratory conditions, there is a deficiency in thermoregulation. When temperatures exceed a certain limit, being cold

66 To get our head around: to succeed in understanding or accepting something such as a new idea.

67 The Climate Change Adaptation Gap: An Actuarial Perspective, International Actuarial Association, May 2023.

68 World Health Organization, News Release: How does hot weather affect pregnancy? August 2024.

winter spells or heat waves, there is an increase in the number of deaths. In particular, it has been shown that at temperatures above 27 °C, the daily mortality rate increases more rapidly per degree compared to when temperatures drop below 27 °C. This is especially of relevance with the current emergency of global warming. Besides the direct effect of temperature rises on human health, global warming will have a negative impact on primary producers and livestock, leading to malnutrition , which will in turn lead to a myriad of health-related issues. This is further exacerbated by environmental pollution.[69]

According to a study by Italy's National Institute for the Prevention of Workplace Accidents, starting from the age of 70, the life expectancy of injured and technopathic workers with a disability above 15% has decreased compared to the pre-pandemic period, due to the combined impact of ageing and climate change.[70]

As Social Security Actuaries we are aware that long-term projections of social security plans should be considered within the context of climate change and other global environmental challenges. Our knowledge can help decision-makers better understand the impact of climate change, particularly when discussing projection assumptions. *This is because in such discussions the actuaries can adequately communicate the recent demographic trends and economic factors*.

The ISSA–ILO[71] Guidelines on Actuarial Work for Social Security[72] highlight how actuaries, social security professionals and stakeholders can work together in the design, management, financing, and provision of social security benefits.

Among the recommendations for social justice, the increased use of natural environment accounting is included, thereby recognising the environment's value to quality of life. One of the main domains proposed for inclusion in the Australian Actuaries Intergenerational Equity Index (AAIEI),[73] to reflect climate change, is a group of environmental indicators:

a) Atmospheric CO2 concentration;
b) Average 5-year mean temperatures;
c) Murray Darling Basing rainfall;[74] and
d) Number of threatened, endangered or extinct species.

As social security actuaries, we are deeply concerned about the effects of the climate crisis which imposes unprecedented risks.

69 Calleja-Agius, Kathleen England, Neville Calleja, The effect of global warming on mortality, Early Human Development, Volume 155, April 2021.

70 Daniela Martini, Laura Baradel: Aging of workforce and climate change: impact on injured and diseased workers' survival, National Institute for Insurance against Accidents at Work.

71 SSA: International Social Security Association, ILO: International Labour Organization.

72 https://www.issa.int/sites/default/files/documents/members/2-Guidelines%20ACT-261517.pdf

73 Actuaries Institute MIND THE GAP – The Australian Actuaries Intergenerational Equity Index Green Paper August 2020.

74 The Murray-Darling Basin is a region in Australia with varying rainfall patterns. The eastern side has high average annual rainfall, while the western side is typically hot and dry.

The AAE[75] supports:

a) The transparent classification of savings, pensions, and investment products by ESG[76] criteria and the clear and informative sales process for the saving products; as long-term investors, pensions and insurance play a relevant role in financing the climate change transition.

b) The facilitation of investments in structured green bonds on debts or loans for transition projects.

c) The development and the use of a science-based taxonomy such as the one initiated by the European Commission, as well as the establishment of Green Bond standards.

d) The early identification of protection gaps and the development of shared resilience solutions between the insurance industry and public protection facilities.

e) The development of comprehensive, proper carbon and pollution accounting and valuation approaches to make any such loopholes more transparent.

While climate change presents significant challenges and risks, it may also generate opportunities. The transition to a low-carbon emission economy can create green jobs[77] and green investments – both critical components of the transition. As a result, climate-related investments may also represent new business opportunities. According to the 2019 Carbon Disclosure Project report, about 80% of the world's largest companies believe climate change could generate over $2.1 trillion in new business prospects. There will be more opportunities in sectors related to clean renewable energy and green buildings. The production of hybrid and electric vehicles is expected to grow, and the construction of green and resilient coastal infrastructure could create many new career opportunities.[78]

In this new era, our present is defined by both hope and despair. For our future, we must do everything we can to ensure that we hit the positive tipping points[79] first.

75 Frank Schiller, Sustainability and Climate Change: Main Positions of the AAE.

76 ESG: Environmental Social and Governance.

77 Green jobs: employment opportunities in sectors that prioritize the preservation or restoration of the environment.

78 Actuarial Considerations Around Climate-Related Risks on Social Security, International Actuarial Association, June 2024.

79 Positive tipping points: opportunities where beneficial changes become self-sustaining.

3 UNITED IN THE DIVERSITY

Europe has historically been home to some of the most advanced social security systems in the world. Widespread protection of individuals over the life course enables social security systems to play a key role in ensuring economic and social stability. As Europeans, we are all connected to our country's national pension system which has its own unique – national - pension identity; i.e. a shared understanding among us, each country's citizens, of what the concept of a pension represents.

Andriana Sukova, the Acting Director General, DG for Employment, Social Affairs and Inclusion at the European Commission, in her interview in The European Actuary noted that *'We will continue respecting the diversity of national pension systems and national rules, as across the EU, there is no one-size-fits-all solution'.*[80]

As social security actuaries we find it crucial to take into account how nationally constructed ideas and local institutions frame and shape the different logics and justifications based on underlying national pension concepts. Understanding the various pension concepts will enable us to better understand why different countries opt for different types of reforms. In addition, it will enable us to contribute more effectively to the social dialogue by raising public awareness about pensions.

3.1 WHERE COULD A PENSION CONCEPT REFER TO?

According to Yves Stevens' article (2021),[81] a pension concept could refer to:

a) A form of deserved rest. In this pension concept people will use the word pension to indicate that they have earned their retirement income after working. The pension is in this concept literally earned for a period in which people are entitled to rest. The concept reflects a dichotomy between the active and the passive life.

b) A compensation for the physical impossibility to work any longer. In this pension concept there is an underlying idea of (temporary) incapacity to work or even (permanent) invalidity of a pensioner. The pension is considered a consequence of a (presumed or real) inadequacy to continue working, and often even irrespective of a certain age or required seniority.

c) A part of the wage structure. This pension type refers to the contributory basis of the pension and is more often linked to funded schemes. The pension reflects the calculation

80 Planning ahead: Are our EU pensions and social security systems fit for the future? March 2024.

81 The Role of the Government in Creating or Enhancing the Access to Funded or Unfunded Pensions in the Modern Welfare State | SpringerLink.

basis on which the pension rights are based. As a part of the wage structure the pension is seen as a more negotiable remuneration.

d) A deferred remuneration. In this pension concept, the idea is to have a postponed wage. The pension is thus seen as a part of the salary but not negotiable as such. This concept is often seen or used when the average salary is low but compensated by a relatively higher pension amount. It is more common in pay-as-you-go systems[82] and often more used in civil servants' schemes.

e) A reward for services rendered to the country. This pension concepts occurs often in pension types of civil servants or military personnel. The pension refers to personal sacrifices an individual has incurred due to his or her service to the nation to which he or she belongs. Pensions in this regard are construed as an expression of gratitude on behalf of the nation.

f) A form of savings. Many statutory pensions have their legal origins in this concept. Pensions often started as funded personal savings schemes based on individual accounts. Only after the first world war the first nationwide pay-as-you-go systems occurred often on the basis of the existing individual accounts. Ever since, many people think they have 'saved' for their pension even if their statutory pension is pay-as-you-go. The savings concept is clearly present in some forms of occupational and unequivocally in personal pensions.

g) A form of property. This pension concept is often used in the jurisprudence of the European Court of Human Rights. Some pensions can indeed reflect a property right. Hence, pension reforms can violate personal property rights. The use of the word pension as a property concept is often defensive, in order to avoid the lowering of benefits in politically or regulatorily unstable environments.

h) A form of individual or collective life insurance. Many statutory pensions started as life insurance organised by national insurers working under the strict supervision of the state. Many occupational and personal pensions take the legal form of a life insurance. As a life insurance notion, people view their pension as a risk-sharing product.

i) A form of social insurance. Over the last two centuries many individual or collective life insurance became social insurance. These insurance products are primarily characterised by two key features:

- There is subsidy from the state or government. For each individual payment or payment by the employer there is a tax credit or a true subsidization[83]. Hence the financial risk is socialised in the form of solidarity by all those participating in the scheme.

82 PAYG: Pay as you go pension system: A system in which state retirement benefits are financed by contributions levied from current workers.

83 'true subsidisation' a transfer of resources from a government to a domestic entity without an equivalent contribution in return.

- There is a compulsory participation in the scheme. On the condition of fulfilling all prerequisites, a participant is legally obliged to pay into the scheme and be solidary with the other participants. This pension concept is well established in countries with a more Bismarckian[84] social security tradition and social dialogue.

j) A form of shared citizenship. This form of pension is mainly present in countries that are historically more oriented towards the Beveridge[85] type of social security. The mere fact of being legally recognised as a citizen is sufficient to claim pension rights. Few to no social contributions are involved in the financing. This more universal approach of pension form is often exclusively based on tax expenditure.

In a comparative study between Finland and France,[86] Väänänen and Liukko[87] stated the following:

'Even though the central concerns around pensions, the short- and long-term financial and social sustainability, are similar in Finland and France, the reasoning and the measures discussed are different. The Finnish report emphasises the role of pensions as income smoothing over one's own life-course. The French report stresses the role of pensions as a solidary mechanism between citizens of different socioeconomic groups and different birth cohorts. Thus, the dominant justifications for reforming the systems are different. The Finnish report is dominated by industrial justifications: what is the most efficient way to guarantee an earnings-related pension according to labour market merit? The French report is dominated by civic justifications: how should the competing interests of different stakeholders be reconciled?'

3.2 WHAT WOULD BE THE PERFECT PENSION SYSTEM IN EUROPE?

In a blog post, Niko Väänänen,[88] wrote a short fictional story[89] to illustrate the variety of European pension systems. This fictional story refers to a discussion between pension experts from different countries regarding the best way to organise old-age income security:

- **The Dutch expert:** 'As Mercer has pointed out for many years, the best way is the way we do it. You guarantee a sufficient basic pension for all residents. On top of that each sector agrees on a funded pension scheme that best suits them. These funds should be invested in a

84 Otto von Bismarck: The Germany's chancellor who in 1889 introduced social insurance in Germany for the employees or gainfully employed. It was the world's first state pension scheme.

85 William Henry Beveridge: A British economist and politician who in 1942 introduced a social insurance system for the entire population.

86 The reports commissioned by the relevant ministers or labour market organizations, published in 2013 as preparatory documents for a possible pension reform.

87 Niko Väänänen, Jyri Liukko: Justifying a financially and socially sustainable pension reform: a comparative study of Finland and France, International Journal of Sociology and Social policy, May 2023

88 The perfect European pension system? - Finnish Centre for Pensions (etk.fi)

89 The story, and all nationalities portrayed in the text, are fictitious. No identification is intended or should be inferred.

sustainable way around the world so that we can partake in the growth of foreign economies and diversify the risk.'

- **The French expert:** 'Mais non, absolutely not. The pension system should operate on the basis of répartition, or pay-as-you-go, as you call it in English. The pension system is a unifying force and the hallmark of solidarity between citizens and across generations. Unlike funded schemes, pay-as-you-go is not sensitive to the booms or busts of the financial sector. Investing in families and prenatal policies can ensure that demographics will be good enough to sustain a pay-as-you-go system.'

- **The German expert:** 'Well, the most important thing is that the pension system supports our economies, exporting industries included, and gives incentives to take up work. Pensions mean a redistribution from those that currently work and produce to those who do not. It is important to have a rule for sharing the risk if demographics deteriorate. The system should be based on transparent rules.'

- **The Swedish expert:** 'Or maybe you can look at how we have done it in Sweden? It works very well, you know. You fix all the parameters of the pension system and let pensions decrease if necessary. Buffer funds will smooth out the impact of demographic changes between birth cohorts. This way the pension system will last without any reforms at least until the next Ice Age.'

- **The Finnish expert** remained silent. She was afraid that whatever she would say, the others would not understand her hybrid model.

3.3 PROGRESS HAS MADE – MUST TRY HARDER

In 2021, the European Commission launched the High-Level Group on the Future of Social Protection and of the Welfare State in the EU. The group reflected on how to reinforce social protection systems and the welfare state to respond to megatrends such as demographic change, the impact of new forms of work, and the digital and green transitions.[90]

According to the group report, the key figures for the EU are:

a) Life-cycle risks, specifically: In 2021 19.5% of children were at risk of poverty, 16.5% of 20–34-year-olds were neither in employment nor in education and training; and the number of persons aged 75+ is expected to rise, increasing demand for pensions, health and long-term care.

90 High Level group on the future of social protection and of the welfare state in the EU report, Luxembourg: Publications Office of the European Union, 2023.

b) Workforce transformation, specifically: In 2021, 40% of workers were in non-standard forms of work (temporary, part-time or self-employment) that limit access to social protection; 9% of workers were at risk of poverty over two thirds (18 million) of the 27 million self-employed worked on their own with no employees.

c) Energy poverty: even before the energy crisis, in 2021, nearly 30.5 million Europeans were unable to adequately heat their homes. Those with income below the poverty threshold were much more affected (16.4%) than others (6.9%).

d) Around 70% of all fiscal revenue is used for the welfare state (excluding education). In 2021, fiscal revenue of the EU-27 was €6.1 trillion, amounting to 41.7% of the GDP.

European pension systems are constantly evolving. As of three years after the publication of the report, several Member States:[91]

- Implemented reforms to bolster minimum income protection and introduce or increase child benefits, aiming to reduce poverty and inequality. They adopted policies and tools to improve support for children and families, including services to enhance cash benefits, care and, paid leave policies.

- Adjusted contribution rates and taxation models, alongside efforts to improve employment regulation in the platform economy[92]. They also addressed significant gaps in coverage for self-employed workers by extending legal access to additional branches, adapting contributions to be more affordable and flexible, and improving administrative systems to facilitate access.

- Expanded coverage alongside formalisation strategies, while others are closing gaps for specific vulnerable groups.

- Enhanced efforts at both regional and national levels to close unemployment coverage gaps. Increasingly well-coordinated cash benefits, care and employment policies across the region ensure that workers in all forms of employment can thrive in increasingly dynamic labour markets.

- Increasingly pursuing sustainable investment opportunities, with an emphasis on environmentally and socially responsible investments to ensure more resilient economies and societies over the long term.

The risk of poverty and social exclusion for older people has continued to grow since 2019, driven by the rising relative income poverty, despite improvements in material

91 A detailed analysis on the latest developments is presented in the 2024 Pension Adequacy Report Pensions Adequacy Report.

92 The platform economy encompasses economic and social activities facilitated by digital platforms. These platforms serve as intermediaries between various groups of users, enabling interactions, transactions, collaboration, and innovation.

and social deprivation. In 2022, more than one in five people aged 65 and above were at risk of poverty or social exclusion in the EU. This represents 18.5 million people – a number that continues to grow due to both the rising poverty rate and the ageing of population.[93]

Despite improvements, there is no room for complacency. Greater effort should be paid.

3.4 FINDING THE WORDS

The traditional three-stage life model – education, employment, then retirement – belongs to the past as a result of the substantial increase in life expectancy. The multi-stage life with new milestones and turning points that creates numerous sequencing possibilities is shaped by individual preferences and circumstances.

Under this reality the challenge for the individuals, due to the growing unsustainability of state pensions, is to rely not only on the state, but also on themselves to finance their pensions. But how prepared are we to tackle with this issue?

- Pension design and funding issues are highly complex; most people lack the knowledge and expertise required for a proper understanding.

- The incentives of stakeholders and decision-makers, including among decision-makers themselves, might not be fully aligned. Individuals will often pursue policies that meet their personal or professional objectives rather than those of the pension system or other stakeholders.

- The complexity of public pensions, the large number of stakeholders and decision-makers, as well as the complexity of the institutional environment in which pensions are set, mean that effective pension policy requires close cooperation and productive coordination among different groups with potentially divergent objectives.

In the AAE Social Security Forum[94] panel about raising people's awareness,[95] different views were discussed:

- *'When we speak of 'people's awareness', we should note at the outset that 'the people' concerned are the pension system stakeholders. Even within each subgroup of that larger body, we can observe conflicting goals – for example, within governments, the concerns relating to pensions of the representatives of Ministries of Finance and of Labour are likely to diverge sharply'.*

93 2024 Pension Adequacy Report.

94 AAE Social Security Forum November 2023: The challenges facing Social Security in our times.

95 Wakeup Call: How (and Why) Peoples' Awareness on Pensions Issues should be Raised.

- *'It is in fact a very hard, perhaps almost impossible, task to truly raise public awareness of the more complex issues in the pension system in a meaningful way, whether in the short or long term, as people are usually more focused on shorter term needs'.*

- *'Given the general public reluctance to hear 'bad news', there is little or no incentive for politicians to 'tell the truth'. This is specifically the case with regard to the costs of adequate pension provision, and the prospective burden of costs for future generations.'*

- *'In developing the framework for awareness raising and public discussion, the value of practical experience, and the degree of interest in intergenerational aspects should be highlighted'.*

- *'In relation to developing our thinking on public awareness, we need to consider the relationship between the technical and the political dimensions. It is also of key importance the use of an appropriate language in terms of facilitating people's understanding.'*

As social security actuaries, we are able to work in a way that is independent of industry interests.[96] On that basis, when engaged in a public debate, we may establish and maintain the highest levels of public trust, underpinned by professional standards.

For the many people who are unlikely to understand pensions or do not realise how to manage pension issues, we are able to provide a wide variety of approaches. These approaches are generally underpinned by default scheme rules and conditions that are well-tailored to their needs. We can also offer a variety of approaches to those who engage actively with the pension system.

There are at least two kinds of challenges for us, as social security actuaries:

1. The content for discussion that is often of a technical nature.
2. The need for two-way communication with a wider, public audience.

Communication in this sense should focus a) on people's understanding of how social security contributes to economic security and b) on our understanding of the needs perceived by people widely.[96]

96 Our future role as Social Security Actuaries in Europe, SSSC discussion paper, May 2021.

4 GOOD ADVICE FOR CHALLENGING TIMES

The long-term resilience of social security systems across Europe depends on finding ways to ensure that solutions to address both long-term financial prospects and the near-term concerns with coverage, adequacy and effective delivery, are mutually reinforcing.

Actuarial modelling approaches and methodologies are built on projections of future cashflows, which facilitate assessment of the short, medium and long-term impact of pension policies and reforms on the adequacy and sustainability of pension system provisions in an integrated way. For almost a century, it has been recognised that actuarial reporting, as guided by the International Social Security Association (ISSA) guidelines, forms a key element of good governance in the field of social security.

Social security actuaries are thus well placed to play an active role in analysing the impact of future changes on pension and social security provision, and to advise EU and national institutions.

4.1 THE FUTURE IS ALREADY HERE

Moving along a 50-year time path we foresee the need to face a range of challenges, that are not necessarily 'actuarial' in a narrow sense but nevertheless impact the objectives we as actuaries seek to address.

4.1.1 Pension Tracking Systems: Not only 'nice to have' but 'need to have'[97]

The Pension Tracking System (PTS) is an online tool designed to provide an overview of accrued entitlements and projected retirement income from all possible pension sources, presented in a simple, understandable, and meaningful manner to citizens within Member States.

PTS should help citizens:

- Obtain an overview of all their pension entitlements in one place.
- Understand their expected retirement income and raise their awareness on whether this will be sufficient.
- Engage with and improve their understanding of their pension situation.
- Currently, PTSs are in place in eight Member States: BE, DK, EE, FI, LV, NL, SE, SK and NO, while in four Member States – AT, DE, FR, HR – and in the UK and Switzerland, they are under development.

97 Pensions Tracking Services - Rising Awareness and Managing Retirement Expectations Tatiana Bitunska, Jeroen van den Bosch, European Congress of Actuaries 2024.

In its report[98] on the challenges of implementing PTSs, the AAE highlighted:

- The number of occupational pension plans and differences in the retirement benefits
- The importance to consider state pensions in terms of the replacement ratio
- Issues related to digital literacy and the use of a unique identifier

In addition, it is essential to identify the information that people actually need, as well as the most effective ways to enable comparison of pension entitlements.

Our role as actuaries in the development of PTSs is essential to:

- Define pension product categories
- Propose standardised actuarial assumptions
- Define the data requirements needed to support accurate projections

From an actuarial perspective, this service should be trustworthy and provide an objective overview of future retirement income. Its main goal should be to deliver individualised, objective, and impartial information to citizens (and other rights holders, as appropriate) about their accrued entitlements and projected retirement income – all in a simple and understandable manner.

4.1.2 Lifelong Learning

Education is no longer seen as a 'one-off' process, to be completed relatively early in life, but as something which allows for renewed learning later in life, both as a form of mental refreshment and stimulation, and to adapt to a changing employment landscape. Although qualifications and degrees from initial education and training will continue to play a key role, alternative credentials will be critical to ensure that more adults engage in learning opportunities and to provide better information to employers on workers' skills and competencies.

Lifelong learning is the 'ongoing, voluntary, and self-motivated 'pursuit of knowledge for either personal or professional reasons. It is important for an individual's competitiveness and employability, but it also enhances social inclusion, active citizenship, and personal development. However, participation in lifelong learning remains modest – largely due to cost, time constraints, and family responsibilities.

Promoting a culture of lifelong learning goes hand in hand with fostering equal access to education and training opportunities. Lifelong learning opportunities should be designed to meet the needs of a diverse population. Policymakers should create flexible education and training pathways that take into account individuals' barriers to participation and focus on those most in need of support.

Engagement in lifelong learning will play a critical role in ensuring the alignment of people's skill sets and attitudes to a new technological reality and that new managerial practices emerge so

98 Report on key issues for setting up national pension tracking services in six EU-countries (February 2015).

that workers' contribution to production processes is strengthened and adequately valued.[99] Among the key policies to improve the future-readiness of adult learning systems, the following are highlighted:[100]

- Designing targeted programmes
- Providing adequate public financing
- Creating incentives for employers to contribute
- Creating incentives for individuals to contribute

Our role as actuaries is necessary in order to:

- Ensure the sustainability of those plans
- Evaluate the cost of current and proposed measures
- Ensure transparency
- Act as expert advisors for policy development
- Quantify the associated risks

From our perspective, increased support should be provided to the educational institutions of the Member States to enable:

a) the implementation of new learning technologies and experiential learning.

b) the breaking down of boundaries between age groups and hence facilitating inspirational mentorship and innovative approaches to teaching creativity, innovation, humanity, and empathy.

c) the development of practical and targeted specialisations aligned with technological advancement.

d) the further development and adoption of digital technologies.

Policymakers should consider adopting increasingly flexible ways for the distribution of educational resources – not only for younger populations, but across the life course as a whole.

99 OECD Skills outlook 2023.

100 Life Long Learning Assia Billig, Social Security Forum November 2023.

4.2 OUR COMMON AGENDA

Which are the ageing challenges and opportunities?
How we can defend the public pension systems?
How (and why) people's awareness on pension issues should be raised?

With these questions, the Actuarial Association of Europe addressed to the distinguished speakers and high-level audience – including colleagues, actuaries and non-actuaries working in ministries, governmental organisations and institutions, universities as well as insurance companies and pension funds – who participated in the Social Security Forum in November 2023[101] to engage in a discussion on the future of social security.

This initiative of the Actuarial Association of Europe aimed to enhance communication with all involved parties in the field of social security, regarding the challenges facing Social Security in our times. From this fruitful and open discussion, the following priorities were set:

> **To address the challenges of ageing: Consider innovative forms of employment that use technology, when necessary, of the transition to jobs suited to older workers.**

From an actuarial perspective, increases in retirement age should take into account persistent socio-economic inequalities. One relevant case is that of older workers in hazardous or arduous jobs, where long-term exposure may have a lasting impact on health. Inability to continue in a specific role should not automatically lead to early retirement.
When no longer fit for physically demanding roles, older workers can remain active in other capacities – for example, through clerical work, mentoring, or coaching. Job rotation programmes may also help reduce exposure to harmful working conditions while increasing job flexibility.

Reskilling and upskilling enable workers to remain productive and adapt to new tasks, thereby increasing the likelihood of continued employment. A career transition can be feasible when supported by sound policies. A professional training and guidance framework must therefore be implemented by governments and social partners.

Our role as social security actuaries is essential to:
- Ensure the sustainability of these plans
- Evaluate the cost of current and proposed measures
- Quantify the associated risks.

> **To achieve and maintain support for pension systems, Key action: Cater for the diversity of profiles amongst individuals protected under social security when designing policy.**

101 AAE Social Security Forum November 2023: The challenges facing Social Security in our times.

The Pension Adequacy Report[102] refers to the basic income maintenance measure of the Theoretical Replacement Rates (TRRs); *see Section 2.2.3, Modelling future adequacy.*

Our role as Social Security Actuaries is to:

- Determine a range of assumptions – from specific career paths and demographics to salary growth, inflation, and interest rates – tailored to different individual profiles. We strongly recommend calculating TRRs separately for each group.

- Compare TRRs' sensitivity to various career and life events to assess pension system adequacy across individual profiles.

> **To raise people awareness: seeking to explain issues around balancing the concerns of different generations**

Fairness, in the broadest sense, invites both subjective and objective assessments. Actuaries are well used to addressing questions of equity, by way of establishing suitable parameters for their assessment.[103]

Our role as social security actuaries is to:[104]

- State the facts and analyse the financial costs of risk and uncertainty

- Quantify the risks associated with policymakers' proposals, providing a clear view of the pros and cons of each option.

To face the challenges facing Social Security in our times, we as social security actuaries seek to strengthen our problem-solving approaches. This includes steps to clearly define the requirements for recognising and measuring social benefits.

102 2024 Pension Adequacy Report.

103 Intergenerational equity is the concept of fairness or justice between generations, often covering economic, psychological and sociological aspects.

104 Our Future role as Social Security Actuaries in Europe, AAE Discussion paper, October 2021.

5 UTOPIA FOR REALISTS

Our effort to respond to the challenges facing Social Security, is rooted in our overarching objective:

In the long run, to guide the provision of pension benefits that are sufficient, first and foremost, to prevent poverty — and beyond that, to ensure human dignity in old age.

Poverty elimination is our great milestone to reach– a goal that may at first carry a whiff of utopia.
According to Albert Hirschman,[105] utopias are initially attacked on three grounds: futility (it's not possible), danger (the risks are too great), and perversity (it will degenerate into dystopia). But Hirschman also wrote that almost as soon as utopia becomes a reality, it often comes to be seen as utterly commonplace.[106]

'Progress is the realization of Utopias', Oscar Wilde wrote many years ago.

We are aware that to translate our utopia into reality, the key is this: ***to keep moving forward***.

105 Albert Otto Hirschman: German economist and the author of several books on political economy and political ideology.

106 Utopia for Realists - and how we can get there, Rudger Bregman, Bloomsbury Publishing Plc.

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APPENDIX A

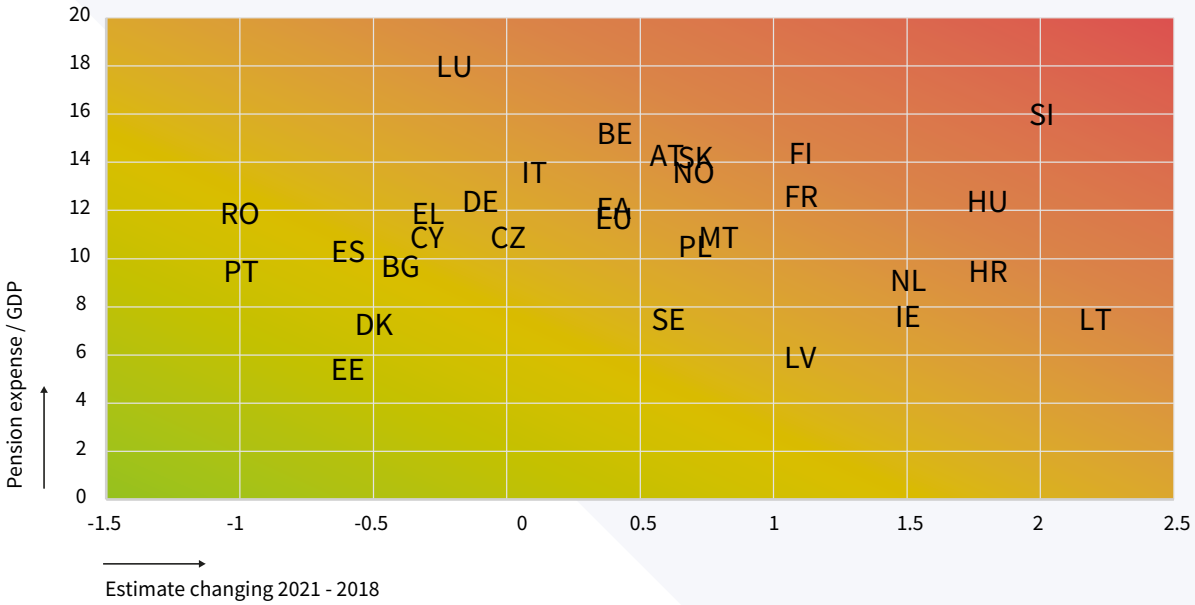
Example: Risk mapping – Sustainability in the Ageing Report

To illustrate risk assessment and its interpretation using a heatmap, data from the 2021 Ageing Report are used.

The central metrics of the Ageing Report – s pension expenditure as a percentage of GDP – is a sustainability measure, taken into account in cross-country comparisons. In order to breakdown this measure we apply, as component factors, the benefit ratio, the coverage ratio, the dependency ratio and the employment (or labour) ratio. This decomposition can also support conclusions at individual country level.

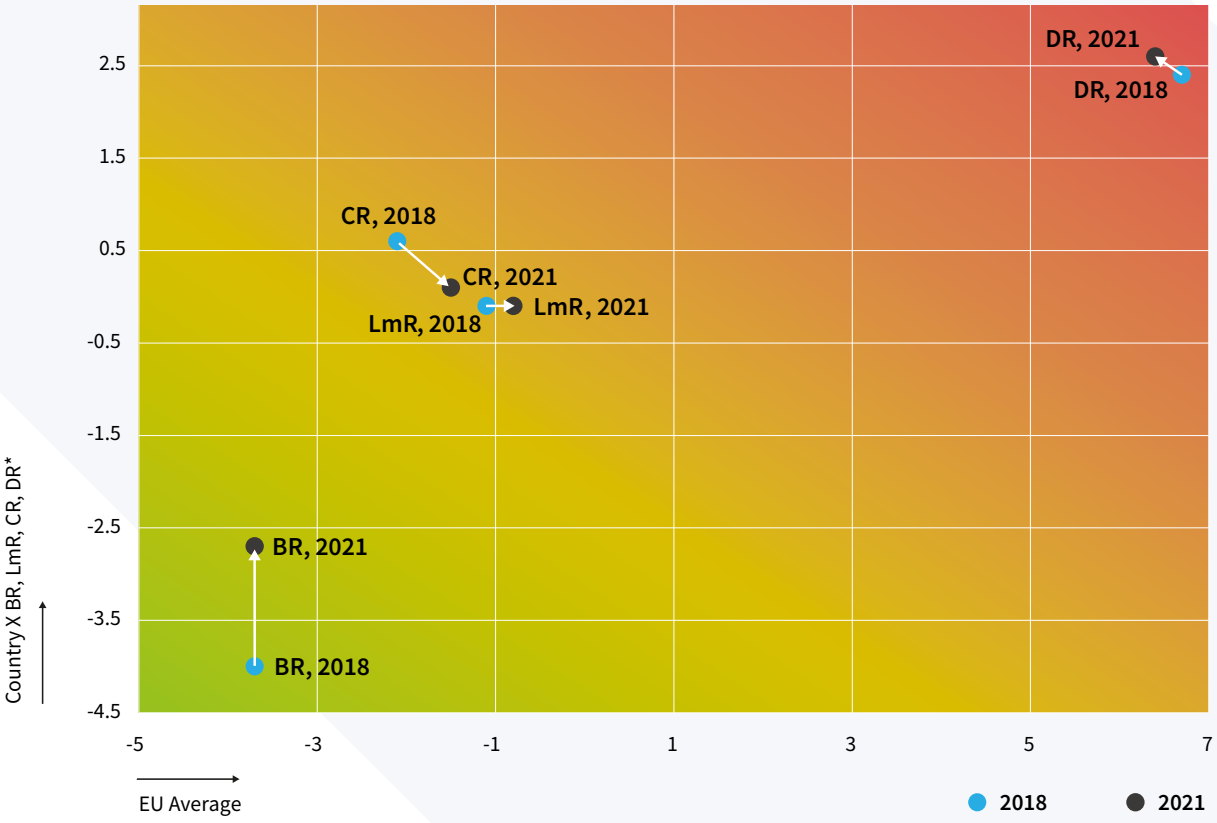
The first graph illustrates the risk of the Member States contribution to the Pension expenditure/ GDP risk at EU level. The higher the percentage, the higher the impact is. A proxy of the probability is derived from the magnitude (in percentage points) and direction (increase or decrease) of the change since the last assessment in 2018.

FIGURE 12: RISK OF THE MEMBER STATES CONTRIBUTION TOWARDS PENSION EXPENDITURE/GDP RISK AT EU LEVEL



The second graph illustrates the changes in the decomposition of the Pension Expenditure / GDP risk index of a selected country in the two assessment periods. The idea is that the policy recommendations in the Reports, together with the subsequent European Semester exercise, serve as risk control mechanisms that help mitigate emerging risks over time. If the graph had been drawn ex ante, it would have represented the inherent (residual) risk profile. The y-axis shows the contribution of each risk component to the total risk, and the x-axis provides a proxy measure for probability, represented by the deviation from the EU average.[107]

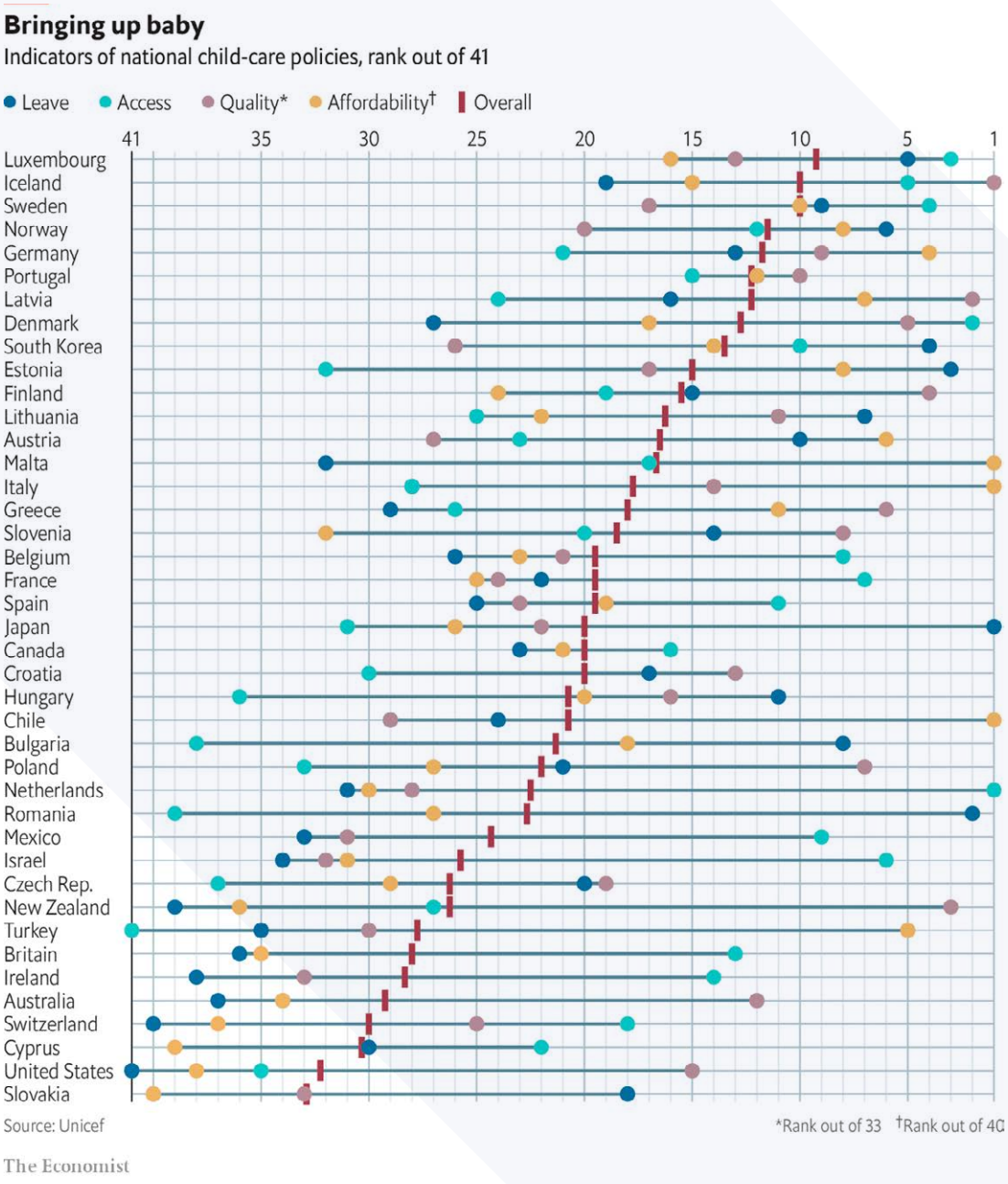
FIGURE 13: CHANGES OF THE DECOMPOSITION OF THE PENSION EXPENDITURE / GDP RISK INDEX OF A SELECTED COUNTRY IN THE TWO ASSESSMENT PERIODS



107 As for an average measure in the EU practice see the inflation and interest rates definitions in the conditions of the introduction of the euro currency.

APPENDIX B

Which countries have the most generous child-care policies?[108]
The Economist 2021



108 https://www.economist.com/graphic-detail/2021/07/01/which-countries-have-the-most-generous-child-care-policies.

THE ACTUARIAL ASSOCIATION OF EUROPE

The Actuarial Association of Europe (AAE), founded in 1978 under the name of Groupe Consultatif Actuariel Européen, is the Brussels-based umbrella organisation, which brings together the 38 professional associations of actuaries in 37 countries of the EU, together with the countries of the European Economic Area and Switzerland and some EU candidate countries.

The AAE has established and keeps up-to-date a core syllabus of education requirements, a code of conduct and discipline scheme requirements, for all its full member associations. It is also developing model actuarial standards of practice for its members to use and it oversees a mutual recognition agreement, which facilitates actuaries being able to exercise their profession in any of the countries concerned.

The AAE also serves the public interest by providing advice and opinions, independent of industry interests, to the various institutions of the European Union – the Commission, The Council of Ministers, the European Parliament, ECB, EIOPA and their various committees – on actuarial issues in European legislation and regulation.

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