Department of International Relations

Chair of Demography and Social Challenges

Tackling Demographic Ageing in The European Union: Education, Skills, and Workforce Participation as Strategic Solutions

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Table of Contents

Abstract

The European Union (EU) has long been shaped by population growth, but now faces the challenge of an ageing population. This demographic shift, characterized by longer life expectancy, lower fertility rates, and higher levels of education, presents new challenges for the EU. This analysis seeks to evaluate the most effective policies for mitigating the negative impacts of population ageing, while critically assessing common demographic strategies. Popular arguments suggest that boosting fertility rates or increasing migration could counterbalance ageing by expanding the labour force. However, relying solely on these strategies is not a sustainable long-term solution. By exploring not only migration, fertility, and mortality, but also labour productivity and participation rates, this analysis provides a more comprehensive understanding of future demographic scenarios. The most viable approach to counteract the adverse effects of population ageing is to enhance labour force productivity and increase participation across all demographics, particularly among women and youth.

The paper first examines the correlation between educational attainment and labour productivity, highlighting that higher education levels generally lead to increased productivity across the EU, despite national differences. As educational attainment rises, the economic dependency ratio is expected to decline. The analysis then shifts focus to strategies for boosting labour force participation, especially among underrepresented groups like women and youth. The analysis will also focus on the crucial role of competencies in the labour market, highlighting the importance of aligning education with the demands of employers. By improving labour productivity through education and incentivizing greater workforce participation, the decline in the labour force due to ageing can be mitigated, helping to stabilize the labour force dependency ratio (LFDR).

This analysis covers all EU Member States, identifying key trends and differences. Its innovation lies in a multidimensional approach that integrates demographic trends with social and

economic factors such as education and labour force participation. By examining productivity indicators and participation rates, particularly for women, the analysis aims to present a comprehensive outlook on the future of the EU's ageing population. It underscores the essential role of the labour market in addressing these demographic challenges, demonstrating that with a holistic approach to workforce development, the challenges of an ageing population can be more effectively managed.

Introduction

The European Union (EU) is at a crucial stage in its demographic evolution, as the ageing of its population represents a complex and multifaceted challenge. For decades, the EU has benefited from population growth, which has fuelled economic expansion and supported the sustainability of its welfare systems. However, recent demographic changes, characterised by rising life expectancy, falling fertility rates and significant changes in the composition of the labour force, are threatening the balance of the social and economic structures of the Member States. In this context, the need for innovative and sustainable solutions to mitigate the impact of an ageing population has become increasingly urgent.

The objective of this paper is to provide a comprehensive analysis of demographic dynamics within the EU, with a focus on the intersection between population ageing and labour market trends. Central to this analysis is the role of education and skills in shaping labour productivity and mitigating the rising dependency ratios associated with an ageing population. Although traditional approaches to addressing demographic decline have emphasised increasing fertility rates and promoting immigration, these strategies alone are not sufficient to address the long-term challenges.

The first chapter sets the stage by exploring the demographic trends underlying population ageing in the EU. It provides a detailed examination of the impact of ageing on welfare state systems and introduces key strategies aimed at mitigating these effects, such as boosting fertility and migration. A comparative analysis of EU Member States reveals the varying degrees to which these countries are affected by and responding to population ageing.

The second chapter shifts the focus to the critical role of education and skills in shaping workforce dynamics. A smaller, better-educated workforce is emerging as a key factor in countering the negative effects of population ageing. By examining educational attainment across the EU, this chapter highlights the direct correlation between higher education levels and increased productivity,

which in turn can lower dependency ratios. Additionally, the chapter underscores the importance of aligning educational programs with the evolving demands of the labour market, particularly considering the growing significance of digital skills.

In the third chapter, the analysis turns to practical solutions for maximizing workforce potential, with particular attention to policies that promote female labour force participation and youth employment. Gender disparities in education and employment are examined, along with the broader economic benefits of improving gender equality. The chapter also addresses the issue of youth unemployment and underemployment, presenting strategies to engage younger populations in the labour market and reduce their dependency on the state.

Through a multidimensional approach that integrates demographic trends, educational attainment, and labour market participation, this thesis aims to offer a holistic understanding of the challenges posed by population ageing. It highlights the critical role that human capital development—through education and workforce inclusion—plays in ensuring the long-term stability of the EU's economies and welfare systems. The findings suggest that by enhancing labour productivity and participation, the EU can mitigate the adverse effects of demographic decline and better navigate the complex realities of an ageing population.

First Chapter: population ageing in the European Union (EU)

The first chapter will provide an outlook on population ageing, its main features and indicators in the European Union. Therefore, it will be structured as follows: first, an outline of ageing and its trajectories within the European Union will be given. By combining the theoretical approach of the demographic transition theory and data on the dependence of the elderly (65 + years old) on the active population (15-64 years old), this chapter will showcase the challenges stemming from population ageing for the European economic and social security systems. Indeed, the growing share of old inactive population challenges the financial and fiscal sustainability of the welfare state across European countries, despite geographical differences. Finally, the last paragraph will present demographic scenarios for the European Union considering different trajectories in terms of fertility and migration. It will be argued that population strategies alone, for instance in the field of migration and fertility, cannot effectively solve the problem of ageing in the long run for the EU.

1.1. Assessing population ageing in the European Union

Population ageing the rising average age within a population due to longer life expectancies and lower birthrates[1]. Thus, population aging is the increase in the population above the age of 65 in absolute terms, both as relative to the younger population and as a proportion of the total population. Due to its multi-faced implications, there is wide consensus in the literature in considering population ageing as one of the most significant demographic changes and social transformations of the twenty-first century[2].

[1] Kris Heggenhougen and Stella R. Quah, *International Encyclopedia of Public Health* (Amsterdam; Boston: Elsevier, 2008).
[2] Cecilia Reynaud and Sara Miccoli, "Population Ageing in Italy after the 2008 Economic Crisis: A Demographic Approach," *Futures* 105 (January 2019): 17, https://doi.org/10.1016/j.futures.2018.07.011.

From a demographic stance, the age structure of a population and the speed of population ageing depend on fertility, mortality and life expectancy[3]. Additionally, migration, intended both as immigration and emigration, is another important demographic factor[4]. While population aging is a widespread phenomenon affecting many developed countries, this study specifically analyses its impact within the European Union, where it is expected to be particularly significant in the coming decades. Indeed, in the European Union, the population is increasingly composed of older individuals due to prolonged low fertility rates and rising life expectancy. The growth in the relative share of older people may be divided in two components: "ageing at the top" and "ageing at the bottom" of the population pyramid. First, increased longevity, a pattern that has been apparent for several decades as life expectancy has risen, is often referred to as ageing at the top. Currently, the average life expectancy at birth in the European Union is around 81 years[5]. These shifts toward longer lives are part of a broader, nearly universal process of transitioning from pre-modern to post-industrial demographic patterns, driven by advances in medicine, technology and improvements in quality of life. Secondly, consistently low levels of fertility over many years have contributed to population ageing, with fewer births leading to a decline in the proportion of children and young people in the total population. This process is known as "ageing at the bottom" of the population pyramid and is exemplified by a narrow base of the population pyramid. The decline in fertility rates is usually associated with improvements in contraception and the increasing gender equality between men and women within society, for instance in education and in the labour market. The reasoning is that these advancements empower women with greater autonomy in making decisions about childbearing, thus influencing fertility rates.

[3] Wolfgang Lutz, Warren Sanderson, and Sergei Scherbov, "The Coming Acceleration of Global Population Ageing," *Nature* 451, no. 7179 (January 20, 2008): 716, https://doi.org/10.1038/nature06516.
[4] Jakub Bijak, Dorota Kupiszewska, and Marek Kupiszewski, "Replacement Migration Revisited: Simulations of the Effects of Selected Population and Labor Market Strategies for the Aging Europe, 2002–2052," *Population Research and Policy Review* 27, no. 3 (February 9, 2008): 323, https://doi.org/10.1007/s11113-007-9065-2.
[5] Eurostat, "Population Structure and Ageing," ec.europa.eu, February 2024, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Population_structure_and_ageing#:~:text=As%20a%20result%20of%20demographic

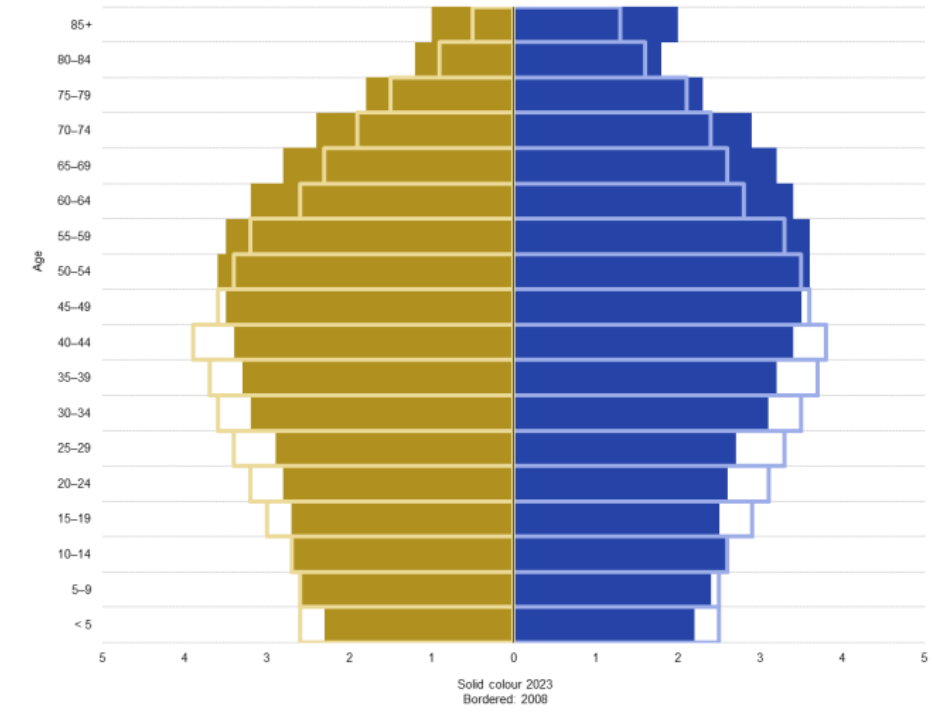
From a theoretical point of view, the transition from high fertility and high mortality rates to stable fertility and low mortality rates across European countries is a known as the process of demographic transition. More precisely, European countries are undergoing the fourth stage of the demographic transition as exposed by Frank Notestein[6]. This theory provides an explanation of how fertility and mortality rates impact the age distribution and growth rate of populations. At the fourth stage of the transition, which is called "post-transition", is negligible or even declining. By the same token, consistently low birth rates and higher life expectancy are transforming the shape of the EU's population pyramid. Probably, the most significant change is the shift toward an older demographic structure, which is already evident in several EU member states. This shift is reflected in an increasing share of older individuals and a declining share of working-age people within the total population.

In 2023, the EU's population pyramid presented a narrow base and a rhomboid shape, primarily due to the "baby boomer" cohorts that resulted from a period of high fertility rates in several European countries after World War II, known as the "baby boom." However, the "baby boom" bulge is gradually moving up the population pyramid, leading to a narrower working-age population and youth base, as illustrated in Figure 1, which compares EU's population

pyramids in 2008 and 2023.

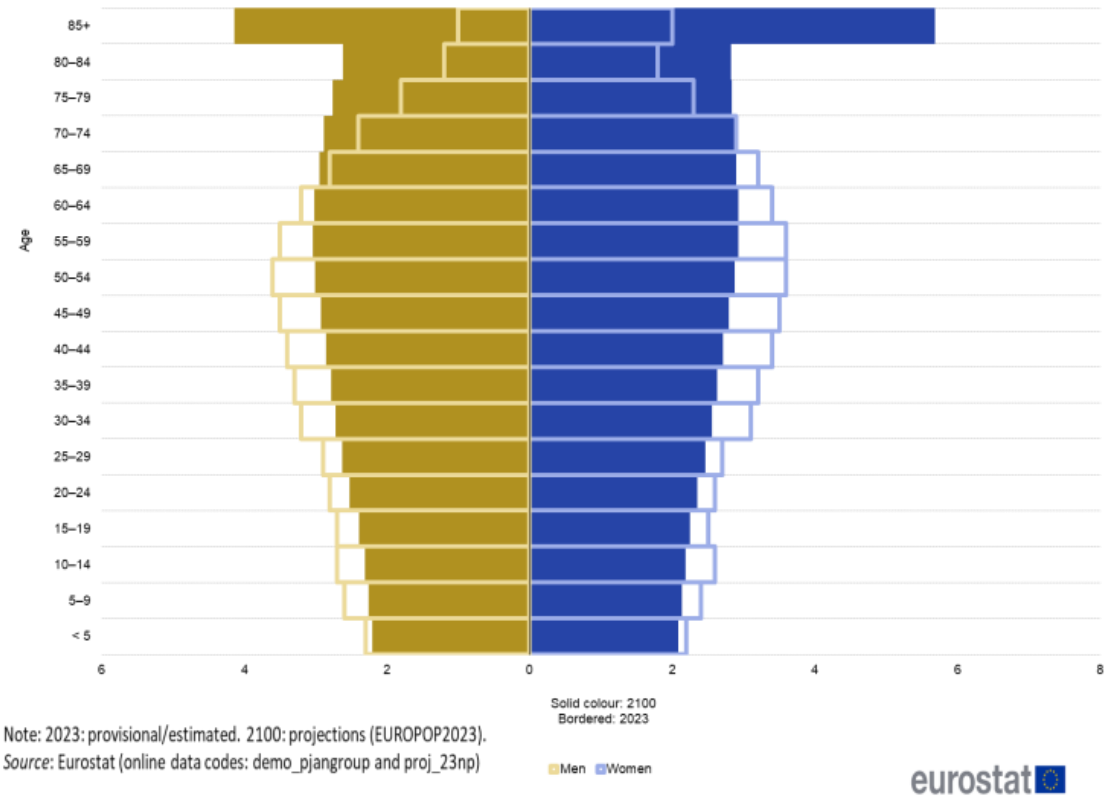
Figure 1. Population pyramids, EU 2008 and 2023
(% of total population)

[6] Jessica Diggs, "Demographic Transition Theory of Aging," *Encyclopedia of Aging and Public Health*, (2020): 266, https://doi.org/10.1007/978-0-387-33754-8_123.



Note: 2023 provisional/estimated.
Source: Eurostat (online data code: demo_pjangroup)

Figure 2. Population pyramids, EU 2023 and 2100 (% of total population)



Note: 2023: provisional/estimated. 2100: projections (EUROPOP2023).
Source: Eurostat (online data codes: demo_pjangroup and proj_23np)

When considering future demographic trends, the EU's population is projected to continue aging, as shown in Figure 2, which compares EU's age pyramids for 2023 and 2100. Over the next several decades, the number of elderly people will increase dramatically. By 2100, the population pyramid will resemble the shape of a rectangular block, narrowing considerably in the middle (around ages 45–54)[7]. Additionally, the EU's population is projected to peak at 453.3 million people around 2026 and then gradually decline to 419.5 million people by 2100. Therefore, future demographic scenarios for EU countries include an aging population, represented by the increasing relative share of older individuals compared to the working-age population, alongside a gradual decline in the total population[8].

It is worth precising that in this study measures of population ageing will use age 65 as the elderly threshold, however, the age range in which people are considered active should be probably raised as people are living longer and are more productive for longer[9]. Moreover, in several Member States of the European Union, the statutory retirement age is already over 65 and it is expected to increase further because of current legislation. In line with this approach, people would not be considered elderly when they reach 65, but rather when they reach the age at which remaining life expectancy is 15 years or less[10]. Nevertheless, in this study, for simplicity's sake, the conventional definition of working age as 15-64 years old will be employed.

While population pyramids illustrate the distribution of the population by age and underscore demographic imbalances, such as the increasing proportion of the elderly relative to the working-age population, additional data might be necessary to provide a comprehensive view on the ageing phenomenon within the EU. In 2023, the EU population was 448,8 million people, and more than

[7] Eurostat, "Population Structure and Ageing,".
[8] *Ibid*.
[9] Gemma Amran et al., "Demographic Scenarios for the EU : Migration, Population and Education," *Publications Office of the European Union*, (June 3, 2019): 19, https://doi.org/10.2760/590301.
[10] Warren C. Sanderson and Sergei Scherbov, "Average Remaining Lifetimes Can Increase as Human Populations Age," *Nature* 435, no. 7043 (June 2005): 812, https://doi.org/10.1038/nature03593.

one-fifth (21,3%) of it was aged 65 years and above[11]. More specifically, children of age between 0 and 14 years constituted 14.9 % of the EU's population, while people of working age (15 to 64 years) accounted for 63.8 % of the population. Older people (aged 65 years and over) had a 21.3 % share, signalling an increase of 0,2 percentage points (pp) compared with the previous year and an increase of 3,0 pp compared with 10 years earlier[12]. Regarding future trends, the proportion of older individuals will likely increase in the European Union. Specifically, those aged 65 years and over are projected to account for 32.5% of the EU's population by 2100, up from 21.3% in 2023[13].

Figure 3. Population age structure by major age groups, 2013, 2022 and 2023 (% of the total population)

	0–14 years			15–64 years			65 years and over		
	2013	2022	2023	2013	2022	2023	2013	2022	2023
EU (¹)(²)	15.4	15.0	14.9	66.3	63.9	63.8	18.3	21.1	21.3
Belgium	17.0	16.6	16.5	65.4	63.8	63.8	17.6	19.5	19.7
Bulgaria(¹)	13.6	14.5	14.2	67.3	63.8	62.3	19.2	21.7	23.5
Czechia	14.8	16.1	16.2	68.4	63.3	63.4	16.8	20.6	20.4
Denmark	17.4	16.1	16.0	64.7	63.5	63.6	17.8	20.3	20.5
Germany	13.3	13.9	14.1	66.0	63.9	63.7	20.8	22.1	22.1
Estonia	15.7	16.4	16.4	66.3	63.2	63.4	18.0	20.4	20.2
Ireland	21.9	19.7	19.3	66.2	65.3	65.5	12.2	15.0	15.2
Greece	14.7	13.7	13.4	65.3	63.6	63.7	20.1	22.7	23.0
Spain	15.2	14.0	13.6	67.1	65.9	66.3	17.7	20.1	20.1
France(²)	18.6	17.5	17.3	63.8	61.5	61.5	17.6	21.0	21.2
Croatia	14.9	14.3	14.3	66.9	63.2	63.0	18.1	22.5	22.7
Italy	14.0	12.7	12.4	64.8	63.5	63.5	21.2	23.8	24.0
Cyprus	16.4	16.1	16.1	70.4	67.4	67.3	13.2	16.5	16.6
Latvia	14.4	16.0	16.0	66.8	63.1	63.1	18.8	20.9	21.0
Lithuania	14.7	14.9	14.9	67.1	65.1	65.0	18.2	20.0	20.0
Luxembourg	17.0	15.9	15.9	69.0	69.3	69.3	14.0	14.8	14.9
Hungary (¹)	14.4	14.6	14.5	68.4	64.9	65.0	17.2	20.5	20.5
Malta	14.6	13.4	12.7	68.3	67.4	68.7	17.2	19.2	18.6
Netherlands	17.2	15.4	15.3	66.0	64.5	64.5	16.8	20.0	20.2
Austria	14.4	14.4	14.4	67.5	66.2	66.0	18.1	19.4	19.6
Poland (¹)	15.1	15.4	15.4	70.5	65.4	64.7	14.4	19.1	19.9
Portugal	14.8	12.8	12.9	65.8	63.5	63.1	19.4	23.7	24.0
Romania (²)	15.7	16.2	16.1	68.0	64.3	64.2	16.3	19.5	19.7
Slovenia	14.5	15.1	15.0	68.4	63.8	63.6	17.1	21.1	21.4
Slovakia	15.4	16.1	16.1	71.5	66.6	66.1	13.1	17.4	17.9
Finland	16.4	15.4	15.1	64.8	61.6	61.6	18.8	23.1	23.3
Sweden	16.9	17.6	17.4	64.0	62.1	62.2	19.1	20.3	20.4
Iceland	20.7	18.6	18.2	66.4	66.5	66.8	12.9	15.0	15.0
Liechtenstein	15.5	14.6	14.5	69.6	66.3	65.9	14.9	19.2	19.6
Norway	:	16.9	16.7	:	64.9	64.9	:	18.2	18.4
Switzerland	14.9	15.1	15.1	67.7	65.9	65.8	17.4	19.0	19.2
Montenegro	18.8	17.9	:	68.1	66.1	:	13.1	16.0	:
North Macedonia	17.0	17.0	:	71.0	65.9	:	12.0	17.1	:
Albania	20.1	16.3	16.0	68.3	68.0	67.5	11.6	15.7	16.5
Serbia (¹)	14.4	14.3	14.4	68.0	64.4	63.4	17.6	21.3	22.1
Moldova	16.1	:	18.0	74.0	:	65.9	9.9	:	16.1
Türkiye	24.9	22.4	22.0	67.6	67.9	68.1	7.5	9.7	9.9
Ukraine	14.6	:	:	70.2	:	:	15.2	:	:

(¹) 2023 break in time series.
(²) 2023 provisional/estimated.
Source: Eurostat (online data code: demo_pjanind)

eurostat

While population aging is a concern for the European Union as a whole, the extent of this phenomenon varies significantly among individual European countries. Regarding the share of people aged 65 years and over in the total population, Italy (24.0 %), Portugal (24.0 %), Bulgaria (23.5 %),

[11] Eurostat, "Population Structure and Ageing".
[12] *Ibid*.
[13] *Ibid*.

Finland (23.3 %), Greece (23.0 %) and Croatia (22.7 %) had the highest shares in 2023, while Luxembourg (14.9 %) and Ireland (15.2 %) had the lowest ones[14].

Moreover, in 2023, compared with 2022, the share of people aged 65 years and over increased in 20 Member States, while in Estonia, Czechia and Malta it decreased, and in Spain, Lithuania, Hungary and Germany this share remained unchanged, as illustrated by Figure 3. Another important indicator of population ageing is the median age, which has been rising across the Member States of the European Union, despite varying rates[15]. In 2023, the median age of the EU population reached 44.5 years, suggesting that the population may be divided into two halves: one older than 44.5 years and the other younger. This indicator also highlights disparities among Member States: the median age ranged from 38.4 years in Cyprus to 48.4 years in Italy, reflecting the relatively young or orld population structure recorded in these Member States[16]. Furthermore, the median age is projected to increase by 5.7 years, going from 44.5 years in 2023 to 50.2 years by 2100. Evidently, this projection confirms the ongoing trend of steady and continued population ageing within the EU[17].

1.2. Population ageing and the impact on European welfare state systems

After the brief assessment of the phenomenon of population aging within the European Union conducted through some key demographic indicators in the previous paragraph, this section will address the effects of population ageing on European economic and social security systems.

The effects of population aging are multifaceted, impacting individuals, families, and society[18]. Older individuals live longer and have different healthcare, social, and cultural needs compared to younger people, raising concerns over psychological, medical, and cultural aspects[19]. At

[14] *Ibid*.
[15] *Ibid*.
[16] *Ibid*.
[17] *Ibid*.
[18] Zbigniew Długosz, "Population Ageing in Europe," *Procedia - Social and Behavioral Sciences* 19 (2011): 48, https://doi.org/10.1016/j.sbspro.2011.05.106.
[19] Reynaud and Miccoli, "Population Ageing in Italy", 17.

an aggregate level, ageing affects social, political, and economic spheres of society at large. In the political arena, older adults are gaining more influence in political issues and elections[20]. Economically and socially, population ageing affects economic growth and the sustainability of European welfare state systems. On the one hand, a declining working age population challenges the potential for economic growth by reducing the productivity of the economic system; on the other hand, the increasing share of people aged 65 and above drives increases in the share of beneficiaries of the two largest welfare programs, namely social security and healthcare, thereby threatening the sustainability and resilience of European welfare states in the long term. Although European countries have different characteristics, levels of benefits, and coverage, most of them have established systems of public transfers aimed at protecting their citizens' well-being[21]. In general, welfare state models across the EU revolve around three pillars: social security, healthcare, and education. While education primarily targets the youth, pensions and healthcare, particularly in their long-term care feature, are the two fields most affected by population aging.

Thus, while the rise in average life expectancy at birth is a remarkable achievement, the increasing proportion of people aged 65 and over will likely bring considerable social and economic challenges in the future. The EU is expected to face a growing burden from healthcare and pensions, combined with a projected decrease in the labour force size. This reduction in the working-age population means not only a decline in productivity but also that fewer potential workers will be available to generate the revenues needed for financing public expenditures, including pensions[22]. In practical terms, ageing in the EU implies that, while there are currently 3.5 individuals of working age per retiree, by 2050 this ratio will decline to only 2. Although it is essential to cautiously consider

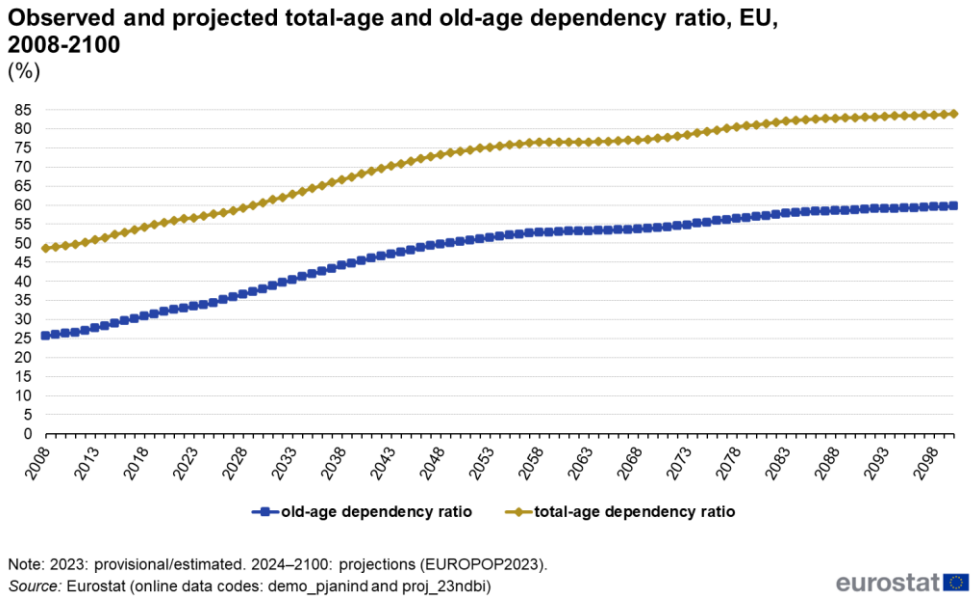
[20] Michael S. Teitelbaum, "Political Demography: Powerful Trends Under-Attended by Demographic Science," *Population Studies* 69, no. sup1 (April 26, 2015): 88-89, https://doi.org/10.1080/00324728.2014.977638.
[21] Elisenda Rentería et al., "Generational Economic Dependency in Aging Europe: Contribution of Education and Population Changes," *The Journal of the Economics of Ageing* 27 (February 1, 2024): 1-2, https://doi.org/10.1016/j.jeoa.2023.100485.
[22] Rafael Muñoz de Bustillo Llorente, "Key Challenges for the European Welfare States," www.econstor.eu, (2019), 14, https://hdl.handle.net/10419/205264.

long-term projections, since they do not account for unforeseen changes in fertility rates or immigration, the evident process of demographic ageing will dramatically impact the welfare state[23].

To assess the extent to which the inactive population, particularly the elderly, burdens the active, working, and productive population, traditional demographic indicators include the old-age dependency ratio and the structural dependency ratio. On the one hand, the old-age dependency ratio is intended as the number of individuals aged 65 and over per 100 people of working age, defined as those aged 15 to 64. On the other hand, the structural dependency ratio can be disaggregated into: (1) the youth dependency ratio, which is the number of children aged 0-14 per 100 persons of working-age, and (2) the old-age dependency ratio. Both indicators are used to measure the pressure of the inactive population, namely youth and elderly, on the productive and active population. Figure 4 shows the structural and old-age dependency ratios in the European Union from 2008 to 2100. The EU's old-age dependency ratio is projected to almost double from 33.4 % in 2023 to 59.7 % by 2100 and the total-age dependency ratio is projected to rise from 56.7 % in 2023 to 83.9 % by 2100[24]. To put these data into a more global perspective, the European Union recorded the highest old-age dependency ratio, at 31% in 2019, compared to a world average of 13.95%. Consequently, Europe has become the oldest continent in the world[25].

[23] *Ibid*.
[24] Eurostat, "Population Structure and Ageing".
[25] Mirela S. Cristea et al., "Workforce Participation, Ageing, and Economic Welfare: New Empirical Evidence on Complex Patterns across the European Union," ed. S.S. Askar, *Complexity* 2022, no. 1 (January 6, 2022): 1, https://doi.org/10.1155/2022/7313452.

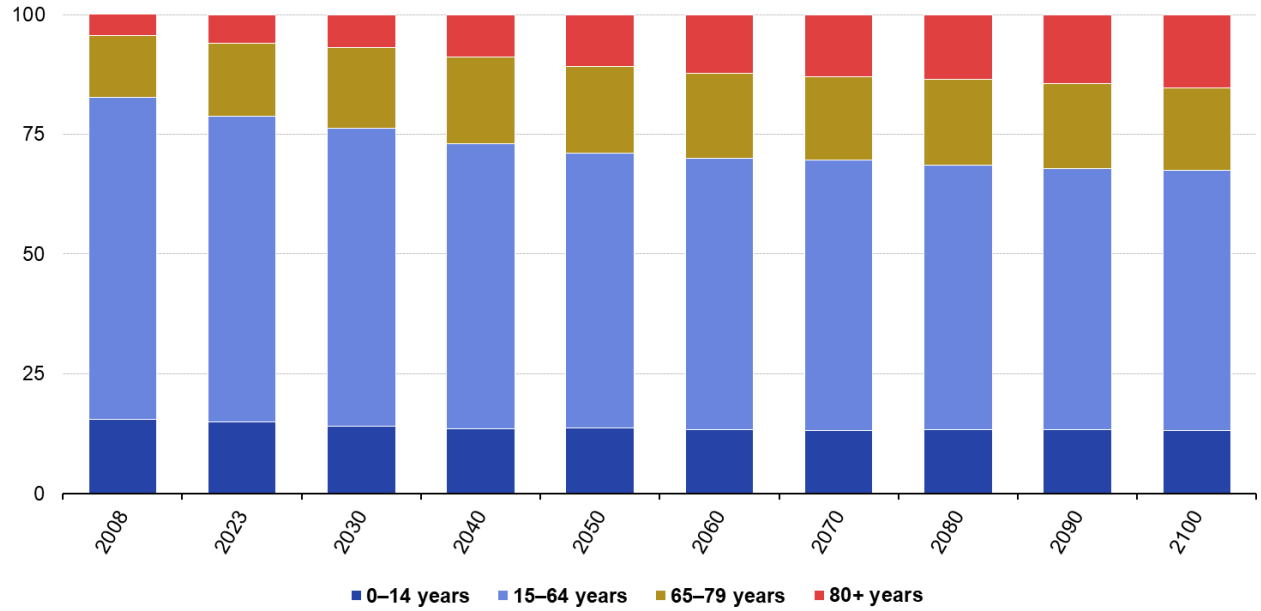
Figure 4. Total-age and old-age dependency ratio, EU, 2008-2100 (%)



Another significant aspect of population ageing is the progressive ageing of the older population itself, as the relative significance of the very old is growing at a faster pace than any other age segment of the EU's population[26]. The share of those aged 80 years or above in the EU's population is projected to increase two and a half times between 2023 and 2100, rising from 6.0% to 15.3%[27]. Figure 5 displays the EU population structure by major age groups from 2008 to 2100. The increase in the share of individuals aged 75 and older is illustrated by the expanding red and brown areas at the top of Figure 5. This trend is particularly significant concerning public expenditure allocated to the elderly and very elderly, specifically for long-term care and pensions. Indeed, as the proportion of older and very old individuals increases at a faster rate than that of other age groups in the EU, it places a growing strain on infrastructure and existing pension and long-term care schemes, which are primarily designed to address the needs of older, rather than very old, people[28].

[26] Eurostat, "Population Structure and Ageing".
[27] *Ibid*.
[28] Mirela Cristea et al., "The Impact of Population Aging and Public Health Support on EU Labor Markets," *International Journal of Environmental Research and Public Health* 17, no. 4 (February 1, 2020): 1439, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7068414/.

Figure 5. Population structure by major age groups, EU, 2008-2100
(% of total population)



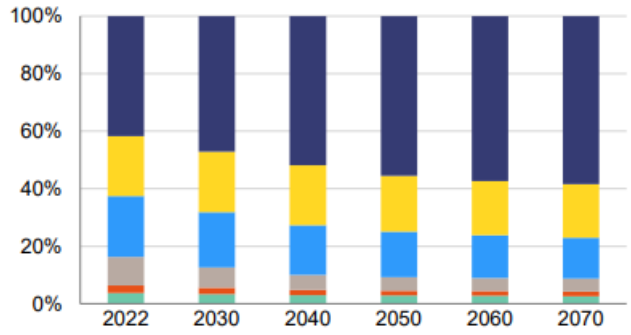
Note: 2023: provisional/estimated. 2030–2100: projections (EUROPOP2023).
Source: Eurostat (online data codes: demo_pjanind and proj_23np)

It is now necessary to analyse the effect that a rapidly growing share of older people will have on public expenditure across EU Member States in the coming years. To understand the significant impact of population ageing on the welfare state, it is useful to analyse pension expenditure and its past, present, and future trends across the European Union. Since 2000, several Member States have experienced significant increases in the pension expenditure to GDP ratio[29]. For example, Spain witnessed an increase of 4.2 percentage points (pps), Greece 4 pps, Italy 2.6 pps, Estonia 1.7 pps, and Sweden 1.2 pps[30]. Between 2007 and 2022, Finland, Belgium, and France also experienced rises in pension spending, 3.1 pps, 2.9 pps, and 1.6 pps, respectively, especially considering the shorter period in which these increases occurred. Cyprus also saw an increase of 1.4 pps between 2010 and 2022. For many of these countries, pension expenditure is projected to continue increasing. Meanwhile,

[29] European Commission, "2024 Ageing Report. Economic and Budgetary Projections for the EU Member States (2022-2070) - European Commission," economy-finance.ec.europa.eu, April 2024, https://economy-finance.ec.europa.eu/publications/2024-ageing-report-economic-and-budgetary-projections-eu-member-states-2022-2070_en.
[30] *Ibid*.

pension expenditure in several other Member States has remained more stable in recent years or even decreased relative to GDP[31].

Regarding future trends, the European Commission expects pension expenditure for individuals above age 75 to rise in all EU countries by 2070, while pension spending for younger age groups is going to decline[32]. This shift reflects stricter access to retirement for lower age groups and rising life expectancy, which, combined with the inflow of the baby boomer cohorts, expands the 75+ age group[33]. Moreover, pension expenditure for the age groups below 75 in the EU is projected to decrease, thereby compensating for the higher spending on the 75+ age cohort. The latter would represent almost 60% of total pension spending in 2070, compared to around 40% in 2022. This trend indicates both population ageing and the faster ageing of the very old, who will increasingly burden on public expenditure[34]. Furthermore, it indicates a reconfiguration of public expenditure across age groups, which could have important implications from a political and social point of view too. Figure 6 illustrates this trend by showing a significant increase in the share of public pension expenditure for those over 75, represented by the expanding blue area.



	2022	2030	2040	2050	2060	2070
75+	4.7	5.6	6.3	6.7	6.8	6.9
70-74	2.4	2.5	2.5	2.3	2.2	2.2
65-69	2.4	2.3	2.1	1.9	1.7	1.7
60-64	1.1	0.8	0.6	0.6	0.5	0.5
55-59	0.3	0.3	0.2	0.2	0.2	0.2
-54	0.4	0.4	0.4	0.3	0.3	0.3

The bottom table shows spending as % of GDP.
Source: European Commission, EPC.

Figure 6. Share of public pension expenditure per age group: EU (% of total expenditure)

[31] *Ibid*. 29-30.
[32] *Ibid*.
[33] *Ibid*. 33
[34] *Ibid.*

1.2.1 Population ageing and the impact on European welfare state systems: a comparative analysis

While all EU countries will experience an increase in public pension expenditure for those aged 75 and over, there are considerable differences among Member States. Between 2022 and 2070, the largest increases are expected in Cyprus, Slovenia, Spain, Luxembourg, Slovakia, and Belgium[35]. Thus, the rapidly growing proportion of older and very old individuals in the EU will significantly impact public expenditure, especially in the areas of long-term healthcare and pensions. This demographic shift will burden on the existing infrastructure and challenge current pension and care models. Additionally, the projected decrease in the working-age population will result in fewer workers available to support the growing number of retirees, potentially threatening the long-term sustainability and resilience of European welfare state systems.

While population ageing is visibly impacting the whole European Union, its degree varies across Member States. The Active Ageing Index (AAI) facilitates the detection of differences among European Member States concerning population ageing. Specifically, it measures the extent to which older individuals live independent lives, participate in paid employment and social activities, and their capacity to age actively[36]. The AAI was developed to identify and assess the untapped potential for the well-being of older people. It is an index comprising 22 indicators, evaluating four dimensions of older people's integration: (i) employment, tracking the employment rate of individuals aged 55 to 75 years; (ii) participation in society, including voluntary activities, caregiving for younger relatives or others in need, and political activities; (iii) independent, healthy, and secure living, which includes physical activity, security, access to health services, income levels, poverty risk, and lifelong learning motivation and participation; and (iv) capacity to age actively, measured by life expectancy, healthy

[35] *Ibid*. 34
[36] A. Zaidi, "Active Ageing Index: A Legacy of the European Year 2012 for Active Ageing and Solidarity between Generations." *European Centre for Social Welfare Policy and Research*, 2015.

life expectancy, digital society adaptation, and education[37]. European countries can be divided into four groups based on the Active Ageing Index (AAI)[38]:

- Cluster 1 includes ten Central and Mediterranean EU Member States with AAI scores below the EU average: Greece, Croatia, Romania, Hungary, Slovenia, Poland, Bulgaria, Slovakia, Italy, and Spain.
- Cluster 2 consists of six Continental and Mediterranean EU Member States with medium AAI values up to the EU average: Luxembourg, Malta, Cyprus, Austria, Belgium, and France.
- Cluster 3 comprises seven EU Member States with upper medium AAI values above the EU average: Lithuania, Portugal, Latvia, the Czech Republic, Estonia, Ireland, and Germany.
- Cluster 4 includes five countries, namely the Nordic countries (Finland, the Netherlands, Denmark, and Sweden) and the United Kingdom, which have the highest AAI values above the EU average.

This classification reveals differences among EU countries regarding the implications of demographic ageing on economic and social well-being. Indeed, the dimensions of ageing and several variables measured by the AAI index impact labour productivity and poverty levels[39]. Conceptually, the macroeconomic impact of ageing on economic and social welfare can be evaluated in two ways: through a higher dependency ratio (i.e., a higher proportion of retirees to workers) and workforce ageing (employees aged 55–64 years). Studies have shown that in countries with the lowest AAI scores, an ageing workforce leads to decreased labour productivity, negatively impacting the economic outlook. In contrast, countries with higher AAI scores experience favourable effects.

[37] UNECE / European Commission (2019) "2018 Active Ageing Index: Analytical Report", Report prepared by Giovanni Lamura and Andrea Principi under contract with the United Nations Economic Commission for Europe (Geneva), co-funded by the European Commission's Directorate General for Employment, Social Affairs and Inclusion (Brussels). Available at: https://www.un-ilibrary.org/content/books/9789210048040
[38] *Ibid*.
[39] Mirela Cristea et al., "Population Ageing, Labour Productivity and Economic Welfare in the European Union," *Economic Research-Ekonomska Istraživanja* 33, no. 1 (January 1, 2020): 1355, https://doi.org/10.1080/1331677x.2020.1748507.

Therefore, the degree to which population ageing impacts the economic and social welfare of EU Member States significantly differs, depending on how the ageing population contributes and is enabled to contribute to society[40]. Moreover, an ageing workforce has reduced poverty in countries from the 1st and 2nd clusters, while the old dependency ratio has an unfavourable impact on countries from the 1st, 2nd, and 3rd clusters. These results underline the need to redesign policies and strategies that will ultimately support the labour market integration and active participation of people from the 55-64 years' cohort[41].

In conclusion, these data demonstrate that the impact of population ageing on the socio-economic welfare of EU countries significantly differs depending on several variables, including those measured by the AAI index.

1.3. Population strategies to mitigate ageing: fertility and migration

Given the significant impact of population ageing on demographic, social, and economic imbalances in resource allocation, there is an ongoing debate about the effectiveness of population strategies, particularly those targeting fertility and immigration, in mitigating ageing within the European Union. Proponents argue that increases in fertility rates and international migration could counterbalance population ageing by enlarging the workforce base and rejuvenating the population. Nonetheless, neither higher fertility rates nor increased migration can fully stop the process of population ageing. Consequently, this section aims at demonstrating that addressing population ageing requires a comprehensive and multidimensional approach, incorporating factors such as labour force participation and educational attainment in addition to traditional population strategies.

It is essential to critically examine arguments that focus exclusively on population strategies to address demographic issues, as these arguments often perpetuate misconceptions that revolve around the concept of demographic anxiety. The term "demographic anxiety", coined by Elizabeth

[40] Mirela, Cristea et al., "Worforce Participation", 2.
[41] Mirela Cristea et al., "Population Ageing, Labour Productivity", 1358.

Krause following her ethnographic study of low fertility rates in 1990s Italy[42], refers to the societal concerns surrounding declining fertility rates and the perceived threat of population replacement by migrants. Krause, along with later scholars such as Marchesi[43], highlighted how this "demographic crisis" has fuelled public alarmism about the future of the Italian nation, including fears of Italians being replaced by migrants[44]. This anxiety refers not only the decline in fertility rates but also the reproductive behaviours of specific social groups, such as religious or ethnic minorities and low-income populations. Other researchers have explored how these anxieties are mobilized as mechanisms of reproductive governance in both the global North and South[45]. The debate is further intensified by the theory of replacement migration, introduced by a 2001 United Nations report[46]. This concept has entered both public and scientific discussions on migration. Replacement migration is inspired by the idea of replacement-level fertility, meaning the technical demography term referring to the fertility rate needed to ensure that two children survive to reproductive age per woman, thereby maintaining a stationary population size in the absence of migration and future mortality changes. In this context, replacement migration refers to the international migration required to counteract population decline and ageing resulting from fertility rates below the replacement level[47].

Therefore, the combined concepts of demographic anxiety and replacement migration may lead to the misconception that targeted interventions in these areas alone can effectively counteract population ageing and its associated challenges. However, neither increased fertility rates nor

[42] Elizabeth L. Krause, "'Empty Cradles' and the Quiet Revolution: Demographic Discourse and Cultural Struggles of Gender, Race, and Class in Italy," *Cultural Anthropology* 16, no. 4 (November 2001): 576–611, https://doi.org/10.1525/can.2001.16.4.576.
[43] Elizabeth Krause and Milena Marchesi, "Fertility Politics as Social Viagra: Reproducing Boundaries, Social Cohesion, and Modernity in Italy," *American Anthropologist* 109, no. 2 (June 2007): 350–62, https://doi.org/10.1525/aa.2007.109.2.350.
[44] Krause, "'Empty Cradles", 576–611.
[45] Claudia Fonseca, Diana Marre, and Fernanda Rifiotis, "Governança Reprodutiva: Um Assunto de Suma Relevância Política," *Horizontes Antropológicos* 27, no. 61 (December 2021): 14-15, https://doi.org/10.1590/s0104-71832021000300001.
[46] UN. Population Division, "Replacement Migration: Is It a Solution to Declining and Ageing Populations?," United Nations Digital Library System (UN, March 21, 2000), https://digitallibrary.un.org/record/412547?v=pdf.
[47] Guillaume Marois, Alain Bélanger, and Wolfgang Lutz, "Population Aging, Migration, and Productivity in Europe," *Proceedings of the National Academy of Sciences* 117, no. 14 (March 23, 2020): 7690, https://doi.org/10.1073/pnas.1918988117.

international migration can fundamentally alter the trajectory of population ageing within the European Union, reflecting a trend that is happening not only in the EU, but in almost every country worldwide[48].

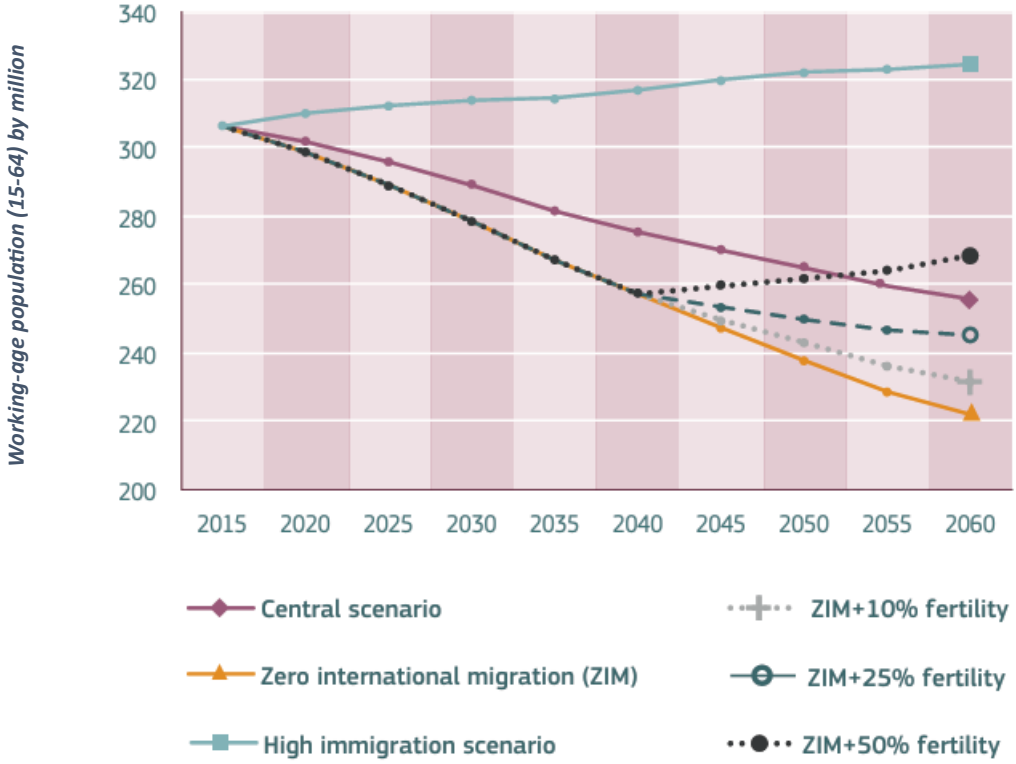
Increasing the number of births through successful government initiatives is not an immediate remedy for population ageing in the European Union. Even if fertility rates were to reach the replacement level of approximately 2 children per woman, this would not completely prevent the EU's working-age population from declining. While the pace of ageing would slow, and the total population size would stabilize, higher fertility rates would still lead to increased total dependency ratios[49]. In the short term, higher fertility would increase the share of dependent children in the population, leading to greater dependency on the labour force and potentially causing a temporary decline in labour-force participation as parents leave work to care for children[50]. Policies aimed at increasing fertility, such as those promoting work-life balance, if effective, would offer benefits only in the long-term, taking effect in 20-25 years.

The impact of different fertility and migration trajectories on the EU's working-age population until 2060 can be evaluated through six scenarios (Figure 7). These scenarios include a central scenario, a zero international migration (ZIM) scenario, a high immigration scenario, and three fertility scenarios: ZIM +10%, ZIM +25%, and ZIM +50%, which distinguish the effects of fertility and migration by adding different trajectories of fertility increase to the zero international migration scenario.

Figure 7. Working-age population of EU-28 in 2015-2060, by scenario

Source: CEPAM

[48] Gemma Amran et al., "Demographic Scenarios", 23.
[49] *Ibid*.
[50] *Ibid*. 20-21



The central scenario, shown by Figure 7, projects the working-age population in the EU if current trends were to continue. By 2060, for every 100 people of working age, there would be 114 people of non-working age (total age-dependency ratio), with around 32% of the population aged 65 and older. In the ZIM scenario, with zero international migration, the working-age population is expected to decrease by almost 27%, from approximately 300 million in 2020 to 222 million by 2060[51]. In the long term, the difference between the central and ZIM scenarios is minor because migrants also age. With zero international migration, the total age-dependency ratio would be 118 non-working-age people for every 100 working-age people, which is 4 percentage points higher than in the central scenario (see Figure 8).

Regarding the size of the working-age population, the three fertility scenarios show that the population size would decline at the same pace until 2040, when babies currently being born reach

[51] *Ibid*. 21

working age. Only the ZIM +50% scenario would result in a larger working-age population than the central scenario, and then only after 2050. However, such a high fertility rate has not been observed in most EU countries since the 1970s[52]. Therefore, even with higher fertility rates, the working-age population would maintain its decline.

Figure 8. Share of population aged 65 and above and total age-dependency ratio in 2015, 2040, 2060. EU-28, by scenario

Source: CEPAM

Year	Central scenario	ZIM	ZIM +10% fertility	ZIM +25% fertility	ZIM +50% fertility	High immigration scenario
% POPULATION 65+						
2015	19	19	19	19	19	19
2040	28	30	29	28	27	26
2060	32	34	33	30	27	29
TOTAL AGE-DEPENDENCY RATIO						
2015	76	76	76	76	76	76
2040	99	103	106	112	121	93
2060	114	118	122	125	130	104

On the other hand, the high immigration scenario, which is consistent with the doubling 2013-2016 migration flows to 20 million coming into the EU every 5 years would increase the number of births due to more people of reproductive age, from 27 million in 2015-2020 to almost 30 million in 2055-2060[53]. With high immigration, the total age-dependency ratio would reach 104 people by 2060 compared to 114 in the central scenario, as shown in Figure 8. However, the high immigration scenario would only moderately reduce the rate of ageing. The proportion of the 65+ population will increase, from 19% in 2015 to 29% in 2060. This is only 2 percentage points lower than the proportion

[52] *Ibid*. 22
[53] *Ibid*. 23

obtained under the central scenario assumptions (see Figure 8). Thus, increased immigration from third countries would have an immediate effect on the EU working-age population. However, even with doubled immigration levels, the long-term impact on reducing the proportion of non-working-age people relative to those of working age would be of little concern. This is because immigrants also age, retire, and require social benefits such as pensions, just like non-immigrants[54].

In summary, neither increased immigration nor higher fertility rates will stop population ageing in the European Union. This conclusion leads to the next section, which will address labour market participation rates. Increasing labour market participation rates is an effective strategy to alleviate the negative consequences of population ageing. This, in turn, can improve productivity and economic potential for future growth across European countries.

[54] *Ibid*.

Second Chapter: The Impact of Education and Skills on Workforce dynamics and Dependency Ratios in the EU

After the presentation of a synthesized overview of the ageing phenomenon and its potential negative repercussions on the economic outlook, social security systems, and cultural cohesion across the European Union, population ageing and its consequences on the EU labour force will be now tackled. As previously discussed, the labour force plays a crucial role in the context of population ageing, which is leading to a decline in the proportion of the workforce relative to the inactive population. This demographic shift presents significant challenges for the sustainability and resilience of social security systems, thereby imposing a fiscal burden on European societies. While increasing fertility nor migration does not appear to be effective long-term solutions to counteract population aging, it is argued that the most viable remedy to the negative consequences of this demographic shift lies in enhancing labour force productivity and raising labour force participation rates across all demographics. Therefore, educational attainment and the associated differences in productivity of the labour force constitute an important demographic dimension and should be considered when analysing the economic consequences of population ageing on the labour force.

This section is structured as follows: first, an analysis of the EU labour force by educational composition will be presented, highlighting ongoing trends in productivity and human capital endowment across EU Member States. Then, the impacts of educational attainment on dependency ratios will be studied, employing complementary and more precise indicators other than the dependency ratio (ADR), such as the productivity-weighted labour force dependency ratio (PWLFDR) and labour-force dependency ratio (LFDR). It will be argued that educational expansion, especially at higher levels, fosters longer and more productive lives, thereby positively impacting dependency ratios. The last paragraph will tackle the critical role of skills, mainly digital, as a bridge between education and labour markets in the EU. This last section will complete the discourse on

educational attainment, productivity and dependency since the interrelation between education and skills will likely determine the ability of the future EU workforce to sustain its economy, particularly in the context of an ageing population.

2.1 A Smaller, Better-Educated EU Workforce

The future labour force in the European Union will be more educated and, consequently, more productive than it is now[55]. This rise in productivity is not limited to younger cohorts, who will significantly shape the future EU labour force, but also extends to older workers, who are likely to remain active in the labour market for longer periods if they are better educated. It is posited that a smaller, highly skilled labour force, combined with a productive aging workforce, will partially mitigate the adverse effects of population aging by positively influencing dependency ratios.

First, it is essential to establish the relationship between educational attainment and productivity, and consequently, their impact on dependency ratios in the European Union. In this regard, it is established that, at least in developed countries, higher levels of educational attainment correlate strongly with increased productivity and higher wages[56]. Indeed, in theory, when the labour market is competitive, workers receive a salary equal to their marginal labour productivity[57]. Therefore, in this study, educational attainment will be used as a proxy for labour productivity, consequently, higher levels of educational attainment will correspond to higher levels of productivity and wages, while lower levels of education will translate into lower labour productivity and salaries[58].

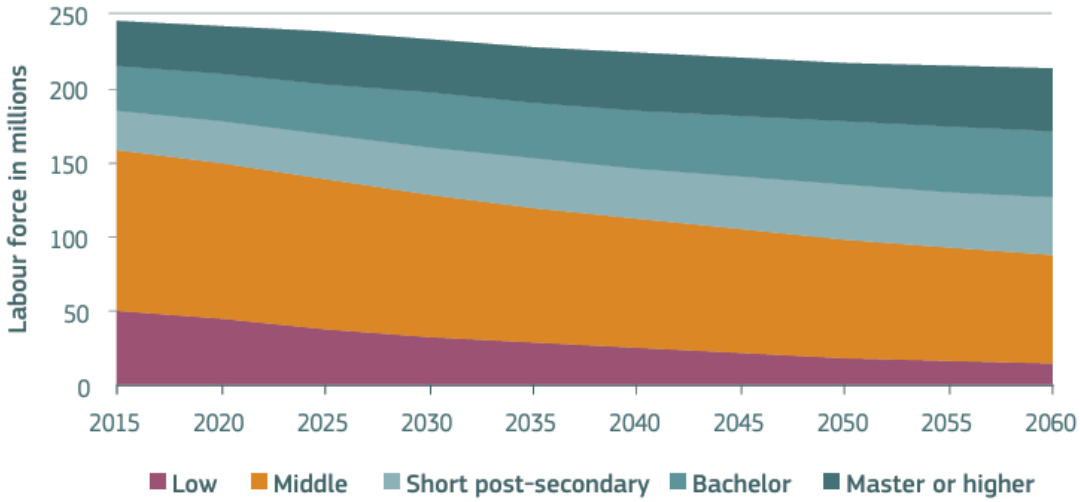
The EU labour force is currently undergoing significant transformation due to social development and the aging process. In this context, a decline in labour force size, due to population

[55] Gemma Amran et al., "Demographic Scenarios for the EU: Migration, Population and Education," *Publications Office of the European Union*, (June 3, 2019): 25-26, https://doi.org/10.2760/590301.
[56] Guillaume Marois, Alain Bélanger, and Wolfgang Lutz, "Population Aging, Migration, and Productivity in Europe," *Proceedings of the National Academy of Sciences* 117, no. 14 (March 23, 2020): 7692-7693, https://doi.org/10.1073/pnas.1918988117.
[57] Pedro Carneiro, James J Heckman, and Edward J Vytlacil, "Estimating Marginal Returns to Education," *American Economic Review* 101, no. 6 (October 1, 2011): 2756-2757, https://doi.org/10.1257/aer.101.6.2754.
[58] Marois, Bélanger, and Lutz, "Population Aging," 7692.

ageing, might not necessarily pose an economic problem if future jobs are fewer in number but intensive in high-skill requirements. Positively, current trends suggest that the future EU labour force will be indeed smaller and increasingly highly skilled. Under a constant participation scenario, as exemplified by Figure 9, the total EU labour force is projected to decrease from 245.8 million to 214.1 million over the next four decades (2015-2060). Interestingly, this decline is primarily expected among those with low education, who will decrease from 50.7 million to 14.0 million, and those with middle levels of education, going from 108.2 million to 74.2 million[59].

Figure 9. EU labour force by education level, the constant participation scenario, 2015-2060

Source: CEPAM



Meanwhile, the number of workers with short post-secondary education, such as technical training, a bachelor's, a master's degree or higher, is currently rising. This is true not just in relation to their proportion to the overall labour force, but also in absolute terms. Significantly, the post secondary groups are expected to increase by almost a half (+45%) over the next decades[60]. This indicates a shift where workers with lower or middle educational levels are decreasing, while those with higher

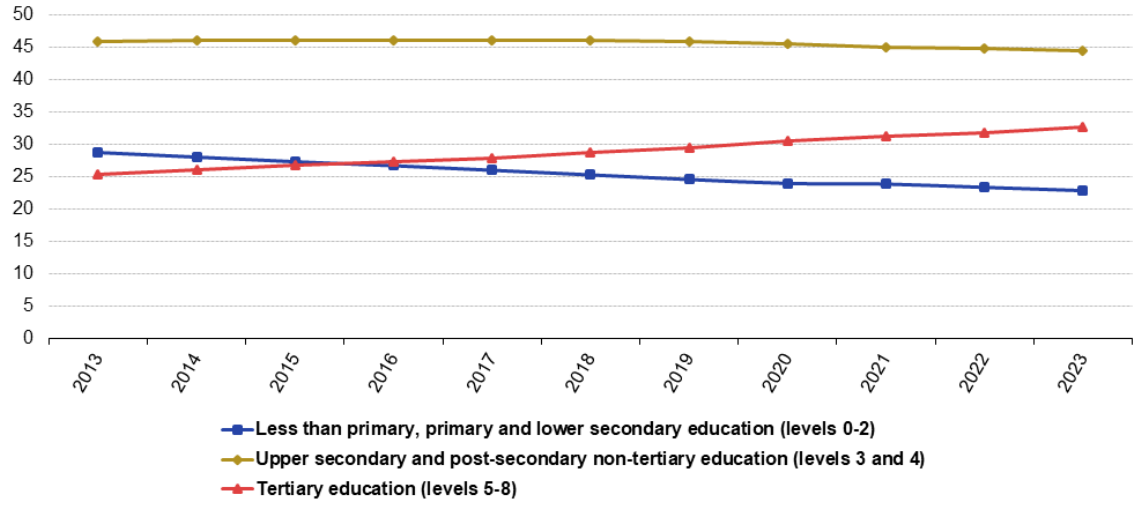
[59] Amran et al., "Demographic Scenarios for the EU", 26.
[60] *Ibid*.

educational backgrounds are on the rise. In other words, regardless of changes in the population's age structure or overall labour force size, the human capital of future workers—measured by their highest level of educational attainment—is expected to be higher than today[61]. This is because in all EU Member States, young people are already better educated than their elders and will gradually replace them through a process that is called "demographic metabolism", which posits that societies change as the composition of their members shifts with respect to certain relevant and measurable characteristics[62]. By looking at educational attainment levels between age groups across the EU it is possible to grasp this trend where younger cohorts are usually better educated than their older counterparts. Indeed, in 2023, 82.1 % of people aged 25-54 years in the EU had attained at least an upper secondary level of education, compared with 69.4 % of those aged 55-74 years. Correspondingly, among younger people (25-54 years) it was less common to have a low educational attainment (17.9 %), compared with 30.6 % for the older age group (55-74 years)[63].

[61] *Ibid*.
[62] Wolfgang Lutz, "Demographic Metabolism: A Predictive Theory of Socioeconomic Change," *Population and Development Review* 38 (February 2013): 283, https://doi.org/10.1111/j.1728-4457.2013.00564.x.
[63] EUROSTAT, "Educational Attainment Statistics - Statistics Explained," Europa.eu, 2021, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Educational_attainment_statistics.

Figure 10. Population aged 25-74 by educational attainment level, EU, 2013-2023

(%of the population aged 25-74)



Note: Break in the series in 2014 and 2021.
Source: Eurostat (online data code: edat_lfs_9903)

eurostat

The development of the proportions of different educational levels in the EU in the last decade, as illustrated by Figure 10, shows that the share of people aged 25-74 with tertiary education increased from 25.3% in 2013 to 32.6% in 2023. Simultaneously, the proportion of the population with a low level of education decreased from 28.7% in 2013 to 22.9% in 2023, while the share of individuals with medium education remained relatively stable over the years, at around 45%. This figure thus underscores the trend toward higher educational attainment and a decline in lower levels of education across the EU[64].

Therefore, it is argued that the potential decline in the number of workers due to population aging and declining fertility rates across the EU might not necessarily lead to economic problems if the labour market adapts to emerging trends by offering jobs that, although fewer in number, are more productive due to high skill requirements. In fact, for the EU, a continued medium-term increase in

[64] *Ibid*.

the demand for higher skills is expected, so the projected increase in the education level of the European labour force should coincide with the labour market demand for skills[65]. Indeed, the alignment between education and labour market demanded skills is crucial to avoid lags in labour productivity generated by skill mismatch and over-qualification[66]. Moreover so, considering that the digitisation, defined by Eurofound[67] as the process of integration of digital technologies and digitised data across the economy and society, has resulted in a steady trend of labour market polarisation[68], with the demand for jobs concentrating at the higher and lower extremities of the job market[69]. Thus, the trend of polarisation seems to contradict the much-needed alignment between high educational attainment levels and high skilled demanding jobs. Nevertheless, a more recent analysis by the European Centre for the Development of Vocational Training (CEDEFOP) in 2023, has forecast that job polarisation will pave the way to jobs upgrading, which, summed with the trend of upward educational expansion, will result in labour supply adjustments to the demand[70]. In sum, the highly skilled labour force will keep on growing in the next decade, the medium-skilled one will stay stable, and the low-skilled labour force will decline[71]. These trends will be matched by an increasing highly educated workforce and a declining middle and low educated workforce.

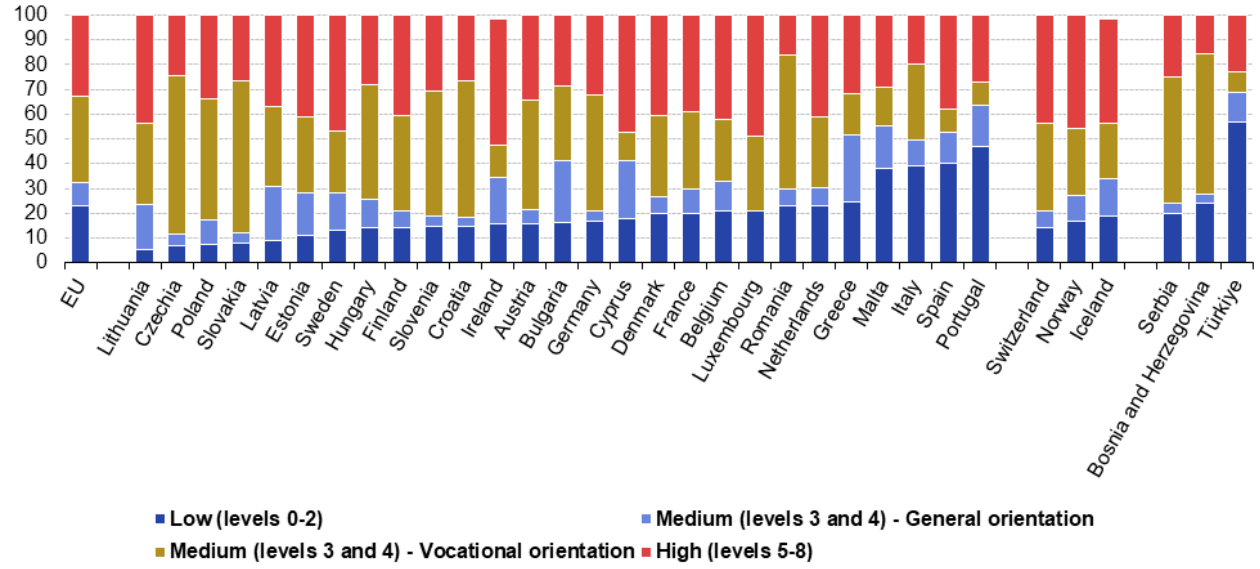
2.1.1 Educational Attainment across EU Member States: A Comparative Analysis

Significant disparities emerge when comparing Member States in terms of educational composition of their workforce. These disparities suggest differing future trajectories concerning labour force composition, productivity, and human capital endowment across EU Member States. Consequently, the ability of Member States to adapt to the impacts of population ageing on the labour-

[65] Wolfgang Lutz et al., *Demographic and Human Capital Scenarios for the 21st Century: 2018 Assessment for 201 Countries*, *Publications Office of the European Union EBooks*, (2018): 50-51, https://doi.org/10.2760/835878.
[66] See paragraph 2.3.
[67] Eurofound, "Definitions | European Foundation for the Improvement of Living and Working Conditions," Europa.eu, 2019, https://www.eurofound.europa.eu/en/definitions.
[68] European Centre for the Development of Vocational Training (CEDEFOP), *Annual Report 2016*, Luxembourg: Publications Office, (June 2017), http://dx.doi.org/10.2801/474919.
[69] *Ibid*.
[70] Cedefop. *Skills in transition: the way to 2035.* Luxembourg: Publications Office, (2023), 15-16. http://data.europa.eu/doi/10.2801/438491
[71] *Ibid*.

force, namely the reduction of the workforce, may significantly vary as different levels of educational attainment are associated with different levels of labour productivity.

Figure 11. Distribution of the population aged 25-74 by educational attainment level, 2023 (%of the population aged 25-74)



Source: Eurostat (online data code: edat_lfs_9903)

eurostat

Figure 11 shows the distribution of the population aged 25-74 by educational attainment level in 2023 across the EU. In 2023, 22.9 % of people of 25-74 years in the EU had a low educational attainment level. The corresponding share was 44.5 % for medium educational attainment level (divided into 9.7 % general and 34.8 % vocational) and 32.6 % for high education, i.e., tertiary education[72]. Concerning differences between Member States, the graph shows that Lithuania, Czechia, Poland, Slovakia and Latvia had the lowest shares of people with a low level of education (all less than 10 %), while Malta, Italy, Spain and Portugal had the highest (all above 35 %). Ireland, Luxembourg, Cyprus and Sweden reported the highest shares of people with tertiary education (over 45 %), while Romania, Italy and Czechia reported the lowest shares (all below 25 %). For the medium level of education, the proportions were the lowest in Spain and Portugal (below 30 %) while they

[72] EUROSTAT, "Educational Attainment Statistics - Statistics Explained," Europa.eu, 2021, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Educational_attainment_statistics.

were the highest in Slovakia and Czechia (above 65 %). For this educational level, a distinction into general and vocational qualifications is necessary, the latter being considered as more relevant for the labour market as more job oriented. Looking at the orientation of the medium level qualifications, the share of people that had a qualification with vocational orientation was higher than the one with a general orientation in almost all countries. Obviously, the extent to which such qualifications prevail in a country reflects both national education systems and labour markets[73]. This grouping highlights regional disparities in educational attainment across the EU, with Northern and Western Europe excelling in tertiary education, Southern Europe showing higher levels of low educational attainment, and Central and Eastern Europe having a strong emphasis on vocational education at the medium level.

2.2 The influence of Educational Attainment on Dependency Ratios

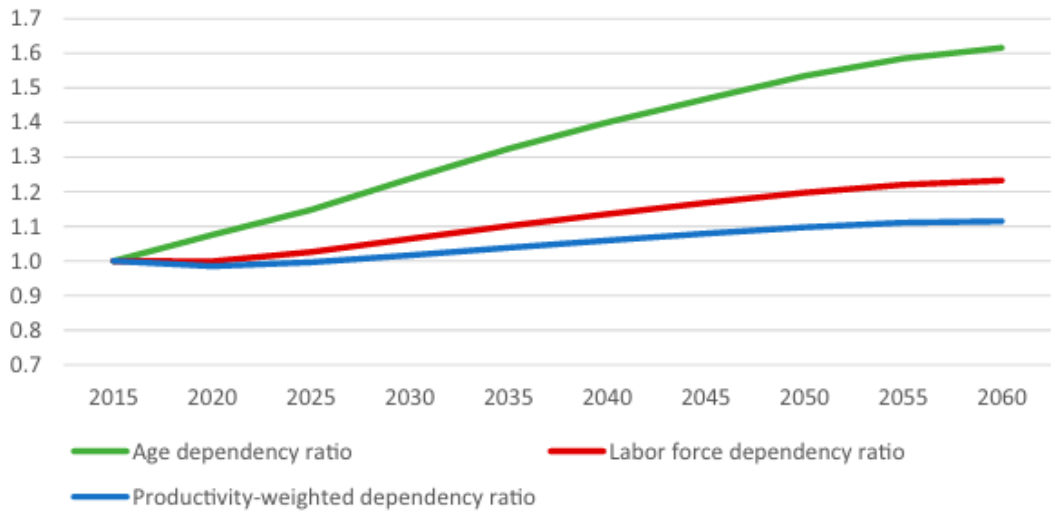
Higher levels of education among younger cohorts appear to align with the labour market's demand for fewer jobs with higher skill requirements in the EU. Although educational attainment varies across EU Member States, it can be argued that when educational attainment is used as a proxy for productivity, scenarios for dependency ratios in the EU are less concerning than they might seem when considering age structure alone. To demonstrate this, an innovative indicator will be used, namely the productivity-weighted labour-force dependency ratio (PWLFDR), which approximates differences in productivity through wage differentials associated with various levels of educational attainment[74]. Indeed, although the relationship between wages and labour productivity is a source of controversy in some contexts, it has been shown valid in most of the economically developed countries. Consequently, when labour markets are competitive, workers receive salaries equal to their marginal labour productivity[75].

[73] *Ibid*.
[74] Marois, Bélanger, and Lutz, "Population Aging," 7692.
[75] *Ibid*.

The PWLFDR recognizes that not all members of the labour force contribute equally to the economy. It therefore considers the "how"—specifically, how productive a particular segment of the workforce is, based on their level of educational attainment[76]. The PWLFDR measures the ratio of inactive population, at all ages, to active population, at all ages, weighted by productivity for education level. In practice, a PWLDFR higher than 1 reveals that, considering the productivity of workers, the burden of dependent people is heavier relative to the avarage burden in the EU in 2015[77]. There are a number of limitations to the interpretation of the PWLFDR. Since the weights are constant over time, there is an implicit assumption that trends in jobs by skill requirements will follow trends in education. This assumes that there will be no major shifts in over- or under-qualification amonf workers[78]. The PWLFDR also only takes into account productivity gains due to changes in education. Productivity gains due to advances in technology or institutional organisation are not taken into consideration and are assumed to be constant. However, this appears to be consistent with the general view that demographic models capture changes in human capital as the supply side of labour. They do not attempt at modelling the demand for labour and the labour market itself, which is the domain of economic modelling[79].

[76] *Ibid*.
[77] Selected data consider the period range from 2015 to 2060 for the European Union.
[78] Cedefop. *Future skill needs in Europe: critical labour force trends*. Luxembourg: Publications Office. Cedefop research paper; No 59. (2016) http://dx.doi.org/ 10.2801/56396
[79] Marois, Bélanger, Lutz, “Population Aging”, 7692-93.

Figure 12. Projections of the three different dependency ratios for the EU, baseline scenario, 2015-2060. Source: Marois, Bélanger, Lutz, "Population Aging" 7692.



Over the coming decades, the conventional age dependency ratio (ADR) shows the most dramatic increase of 62% by 2060. However, examining the productivity gains resulting from the improving educational composition of the population, the projected dependency burden is reduced. Thus, despite the widespread fear of huge increases in dependency due to population ageing, as generally conveyed by studies based solely on the future evolution of the age structure, the results for the productivity-weighted dependency ratio, even in the scenario of a continuation of the present status quo, show a modest increase of only 10% by 2060[80].

Figure 12 shows the projections of three dependency ratios from 2015 to 2060 for the EU under the same scenario that assumes middle road fertility, mortality, migration, education, and labour-force participation till 2060. The discrepancy between the projected dependency burden based on the age dependency ratio and that calculated on the basis of productivity is evident. The graph also considers dependency projections based on the labour force dependency ratio, which will be discussed in brief. Overall, the productivity-weighted labour force measure offers a nuanced perspective on the

[80] *Ibid*. 7693.

productive capacity of national workforces across the EU, enriching the analysis by considering aspects such as economic growth, human capital investment, and the socioeconomic implications of population aging and educational expansion[81].

2.2.1 Productivity Variations Across the EU: A Member States Comparison

While it is true that dependency burdens weighted by productivity are less worrying for the EU than those based solely on age structure considerations, differences in education and productivity highlight potential disparities in the ability of EU economies and social systems to adapt to the challenges of population ageing. Having compared EU Member States based on educational attainment as a proxy for productivity, it is also important to analyse specific data on labour productivity trends to gain a more complete understanding. Labour productivity will be compared across EU Member States by focusing on labour productivity per hour worked, which considers the differences across countries in working time, due to national differences in the regulation of part-time work and working time[82]. This indicator is calculated by dividing the Gross Domestic Product (GDP) by hours worked, where the measure for labour input is the total number of hours worked, considering changes in part-time work, the effect of variations in overtime, the effect of absence from work, or the effect of shifts in normal hours. The indicator is thus normalized at current prices and current Purchase Parity Power (PPPs) index.

Productivity has grown steadily in the EU over the past two decades[83]. The average annual growth of GDP per hour worked between the year 2000 and 2022 was 1.2% for the whole EU[84]. Figure 13

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[81] Guillaume Marois et al., "Measuring Human Capital with Productivity-Weighted Labor Force: Methodology and Projections for China, India, the United States, and the European Union," (2024): 21, https://pure.iiasa.ac.at/id/eprint/19551/1/WP-24-005.pdf.

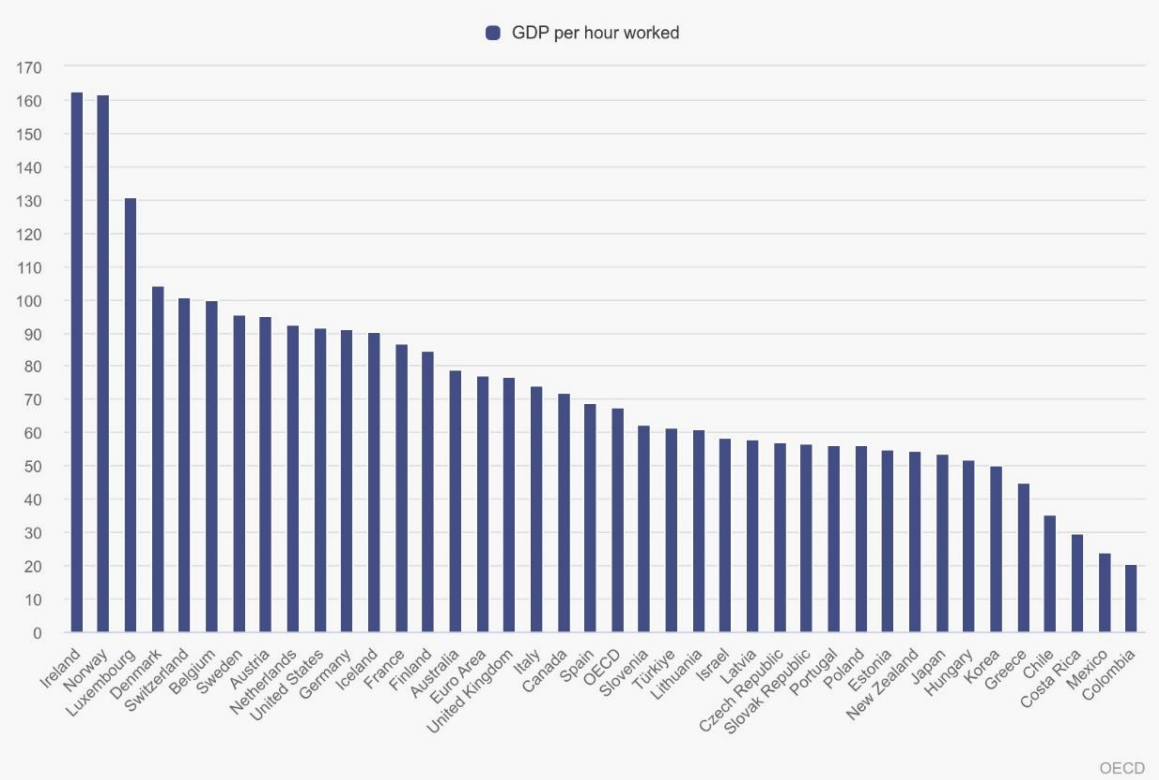
[82] Eurostat, "Productivity Trends Using Key National Accounts Indicators - Statistics Explained," Europa.eu, 2024, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Productivity_trends_using_key_national_accounts_indicators#Labour_productivity_trends_at_country_level.

[83] Oriol Aspachs and Erik Solé Vives, "Productivity Growth in Europe: Low, Uneven and Slowing," CaixaBank Research, (June 21, 2024): 40, https://www.caixabankresearch.com/en/economics-markets/activity-growth/productivity-growth-europe-low-uneven-and-slowing.

[84] *Ibid*.

highlights significant regional disparities in labour productivity among OECD countries in 2022[85]. Although the graph includes OECD countries, a closer examination of those States belonging also to the EU reveals distinct clusters based on labour productivity levels.

Figure 13. Labour Productivity in 2022



GDP per hour worked, current prices and current PPPs

Source: OECD

The most productive countries are Luxembourg and Ireland, while Denmark, Belgium, and Sweden are all highly productive. With marginally lower productivity, nations like Austria, the Netherlands, Germany, and France are in the middle. With the lowest productivity levels, Southern and Eastern European nations—Spain, Italy, Greece, and Hungary—emphasize the disparity in economic conditions within the EU.

[85] OECD, "Cross-Country Comparisons of Labour Productivity Levels," *Oecd-Ilibrary.org*, February 29, 2024, https://doi.org/10.1787/1abf046c-en.

Thus, dependency ratios are significantly lower when productivity is taken into examination, thereby highlighting the value of a skilled and productive workforce in reducing the burden of dependency. Nevertheless, the differences in labour productivity levels between EU Member States suggest different paths for the future and provide insights for future national and EU labour market policies.

2.2.2 Education as a Catalyst for Extended Working Lives

The age dependency ratio seems to be an incomplete indicator as it does not account for other social changes that can shape the real dependency ratio[86]. In fact, this indicator is based on the false assumption that, the entire population of working age is in work and contributing to social welfare, while, after a certain age, the population becomes dependent and in need of public assistance[87]. However, not everyone who is in working-age is contributing to the workforce (i.e., young people who are Not engaged in Education, Employment or Training (NEET), students, early retirees etc.). In addition, workers may continue to be active after the age of 65, thus contributing to the labour force in the later stages of their lives[88]. Therefore, a shift in the age structure of the working-age population toward older ages is occurring, accompanied by a continued increase in labour force participation among individuals over the age of 50[89]. Obviously, there are national differences in the level and rate of increase, but the general trend can be expected to continue across all EU countries[90]. According to the assumptions of the labour supply projections provided by the European Commission, labour force participation rates across all 27 EU countries for ages 20 to 64 will increase from 77.5 % in 2016 to

[86] J. Spijker and J. MacInnes, "Population Ageing: The Timebomb That Isn't?," *BMJ* 347, (November 12, 2013): 6598, https://doi.org/10.1136/bmj.f6598.
[87] Guillaume Marois, Michaela Potancokova, and Miguel Gonzalez-Leonardo, "Demographic and Labor Force Impacts of Future Immigration Flows into Europe: Does an Immigrant's Region of Origin Matter?," *Humanities and Social Sciences Communications* 10, no. 1 (December 15, 2023): 2-4, https://doi.org/10.1057/s41599-023-02482-4.
[88] Aart-Jan Riekhoff and Kati Kuitto, "Educational Expansion as a Driver of Longer Working Lives?," *Comparative Population Studies* 49 (May 15, 2024), 141-67, https://doi.org/10.12765/cpos-2024-06.
[89] European Commission, "The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070) - European Commission," economy-finance.ec.europa.eu, May 2018, https://economy-finance.ec.europa.eu/publications/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en
[90] Lutz et al., "*Demographic and Human Capital Scenarios",* 44.

80.7 % in 2070 on the aggregate level. For men, the projected change is from 83.7 % to 84.5 % while for women it is from 71.4 % to 76.9 %[91]. For men, this increase is mostly driven by expected increases in participation above age 60, due to anticipated impacts of past pension reforms[92]. Interestingly, increases in the participation of women are driven by higher age-specific participation rates above age 45, due to a combination of cohort developments — younger cohorts show higher participation rates than older cohorts, which will translate into higher participation at older ages over time — and pension reforms. Furthermore, the projected increase in aggregate participation rates is accompanied by an expected decrease in the absolute size of the labour force between 2016 and 2070 in most of the EU countries[93].

The trend of higher participation rates of older cohorts to the labour market is positively correlated with the general trend of upward expansion of education in the EU[94]. Indeed, higher levels of educational attainment are associated with higher productivity among older workers too. Specifically, it has been proved that the more educated—particularly in the case of women—tend to work to a greater extent and stay active in the labour market for longer[95]. Some authors have demonstrated this correlation in the period between 2000 and 2019 with regards to Member States of the European Union, thereby highlighting how educational expansion is a driver of longer and more productive working lives[96]. Additionally, in line with the ongoing trend of educational expansion at higher levels among younger cohorts, older workers of the future will more likely be economically active than current older workers[97]. The specific ways in which education affects the likelihood of remaining active in the labour force at older ages remain unclear. Most research emphasises that education primarily lays the foundations for later life and career opportunities. The impact of

[91] European Commission, "2024 Ageing Report".
[92] *Ibid*.
[93] Lutz et al., "*Demographic and Human Capital Scenarios",* 44.
[94] Riekhoff and Kuitto, "Educational expansion", 143.
[95] Marois, Bélanger, Lutz, "Population Aging", 7692.
[96] Riekhoff and Kuitto, "Educational Expansion" 141-67.
[97] Alexia Prskawetz and Bernhard Hammer, "Does Education Matter? – Economic Dependency Ratios by Education," *Vienna Yearbook of Population Research* 1 (2019): 142, https://doi.org/10.1553/populationyearbook2018s111.

education on activity in later life is often mediated by factors such as occupational status, income, wealth, working conditions and health[98],[99]. In other words, highly educated people are often in better health, enjoy better working conditions, have better opportunities to find work and earn higher incomes. As a result, they are often more able and willing to continue working until a later age than those with lower levels of education. Consequently, as levels of education have steadily increased across cohorts around the world, so too has the potential of an ageing workforce to continue working longer[100].

To properly capture the phenomenon which entails older cohorts remaining active and productive within the workforce, a useful and more complete indicator would be the labour force dependency ratio (LFDR)[101]. The labour force dependency ratio has all inactive persons in the numerator and all active persons in the denominator, regardless of their age. It thus captures the fact that a significant proportion of persons aged 15-64 are not in the labour force (students, housewives, early retirees) and that some persons aged 65 and over are still in the labour force[102]. The higher the value of this indicator, the greater the challenges faced by labour markets, government tax revenues and spending, and the broader economy. All projection scenarios indicate an increase in the three dependency ratios by 2060. Nevertheless, by focusing on the labour force dependency ratio, figure 12 underscores that the projected increase for 2060 in the EU is about 20% and thus lies between the expected burden from the age dependency ratio, which is projected to increase by 62% by 2060, and the more modest increase of 10% projected for the productivity-weighted labour force dependency ratio[103]. These results show the positive effects of the increasing share of the more educated cohorts

[98] Anna Amilon and Mona Larsen, "Increasing Retirement Ages in Denmark: Do Changes in Gender, Education, Employment Status and Health Matter?," *European Journal of Ageing* 20, no. 1 (June 17, 2023): 23, https://doi.org/10.1007/s10433-023-00771-0.
[99] Max Rohrbacher and Hans Martin Hasselhorn, "Social Inequalities in Early Exit from Employment in Germany: A Causal Mediation Analysis on the Role of Work, Health, and Work Ability," *Scandinavian Journal of Work, Environment & Health*, (June 16, 2022): 571, https://doi.org/10.5271/sjweh.4043.
[100] Riekhoff and Kuitto, "Educational Expansion", 142.
[101] Amran et al., "Demographic Scenarios for the EU", 29.
[102] Marois, Bélanger, and Lutz, "Population Aging", 7692.
[103] Amran et al., "Demographic Scenarios for the EU", 29.

who maintain higher participation rates, even at the older stages of life, thereby positively influencing the overall labour-force participation and its productivity. Ultimately, these discrepancies arise because the ADR starts at a much lower level, considering the entire working-age population as potential support, whereas the LFDR and PWLFDR account for the fact that some portions of the population aged 15–64 is economically dependent, while some of the older cohorts are still economically active. Furthermore, the LFDR and PWLFDR projections reflect the gradual replacement of older cohorts of workers with younger, more educated and more productive cohorts.

Not only do improvements of education help reducing economic dependency through an increase in productivity, but they also might induce behavioural changes that are conducive to the sustainability of social security systems[104]. Indeed, better educated individuals, continue working until older ages, have higher productivity and total labour income than lower educated individuals[105]. Higher educated individuals might therefore contribute larger transfer amounts at working ages than their less educated counterparts. It is also possible that compared to their lower educated counterparts, higher educated individuals will receive less health and elderly care, given that education is positively related to health behaviour and healthy lifestyles, although these effects may differ across European welfare states, as shown by Avendano et al[106]. Educational expansion is hence related to changes in behaviour, such as increasing labour force participation and higher productivity. Promoting higher levels of educational attainment could make it easier for EU countries to address the challenges associated with population ageing.[107]

[104] Prskawetz and Hammer, "Does Education Matter", 112.
[105] EUROSTAT 2018. Structure of Earning Survey. Table earn ses14 30. Available at: https://ec.europa.eu/eurostat/cache/metadata/en/earn_ses2018_esms.htm
[106] Mauricio Avendano, Hendrik Jürges, and Johan P. Mackenbach, "Educational Level and Changes in Health across Europe: Longitudinal Results from SHARE," *Journal of European Social Policy* 19, no. 4 (October 2009): 301–16, https://doi.org/10.1177/1350506809341512.
[107] Prskawetz and Hammer, "Does Education Matter",131.

2.3 The Critical Role of Digital Skills in the EU Labour Market

While it is true that higher levels of education are positively correlated with decreasing dependency ratios over time, it is equally important to consider the specific skills developed during education periods and their match with those required by the labour market. In a rapidly evolving economy characterised by technological advances and structural changes, the relevance and quality of the skills acquired, especially in the digital domain, are as important as the duration of education.

The labour market increasingly requires new technical skills, as almost half of the working population will undergo significant changes in the content and organisation of their work. A significant part of the workforce will have to rapidly acquire or improve their digital, cognitive, numerical, social and situational skills[108]. Nowadays, having digital skills is much more than having a good degree: it is a necessity to get a job, remain competitive and increase employability. Consequently, to maintain employment and productivity, it is necessary to dedicate oneself to lifelong learning and the constant improvement of skills[109]. This in turn might reduce dependency ratios and ensures a more robust and dynamic workforce.

It is crucial to assess whether the EU labour supply can keep pace with a growing demand for higher skills. This requires an assessment of the extent to which EU education and training programmes are equipping people with the skills needed for gainful employment and employability. Employability is not only finding a job, but also being able to grow and change with the job[110]. High employability is the product of quality education and training, supported by policies that promote skills such as digital literacy, numeracy, ICT skills, decision-making and lifelong learning. These skills enable individuals to succeed in the changing labour market[111].

[108] Predrag Bejaković and Željko Mrnjavac, "The Importance of Digital Literacy on the Labour Market," *Employee Relations: The International Journal* 42, no. 4 (April 6, 2020): 921, https://doi.org/10.1108/er-07-2019-0274.
[109] *Ibid*. 923.
[110] *Ibid*. 927.
[111] *Ibid*.

In contrast, a lack of digital skills not only hinders employability, but also has a negative impact on productivity, job security and career progression[112]. A Eurostat indicator can be used to quantify e-skills. It classifies digital skills into four clusters: 'no skills', 'low', 'basic' and 'higher'[113]. Although the level of digital skills required for a job may vary, the job demands at least a basic understanding of technology[114]. A series of factors influence employment rates and digital skills levels across countries, a detailed explanation of which would require an advanced modelling. For the purposes of this study and simplicity's sake, we will focus on the assessment of digital skills levels and their strong relationship with employment and employability in the EU.

Eurostat data display differences in the level of digital skills between Member States of the EU. The indicator distinguishes between individuals aged 25-34 and the general population, highlighting the existing digital skills gap between younger and older generations in the labour market. In 2023, Finland had the highest share of 25 to 34 year olds with above basic digital skills, while Bulgaria had the lowest share across all age groups. The Netherlands too lead the way in digital skills. Countries such as Spain, Denmark, Malta and Estonia have more than 50% of young people with high-level digital skills, positioning themselves midway. Bulgaria and Romania, instead, show poor results, with less than 15% of their population having above basic digital skills[115].

2.3.1 Skills-in-Demand: Aligning Education with Labour Market needs

Another important measure is the over-qualification rate, an indicator of skills mismatch in the labour market. In 2022, more than a fifth (21.7%) of the employed population aged 25-64 with tertiary education in the EU were considered overqualified for their jobs[116]. The over-qualification rate measures the discrepancy between educational attainment levels and occupations. It is defined

[112] *Ibid*.
[113] CEDEFOP, "Digital Skills Level,"(2023), https://www.cedefop.europa.eu/en/tools/skills-intelligence/digital-skills-level?year=2023#1.
[114] Bejaković and Mrnjavac, "The Importance of Digital Literacy," 928.
[115] CEDEFOP, "Digital Skills Level".
[116] Eurostat, "Labour Market Statistics at Regional Level," *Ec.europa.eu*, April 2023, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Labour_market_statistics_at_regional_level.

as the share of employed persons (aged 25–64) with a tertiary level of educational attainment[117] who are employed in low or medium-skilled occupations for which a tertiary education is generally not required[118]. This rate varies between regions, with the highest rates in parts of Greece and Spain and the lowest in Luxembourg and Stockholm[119]. This disparity highlights the need for education and training policies that not only raise educational attainment levels, but also ensure that skills are aligned with current and future labour market needs. Otherwise, skill mismatch between labour demand and supply may hinder the productivity resulting from an increasing share of high-educated people in the workforce. In this regard, a "New Skills Agenda for Europe"[120] and the "European Skills Agenda for Sustainable Competitiveness, Social Equity and Resilience[121]" have set out EU policy priorities and actions to be taken to improve the anticipation, development and activation of skills within the EU labour force. One of the main objectives of these initiatives is to ensure that the skills available in the labour market match those required by businesses and the economy.

In conclusion, the interplay between education and skills will likely determine the ability of a smaller but better educated workforce to sustain the EU economy, particularly in the context of an ageing population. Policies should therefore aim not only to raise educational attainment but also to match skills to the evolving needs of the EU labour market. Indeed, a lack of up-to-date skills, especially pertaining to the digital field, can lead to a mismatch between educational provision and

[117] As defined by the International Standard Classification of Education (ISCED) in 2011, levels 5–8. ISCED has been formally by the General Conference of UNESCO Member States. Available at: https://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf
[118] As defined by major groups (4–9) of the International Standard Classification of Occupations (ISCO-08). ISCO is an international classification under the responsibility of the International Labour Organization (ILO), for organising jobs into a clearly defined set of groups. Available at: https://isco-ilo.netlify.app/en/isco-08/
[119] Eurostat, "Labour Market Statistics at Regional Level".
[120] European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *A New Skills Agenda For Europe. Working together to strengthen human capital, employability and competitiveness*. Brussels 10.06.2016, Document 52016DC0381, COM/2016/0381 final.
[121] European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *European Skills Agenda for Sustainable Competitiveness, Social Fairness And Resilience.* Brussels, 1.7.2020, Document 52020DC0274, COM(2020) 274 final.

market needs, undermining overall productivity and therefore fostering increased economic dependency in the future.

Third Chapter: Maximizing Workforce Potential as a Solution to Population Aging

3.1 Impact of Female Labour Policies on Dependency Ratios

The second chapter has introduced two indicators, namely the productivity-weighted labour force dependency ratio (PWLFDR), and the labour force dependency ratio (LFDR), which suggest that future scenarios regarding dependency ratios within the EU should consider: first, that not all the working-age population contribute to the same extent to the workforce. Indeed, some of those who should be active in the workforce (15-64 years old), are not, whereas some that should theoretically be dependent (65+), are still active and working[122]. Second, that, given that the education system is responsive to the demanded skills of the labour market and the changing nature of work, especially regarding the process of digitisation, the higher potential productivity of increasingly highly educated young people might be actualised[123], thereby mitigating future EU dependency scenarios.

Given this premise, the third and last chapter of this study will analyse how the expected decline in the size of the EU labour force resulting from population aging, could be lessened by increases in rates of participation to the labour market across all demographics, especially women and youth[124]. These categories have been selected since the purpose of this analysis is to show how a more effective, and some may say also intuitive, and extended employment of the segments of the workforce who are currently under-employed or unemployed, such as women and youth, could stabilise dependency ratios over time and prevent the labour force size from declining. This argument is salient as it poses the focus on education, labour market policies and transversal policies such as those targeting gender equality, rather than on population policies alone, such as in the fields of

[122] Marois, Bélanger, and Lutz, "Population Aging, 7692.
[123] Amran et al., "Demographic Scenarios", 30.
[124] *Ibid*.

migration and fertility, to counteract the negative effects of population ageing on European economic and social security systems. Thus, by merging the conclusions of the second chapter and the results coming from this section, the study will demonstrate how the combined effect of increasing both worker productivity and labour-force participation rates could foster economic growth to persist, mitigating public spending stemming from old-age dependant people across the EU.

Greater involvement of women in the workforce could help the EU boosting its economic performance. Not only is gender equality in the labour market a crucial goal in terms of equal rights and social development in line with EU values, but it could also foster considerable macroeconomic benefits[125]. The study by Amran et al. has demonstrated, by creating scenarios that deviate from constant labour-force participation rates into the future, the power that increasing labour-force participation rates has of counteracting the expected increases in dependency[126]. The scenarios that deviate from the constant EU workforce participation trajectory are two. The first one is the "equalisation" scenario, which postulates gender equality in labour-force participation rates between men and women. The second one, labelled as the "Swedish" scenario, considers a more realistic path, meaning the gradual convergence of all EU Member States to the participation rates observed in Sweden today[127]. Indeed, Sweden is the country where all-labour force participation rates are among the highest in the EU[128], positioning at 67% in 2023[129]. Their analysis show that an increased labour force size could stabilise dependency ratios.

Figure 14. The three scenarios influencing the size of the EU's total labour force, 2015-2060.

Source: CEPAM

[125] Lone Engbo Christiansen et al., "Unlocking the Potential of Greater Female Employment in Europe," *Intereconomics* 2017, no. 1 (2017): 6, https://www.intereconomics.eu/contents/year/2017/number/1/article/unlocking-the-potential-of-greater-female-employment-in-europe.html.
[126] *Ibid*. 1-92
[127] *Ibid*. 7-8
[128] Marois, Bélanger, and Lutz, "Population Aging", 7691
[129] World Bank, "World Bank Open Data," World Bank Open Data, 2024, https://data.worldbank.org/indicator/SL.TLF.CACT.ZS?locations=SE.

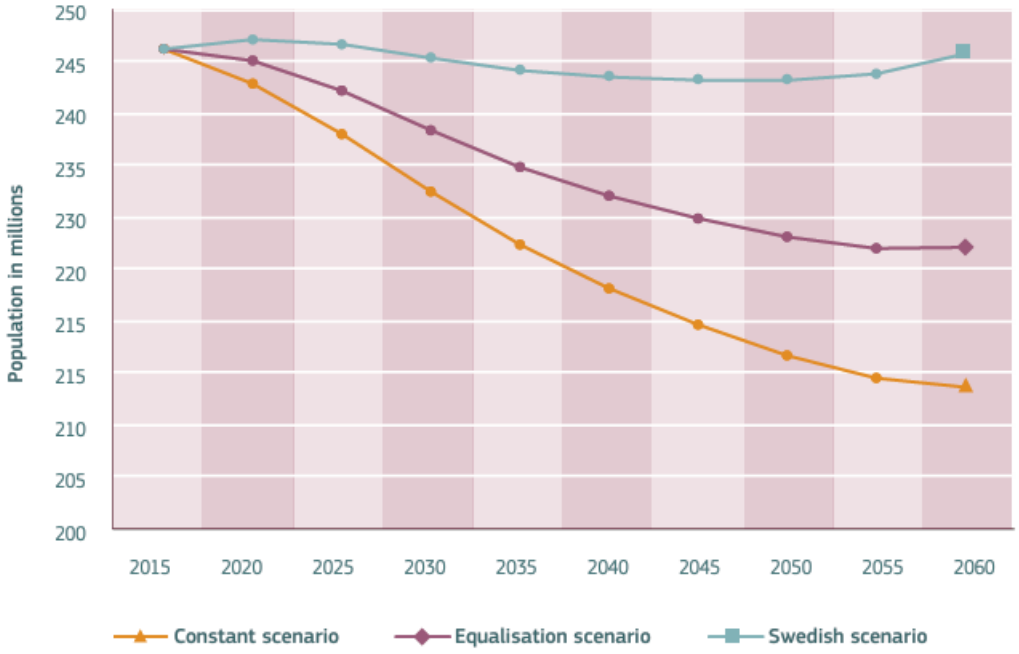


Figure 14 represents how different labour force participation rates influence the labour force size over the period from 2015 to 2060. By extending the present trends to the future, the constant participation scenario predicts a EU labour force size 13% smaller than now. More specifically, it will shrink from 245 to 215 million. Considering the equalisation scenario, the size of the labour force would decrease to 227,2 million in 2060, which means 13 more million workers than the previous scenario. Additionally, if participation rates converge towards the Swedish levels (Swedish scenario), the workforce size would stabilise at 245 million workers, which is equal to the 2015 level. Thus, both the equalisation and the Swedish scenario convey the high capacity of participation rates, especially among women, to positively affect the labour force size[130]. There is one crucial limitation to this analysis, namely that it does not entirely account for the existing differences between EU Member States. Indeed, Eastern and Southern EU Member States will most likely experience reductions in the size of their workforce anyways, because of the effect of loosing their labour force to more affluent Western Member States. Western Member States would instead gain working-age national from Eastern Member States, therefore stabilising their workforce also in the case of a

[130] Amran et al., "Demographic Scenarios", 26

constant-participation scenario[131]. This is an implication of the process of intra-EU mobility and emigration with the potential of creating large population shifts in Europe. In sum, gaps in wages and living standards keep driving the flow of labour westwards despite the implementation of EU cohesion policies, resulting in a loss of home-grown talent and innovation as well as consequences for inter-generational replacement and acceleration of population ageing[132]. Nevertheless, it stays true that, when comparing scenarios, the Swedish one is better than the constant one with regards to EU labour force size.

It is possible to look at the same picture from a different perspective, by considering labour-force dependency ratios (LFDR). In 2015, the LFDR in the EU was 1.05, meaning that there were around 105 inactive people for every 100-working people. Following the constant participation scenario, in 2060, the LFDR would be 1.36[133]. It is worth mentioning that labour-force dependency ratios would significantly vary between EU countries. Specifically, they would be higher in countries with low fertility, higher life expectancy and low labour-force participation, such as Greece (1.69) and Italy (1.72)[134]. On the other hand, Member States with medium or high fertility and a higher labour-force participation rates would reach more favourable ratios, such as Sweden (1.04) and Denmark (1.05)[135]. Once again, already existing disparities in terms of demographic, economic and social indicators between EU Member States significantly impact future trajectories for dependency ratios, underscoring the relevance of policies aimed at cohesion and convergence between countries. Considering the equalisation scenario where participation rates of women and men reach the same level, the ratio would stabilise at 1.2., which is half the expected increase under the constant participation scenario (0,15 vs. 0,31). Like the equalisation scenario, the Swedish one is favourable too, if not more, stabilising the ratio at the level of 2015 (1.05). Thus, a considerable yet possible

[131] *Ibid*.
[132] Atoyan et al., *Emigration and Its Economic Impact on Eastern Europe*, *Repec.org*, Staff Discussion Notes No. 2016/007 (International Monetary Fund, 2016), 8-9, https://econpapers.repec.org/paper/imfimfsdn/2016_2f007.htm.
[133] Amran et al., "Demographic Scenarios", 29.
[134] *Ibid*.
[135] *Ibid*.

increase – it is already a reality in Sweden – of all labour-force participation rates over time could stabilise dependency ratios, preventing them from worsening. Thus, combined with the increased worker productivity stemming from high levels of educational attainment, higher participation rates, especially of women, have the highest potential of mitigating the challenges of population aging[136].

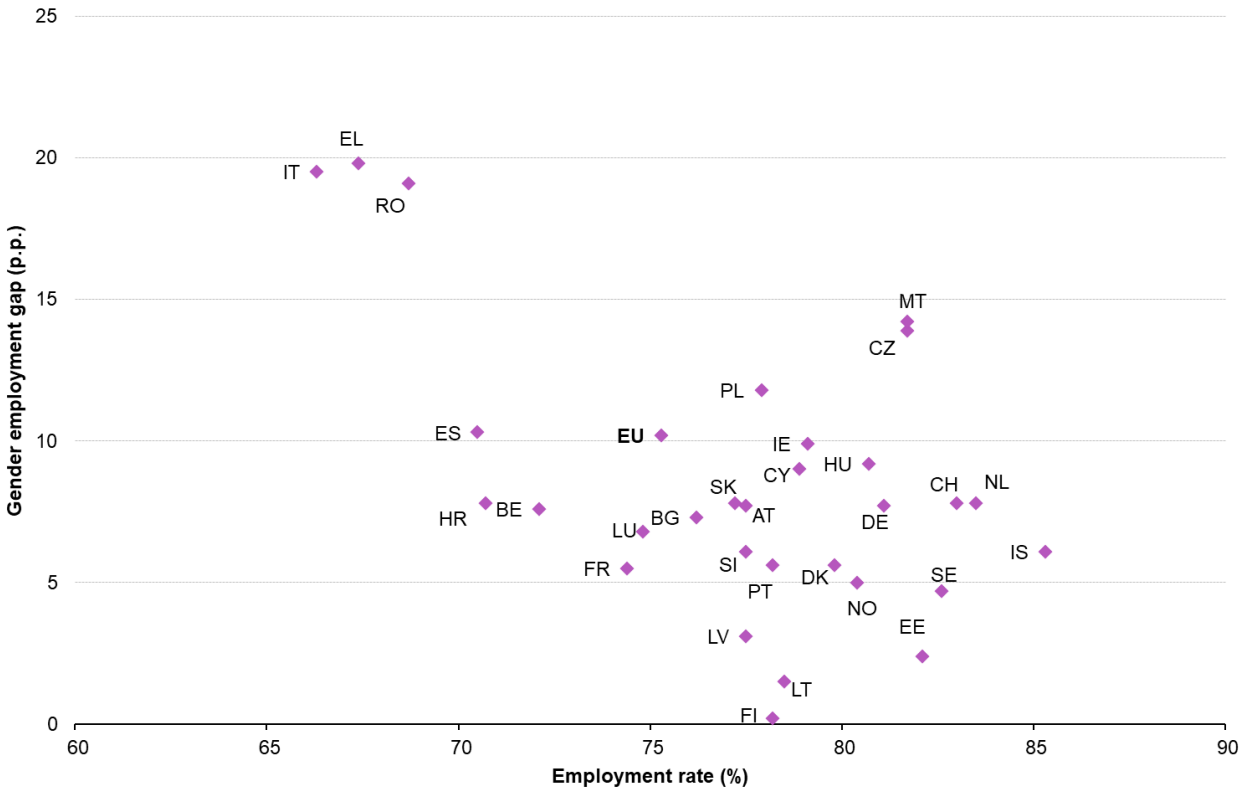
3.1.1 Gender Employment and Education Gaps in the EU: a Comparative Analysis

Gender gaps in access to resources and opportunities considerably vary across EU Member States. For simplicity's sake and in line with the goal of the analysis, this study will address gender gaps in employment rate and educational attainment levels, thereby showing their implications for the EU labour market and its future challenges, including population aging. Considering the entire EU, the employment gender gap in 2023 amounted to 10,2 percentage points in favour of men, with the employment rate for men of working age being 80,4% and that of women of 70,2%[137]. However, in the same year, the lowest gap was reported in Finland (0,2 pp), Lithuania (1,5 pp), Estonia (2,4 pp) and Latvia (3,1 pp), as showed by Figure 15. At the other end of the spectrum, Romania (19,1 pp), Italy (19,5 pp) and Greece (19,8 pp) presented the highest scores[138]. These disparities between EU Member States overlap with gaps in employment rate as measured with regards to the whole population. For EU population the employment rate of people aged 20-64 in 2023 spanned from 66,3% in Italy to 83,5% in the Netherlands. Among all the countries with small gender gaps (below 5 pp), the employment rate was above the EU average, which is 75,3%[139]. Conversely, in Italy, Greece and Romania, which had the largest gender employment gaps, the employment rate was below the EU average, amounting respectively at 66,3%, 67,4%, and 68,7%[140].

Figure 15. Employment rate and gender employment gap, 2023

[136] *Ibid*.
[137] Eurostat, "Gender Statistics," ec.europa.eu, April 2024, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Gender_statistics#Labour_market.
[138] *Ibid*.
[139] *Ibid*.
[140] *Ibid*.

Source: Eurostat



Source: Eurostat (online data code: lfsi_emp_a)

eurostat

It is interesting to consider data on education too since women generally appear to be more educated than men across the EU. Nevertheless, the discrepancy in terms of educational attainment levels favouring women does not seem to favour them in the labour market. Therefore, increasing levels of female participation rates to the workforce, not only could lessen the negative effects of population aging by impacting the EU labour force size, but could also unlock a higher labour productivity potential as women tend to be more educated than men. By considering the proportion of persons who have attained tertiary education (i.e. who graduated from universities or other higher education institutions), a gender gap can be derived. The gender gap in tertiary education attainment is defined as the proportion of men aged 30-34 years that have attained tertiary education minus that of women. In 2023, in the EU the gender gap was -10,9 percentage points, which means that the

proportion of women aged 30-34 that had completed tertiary education exceeded that of men by 10,9 pp[141]. This negative gender gap was common to all EU Member States, ranging from -2,5 pp in Germany to -28,3 pp in Estonia. Ireland (-3,9 pp) and Luxembourg (5,4 pp) were the other EU countries to obtain the smallest gender gaps in absolute value other than Germany. Conversely, Lithuania (-22,0 pp), Latvia (-24,3 pp) and Slovenia (-28,3 pp) recorded the worse gender gaps together with Estonia[142].

Hence, gender gaps in education and the labour market contribute to an "inefficient inequality[143]" that is costing the EU remarkably in terms of productivity and economic growth. If unaddressed, these disparities are likely to exacerbate rising dependency ratios of an ageing population. Overall, the total economic loss of gender employment inequality amounted to €370 billion per year in 2013, which is equivalent to 2,8% of EU's GDP. These costs include earning losses and missing welfare contributions resulting from women's exclusion from the workplace, but also public finance transfers and welfare state benefits received by non-working women[144]. The cost of a woman's exclusion from employment throughout her working life is estimated at between €1.2 million and €2 million, depending on her educational level[145]. On the contrary, lifting women's workforce participation, has positive economic and social implications on the individual level as well as on the aggregate level, through the reappropriation of a potential that is lost due to existing disparities.

[141] *Ibid*.
[142] *Ibid*.
[143] Martina Bisello et al., "Inefficient Inequality: The Economic Costs of Gender Inequality in Europe," *Intereconomics* 2017, no. 1 (2017): 4–4, https://www.intereconomics.eu/contents/year/2017/number/1/article/inefficient-inequality-the-economic-costs-of-gender-inequality-in-europe.html.
[144] Martina Bisello and Massimiliano Mascherini, "The Gender Employment Gap: Costs and Policy Responses," *Intereconomics* 2017, no. 1 (2017): 24–27, https://www.intereconomics.eu/contents/year/2017/number/1/article/the-gender-employment-gap-costs-and-policy-responses.html.
[145] Eurofound, "The Gender Employment Gap: Challenges and Solutions," 2016, https://www.astrid-online.it/static/upload/ef16/ef1638en_0.pdf.

3.1.2 Gender equality improvements: an investment for EU economic growth

Against this background, gender equality in employment can be viewed as an investment, rather than "only" a social and developmental imperative, aimed at unlocking the full productive potential of the EU labour force. Moreover, it can be considered as a fundamental precondition for sustainable demographic development, an increase in net contributions to the fiscal systems, thus providing financial entrances to the state[146]. In this regard, it is worth underlining the significance of interventions aimed at gender equality given their spillover effects[147]. It has been demonstrated that, pursuing gender equality in one domain, for instance, education, has spillover effects in other domains, such as employment, thereby creating positive waterfall effects. Following the same logic, it is of utmost importance to use a wholistic approach when tackling gender equality, meaning that addressing different aspects of gender inequality together is likely to have more positive impacts than addressing each aspect of gender inequality separately[148]. Moreover, gender equality improvements are demonstrated to have a higher impact on economic growth, measured through GDP, than other policies, such as those pertaining to labour market or education[149]. For example, by 2050, improving gender equality would lead to an increase in EU GDP per capita by 6.1 to 9.6%, which amounts to €1.95 to €3.15 trillion. This is mainly due to the transversal nature of gender equality policies. For example, a European Commission study in 2016 showed that improvements in educational attainment across EU member states would lead to a 2.2% increase in EU GDP in 2050[150], which is much lower than the impact forecast for gender equality improvements.

[146] Helena Morais Maceira, "Economic Benefits of Gender Equality in the EU," *Intereconomics* 52, no. 3 (May 2017): 178, https://doi.org/10.1007/s10272-017-0669-4.
[147] *Ibid*. 180
[148] *Ibid*.
[149] *Ibid*. 182
[150] European Commission, "Study on the Potential of Education to Cause Macroeconomic Imbalances and Negative Spillovers" (Luxembourg: Publications Office of the European Union, April 2016), https://op.europa.eu/en/publication-detail/-/publication/de1c36f8-2d3b-11e6-b497-01aa75ed71a1.

It is true that there is a negative correlation between educational attainment levels and fertility rates, meaning that as women become more educated, they also become more empowered and able to make conscious choices regarding childbearing and rearing. Moreover, the opportunity-cost of raising a child becomes higher as women are forced to choose between career advancements and having babies. However, some authors have suggested how policies aiming at favouring gender equality in the labour market and education, as well as more balanced sharing of unpaid care work between men and women, could lead to an actual increase of fertility rates, which in turn would result in an increased long-term labour supply[151]. Improvements in gender equality in the workplace can also have a positive impact on fertility rates in the long term, which can have a positive effect on the supply of labour in the future. Ultimately, this would result in a larger labour force than the inactive population. This approach illustrates how promoting gender equality in the workplace may not only increase productivity and the number of workers today but may also increase the number of workers in the future. The reasoning is that gender-equal societies women of all educational background are facilitated in managing child-rearing while continuing to participate in the labour market by splitting the responsibility evenly with men[152]. Consequently, women would obviously be expected to work, just as it is for men, but men would also contribute to domestic responsibilities in a just way. Therefore, having and raising children become easier, effectively increasing fertility rates in the long run. However, less gender-equal societies do not consider women's demands while still expecting them to participate in the labour force, leading more women, regardless of their level of education, to choose not to have children[153], [154].

[151] Morais Maceira, "Economic Benefits of Gender Equality in the EU", 182
[152] Jonas Flötzer, "Combatting the Demographic Change a Quantitative Analysis of the Effect of Higher Education and Gender Equity on Fertility Rates in the EU," (2024): 10, https://studenttheses.uu.nl/bitstream/handle/20.500.12932/47286/Master%20Thesis%20-%20Jonas%20Fl%c3%b6tzer%20-%20Publication.pdf?sequence=1&isAllowed=y.
[153] Mary C. Brinton and Dong-Ju Lee, "Gender-Role Ideology, Labor Market Institutions, and Post-Industrial Fertility," *Population and Development Review* 42, no. 3 (September 2016):407, https://doi.org/10.1111/padr.161.
[154] Sinn Won Han and Mary C. Brinton, "Theories of Postindustrial Fertility Decline: An Empirical Examination," *Population and Development Review* 48, no. 2 (March 29, 2022): 326, https://doi.org/10.1111/padr.12490.

The European Commission has proposed a toolbox for action containing policy tools for addressing and managing demographic change[155]. Unpaid care responsibilities keep an estimated 7.7 million women in the EU from joining the labour market. By comparison, only 450 000 men are estimated to be concerned in this regard[156]. Over the past 20 years, mothers with infants have even participated less in the labour market, which has frequently had a long-term negative effect on their careers and salaries. Care intensity is also important; of informal caregivers who contribute over 40 hours per week, only 35% are employed, compared to 71% of those who provide less than 10 hours[157]. Furthermore, women continue to be disproportionately underrepresented in several in-demand fields, including information and communication technologies (ICT). This exacerbates the labour shortage and the old-age dependency ratio, with fewer people engaged in the economy today and in the future. Age-related increases in care requirements may disproportionately impact women as there is still an uneven distribution of the cost of informal care[158].

In this context, expanding accessible and good quality care services, may play a pivotal role in boosting women's employment, especially in Member States with low labour market participation rates of women and low shares of formal care provisions. Indeed, offering affordable and high-quality childcare to parents enable them to reconcile paid work and family life, thus, to raise a family while remaining active in the labour market, to make an independent income and pursue their professional careers[159]. However, only 35.7% of children under the age of three in the EU attended formal early childhood education and care (ECEC) in 2022; participation rates for children from disadvantaged

[155] European Commission, "Communication from The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions: *Demographic Change in Europe: A Toolbox for Action*", 1-25, COM (2023) 577 final § (2023).
[156] European Institute for Gender equality, "Gender Inequalities in Care and Consequences for the Labour Market | European Institute for Gender Equality," *Eige.europa.eu* (Luxembourg: Publications Office of the European Union, January 20, 2021), https://eige.europa.eu/publications-resources/publications/gender-inequalities-care-and-consequences-labour-market?language_content_entity=en.
[157] European Commission: Directorate-General for Employment, Social Affairs and Inclusion, "Study on Exploring the Incidence and Costs of Informal Long-Term Care in the EU" (Publications Office of the European Union, 2021), https://data.europa.eu/doi/10.2767/06382.
[158] European Commission, "Demographic Change in Europe: A Toolbox for Action", 7-8.
[159] *Ibid*. 8

backgrounds were significantly lower, and there were notable variations both within and between EU countries. The revised 2030 Barcelona target of a 45% participation rate in ECEC has only been attained by nine Member States. For children under three years old, near full-time childcare is only a reality in Denmark[160].

Flexible working arrangements and work-life balance policies can lighten the care burden for women, empowering them to make free and independent choices regarding child-bearing and professional life. Experiences from across the Member States demonstrate that a range of policies, including those that increase their uptake, can have a lasting impact on redistributing the caregiving load among parents. These policies include flexible work schedules, sufficient leave entitlements, particularly paternity leave and non-transferable, well-compensated parental leave. In the European Union, fathers have the right to a minimum of ten days of paid paternity leave and four months of paid parental leave; however, these rights have not yet been implemented uniformly[161]. Finland and Spain, for example, provide rather long periods of paternity leave. However, fathers continue to use parental leave at a usually low rate. Caregivers' leave, which is often offered in countries like the Netherlands, for instance, can also enable people who are responsible for providing care for other dependent family to remain active in the labour market. Incorporating flexible work arrangements, such as part-time work that is gender-balanced, can help manage work and family obligations. Making the most of telework when it's feasible and appropriate can also help improve the balance between work and home life[162]. A targeted approach to tax and benefit reforms can guarantee that work is financially fulfilling, particularly for low-income single moms who frequently lose a large percentage of their income to taxes, withdrawn benefits, and daycare expenses[163]. By eliminating tax incentives for second-income earners and providing tax credits for low-income workers, efficient tax-benefit

[160] *Ibid*.
[161] European Commission: Directorate-General for Justice and Consumers and De la Corte-Rodríguez, M., "The Transposition of the Work-Life Balance Directive in EU Member States – a Long Way Ahead" (Publication Office of the European Union, 2022), https://data.europa.eu/doi/10.2838/096508.
[162] European Commission, "Demographic Change in Europe: A Toolbox for Action", 9.
[163] OECD, "Net Childcare Costs," OECD, 2024, https://www.oecd.org/en/data/indicators/net-childcare-costs.html.

regimes can promote employment while preserving progressive taxation to support public investments and social security. Furthermore, child benefits can encourage the development of families without deterring women from pursuing careers.

A great number of initiatives have been already activated by the European institutions and agencies to tackle gender employment gaps by empowering women to reconcile paid and unpaid work of care. Among these, the Work-Life Balance Directive[164] introduced the right to compensated paternity leave, compensated parental leave, a right to careers' leave, and a right to request flexible working arrangements for all working parents of children up to at least 8 years. Further legal protections include, notably, the Pregnant Workers Directive[165] (right to minimum maternity leave and protection against dismissal during leave) and the Directive on equal opportunities and equal treatment of men and women in matters of employment and occupation[166]. Finally, the Council Recommendation on early childhood education and care[167] calls Member States to increase participation in these services by establishing ambitious targets and supports the delivery of quality, affordable and accessible services, with specific attention to the inclusion of children from disadvantaged backgrounds.

Policy makers at all levels should create an environment that enables individuals across the EU to realize their life choices and balance family and professional lives. By promoting gender equality, particularly in education, employment, and the reconciliation of paid work with unpaid care responsibilities, empirical evidence shows that women are more likely to remain active in the labour market. Increased female participation in the workforce could, in turn, expand the EU labour force

[164] Directive (EU) 2019/1158 of the European Parliament and of the Council of 20 June 2019 on work-life balance for parents and carers and repealing Council Directive 2010/18/EU.
[165] Council Directive 92/85/EEC of 19 October 1992 on the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding.
[166] Directive 2006/54/EC of the European Parliament and of the Council of 5 July 2006 on the implementation of the principle of equal opportunities and equal treatment of men and women in matters of employment and occupation (recast).
[167] Council Recommendation of 8 December 2022 on early childhood education and care: the Barcelona targets for 2030 (2022/C 484/01).

and help alleviate the burden associated with an aging population. The EU has already made efforts to improve gender equality, but disparities between Member States could hinder comprehensive and widespread progress.

3.2 The Role of Youth in the EU Labour Market

3.2.1. The development trap: exacerbating demographic and regional disparities

Demographic divergences can worsen economic, regional and social divides[168]. Some EU countries, and more specifically, some EU regions, mostly rural and less developed, are experiencing an accelerated reduction in the working-age population vis-à-vis the inactive one[169]. As previously mentioned, workers from Southern and Eastern Europe are increasingly attracted towards Western labour markets, because of higher wages, living standards and a sophisticated capacity of developing, attracting and retaining talents for economic growth. Over time this may create large population shifts, aggravating the process of population aging and workforce reduction, thereby amplifying existing divides between EU Member States and regions[170]. Indeed, as the population ages and the skill level of the workforce declines in some areas, the mismatch between talent, skills and labour demand is expected to exacerbate territorial disparities, fostering a "development trap" -- a vicious circle in which areas with a shrinking workforce, low educational attainment levels and high rates of youth emigration struggle to keep up with economic growth[171]. This combination of challenges may impede the capacity for some Member States to build sustainable, competitive and knowledge-based

[168] European Commission, "The Impact of Demographic Change -in a Changing Environment" (Brussels: European Commission Publications Office, January 17, 2023), https://commission.europa.eu/system/files/2023-01/the_impact_of_demographic_change_in_a_changing_environment_2023.PDF.
[169] *Ibid*.
[170] European Commission, "EU Labour Force Size Likely to Decrease | Knowledge for Policy," knowledge4policy.ec.europa.eu, January 2020, https://knowledge4policy.ec.europa.eu/foresight/topic/increasing-demographic-imbalances/eu-labour-force_en.
[171] European Commission, "COMMUNICATION from the COMMISSION to the EUROPEAN PARLIAMENT, the COUNCIL, the EUROPEAN ECONOMIC and SOCIAL COMMITTEE and the COMMITTEE of the REGIONS. Harnessing Talent in Europe's Regions," European Commission - European Commission § (2023), https://ec.europa.eu/commission/presscorner/detail/en/ip_23_145.

economies, and puts them at a higher risk of failing to catch up with more advanced regions. Specifically, there are 82 regions across 16 Member States—which together make up about 30% of the EU population—that are negatively impacted by the reduction in the working-age population, low percentages of graduates from universities or other higher education institutions, and negative migration trends among their 15–39-year-old population. Obviously, certain structural issues are unique to these locations, including low performance in innovation, public governance, or company development; inefficiencies in the labour market; and limited access to services[172].

Addressing the development trap is therefore essential to interrupt this dangerous vicious cycle which could worsen the demographic transition and add disparities within the EU. Thus, policies to tackle the negative effects of population aging should aim at harnessing talent across all EU Member States and regions. In this regard, the European Commission has launched in 2023 the "Talent Booster Mechanism[173]", which aims at supporting EU regions affected by the accelerated decline of their working-age population to train, retain and attract the people, skills and competences that are necessary for addressing the effects of the demographic transition. This initiative is part of the "European Year of Skills[174]", whose goal is to bring a new impetus for reskilling and upskilling among the EU labour force in line with the EU 2030 social target of at least 60% of adults in training every year, and at least 78% in employment[175]. Moreover, this initiative aims at reaching the 2030 Digital Compass goal of at least 80% of adults with basic digital skills and 20 million employed ICT specialist in the EU[176]. Data indicate that, in 2023, more than three quarters of companies in the EU have reported to have difficulties in finding workers with the necessary skills, while only 37% of adults

[172] *Ibid*.
[173] European Commission, "Inforegio - Talent Booster Mechanism," ec.europa.eu, 2024, https://ec.europa.eu/regional_policy/policy/communities-and-networks/harnessing-talent-platform/talent-booster-mechanism_en.
[174] European Commission, "European Year of Skills 2023," commission.europa.eu, 2022, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-year-skills-2023_en.
[175] European Union, "EU VOLUNTARY REVIEW on the Implementation of the 2030 Agenda for Sustainable Development" (Luxembourg: Publications Office of the European Union, 2023), 12, https://commission.europa.eu/system/files/2023-06/SDG-Report-WEB.pdf.
[176] *Ibid*. 62

were undertaking training on a regular basis. Moreover, the Digital Economic and Society Index (DESI) shows that in 2023 4 out of 10 adults and every third person who worked in Europe lacked basic digital skills[177]. Indeed, demographic change – if left unaddressed – may further exacerbate labour shortages, creating bottlenecks in the EU economy[178]. The EU is currently experiencing historic levels of labour shortages, partly due to a decline in the working-age population. Professionals in the STEM fields—science, technology, engineering, and mathematics—ICT (information and communications technology), construction, care services, and transportation are in particularly high demand throughout several Member States[179]. Furthermore, skill shortages are expected to increase with new task requirements triggered by the green and digital transitions, which will affect labour market across sectors, often requiring upskilling. In this regard, the raising share of young people with low levels of basic skills accentuates the risk of future skills shortages[180]. Large-scale standardized international surveys, such as the Programme for International Student Assessment (PISA), provide evidence of the growing lack of basic skills of young generations in literacy, mathematics and science[181]. The problem is that people with low levels of basic skills will face challenges in entering the labour market, due to their limited employability[182]. Improving the performance of education systems, tackling the growing lack of qualified teachers, and providing continuous training throughout professional careers are key to addressing evolving skills needs[183].

If left unaddressed, demographic change risks exacerbating economic, regional, and social divides through a "development trap," as well as leading to labour and skill shortages across the EU. In this

[177] The Digital Economy and Society Index summarises indicators on Europe's digital performance and progress of EU countries since 2014.
[178] European Commission, "Demographic Change in Europe: A Toolbox for Action", 3.
[179] *Ibid*.
[180] European Commission, "Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions: *Labour and Skills Shortages in the EU: An Action Plan*," Pub. L. No. COM(2024) 131 final (2024).
[181] According to the most recent data on PISA, the share of young people (aged 15) who have a very low level of basic skills went up in mathematics from 22.9% in 2018 to 29.5% in 2022 (https://www.oecd.org/publication/pisa-2022-results/).
[182] See Chapter 2.
[183] European Commission, "Labour and Skills Shortages in the EU: An Action Plan".

context, underrepresented groups may see an increase in opportunities to apply their talent in the labour market when companies and employment practices adjust to a reduced workforce. The declining number of people in the working age population emphasizes how important it is to develop and cultivate existing talents and fund skill development across all generations. This is especially true for older adults, women, individuals with disabilities, and young people who are not in school, work, or training (NEETs)[184]. To ensure that the working age population's potential is maximized, the EU Commission believes that active labour market policies in line with the Youth Employment Support Package[185], the Commission Recommendation on Effective Active Support to Employment[186], and the Disability Employment Package[187] are essential. These policies additionally contribute to improve labour market integration and ease job-to-job transitions[188]. More recently, in March 2024, the Commission adopted an action plan on addressing skills shortages, with fundamental actions that Member States and social partners should take in the short and medium term, such as supporting the activation of under-represented people in the labour market; providing support for skills development, training and education; improving fair intra-EU mobility for workers and learners; attracting talents from outside the EU[189].

In this context, policies should thus leverage the multifaceted nature of demographic transitions, recognizing that a variety of actors must be informed and involved in a complex, coordinated effort. Furthermore, the multi-dimensionality of demography presents a unique opportunity for the EU to lead and innovate in this field by actively engaging underrepresented groups in a horizontal,

[184] European Commission, "The Impact of Demographic Change".
[185] European Commission, "Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions: *Youth Employment Support: A Bridge to Jobs for the next Generation*," COM/2020/276 final § (2020).
[186] European Commission, "Commission Recommendation on an Effective Active Support to Employment Following the COVID-19 Crisis (EASE)," C(2021) 1372 final § (2021).
[187] The package is part of the "Strategy for the Rights of Persons with Disabilities 2021-2030". European Commission: Directorate-General for Employment, Social Affairs and Inclusion, *Union of equality – Strategy for the rights of persons with disabilities 2021-2030*, Publications Office, 2021, https://data.europa.eu/doi/10.2767/31633
[188] European Commission, "The Impact of Demographic Change", 18.
[189] European Commission, "Labour and Skills Shortages in the EU: An Action Plan".

comprehensive and inclusive transition[190]. Policies should therefore focus on harnessing the potential of under-represented segments of the workforce, which, if effectively integrated, could expand the size and productivity of the labour force thereby easing the burden of dependency on EU social security systems. While much of the existing literature concentrates on making the employment of older workers more active, productive, and efficient, fewer studies address how underrepresented groups of working-age individuals could be part of the solution to population aging. This is true especially for young people, who face several challenges related to unemployment, training and education in the EU.

3.2.2 Youth Unemployment and Underemployment in the EU: the challenge of NEETs

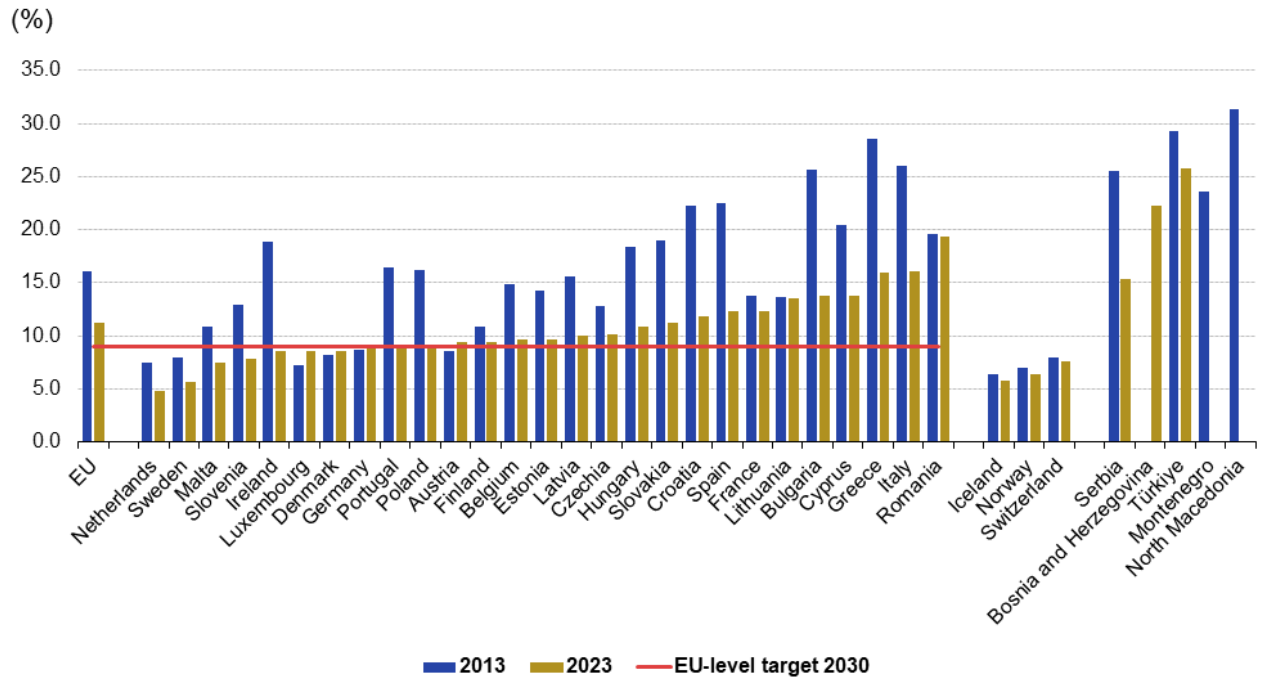
The second chapter of this study has emphasized the importance of ensuring a smooth transition from education to employment for young adults, particularly in aligning their skills and competences with labour market needs. This alignment is crucial for enabling the workforce to maximise its full potential and productivity. The risk is indeed that young adults may be disengaged from both education, training and the labour-market, finding themselves in what labour market statistics call NEET category, meaning neither in employment nor in education and training. The problem of NEETs is mainly driven by two factors: first, EU labour markets are reportedly increasingly insecure, with a high share of the workforce on temporary, and part-time contracts. A significant part of these workers is often relatively young and striving to move from education or training to the labour market. These individuals are vulnerable, especially when the business cycle is turning as they are often competing with other more experienced jobseekers. Moreover, the high share of NEETs in the EU signifies not only that employers have a wide choice of potential candidates to recruit, but also the existence of labour market mismatches in terms of skills or for instance geographically. In this

[190] *Ibid*. 19

respect, employers criticise the lack of basic or underdeveloped skills of young people recently out of education, or the lack of work experiences relevant to the field of their chosen profession. EU statistics on NEET show that in 2023, 11,2% of 15–29-year-olds were neither in employment nor in education or training[191]. The EU has a target of lowering the share of NEET by 2030 to at least 9%, and this is supported by a considerable amount of EU funding[192]. Across the EU Member States there were wide variations in 2023 concerning people who are NEETs in the age 15-29, see Figure 16. The lowest rates already below the target of 9.0 % are reported by the Netherlands, Sweden, Malta, Slovenia, Ireland, Luxembourg, Denmark, Germany and Portugal. These countries thus reached the long-term EU-level target for 2030 in 2023 or earlier[193].

Figure 16. Young people (aged 15-29) neither in employment nor in education and training, 2013 and 2023

Source: Eurostat



Note: Breaks in series.
Source: Eurostat (online data code: edat_lfse_20)

eurostat

[191] Eurostat, "Statistics on Young People Neither in Employment nor in Education or Training," ec.europa.eu, May 2024, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Statistics_on_young_people_neither_in_employment_nor_in_education_or_training#Educational_attainment_level_affects_the_share_of_NEETs.
[192] *Ibid*.
[193] *Ibid*.

In addition, nine Member States had NEET rates in 2023 that were higher than the EU average of 11.2%. The countries with the highest rates were Greece, Italy, and Romania, where 16 percent or more of the youth between the ages of 15 and 29 did not have a job or be enrolled in an educational program. To give an idea of the gap between Member States in terms of the share of NEETs, the share of young adults who were NEETs was four times higher in Romania, which registered the highest share, than in the Netherlands, which instead had the best results. This suggests that although the problem is common to EU countries, the extent to which different Member States are affected by it varies considerably. Overall, apart from few exceptions, namely Austria, Luxembourg, Denmark and Germany, the overall share of NEETs decreased in the EU by 4,9 percentage points between 2013 and 2023[194]. With a surplus of labour, employers may prefer to recruit young people who have completed a tertiary level of education or an apprenticeship. As such, young people with few or no qualifications may struggle to enter the labour market and may be excluded of work or increasingly find themselves stuck in a cycle of low paid jobs with little opportunity for progression. Apart from educational attainment levels, there is a wide range of factors that may contribute to young people being NEETs, among which: having a low or medium level of educational attainment; living in a household with a low level of income; coming from a family where a parent experienced unemployment; being raised by a single parent; living in a rural area; having been born in a country outside the EU; or having a disability. Moreover, the gender gap in NEET rates in the EU is a cause for concern. Indeed, in 2023, 12.5 % of young women aged 15–29 years in the EU were NEETs, while the corresponding share among young men was 10.1 %, meaning 2.4 percentage points lower[195]. Particularly, this phenomenon was evident in two EU Member States, namely Czechia and Romania, where the proportion of young female NEETs was at least 10 percentage points higher than

[194] *Ibid*.
[195] *Ibid*.

the corresponding share for young men. Conversely, in four EU countries – Portugal, Finland, Spain and Sweden – rates were similar for women and men.

Moreover, data showed that young female NEETs are more likely to be outside the labour force than young male NEETs. Indeed, the share of young men NEETs outside the labour force in 2023 was 5,4% while that of females was 8,7%, with a total difference of 3,3 percentage points between sexes in the EU. It is true that, when considering unemployment among NEETs, the results are opposite, meaning that the share of young male NEETs who were unemployed in 2023 amounted to 4,7%, compared with 3,8% among females[196]. Combined, these data suggest that women who are neither in employment nor in education or training in the EU are likely to be outside the labour force to a larger extent than men, while young men are unemployed to a larger extent than women. Being unemployed means that the individual has still some degree of connection to the labour market, while people outside the labour force do no[197]t. Having such stark gender differences may be a cause for concern, moreover so if we consider the intersectionality of gender disparities between education, labour market, and the process of transition between the former and the latter. Intersectionality entails the stratification of inequality stemming from the belonging to different disadvantaged social segments. In this case, the vulnerabilities coming from being a young person entering the labour market intertwines with those resulting from being a woman.

Once more, gender equality improvements appear to be a reasonable solution to problems of inefficiency, where full productivity potential remains unexpressed and hindered by inequalities. In this case, gender differences in NEETs rates may be caused by social conventions or pressures, that tend to favour a male-bread winner model in family structures rather than a dual-earning model, where

[196] *Ibid*.
[197] *Ibid*.

work and care responsibilities are equally shared between sexes. For both men and women, in June 2024, the youth unemployment rate was 14.4 % in the EU[198].

3.2.3 The impact of youth labour-market engagement on dependency ratios

NEETs represent a valuable human resource with remarkable potential for the sustainable development of the EU and its social security system[199]. Addressing the NEET issue could yield important benefits for all EU Member States by enabling the full potential of their labour force. Additionally, resolving inefficiencies associated with the NEET phenomenon would lead to broader positive outcomes, including a more educated, productive, equitable, and less impoverished society[200]. By effectively integrating youngsters into the workforce, increased participation rates would expand the labour force, thereby raising the share of active population relative to the inactive one. Furthermore, by paying taxes rather than receiving state benefits, NEETs who find employment would be able to actively support welfare states and national budgets[201]. During the economic crisis from 2007-2013, Eurofound estimated that the economic loss caused by having such a large number of NEETs exceeded €153 billion per year. Overall, it is estimated that NEETs generated a cost to the EU – represented by unemployment benefits, loss of income and uncollected taxes – worth of 1,2% of EU's GDP, in 2012[202]. Nevertheless, it is difficult to determine the entire cost of NEETs to the EU because several direct and indirect factors affect the figure. While indirect costs encompass the loss of income and productivity for the entire economy and may also include social costs, direct costs are the costs to the state incurred by providing unemployment insurance and other welfare benefits to

[198] Eurostat, "Unemployment Statistics," ec.europa.eu, June 2024, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Unemployment_statistics#Youth_unemployment.
[199] Silvia Puiu, "NEETs—a Human Resource with a High Potential for the Sustainable Development of the European Union," in *The Future of the UN Sustainable Development Goals. CSR, Sustainability, Ethics & Governance.* (Cham: Springer International Publishing, 2019), 239-260, https://doi.org/10.1007/978-3-030-21154-7_12.
[200] *Ibid*. 239
[201] *Ibid*. 257
[202] Eurofound, "NEETs – Young People Not in Employment, Education or Training: Characteristics, Costs and Policy Responses in Europe," *Eurofound.europa.eu* (Luxembourg: Publications Office of the European Union, 2012), https://www.eurofound.europa.eu/en/publications/2012/neets-young-people-not-employment-education-or-training-characteristics-costs-and.

NEETs. If administrative data is available, it is easy to estimate direct costs; however, indirect costs are much harder, if not impossible, to calculate because a monetary value can only be attributed to them based on a strong set of assumptions[203]. Additionally, there are long-term consequences that need to be considered. Youth unemployment increases the likelihood of future unemployment due to declining skills and a loss of motivation to re-enter the labour market after a prolonged absence. This leads to an increased risk of persistent inactivity and poverty among young NEETs[204]. Moreover, due to a lack of opportunities, NEETs often emigrate in search of employment, and this often results in "brain drain" for the origin country[205]. By investing in the untapped potential of NEETs as a valuable source of human capital, states and welfare systems can expect significant gains in taxation and economic returns.

Tailoring policies focusing on harnessing the potential of under-represented segments of the workforce, such as NEETs, is not an easy task due to the heterogeneity of the category's subgroups[206]. Moreover, the effectiveness of activation policies is still arguably questioned by many scholars, and activation costs need to be factored in[207]. However, the analysis has shown that to mitigate the negative effects of population aging in the EU, the focus should be on the labour force, particularly on addressing existing labour market problems that could worsen with demographic changes. While it is essential to address the challenges posed by an aging population, it would be a mistake to prioritize them over persistent labour market issues that could intensify, if not properly addressed through fiscal, monetary, wage, and labour market policies[208]. A study by Woss and Turk has

[203] *Ibid*. 65
[204] Denisa Ligia MATEI, "Integration of Young NEETS on the Labor Market," in *Proceedings of the 15th International Management Conference "Managing People and Organizations in a Global Crisis"* (Bucharest, Romania: Bucharest University of Economic Studies, 2022), 581, https://doi.org/10.24818/imc/2021/03.12.
[205] Manos Matsaganis, "Youth Unemployment and the Great Recession in Greece," in *No Country for Young People? Youth Labour Market Problems in Europe.* (London: CEPR Press, 2015), 79.
[206] Paul Redmond and Ciara McFadden, "Young People Not in Employment, Education or Training (NEET): Concepts, Consequences and Policy Approaches," *The Economic and Social Review* 54, no. 4, Winter (2021): 285, https://www.esr.ie/article/view/2574.
[207] Piotr Michoń, "The Great Recession and the Youth Labour Market in European Countries: The Demographic versus the Labour Market Effect," in *Youth Unemployment and Job Insecurity in Europe* (Edward Elgar Publishing, 2019), 90, https://doi.org/10.4337/9781788118897.00010.
[208] *Ibid*.

demonstrated that the use of the employment potential among the 15 to 64 age group and the reduction of the high level of unemployment, especially among youth, are of crucial significance for the future development of the economic dependency ratio[209]. The authors have underscored that raising the effective labour-market-exit age and a significantly higher activity rate of both men and women in the 55 to 64 age group, together with reducing unemployment and increasing women participation rates, are undoubtedly important means to achieving this end. By contrast, the focus on raising the statutory retirement age, so frequently in the foreground of discussions, tends to bypass the real problems, at the same time causing highly significant policy areas and issues to be overlooked[210]. The use of available employment potential and a raising of the employment rate constitute crucial responses to demographic change, but in many publications on the long-term financial viability of pension systems this potential has not been dealt with or has been referred to only marginally. Raising employment rates, with quality jobs, could help to considerably reduce the future increase in the economic dependency ratio, thereby alleviating the financial burden of ageing. Moreover, such a strategy would help to solve key problems of our societies such as poor labour market opportunities for young people, unemployment, skill shortages and lack of opportunities to combine working and family life[211]. Although their analysis focused on the effective employment of the entire working-age population rather than solely on youth engagement, their study demonstrated that an increase in employment rates could lead to a significant reduction in economic dependency ratios in the future. The analysis is based on two scenarios: a standard scenario, where current trends continue, and a "Europe 2020 Plus" scenario, in which the EU achieves a 75% employment rate[212]. In this regard, the numerous initiatives and measures fostered by the European Union are of crucial significance to attract and invest in talents, train the skills in need and facilitate the integration of young people into

[209] Josef Wöss and Erik Türk, "Policy Implications ETUI Policy Brief Dependency Ratios and Demographic Change the Labour Market as a Key Element" (Brussels: ETUI, the European Trade Union Institute, 2011), 1-7, https://www.etui.org/sites/default/files/Policy%20Brief-Blue-Issue4-2011-EN.pdf.
[210] *Ibid*. 7
[211] *Ibid*.
[212] *Ibid*. 6

the labour market, to effectively employ the potential that resides within this segment of the population. Thus, promoting young people's access to quality jobs, affordable housing and decent living standards, investments in education and training are essential for mobilising young people and equipping them with basic skills as well as future proof skills, such as those needed for the green and digital transitions. In addition to the already mentioned instruments, others include as the Council Recommendation on vocational education and training (VET)[213] which aims at modernising VET and giving a renewed impetus for apprenticeships and the European Framework for Quality and Effective Apprenticeships[214]. Moreover, the Sustainable and Smart Mobility Strategy[215] supports the development of smart mobility solutions that help prevent depopulation and allow young people to have access to basic services (health, education) and work opportunities. Finally, the ALMA (Aim, Learn, Master, Achieve) initiative[216] is a cross-border youth mobility scheme to support young people and NEETs in integrating into the job market[217]. All these initiatives, if fully implemented across all Member States, may help to unlock the potential of young working-age people, thereby reducing the fiscal burden stemming from population aging on EU societies. Further research is clearly needed to accurately determine the impact of active youth engagement in the labour force on dependency ratios.

In conclusion, addressing the challenges of population aging requires a multifaceted approach that not only focuses on the immediate needs of an aging society but also leverages the untapped potential of younger and underrepresented segments of the workforce. By implementing targeted policies that promote labour market participation, education, and skill development across all

[213] Council of the European Union, "Council Recommendation of 24 November 2020 on Vocational Education and Training (VET) for Sustainable Competitiveness, Social Fairness and Resilience," (2020/C 417/01) § (2020).
[214] Council of the European Union, "Council Recommendation of 15 March 2018 on a European Framework for Quality and Effective Apprenticeships," (2018/C 153/01) § (2018).
[215] European Commission, "Communication from The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions: *Sustainable and Smart Mobility Strategy – Putting European Transport on Track for the Future*," COM/2020/789 final § (2020).
[216] European Commission: Directorate-General for Employment, Social Affairs and Inclusion , "ALMA: Aim-Learn-Master-Achieve: Handbook" (Brussels: Publication Office of the European Union, 2024).
[217] European Commission, "Demographic Change in Europe: A Toolbox for Action", 12.

demographics, the EU can foster sustainable economic growth and ensure a balanced dependency ratio for future generations.

Conclusion

The demographic passage towards an ageing population in the European Union presents a pressing challenge that requires strategic and innovative solutions. The present thesis has demonstrated that relying solely on traditional approaches such as increasing fertility rates or encouraging migration will not provide a sustainable response to the long-term impacts of population ageing. Conversely, addressing this issue requires a comprehensive approach that focuses on maximizing the potential of the existing and future EU labour force. In this regard, education and skills development play a critical role. By improving educational attainment and aligning education systems with the evolving needs of the labour market, the EU can enhance labour productivity thereby mitigate rising dependency ratios. The correlation between higher education levels and increased workforce productivity, explored in this analysis, highlights the importance of investing in human capital to foster economic growth and demographic stability. Moreover, increasing labour force participation, particularly among underrepresented groups such as women and youth, will be essential in alleviating the negative effects of an ageing population. Gender equality initiatives, policies aimed at closing employment and education gaps, and strategies to reduce youth unemployment can all contribute to a more inclusive and resilient labour market. Engaging these groups not only boosts economic growth but also reduces the social and financial pressures on welfare systems caused by rising dependency ratios.

This thesis has therefore underscored the importance of a multidimensional approach to population ageing, one that integrates demographic trends with social and economic policies. By focusing on education, skills, and labour market participation, the EU can better manage the challenges posed by an ageing population and build a more sustainable and prosperous future. This study therefore aims to demonstrate that, by exploiting the potential the European Union already has, the latter can effectively manage one of its most pressing challenges, namely its ageing population. In this perspective, enhancing human capital and workforce inclusion will be key to maintaining the

balance of the EU's economies and ensuring the long-term viability of its welfare systems in the face of demographic change.

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