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2024 Ageing Report

Underlying Assumptions & Projection Methodologies

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Directorate-General for Economic and Financial Affairs

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Institutional Paper 257

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This report was prepared as part of the mandate the Economic and Financial Affairs Council gave to the Economic Policy Committee (EPC) in 2021 to update and further deepen its triannual projections of age-related expenditure based on new population projections by Eurostat. The work to fulfil this mandate is performed within the EPC's Ageing Working Group (AWG).

The forthcoming 2024 Ageing Report will provide long-term projections for public expenditure on pensions, healthcare, long-term care and education in the European Union up to 2070. These budgetary projections build on the macroeconomic assumptions and methodologies described in this report. The 2024 Ageing Report will be the eighth edition. Publication is scheduled for spring 2024.

This report is presented by the EPC and the European Commission (Directorate-General for Economic and Financial Affairs - DG ECFIN) after discussion and agreement in the AWG. DG ECFIN provided the analysis and calculations underpinning the report. Eurostat prepared the demographic projections.

The report was prepared under the supervision of Massimo Suardi (Director in DG ECFIN), Andrea Oliveira (Chair of the EPC), Pieter de Jonge (Chair of the AWG) and Stéphanie Pamies (Head of Unit in DG ECFIN). The main contributors were Santiago Calvo Ramos, Ben Deboeck, Miklos Erdei, Nicola Gagliardi, Boriana Goranova, Frederic Opitz and Adja Awa Sissoko, in collaboration with the Members of the AWG (see list below). Secretarial support was provided by Laura Crapanzano. The EPC and DG ECFIN would like to thank all those concerned.

Comments can be sent to:

DG ECFIN - Unit C2: ecfin-secretariat-c2@ec.europa.eu

Secretariat of the Economic Policy Committee: epc-secretariat@ec.europa.eu

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EXECUTIVE SUMMARY

1. 2024 AGEING REPORT: MANDATE, GENERAL PRINCIPLES AND PROCESS

To assess the long-term sustainability of public finances in the EU Member States, the ECOFIN Council mandated the Economic Policy Committee (EPC) to update its comprehensive long-term budgetary projections by the summer of 2024. The update of the Ageing Report, a joint report by the EPC and the European Commission (DG ECFIN), should be based on new population projections by Eurostat. The report is prepared by the EPC's Ageing Working Group (AWG). The 2024 Ageing Report is the eighth edition and will be published in spring 2024.

The Ageing Report's long-term economic and budgetary projections are a unique exercise, covering the EU Member States and Norway up to 2070. The report provides a vast set of comparable and internally consistent information for all countries. These give insight in the timing of population ageing, its economic implications and the associated budgetary challenges. Such pressures are already manifest in many countries and are expected to accelerate as large cohorts of baby boomers retire, life expectancy continues to rise and fertility rates remain low from a historical point of view.

Being a joint EPC-Commission product, the Ageing Report provides a shared assessment between the Member States and the Commission on how ageing costs might develop in the future. The projections are therefore a cornerstone of various surveillance processes at the EU level. They inform the coordination of economic policies, in particular the European Semester, the Recovery and Resilience Facility, fiscal surveillance, and the assessment of the sustainability of public finances.

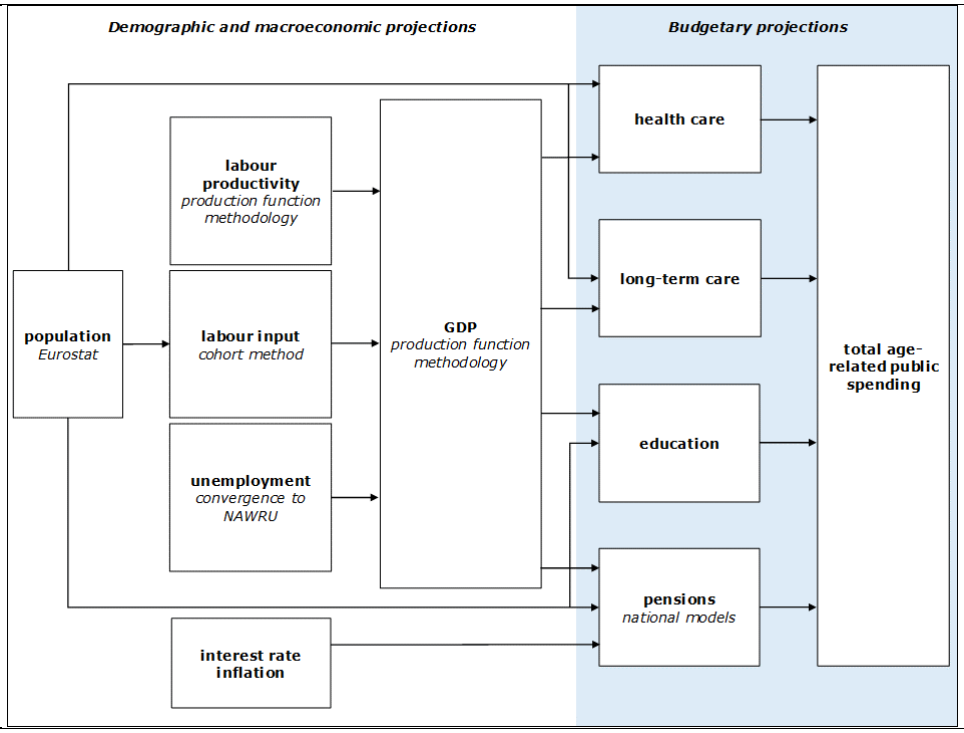
Overview of the projection exercise

Graph 1 summarises the process for the triennial update of the report. In a first phase, the Commission and the Member States in the AWG agree on the underlying assumptions and projection methodologies, which are subsequently endorsed by the EPC. This first phase is the topic of the current report. In a second phase, the age-related spending projections are prepared.

Part 1 of this report gives an overview of the demographic and macroeconomic assumptions. The EUROPOP2023 population projections by Eurostat serve as a starting point. In addition, based on common methodologies, macroeconomic projections are prepared for each country. These cover economic growth and its drivers, namely changes in labour productivity (total factor productivity and capital deepening) and in the labour force (participation, employment and unemployment rates), as well as interest rates and inflation. A statistical annex at the end of the report gives a country-by-country overview of the demographic and macroeconomic projections.

Part 2 details the methodologies used to project age-related expenditure in the second phase of the cycle. The budgetary projections cover four items: public spending on pensions, health care, long-term care and education. They will be published in the spring of 2024 in the 2024 Ageing Report. For pensions, Member States prepare projections based on national models, which are the subject of an in-depth peer review by the Commission and the AWG. This approach allows capturing the specificity of each country's public pension system, while ensuring cross-country consistency since the projections are based on shared assumptions and methodologies. Based on common models, the Commission prepares the health care, long-term care and education projections, which are discussed and agreed within the AWG.

Graph 1: **Overview of the Ageing Report projection exercise**



Source: European Commission, EPC.

The Ageing Report's long-term baseline projections are based on a general 'no-policy-change' assumption. Thus, they illustrate what the future might look like if current policies remain unchanged and given a number of realistic assumptions. Nonetheless, projecting economic and budgetary developments over the next fifty years is a challenging exercise and subject to considerable uncertainty. Therefore, a series of sensitivity tests and alternative scenarios is conducted around the baseline to assess the responsiveness of the projections to changes in the main underlying assumptions. In addition to the common tests covering demographic and macroeconomic variables (see Table 1), specific scenarios apply for each expenditure item.

Table 1: **Overview of the common sensitivity tests around the baseline**

Demography			Inflation	Labour force	Productivity
Higher life expectancy	**Lower/higher migration**	**Lower fertility**	**Higher inflation**	**Higher employment rate older workers**	**Lower/higher TFP growth**
Additional gain in life expectancy at birth of two years by 2070.	*33% less/more non-EU immigration over the entire projection period.*	*20% lower fertility rate over the entire projection period.*	*Converge to 2% by T+30 (T+5 in baseline).*	*Employment rate of older workers (55-74y) 10 pps higher than assumed in the baseline projection.*	*TFP growth converges to 0.6%/1.0% (instead of 0.8%).*

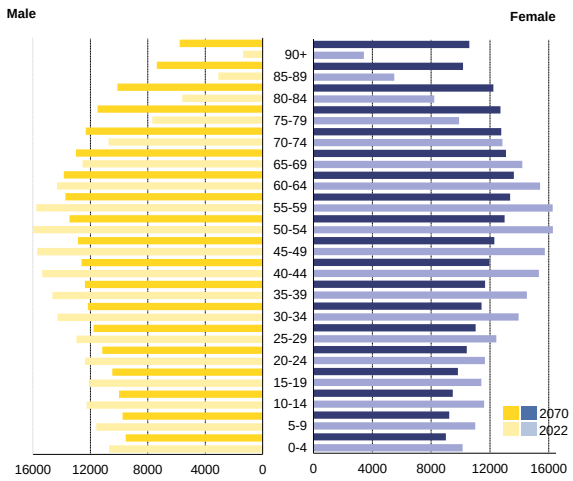
Source: European Commission, EPC.

2. MAIN RESULTS: THE ECONOMIC IMPACT OF POPULATION AGEING

The EU population is projected to start falling in the coming years while the number of older people grows, especially relative to the number of people at working age

The total EU population is expected to rise from 449 million people in 2022 to a peak of 453 million people in 2026. After that, it would fall to 432 million in 2070, a decline by 4% compared to 2022 (see Table 2). This general trend at EU aggregate level encompasses heterogeneous developments at country level. For instance, in 13 Member States, the population is projected to increase between 2022 and 2070. Yet, an upward shift in the age distribution is expected in all Member States. As shown in Graph 2 for the EU, the size of older age groups would grow, while younger age brackets would shrink. The few countries where the working-age population (people aged 20 to 64) is projected to increase would see an even greater increase in the population aged 65 or more.

Graph 2: **EU – Population by age group and sex, 2022 and 2070 (thousands)**



Source: European Commission, EPC.

Relating the old-age population to the working-age population provides the *old-age dependency ratio*. This ratio gives an idea about the relative shift between potential retirees and potential workers and thus of how an ageing population alters the beneficiary-contributor balance. As a result of the projected dynamics in both groups, this ratio will rise sharply in all Member States over the coming decades (see Table 3). From about 29% in 2010 in the EU, it rose to 36% in 2022 and would rise further to 59% in 2070, with most of the increase expected already by 2045. Put differently, the EU goes from having nearly thirty people aged 20 to 64 for every ten people aged over 65 years in 2022, to having less than twenty people by 2045.

Projected changes in the size and age profile of the population are determined by assumptions regarding fertility rates, mortality rates and migration (see Table 3).

- The total **fertility** rate in the EU is projected to rise from 1.5 live births per woman in 2022 to 1.6 by 2070. This limited increase reflects the assumption that, in the very long run, fertility rises to the highest rate currently observed across the EU Member States. Fertility rates would stay below the natural replacement rate of 2.1 in all countries.

- **Life expectancy** at birth for males is expected to increase by 7.7 years in the EU, from 78.4 in 2022 to 86.1 in 2070. Female life expectancy at birth would rise by 6.4 years, from 84.0 in 2022 to 90.4 in 2070, thus leading to a further convergence between sexes. When looking at the remaining life expectancy at the age of 65, the average increase is about 5 years for both. These projections are based on the hypothesis of a partial upward convergence in longevity between Member States.

- **Net migration** is assumed to return to pre-2022 levels in the coming years, at around 1 million people annually (0.2% of the EU population). This compares to an exceptionally high inflow of around 1% of the EU population in 2022 because of the Russian war of aggression against Ukraine. Countries' long-

term immigration and emigration rates are based on a partial convergence to past trends for the EU as a whole. Net migration is projected to be positive in nearly all countries, at an average of 0.3% of the EU population in 2022-2070.

Labour force participation is projected to rise, driven by older workers and women in general, but not sufficiently to compensate for the decline in the working-age population

The macroeconomic implications of the demographic projections depend on how many people take part in the labour market and for how long. The Ageing Report's labour force projections follow a cohort approach that captures the current situation in each country. It assumes no further policy changes beyond already legislated pension reforms. The participation rate of the EU working-age population is projected to increase by around 3 pps and by 10 pps for people aged 55-64 (see Table 4). The upward trend reflects the combined effect of pension reforms on the exit behaviour of older age groups and the progressive increase in the labour market attachment of female cohorts.

However, in most countries, higher participation is expected to be insufficient to offset the projected decline in the working-age population. As a result, the number of people in the labour force is projected to decrease by 12% (25 million people) between 2022 and 2070 in the EU or 0.3% annually. In several Member States, the labour force would shrink by more than a quarter by 2070.

Employment rates are also projected to increase, though total hours worked would decline because of population ageing

The employment assumptions are determined by the population, participation and unemployment projections. The unemployment projections are based on estimates of structural unemployment rates. The unemployment rate for the 20-64 age group would fall from 5.9% in 2022 to 5.1% in 2070 (see Table 4). Employment in the EU is projected to increase from around 75% of the working-age population in 2022 to around 79% in 2070. This 4 pps increase includes a nearly 6 pps increase for women and about 2 pps for men. The employment rate of people aged 55-64 is expected to rise by as much as 10 pps on average.

While a higher share of the population is expected to be employed, a shrinking working-age population means that the total number of hours worked is nevertheless expected to fall by 9% in the EU between 2022 and 2070. As a result, the *economic old-age dependency ratio* (inactive people above the age of 65 relative to employed people aged 20-64) would rise from 46% in 2022 to 70% in 2070 (see Table 2). This means that for every ten inactive people above 65, there will be 14 employed people in 2070, down from 22 in 2022 and 16 in 2045.

Given the expected decline in hours worked, labour productivity growth would become the sole driver of GDP growth, projected at 1.3% in the EU

Annual real GDP growth of 1.3% on average is projected for the EU in the period 2022-2070 (see Table 5). On the one hand, the contribution of labour to GDP growth is expected to turn negative as of the late 2020s, decreasing by 0.2% on average over the projection period. This decline results from a lower share of working-age people in an already shrinking total population, with a higher employment rate somewhat offsetting the decline. On the other hand, labour productivity growth is assumed to grow by 1.4% on average over the projection period, of which 0.9 pps comes from total factor productivity (TFP) and 0.5 pps from capital deepening.

In the updated projections, TFP growth converges to 0.8% in the long term in all countries. Member States with GDP per capita below the EU average are assumed to experience faster TFP growth in the first part of the projection period, in line with past trends. A similar catching-up mechanism applies to the capital deepening projections. The TFP convergence growth rate of 0.8% compares to 1% in the 2021 Ageing Report. Despite this downward revision, the assumptions still imply an acceleration in productivity growth in the medium term for many Members States, considering that TFP growth has fallen back to historically low levels in recent years.

The sensitivity tests (see Table 1) show the responsiveness of the economic growth projections to the underlying assumptions, with stronger growth projected in case of higher migration, a higher employment rate among older people or higher productivity growth. Similarly, lower migration, lower fertility, and lower productivity would reduce economic growth. Some policy scenarios illustrate the role of pension policies for future economic development, e.g. the scenario that models the impact of introducing a link between legal retirement ages and gains in life expectancy.

Comparison with the economic projections underlying the 2021 Ageing Report

In 2022, the base year for the new projections, the EU counted 0.2 million more people than anticipated in the previous demographic projections (see Table 2), but 0.9 million fewer people aged 65 or over. This reflects a surge in mortality during the COVID-19 pandemic. The latter is visible in the life expectancy at birth, which in 2021 had returned to the 2019 level only in a few countries. In 2022, life expectancy was estimated to be still 0.6 years lower for men and 0.5 years for women than projected in the 2021 Ageing Report (see Table 3). The 4.8 million higher net migration in 2022 is due to the strong inflow of displaced Ukrainians.

The EU population is projected to shrink less by 2070, counting 7.9 million more people compared to the demographic assumptions underpinning the 2021 Ageing Report, with a larger population in most Member States. On average, dependency ratios are similar to those in the previous update, though the size of the revision varies between countries. With few exceptions, the assumptions on future fertility are unchanged from the previous update (see Table 3). The same holds for life expectancy, which is about identical to the previous assumption for 2070. This implies a higher increase over the projection period, as the COVID-19 impact gradually disappears from the statistics. Net migration is higher on average.

Participation rates being generally higher and unemployment rates lower in 2022 than projected in the 2021 Ageing Report, employment rates came out better than anticipated, being 1.6 pps higher on average in the EU (see Table 4). Among the 55-64 age group, employment was 1.4 pps higher. When comparing the projections for 2070 between the subsequent vintages, employment rates are 2.3 pps higher on average. This follows from the better 2022 starting point, though also the overall increase in 2022-2070 is 0.7 pps higher in the new projections and 2.2 pps for people aged 55-64.

Average GDP growth in 2022-2070 is 0.1 pp lower for the EU than projected in the 2021 Ageing Report (see Table 5). The annual contribution from hourly labour productivity is 0.2 pps lower, with weaker TFP and capital deepening growth because of the downward revision in the long-term convergence assumptions. The number of hours worked grows by 0.1 pp more on average, thus partially offsetting the overall negative GDP impact of the new productivity assumptions.

Table 2: **Population projections: 2024 Ageing Report and changes compared to 2021 Ageing Report**

	2024 Ageing Report									2024 Ageing Report - 2021 Ageing Report									
	Total population (million)			Old-age dependency ratio (%)(1)			Economic dependency ratio (%)(2)			Total population (thousand)			Old-age dependency ratio (pps)			Economic dependency ratio (%)			
	2022	2070	% change	2022	2070	change (pps)	2022	2070	change (pps)	2022	2070	difference in % change(3)	2022	2070	difference in change (pps)	2022	2070	difference in change (pps)	
BE	11.7	12.7	9%	33.7	53.0	19.2	45.4	66.9	21.5	78	857	7%	-0.6	-0.3	0.2	-1.6	-5.0	-3.4	BE
BG	6.9	5.3	-23%	36.6	60.3	23.6	45.1	75.5	30.3	72	263	5%	-1.7	-0.5	1.1	-2.5	-2.6	-0.1	BG
CZ	10.7	10.6	-2%	34.9	51.5	16.6	40.2	62.7	22.5	-28	359	4%	-0.5	-2.2	-1.7	-1.9	-2.7	-0.7	CZ
DK	5.9	6.2	5%	35.4	56.5	21.1	40.3	56.6	16.3	58	31	1%	-0.6	2.8	3.4	-2.2	0.6	2.8	DK
DE	83.9	84.2	0%	37.4	55.0	17.6	42.9	62.9	20.0	513	2526	3%	-0.5	0.4	0.9	-1.0	0.1	1.1	DE
EE	1.4	1.3	-3%	34.9	57.3	22.4	35.9	58.5	22.6	24	117	10%	-1.0	-2.0	-1.0	-3.8	-2.9	0.8	EE
IE	5.1	6.1	19%	25.7	55.6	29.8	30.4	63.8	33.3	-14	-426	-7%	0.0	2.6	2.6	-0.5	0.8	1.3	IE
EL	10.4	7.8	-25%	39.0	66.0	27.0	56.2	80.9	24.7	-175	-809	-9%	-0.9	0.8	1.7	-4.1	3.7	7.8	EL
ES	47.7	47.7	0%	33.3	64.5	31.2	46.3	77.8	31.5	-258	642	1%	-0.4	1.9	2.3	-1.9	2.2	4.1	ES
FR	68.0	69.7	2%	38.2	57.8	19.7	49.7	70.2	20.5	427	234	0%	-0.5	0.9	1.5	-3.0	-1.9	1.2	FR
HR	3.9	3.0	-22%	38.9	62.2	23.3	53.9	78.5	24.6	-136	-16	-1%	1.2	-2.3	-3.5	-0.1	-11.3	-11.2	HR
IT	59.0	53.3	-10%	40.8	65.5	24.7	60.0	79.9	20.0	-1111	-614	-1%	0.2	-0.1	-0.2	0.4	-2.3	-2.7	IT
CY	0.9	1.0	9%	26.7	55.5	28.8	31.1	62.4	31.3	8	-102	-9%	-1.2	4.8	6.0	-3.0	5.6	8.6	CY
LV	1.9	1.3	-33%	36.0	61.0	25.0	41.0	75.5	34.5	16	79	7%	-1.0	-2.5	-1.6	-3.4	-2.9	0.4	LV
LT	2.8	2.0	-29%	33.1	72.4	39.3	37.2	86.6	49.4	68	190	10%	-1.4	6.4	7.7	-4.4	7.7	12.1	LT
LU	0.7	1.0	49%	23.1	55.4	32.3	30.0	73.1	43.0	10	188	24%	-0.7	-0.7	0.0	-2.0	-1.6	0.4	LU
HU	9.7	9.0	-7%	34.5	54.3	19.8	40.4	62.0	21.5	-47	103	1%	-0.5	-3.1	-2.6	-3.8	-4.9	-1.1	HU
MT	0.5	0.8	54%	30.5	65.4	34.9	35.2	75.5	40.3	-9	104	15%	-0.3	3.0	3.3	-2.6	2.3	4.9	MT
NL	17.7	18.7	6%	34.3	56.3	22.0	37.3	55.9	18.6	105	759	4%	-0.6	1.1	1.7	-3.1	-4.6	-1.5	NL
AT	9.0	9.5	6%	32.0	57.0	25.0	39.5	67.4	27.9	66	298	3%	-0.5	1.1	1.6	-1.2	-0.1	1.1	AT
PL	38.1	31.8	-16%	31.9	63.7	31.9	39.0	80.0	41.0	283	1040	3%	-0.8	-4.1	-3.2	-2.8	-10.0	-7.1	PL
PT	10.4	9.0	-14%	40.7	67.8	27.0	48.6	75.8	27.2	99	493	6%	1.4	0.5	-0.9	1.0	-0.5	-1.5	PT
RO	19.0	15.0	-21%	33.5	55.8	22.3	47.9	78.8	30.9	130	1363	10%	-0.7	-6.3	-5.6	3.8	-0.9	-4.7	RO
SI	2.1	2.0	-5%	36.1	57.5	21.5	44.1	69.7	25.6	0	64	3%	0.0	-1.2	-1.2	-1.3	-2.8	-1.4	SI
SK	5.5	4.8	-12%	28.5	59.7	31.2	35.4	69.7	34.3	12	104	2%	-0.6	-3.4	-2.8	-3.0	-17.0	-14.0	SK
FI	5.6	5.2	-6%	41.2	62.4	21.3	48.4	70.1	21.7	41	199	4%	-0.4	0.0	0.4	-2.4	-0.8	1.6	FI
SE	10.5	12.9	23%	36.0	50.4	14.4	39.1	52.9	13.7	-38	-183	-1%	-0.1	0.6	0.7	-1.4	-3.0	-1.7	SE
NO	5.4	6.5	20%	31.2	54.4	23.2	33.8	60.7	26.9	-19	-201	-3%	0.1	1.9	1.9	-1.4	-0.9	0.5	NO
EA	348.2	341.1	-2%	36.9	59.6	22.7	47.1	70.0	22.9	-238	4887	1%	-0.3	0.6	0.9	-1.6	-1.0	0.5	EA
EU	449.1	431.9	-4%	36.1	59.1	23.0	45.7	69.9	24.2	193	7864	2%	-0.4	-0.1	0.3	-1.6	-1.9	-0.3	EU

(1) (population 65+) / (population 20-64y).
(2) (inactive population 65+) / (employment 20-64y).
(3) 2070 difference as % of 2070 population according to EUROPO2019 (2021 Ageing Report).

Source: European Commission, EPC.

Table 3: **Population assumptions: 2024 Ageing Report and changes compared to 2021 Ageing Report**

	2024 Ageing Report												2024 Ageing Report - 2021 Ageing Report											
	Fertility rate (live births/woman)			Life expectancy at birth (y)						Net migration ('000)			Fertility rate (live births/woman)			Life expectancy at birth (y)						Net migration ('000)		
				Males			Females									Males			Females					
	2022	2070	avg 2022-70	2022	2070	change 2022-70	2022	2070	change 2022-70	2022	2070	avg 2022-2070[1]	2022	2070	change in avg 2022-70	2022	2070	diff in change 2022-70	2022	2070	diff in change 2022-70	2022	2070	avg 2022-2070[1]	
BE	1.53	1.64	1.59	79.5	86.4	6.9	84.6	90.5	5.9	116	29	0.3%	-0.03	-0.04	0.0	-0.4	0.1	0.5	0.0	0.2	0.2	86	8	0.1%	BE
BG	1.56	1.69	1.65	70.5	82.8	12.3	77.7	87.7	10.0	160	16	0.2%	-0.04	-0.02	0.0	-1.8	-0.1	1.7	-1.6	0.0	1.6	164	6	0.1%	BG
CZ	1.72	1.75	1.74	75.9	84.8	8.9	81.9	89.2	7.3	471	25	0.3%	0.00	-0.03	0.0	-1.0	0.0	1.0	-0.7	0.0	0.7	442	7	0.1%	CZ
DK	1.68	1.73	1.71	79.9	86.4	6.5	83.6	90.1	6.5	55	13	0.2%	-0.04	-0.04	0.0	0.1	0.3	0.2	0.0	0.3	0.3	47	2	0.0%	DK
DE	1.53	1.63	1.58	79.0	86.0	7.0	83.8	90.0	6.2	1631	236	0.4%	0.00	-0.04	0.0	-0.4	0.0	0.4	-0.2	0.1	0.3	1349	22	0.1%	DE
EE	1.57	1.73	1.69	74.3	84.1	9.8	83.0	89.8	6.8	45	4	0.3%	0.08	0.03	0.0	-0.6	-0.2	0.4	-0.4	-0.1	0.3	43	1	0.2%	EE
IE	1.60	1.69	1.65	80.8	86.9	6.1	84.6	90.6	6.0	93	12	0.3%	-0.20	-0.12	-0.2	-0.2	0.1	0.3	-0.1	0.2	0.3	60	1	0.0%	IE
EL	1.41	1.55	1.48	78.8	86.5	7.7	84.2	90.4	6.2	22	20	0.1%	0.06	0.01	0.0	-0.7	0.1	0.8	-0.4	0.1	0.5	10	-6	-0.1%	EL
ES	1.19	1.42	1.31	80.8	87.1	6.3	86.5	91.5	5.0	677	194	0.5%	-0.10	-0.07	-0.1	-0.5	0.0	0.5	-0.3	0.1	0.4	399	25	0.1%	ES
FR	1.82	1.79	1.80	79.7	86.7	7.0	85.9	91.3	5.4	275	99	0.1%	-0.02	-0.05	0.0	-0.6	0.0	0.6	-0.6	-0.1	0.5	204	18	0.0%	FR
HR	1.49	1.59	1.54	74.9	84.2	9.3	81.2	88.9	7.7	14	10	0.2%	0.04	0.00	0.0	-0.8	-0.1	0.7	-0.7	0.1	0.8	19	4	0.1%	HR
IT	1.24	1.45	1.35	81.1	87.1	6.0	85.5	91.0	5.5	348	240	0.4%	-0.10	-0.07	-0.1	-0.4	0.1	0.5	-0.4	0.1	0.5	154	34	0.1%	IT
CY	1.37	1.51	1.44	80.5	86.8	6.3	84.6	90.3	5.7	18	2	0.2%	0.02	-0.02	0.0	-0.5	0.2	0.7	-0.6	0.1	0.7	14	0	-0.1%	CY
LV	1.53	1.70	1.64	70.3	82.5	12.2	79.8	88.4	8.6	33	2	-0.1%	-0.07	-0.01	0.0	-0.8	-0.1	0.7	-0.7	-0.1	0.6	40	1	0.2%	LV
LT	1.44	1.65	1.56	70.8	82.8	12.0	80.5	88.9	8.4	82	6	0.1%	-0.17	-0.05	-0.1	-0.9	-0.1	0.8	-0.8	0.1	0.9	86	3	0.3%	LT
LU	1.38	1.56	1.48	80.7	86.9	6.2	85.0	90.8	5.8	15	4	0.7%	0.02	0.01	0.0	0.2	0.3	0.1	-0.2	0.0	0.2	10	1	0.3%	LU
HU	1.62	1.72	1.69	72.5	83.6	11.1	79.3	88.5	9.2	48	26	0.3%	0.09	0.02	0.0	-1.0	0.0	1.0	-1.0	0.0	1.0	22	2	0.0%	HU
MT	1.15	1.49	1.36	80.9	87.0	6.1	84.6	90.8	6.2	11	4	1.0%	-0.02	0.02	0.0	0.1	0.2	0.1	-0.2	0.2	0.4	2	0	0.2%	MT
NL	1.53	1.63	1.59	80.3	86.7	6.4	83.6	90.0	6.4	235	42	0.3%	-0.05	-0.05	0.0	-0.5	0.1	0.6	-0.3	0.1	0.4	182	9	0.1%	NL
AT	1.44	1.57	1.51	79.5	86.3	6.8	84.2	90.2	6.0	104	35	0.4%	-0.02	-0.03	0.0	-0.5	0.0	0.5	-0.4	0.0	0.4	76	9	0.1%	AT
PL	1.39	1.61	1.53	73.2	84.1	10.9	81.3	89.5	8.2	1001	69	0.2%	0.04	0.05	0.1	-1.5	-0.2	1.3	-1.2	0.0	1.2	982	-3	0.0%	PL
PT	1.41	1.55	1.48	79.6	86.9	7.3	85.0	90.4	5.4	82	39	0.3%	-0.03	-0.04	0.0	0.7	1.2	0.5	0.0	0.0	0.0	64	20	0.1%	PT
RO	1.81	1.77	1.79	70.9	83.3	12.4	78.6	88.5	9.9	79	28	0.0%	0.19	0.03	0.1	-1.7	-0.2	1.5	-1.3	0.0	1.3	143	7	0.1%	RO
SI	1.59	1.69	1.65	78.5	86.0	7.5	84.4	90.5	6.1	15	6	0.3%	0.04	0.01	0.0	-0.5	0.1	0.6	-0.4	0.1	0.5	7	1	0.1%	SI
SK	1.60	1.66	1.63	73.4	84.1	10.7	80.4	89.1	8.7	96	8	0.1%	0.02	-0.01	0.0	-1.3	0.0	1.3	-1.1	0.1	1.2	92	0	0.0%	SK
FI	1.39	1.53	1.47	79.0	86.1	7.1	84.1	90.4	6.3	77	13	0.3%	0.05	0.00	0.0	-0.6	0.0	0.6	-0.9	0.0	0.9	64	0	0.0%	FI
SE	1.68	1.76	1.74	81.5	87.0	5.5	85.4	90.7	5.3	99	32	0.4%	-0.03	-0.03	0.0	0.0	0.2	0.2	0.5	0.4	-0.1	36	2	0.0%	SE
NO	1.47	1.60	1.54	82.1	87.3	5.2	85.1	90.7	5.6	36	26	0.4%	-0.06	-0.05	-0.1	0.6	0.4	-0.2	0.2	0.4	0.2	8	3	0.0%	NO
EA	1.48	1.60	1.54	79.6	86.5	6.9	84.8	90.7	5.8	3990	1002	0.3%	-0.04	-0.05	0.0	-0.5	0.0	0.6	-0.4	0.0	0.4	2960	152	0.1%	EA
EU	1.50	1.62	1.57	78.4	86.1	7.7	84.0	90.4	6.4	5902	1212	0.3%	-0.02	-0.03	0.0	-0.6	0.0	0.7	-0.5	0.0	0.5	4796	175	0.1%	EU

(1) Net migration as % of total population in the previous year.

Source: European Commission, EPC.

Table 4: **Labour force projections: 2024 Ageing Report and changes compared to 2021 Ageing Report**

	2024 Ageing Report															2024 Ageing Report - 2021 Ageing Report															
	Employment rate (%)						Participation rate (%)						Unemployment rate (%)			Employment rate (pps)						Participation rate (pps)						Unemployment rate (pps)			
	(20-64y)			(55-64y)			(20-64y)			(55-64y)			(20-64y)			(20-64y)			(55-64y)			(20-64y)			(55-64y)			(20-64y)			
	2022	2070	pps change	2022	2070	pps change	2022	2070	pps change	2022	2070	pps change	2022	2070	pps change	2022	2070	pps diff	2022	2070	pps diff	2022	2070	pps diff	2022	2070	pps diff	2022	2070	pps diff	
BE	72.1	75.8	3.7	56.9	67.8	10.9	76.1	80.3	4.1	59.1	70.6	11.5	5.3	5.6	0.3	0.8	4.8	4.0	-1.1	6.9	8.0	0.2	4.6	4.4	-1.9	6.6	8.4	-0.8	-0.6	0.2	BE
BG	75.8	76.6	0.8	68.5	70.5	2.0	79.1	80.5	1.3	71.0	73.5	2.5	4.2	4.9	0.6	1.5	3.1	1.6	6.8	6.1	-0.7	0.9	2.9	2.0	6.3	5.8	-0.5	-0.8	-0.4	0.4	BG
CZ	81.3	79.4	-1.9	73.2	73.2	0.0	83.1	81.5	-1.6	74.7	75.0	0.3	2.2	2.6	0.5	2.2	0.9	-1.3	8.6	4.9	-3.7	1.0	0.2	-0.8	7.7	4.3	-3.3	-1.4	-0.9	0.6	CZ
DK	80.2	84.8	4.6	73.3	84.3	11.0	83.6	88.0	4.4	75.5	86.6	11.1	4.1	3.6	-0.5	1.6	3.9	2.3	0.8	4.6	3.8	1.1	4.3	3.2	0.5	5.0	4.5	-0.7	0.3	1.0	DK
DE	80.7	81.9	1.2	73.3	75.2	2.0	83.3	85.2	1.9	75.3	77.9	2.6	3.1	3.8	0.8	0.5	1.2	0.7	1.5	1.9	0.4	0.3	1.0	0.7	1.4	1.8	0.4	-0.2	-0.2	0.0	DE
EE	81.8	86.1	4.3	73.4	85.0	11.6	86.5	91.7	5.1	77.1	89.7	12.6	5.4	6.0	0.6	2.5	3.6	1.1	3.7	2.3	-1.4	2.4	3.7	1.2	3.4	2.1	-1.4	-0.2	-0.2	0.1	EE
IE	78.2	81.3	3.1	66.7	71.6	4.9	81.6	85.8	4.3	69.0	74.8	5.8	4.2	5.3	1.2	4.0	5.4	1.4	5.2	4.7	-0.5	2.4	4.8	2.3	4.4	4.4	0.0	-2.1	-1.1	1.0	IE
EL	66.1	74.7	8.6	52.2	74.5	22.3	75.4	79.9	4.5	57.4	78.2	20.8	12.4	6.5	-5.8	2.6	-1.8	-4.4	4.8	-1.9	-6.7	0.5	-2.3	-2.8	3.6	-2.6	-6.2	-2.9	-0.4	2.5	EL
ES	69.6	76.4	6.8	57.6	72.9	15.2	79.6	81.6	2.0	65.4	77.5	12.1	12.6	6.4	-6.2	1.5	0.1	-1.4	3.8	-0.8	-4.6	-0.7	-0.9	-0.2	-0.5	-1.2	-0.7	-3.6	-1.2	2.4	ES
FR	74.0	79.0	5.0	56.9	71.9	14.9	79.6	84.3	4.7	60.4	75.9	15.5	7.0	6.3	-0.7	2.8	4.5	1.6	2.6	8.6	6.0	1.3	4.4	3.1	1.7	8.9	7.2	-2.1	-0.5	1.6	FR
HR	70.0	76.1	6.1	50.4	62.3	11.9	74.9	81.2	6.2	53.0	65.4	12.4	6.6	6.3	-0.3	2.3	6.4	4.2	5.1	9.8	4.7	2.3	6.6	4.3	6.0	10.9	4.9	-0.1	-0.4	-0.2	HR
IT	64.8	71.3	6.5	55.1	73.3	18.2	70.4	76.3	5.8	57.9	76.3	18.4	8.0	6.4	-1.5	0.1	1.6	1.4	-4.7	0.1	4.8	-1.2	1.4	2.6	-5.3	0.4	5.7	-1.8	-0.3	1.4	IT
CY	77.5	80.8	3.3	64.6	72.5	7.9	83.2	86.1	3.0	68.0	76.1	8.1	6.8	6.2	-0.6	1.7	0.7	-1.0	5.0	-2.9	-7.9	1.2	0.3	-0.9	4.2	-4.0	-8.2	-0.7	-0.5	0.2	CY
LV	77.0	78.0	1.0	69.5	70.6	1.1	82.7	83.3	0.6	73.7	74.6	0.9	6.9	6.5	-0.5	1.3	0.6	-0.7	6.1	5.9	-0.3	0.4	0.3	0.0	4.7	5.1	0.4	-1.1	-0.4	0.8	LV
LT	79.1	79.8	0.8	70.1	70.3	0.1	84.2	85.4	1.2	75.3	75.7	0.4	6.1	6.5	0.4	2.1	-0.6	-2.8	8.2	1.2	-7.0	1.5	-1.0	-2.5	8.3	1.2	-7.1	-0.9	-0.4	0.5	LT
LU	74.5	74.5	0.0	46.3	50.2	4.0	77.6	78.4	0.8	48.4	53.3	4.9	4.0	5.0	1.0	1.2	0.4	-0.8	2.9	6.7	3.7	0.1	0.8	0.7	3.1	8.1	5.0	-1.4	0.5	2.0	LU
HU	80.3	83.6	3.3	65.9	75.5	9.6	83.2	86.6	3.4	68.0	77.8	9.8	3.5	3.5	-0.1	3.4	1.7	-1.7	0.1	-5.9	-6.1	1.8	1.4	-0.5	-0.3	-5.8	-5.5	-2.0	-0.5	1.5	HU
MT	81.0	83.5	2.5	54.3	70.0	15.7	83.3	87.0	3.8	55.3	71.8	16.5	2.7	4.0	1.3	2.2	0.8	-1.4	2.0	2.5	0.4	1.3	1.0	-0.2	1.8	2.6	0.8	-1.2	0.2	1.5	MT
NL	82.9	87.7	4.8	73.1	81.6	8.4	85.4	90.4	5.0	75.3	84.2	8.9	2.9	3.0	0.1	4.0	6.9	2.9	4.8	6.9	2.1	2.9	5.8	3.0	3.5	5.6	2.1	-1.5	-1.5	0.0	NL
AT	77.3	81.4	4.2	56.5	67.1	10.7	80.9	85.1	4.1	58.6	69.4	10.7	4.5	4.3	-0.2	0.7	1.9	1.2	1.8	5.1	3.3	0.7	2.2	1.5	2.0	5.5	3.5	0.0	0.2	0.2	AT
PL	76.9	76.9	0.1	56.8	60.7	3.9	79.1	79.3	0.2	57.8	61.9	4.1	2.9	3.0	0.1	3.4	4.9	1.4	5.6	7.6	2.0	2.3	3.5	1.2	5.0	6.7	1.8	-1.6	-2.0	-0.4	PL
PT	77.6	80.7	3.1	65.8	76.4	10.6	82.5	86.1	3.6	69.3	80.6	11.3	5.9	6.2	0.3	0.8	0.3	-0.5	4.0	2.6	-1.3	0.6	0.4	-0.3	3.5	2.2	-1.3	-0.3	0.0	0.3	PT
RO	68.3	68.3	0.0	46.8	56.3	9.4	72.1	72.5	0.4	48.6	58.5	9.9	5.2	5.8	0.6	-3.0	-4.4	-1.4	-4.0	0.6	4.6	-3.0	-3.5	-0.5	-3.9	1.3	5.2	0.2	1.4	1.3	RO
SI	78.3	80.6	2.3	55.1	72.4	17.3	81.4	85.4	4.0	57.3	76.6	19.4	3.9	5.7	1.8	0.8	2.3	1.4	1.4	11.7	10.3	-0.1	2.4	2.5	0.4	12.1	11.7	-1.2	0.0	1.2	SI
SK	76.8	79.7	2.9	64.0	79.2	15.2	81.7	84.8	3.1	67.1	82.8	15.7	6.0	6.0	0.1	3.8	8.4	4.6	8.0	22.9	14.9	3.5	8.4	4.9	7.6	23.1	15.5	-0.7	-0.6	0.1	SK
FI	78.3	80.3	2.0	71.5	77.2	5.8	83.7	85.6	1.9	77.0	83.1	6.0	6.4	6.2	-0.2	1.0	0.6	-0.4	4.8	1.3	-3.6	1.1	0.6	-0.5	5.6	1.7	-3.9	0.0	0.0	0.0	FI
SE	82.3	84.2	1.9	77.8	82.4	4.6	87.8	89.1	1.3	82.2	86.5	4.3	6.3	5.5	-0.8	0.9	1.2	0.3	1.9	6.3	4.5	0.2	2.0	1.8	1.8	7.6	5.7	-0.7	0.8	1.6	SE
NO	80.8	82.0	1.3	74.5	72.1	-2.4	83.0	84.5	1.5	75.5	73.2	-2.3	2.7	3.0	0.3	1.7	3.3	1.6	2.2	2.9	0.6	0.8	3.3	2.5	1.9	2.9	1.0	-1.2	-0.1	1.1	NO
EA	74.1	78.6	4.6	62.5	73.5	11.0	79.3	83.1	3.8	65.9	76.9	11.0	6.6	5.4	-1.2	1.6	2.4	0.8	0.8	3.3	2.5	0.4	2.1	1.7	0.1	3.3	3.2	-1.5	-0.4	1.1	EA
EU	74.7	78.5	3.8	62.3	72.3	10.0	79.4	82.7	3.3	65.4	75.5	10.1	5.9	5.1	-0.9	1.6	2.3	0.7	1.4	3.6	2.2	0.5	2.0	1.5	0.8	3.6	2.8	-1.4	-0.4	1.0	EU

Source: European Commission, EPC.

Table 5: **GDP projections: 2024 Ageing Report and changes compared to 2021 Ageing Report**

	2024 Ageing Report										2024 Ageing Report - 2021 Ageing Report										
	Average real GDP growth (2022-2070)										**Average real GDP growth (2022-2070; pps)**										
		Labour productivity (GDP per hour worked)			**Labour input** (hours worked)					Real GDP per capita growth		**Labour productivity** (GDP per hour worked)			**Labour input** (hours worked)					Real GDP per capita growth	
			TFP	Capital deepening	*change in:*	Population	Employment rate	Working-age population share	Average hours worked				TFP	Capital deepening	*change in:*	Population	Employment rate	Working-age population share	Average hours worked		
	1=2+5	*2=3+4*	3	4	*5= 6+7+8+9*	6	7	8	9	10=1-6	**1=2+5**	*2=3+4*	3	4	*5= 6+7+8+9*	6	7	8	9	10=1-6	
BE	**1.3**	*1.1*	0.7	0.4	*0.2*	0.2	0.1	-0.1	0.0	1.1	**0.1**	*-0.2*	-0.1	-0.1	*0.3*	0.1	0.1	0.0	0.0	0.0	BE
BG	**1.4**	*2.2*	1.4	0.8	*-0.7*	-0.5	0.1	-0.3	0.0	2.0	**0.2**	*0.0*	0.0	0.0	*0.2*	0.1	0.1	0.0	0.0	0.1	BG
CZ	**1.5**	*1.7*	1.1	0.6	*-0.2*	0.0	0.0	-0.2	0.0	1.5	**-0.1**	*-0.3*	-0.2	-0.1	*0.2*	0.1	0.0	0.0	0.0	-0.2	CZ
DK	**1.3**	*1.3*	0.8	0.5	*0.1*	0.1	0.1	-0.2	0.0	1.2	**-0.3**	*-0.2*	-0.2	0.0	*-0.1*	0.0	-0.1	0.0	0.0	-0.3	DK
DE	**1.1**	*1.3*	0.8	0.4	*-0.1*	0.0	0.0	-0.2	0.0	1.1	**-0.1**	*-0.2*	-0.1	-0.1	*0.1*	0.1	0.0	0.0	0.0	-0.2	DE
EE	**1.6**	*1.6*	1.0	0.6	*0.0*	0.0	0.2	-0.2	0.0	1.6	**-0.2**	*-0.5*	-0.3	-0.2	*0.3*	0.2	0.0	0.0	0.1	-0.4	EE
IE	**2.1**	*1.8*	1.4	0.4	*0.3*	0.4	0.0	-0.1	0.0	1.7	**0.4**	*0.3*	0.3	0.0	*0.1*	-0.1	0.2	0.0	0.0	0.5	IE
EL	**1.1**	*1.6*	1.1	0.5	*-0.6*	-0.6	0.3	-0.3	0.0	1.7	**-0.3**	*0.0*	0.0	0.0	*-0.3*	-0.2	0.0	0.0	0.0	-0.1	EL
ES	**1.2**	*1.3*	0.8	0.5	*-0.1*	0.0	0.1	-0.2	0.0	1.2	**-0.2**	*-0.2*	-0.2	-0.1	*0.0*	0.0	-0.1	0.0	0.0	-0.3	ES
FR	**1.1**	*1.0*	0.7	0.4	*0.1*	0.1	0.2	-0.2	0.0	1.1	**-0.2**	*-0.3*	-0.2	-0.1	*0.1*	0.0	0.0	0.0	0.0	-0.2	FR
HR	**1.5**	*1.9*	1.2	0.7	*-0.4*	-0.6	0.3	-0.2	0.0	2.0	**0.4**	*0.0*	0.1	0.0	*0.4*	0.0	0.3	0.0	0.0	0.4	HR
IT	**1.1**	*1.2*	0.8	0.4	*-0.1*	-0.2	0.3	-0.2	0.0	1.3	**0.0**	*-0.2*	-0.1	-0.1	*0.2*	0.0	0.1	0.0	0.0	0.0	IT
CY	**1.6**	*1.5*	0.9	0.6	*0.1*	0.2	0.1	-0.2	0.0	1.4	**-0.3**	*0.0*	0.0	0.0	*-0.3*	-0.2	-0.1	0.0	0.0	-0.1	CY
LV	**1.1**	*2.1*	1.3	0.8	*-1.0*	-0.8	0.1	-0.2	0.0	1.9	**-0.1**	*-0.2*	-0.1	-0.1	*0.1*	0.1	0.0	0.0	0.0	-0.2	LV
LT	**1.1**	*2.1*	1.2	0.9	*-1.0*	-0.7	-0.1	-0.3	0.0	1.7	**0.0**	*-0.1*	-0.1	0.0	*0.1*	0.2	-0.1	0.0	0.0	-0.2	LT
LU	**1.8**	*0.9*	0.6	0.3	*0.8*	0.9	0.1	-0.2	0.0	0.9	**-0.1**	*-0.3*	-0.2	-0.1	*0.2*	0.4	-0.2	0.0	0.0	-0.5	LU
HU	**1.7**	*2.0*	1.3	0.8	*-0.3*	-0.2	0.1	-0.2	-0.1	1.9	**0.0**	*0.0*	0.0	0.0	*0.0*	0.0	0.0	0.0	-0.1	0.0	HU
MT	**2.1**	*1.6*	1.0	0.6	*0.5*	0.9	0.0	-0.3	-0.1	1.2	**0.0**	*-0.2*	-0.2	-0.1	*0.2*	0.3	-0.1	0.0	0.0	-0.3	MT
NL	**1.3**	*1.1*	0.7	0.4	*0.2*	0.1	0.2	-0.2	0.0	1.2	**0.0**	*-0.3*	-0.2	-0.1	*0.3*	0.1	0.2	0.0	0.0	-0.1	NL
AT	**1.3**	*1.2*	0.8	0.4	*0.0*	0.1	0.1	-0.2	0.0	1.1	**-0.1**	*-0.2*	-0.1	-0.1	*0.1*	0.1	0.1	0.0	0.0	-0.1	AT
PL	**1.5**	*2.2*	1.4	0.8	*-0.7*	-0.3	0.0	-0.3	0.0	1.8	**0.0**	*-0.1*	-0.1	0.0	*0.1*	0.1	0.1	0.0	0.0	0.0	PL
PT	**1.2**	*1.7*	1.1	0.5	*-0.4*	-0.3	0.1	-0.3	0.0	1.5	**0.1**	*-0.1*	0.0	-0.1	*0.2*	0.1	0.0	0.0	0.0	0.0	PT
RO	**1.7**	*2.4*	1.4	1.0	*-0.7*	-0.5	0.0	-0.2	0.0	2.2	**0.1**	*-0.1*	-0.1	0.0	*0.2*	0.2	0.0	0.0	0.0	-0.1	RO
SI	**1.6**	*1.7*	1.2	0.6	*-0.1*	-0.1	0.2	-0.2	0.0	1.7	**0.0**	*-0.2*	-0.1	-0.1	*0.2*	0.1	0.1	0.0	0.0	-0.1	SI
SK	**1.4**	*2.0*	1.2	0.7	*-0.5*	-0.3	0.1	-0.3	0.0	1.7	**0.1**	*-0.1*	-0.1	-0.1	*0.2*	0.1	0.2	0.0	0.0	0.1	SK
FI	**1.1**	*1.3*	0.8	0.5	*-0.2*	-0.1	0.1	-0.2	0.0	1.2	**-0.1**	*-0.2*	-0.1	-0.1	*0.1*	0.1	0.0	0.0	0.0	-0.2	FI
SE	**1.6**	*1.2*	0.8	0.4	*0.4*	0.4	0.1	-0.1	0.0	1.2	**-0.2**	*-0.2*	-0.1	0.0	*0.0*	0.0	0.0	0.0	0.0	-0.2	SE
NO	**1.5**	*1.2*	0.8	0.4	*0.3*	0.4	0.1	-0.1	0.0	1.1	**-0.2**	*-0.3*	-0.2	-0.1	*0.1*	-0.1	0.1	0.0	0.0	-0.1	NO
EA	**1.2**	*1.3*	0.9	0.4	*-0.1*	0.0	0.1	-0.2	0.0	1.2	**-0.1**	*-0.2*	-0.1	-0.1	*0.1*	0.0	0.0	0.0	0.0	-0.1	EA
EU	**1.3**	*1.4*	0.9	0.5	*-0.2*	-0.1	0.1	-0.2	0.0	1.3	**-0.1**	*-0.2*	-0.1	-0.1	*0.1*	0.0	0.0	0.0	0.0	-0.1	EU

GDP growth is potential growth, which coincides with actual growth as of 2027 in the projections (see Part 1 – Chapter 3).

Source: European Commission, EPC.

Part I

Underlying assumptions

1. DEMOGRAPHIC PROJECTIONS

1.1. INTRODUCTION

EUROPOP2023, the 2022-based population projections, was released by Eurostat in March 2023. It provides the demographic basis for the age-related expenditure projections in the 2024 Ageing Report for the 27 EU Member States and Norway. The assumptions on fertility, mortality and net migration underlying the projections for the period 2022-2100, as well as the underlying methodologies used can be found on the Eurostat dedicated website. ([1]) National statistical institutes collaborated with Eurostat for the data collection and had the opportunity to make methodological suggestions during the preparation of these population projections. ([2])

EUROPOP2023 applies a 'partial convergence' approach, meaning that the country-specific key demographic determinants converge in the very long term towards common values. Setting the convergence point far into the future – even beyond the endpoint of the projections – has the advantage of taking due account of recent country-specific trends at the start, while at the same time assuming that Member States' demographic drivers will converge over time. These demographic determinants are the fertility rate (impacting the number of births), the mortality rate (impacting the number of deaths) and net migration (the population growth beyond the 'natural' growth due to births and deaths) derived from converging emigration rates and per capita immigration levels.

The projection methodology assumes that fertility and mortality rates converge to those of the 'best performing' Member States. As a result, fertility rates would rise in almost all Member States between 2022 and 2070, faster in the countries that currently have the lowest rates. Similarly, life expectancy follows an upward convergence trajectory, with longevity increasing relatively faster in countries with currently the lowest levels of life expectancy.

Net migration is estimated through separate emigration and immigration flows, based on past trends, the latest empirical evidence, long-term partial convergence and intra-EU flows consistency. Moreover, when the working-age population shrinks, additional 'partially compensating' immigration is assumed. For this exercise, specific assumptions are made on the impact of displaced persons from Ukraine (see Box I.1.1).

1.2. DEVELOPMENTS AND ASSUMPTIONS FOR FERTILITY RATES

The total fertility rate is assumed to rise in almost all Member States between 2022 and 2070, increasing from 1.50 to 1.62 on average in the EU.

1.2.1. Past trends

Total fertility rates (TFR ([3])) declined sharply in the EU Member States following the post-war 'baby boom'. From an EU average of 2.59 in 1960, the number of live births per woman declined steadily in nearly all countries, to less than two children on average in 1980, thus below the natural replacement rate of 2.10 (see Table I.1.1). By 1980, fertility had fallen to 1.60 or less in Denmark, Germany, Luxembourg, and the Netherlands.

([1]) For the methodology, see Eurostat (2023).
([2]) This does not preclude national statistical institutes having different population projections based on their own assumptions and methodologies.
([3]) Fertility rates reflect the average number of children a woman would have, should she, at each childbearing age, have the fertility rates of the year under review. This number is obtained by summing the fertility rates by age and is called the Total Fertility Rate or TFR.

By the mid-1990s, fertility rates had fallen below the natural replacement rate in all Member States. In 2000, fertility rates were below 1.40 in fifteen Member States, with women in Czechia, Spain and Latvia giving birth to just 1.20 children on average.

The total fertility rate in the EU seemed to have reached its nadir by the turn of the century, hovering around 1.50 since then. The average masks nonetheless diverse developments among Member States. Fertility increased in all but five Member States in the 2000s. Since 2010, the trend has reversed again in several cases, with decreases in 17 Member States. Since 2000, the largest declines were in Malta, Luxembourg, Finland, and Cyprus, with a decline in the TFR of 0.30-0.60 live births per woman. Conversely, Czechia, Romania, Slovenia, Slovakia, Latvia, Bulgaria, Hungary, and Estonia saw increases of 0.30-0.70 in their fertility rates during the same period.

In 2021, France, Czechia, Romania, and Ireland had the highest fertility rates, at around 1.80. At 1.13 children per woman, Malta had the lowest fertility rate in 2021, followed by 1.19 in Spain, 1.33 in Poland and 1.25 in Italy.

Table I.1.1: **Past trends in total fertility rates (TFR), 1960-2021**

	1960	1980	2000	2021	*1960-2021*	*2000-2021*
BE	2.54	1.68	1.67	1.60	*-1.0*	*-0.1*
BG	2.31	2.05	1.26	1.58	*-0.8*	*0.3*
CZ	2.09	2.08	1.15	1.83	*-0.4*	*0.7*
DK	2.57	1.55	1.77	1.72	*-0.9*	*-0.1*
DE	2.37	1.56	1.38	1.58	*-0.8*	*0.2*
EE	1.98	2.02	1.36	1.61	*-0.4*	*0.3*
IE	3.78	3.21	1.89	1.78	*-2.2*	*-0.1*
EL	2.23	2.23	1.25	1.43	*-0.8*	*0.2*
ES	2.86	2.22	1.22	1.19	*-1.7*	*0.0*
FR	2.73	1.95	1.89	1.84	*-0.9*	*0.0*
HR	2.38	1.90	1.46	1.58	*-0.9*	*0.1*
IT	2.40	1.64	1.26	1.25	*-1.2*	*0.0*
CY	3.51	2.48	1.64	1.39	*-2.2*	*-0.3*
LV	1.95	1.88	1.25	1.57	*-0.4*	*0.3*
LT	2.60	1.99	1.39	1.36	*-1.1*	*0.0*
LU	2.29	1.50	1.76	1.38	*-0.9*	*-0.4*
HU	2.02	1.91	1.32	1.61	*-0.4*	*0.3*
MT	3.62	1.99	1.68	1.13	*-2.5*	*-0.6*
NL	3.12	1.60	1.72	1.62	*-1.6*	*-0.1*
AT	2.69	1.65	1.36	1.48	*-1.3*	*0.1*
PL	2.98	2.28	1.37	1.33	*-1.6*	*0.0*
PT	3.16	2.25	1.55	1.35	*-1.8*	*-0.2*
RO	2.74	2.43	1.31	1.81	*-0.9*	*0.5*
SI	2.18	2.11	1.26	1.64	*-0.6*	*0.4*
SK	3.04	2.32	1.30	1.63	*-1.5*	*0.3*
FI	2.72	1.63	1.73	1.46	*-1.4*	*-0.3*
SE	2.20	1.68	1.54	1.67	*-0.5*	*0.1*
NO	2.90	1.72	1.85	1.55	*-1.4*	*-0.3*
EA	2.59	1.83	1.47	1.51	*-1.1*	*0.0*
EU	2.62	1.92	1.46	1.54	*-1.1*	*0.1*

DE: time series does not include the former GDR until 1991. CY: 1980 value is from 1982; LV: 1960 based on UN data; RO: 1960 based on UN data; HR: 2000 value is from 2001.
Source: European Commission based on Eurostat data.

Table I.1.2: **Projection of total fertility rates (TFR) in EUROPOP2023, 2022-2070**

	2022	2030	2050	2070	*change 2022-2070*	*avg 2022-2070*
BE	1.53	1.55	1.60	1.64	*0.11*	*1.6*
BG	1.56	1.60	1.66	1.69	*0.13*	*1.6*
CZ	1.72	1.73	1.75	1.75	*0.04*	*1.7*
DK	1.68	1.69	1.72	1.73	*0.05*	*1.7*
DE	1.53	1.55	1.59	1.63	*0.09*	*1.6*
EE	1.57	1.64	1.71	1.73	*0.15*	*1.7*
IE	1.60	1.62	1.66	1.69	*0.09*	*1.6*
EL	1.41	1.44	1.50	1.55	*0.14*	*1.5*
ES	1.19	1.23	1.33	1.42	*0.23*	*1.3*
FR	1.82	1.81	1.80	1.79	*-0.03*	*1.8*
HR	1.49	1.51	1.55	1.59	*0.11*	*1.5*
IT	1.24	1.28	1.37	1.45	*0.21*	*1.4*
CY	1.37	1.40	1.46	1.51	*0.15*	*1.4*
LV	1.53	1.59	1.66	1.70	*0.16*	*1.6*
LT	1.44	1.49	1.59	1.65	*0.21*	*1.6*
LU	1.38	1.42	1.51	1.56	*0.19*	*1.5*
HU	1.62	1.67	1.71	1.72	*0.10*	*1.7*
MT	1.15	1.25	1.40	1.49	*0.33*	*1.4*
NL	1.53	1.55	1.60	1.63	*0.10*	*1.6*
AT	1.44	1.46	1.52	1.57	*0.13*	*1.5*
PL	1.39	1.45	1.56	1.61	*0.22*	*1.5*
PT	1.41	1.44	1.50	1.55	*0.14*	*1.5*
RO	1.81	1.80	1.78	1.77	*-0.03*	*1.8*
SI	1.59	1.62	1.67	1.69	*0.10*	*1.7*
SK	1.60	1.61	1.63	1.66	*0.06*	*1.6*
FI	1.39	1.42	1.48	1.53	*0.14*	*1.5*
SE	1.68	1.73	1.76	1.76	*0.08*	*1.7*
NO	1.47	1.49	1.55	1.60	*0.13*	*1.5*
EA	1.48	1.50	1.55	1.60	*0.12*	*1.5*
EU	1.50	1.53	1.58	1.62	*0.12*	*1.6*

Source: EUROPOP2023 (Eurostat).

1.2.2. Latest Eurostat population projections

The assumptions on future values of total fertility rates (TFR) are based on two components: a country-specific trend extrapolation and a convergence to an ultimate value. The trend extrapolation component is the only driver up to 2024, when the convergence component starts gaining weight. For EUROPOP2023, this ultimate convergence value equals 1.77 live births per woman, which is derived from projecting TFR of the EU frontrunners in fertility development, notably Ireland, Sweden, France, Denmark, Finland, Belgium, and the Netherlands. The year 2021 is excluded as base for projections due to the impact of the COVID-19 pandemic; the rate of 1.77 is thus derived from data for 2016 to 2020.

The fertility rate would rise from 1.50 in 2022 to 1.62 by 2070 for the EU (see Table I.1.2). It is projected to increase in all Member States, except for marginally decreases in France and Romania (Member States with the highest current and prospective TFR). Using a long-term anchor to which fertility rates converge (beyond the projection period) of 1.77 live births per woman implies that fertility in all countries would remain below the natural replacement rate over the entire projection period. The difference in fertility between the countries with the highest and lowest rates shrinks from 0.7 live births per woman in 2022 to 0.4 in 2070, with a minimum of 1.42 in Spain versus a maximum of 1.79 in France in 2070. Spain, Italy, Malta, Cyprus, Finland, Greece, Portugal, Luxembourg, Austria, and Croatia would have fertility rates below 1.60 in 2070.

1.3. DEVELOPMENTS AND ASSUMPTIONS FOR LIFE EXPECTANCY

The COVID-19 pandemic had a massive impact on mortality rates that led to drops or stagnation of life expectancy in all countries, though with significant differences among Member States. Following that impact, Eurostat demographic projections show increases in life expectancy both at birth and at the age of 65 for both males and females over the period 2022-2070. For the EU, life expectancy at birth would increase by 7.7 years for males and by 6.4 years for females, with the largest increases in Member States that currently have the lowest life expectancy.

1.3.1. Past trends

Life expectancy has been increasing in most developed countries for very long periods. Since 1960, there have been significant gains in life expectancy at birth in all EU Member States (see Table I.1.3). The average life expectancy at birth increased by more than 15 years between 1960 and 2021 in the EU, from 63.2 years in 1960 to 78.6 in 2021 for males, and from 68.3 years to 84.2 for females.

The gap between the average female and the average male life expectancies at birth rose from 5.1 years in 1960 to close to 7 years in 1980 and remained at that level until 2000, with diverging developments across Member States. Since 2000, the increase in life expectancy has been 2.7 years for females and 3.9 years for males, resulting in a narrowing of the longevity gap between the two sexes to 5.7 years in 2021.

The general trend of rising life expectancy and a smaller gap between the two sexes differs across countries. Between 1960 and 2021, females gained 12 years or more in life expectancy in Ireland, Spain, Italy, Luxembourg, Malta, Portugal, and Finland. Gains amounted to less than 7 years in Bulgaria, Latvia and Slovakia. Gains in male life expectancy over the same period exceeded 12 years in Belgium, Ireland, Spain, France, Italy, Luxembourg, Malta, Austria, Portugal, and Finland. Male longevity rose by at most 7 years in Bulgaria, Czechia, Latvia, Lithuania, Hungary, Poland, and Slovakia. ([4])

([4]) Cyprus and Romania also gained less than 7 years (for both men and women), but over a shorter period (1980-2021), see Table I.1.3.

Up to 2000, the gap between the two sexes widened compared to 1960 in almost all Member States, as gains in female life expectancy exceeded that for males. Looking at developments since 2000, the gap widened only in Bulgaria, Greece and Romania.

The COVID-19 pandemic has been having a massive impact on mortality since 2020. The pandemic led to drops or stagnation of life expectancy in all Member States, though the timing and impact was not uniform for all countries. In 2020, life expectancy decreased in all Member States but Denmark and Cyprus. It increased again in 10 Member States in 2021, though without exceeding its 2019 level in any Member State. While it was close to (not more than 0.2 years below) that level in Belgium, Denmark, Luxembourg, Finland, and Sweden, it was more than 2 years below the 2019 level in Bulgaria, Latvia, Lithuania, Hungary, Poland, Romania, and Slovakia. Following the temporary shock, the increasing trend of the past should resume.

Table I.1.3: **Past trends in life expectancy at birth, 1960-2021**

	Males						*Females*						
	1960	1980	2000	2021	*1960-2021* (1)	*2000-2021*	1960	1980	2000	2021	*1960-2021* (1)	*2000-2021*	
BE	66.8	69.9	74.6	79.4	*12.6*	*4.8*	72.8	76.7	81.0	84.3	*11.5*	*3.3*	BE
BG	67.5	68.4	68.4	68.0	*0.5*	*-0.4*	71.1	73.9	75.0	75.1	*4.0*	*0.1*	BG
CZ	67.8	66.9	71.6	74.1	*6.3*	*2.5*	73.5	74.0	78.5	80.5	*7.0*	*2.0*	CZ
DK	70.4	71.2	74.5	79.6	*9.2*	*5.1*	74.4	77.3	79.2	83.3	*8.9*	*4.1*	DK
DE	66.5	69.6	75.1	78.4	*11.9*	*3.3*	71.7	76.2	81.2	83.3	*11.6*	*2.1*	DE
EE	64.7	64.2	65.6	72.7	*8.0*	*7.1*	73.1	74.3	76.4	81.4	*8.3*	*5.0*	EE
IE	68.1	70.1	74.0	80.5	*12.4*	*6.5*	71.9	75.6	79.2	84.3	*12.4*	*5.1*	IE
EL	67.3	73.0	75.9	77.4	*10.1*	*1.5*	72.4	77.5	81.3	82.9	*10.5*	*1.6*	EL
ES	67.4	72.3	75.8	80.4	*13.0*	*4.6*	72.2	78.4	82.8	86.2	*14.0*	*3.4*	ES
FR	66.9	70.2	75.3	79.3	*12.4*	*4.0*	73.6	78.4	83.0	85.5	*11.9*	*2.5*	FR
HR	:	:	70.9	73.6	*:*	*2.7*	:	:	78.1	79.8	*:*	*1.7*	HR
IT	67.2	70.6	76.9	80.5	*13.3*	*3.6*	72.3	77.4	82.8	84.9	*12.6*	*2.1*	IT
CY	:	72.3	75.4	79.2	*6.9*	*3.8*	:	77.0	80.1	83.4	*6.4*	*3.3*	CY
LV	65.2	63.6	65.0	68.2	*3.0*	*3.2*	72.4	74.2	76.1	78.0	*5.6*	*1.9*	LV
LT	64.9	65.4	66.7	69.5	*4.6*	*2.8*	71.4	75.4	77.4	78.8	*7.4*	*1.4*	LT
LU	66.5	70.0	74.6	80.5	*14.0*	*5.9*	72.2	75.6	81.3	84.8	*12.6*	*3.5*	LU
HU	65.9	65.5	67.5	70.7	*4.8*	*3.2*	70.2	72.8	76.2	77.8	*7.6*	*1.6*	HU
MT	66.5	68.0	76.3	80.8	*14.3*	*4.5*	70.5	72.8	80.5	84.3	*13.8*	*3.8*	MT
NL	71.5	72.7	75.6	79.7	*8.2*	*4.1*	75.5	79.3	80.7	83.0	*7.5*	*2.3*	NL
AT	66.2	69.0	75.2	78.8	*12.6*	*3.6*	72.7	76.1	81.2	83.7	*11.0*	*2.5*	AT
PL	64.9	66.9	69.6	71.6	*6.7*	*2.0*	70.6	75.4	78.0	79.6	*9.0*	*1.6*	PL
PT	61.1	67.9	73.3	78.5	*17.4*	*5.2*	66.7	74.9	80.4	84.4	*17.7*	*4.0*	PT
RO	:	66.6	67.7	69.2	*2.6*	*1.5*	:	71.9	74.8	76.6	*4.7*	*1.8*	RO
SI	66.1	67.4	72.2	77.7	*11.6*	*5.5*	72.0	75.2	79.9	83.8	*11.8*	*3.9*	SI
SK	67.9	66.7	69.2	71.2	*3.3*	*2.0*	72.7	74.4	77.5	78.2	*5.5*	*0.7*	SK
FI	65.5	69.2	74.2	79.3	*13.8*	*5.1*	72.5	78.0	81.2	84.6	*12.1*	*3.4*	FI
SE	71.2	72.8	77.4	81.3	*10.1*	*3.9*	74.9	79.0	82.0	84.9	*10.0*	*2.9*	SE
NO	71.6	72.4	76.0	81.7	*10.1*	*5.7*	76.0	79.3	81.5	84.7	*8.7*	*3.2*	NO
EA	65.7	69.2	75.1	79.0	*13.3*	*3.9*	71.1	76.0	81.7	84.3	*13.2*	*2.6*	EA
EU	63.2	69.5	74.7	78.6	*15.3*	*3.9*	68.3	76.4	81.5	84.2	*16.0*	*2.7*	EU

(1) 1980-2021 for CY and RO.
HR: 2000 values are from 2001.
Source: European Commission based on Eurostat data.

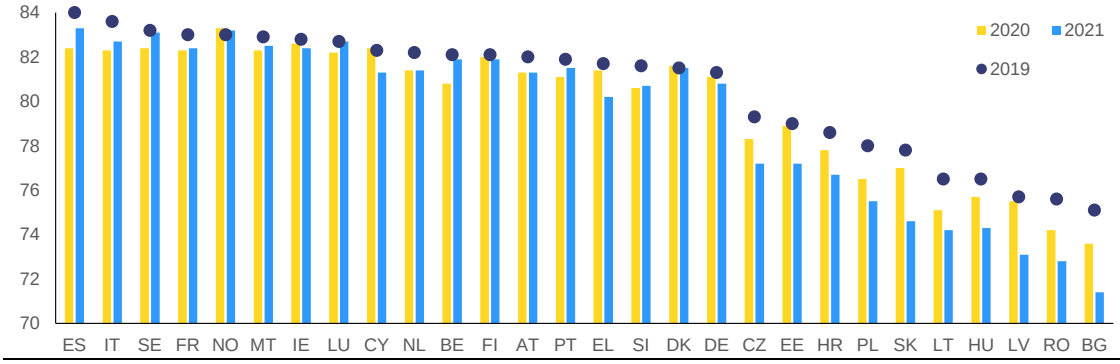
There is no consensus among demographers on very long-term trends, e.g. whether there is a natural biological limit to longevity, the impact of future medical breakthroughs or the long-term effect of public health programmes and societal behaviour such as the reduction of smoking rates or a higher prevalence of obesity.

On the one hand, most demographic projections by international and national statistical institutes assume that gains in life expectancy at birth will slow down compared with historical trends. This is because

mortality rates at younger ages are already very low and future gains in life expectancy would require improvements in mortality rates at older ages, which statistically have a smaller impact on life expectancy at birth.

On the other hand, the current wide range of life expectancies across EU Member States, also compared with developed non-EU countries, points to considerable scope for future gains. In 2021, life expectancy at birth for females ranged from 75.1 years in Bulgaria to 86.2 in Spain and from 68.0 years in Bulgaria to 81.3 in Sweden for males, corresponding to gaps of 11.1 and 13.3 years between the highest and lowest life expectancy in the EU.

Graph I.1.1: **Change in life expectancy at birth (2019-2021) – impact of COVID-19 pandemic**



Source: Eurostat.

1.3.2. Latest Eurostat population projections

The projected changes in life expectancy at birth and at the age of 65 for males and females underlying the 2022-based population projections are shown in Table I.1.4. The projections assume that increases in life expectancy at birth are sustained during the projection period, albeit with considerable diversity across Member States. ([5])

In the EU, life expectancy at birth for males is expected to increase by 7.7 years over the projection period, from 78.4 in 2022 to 86.1 in 2070. Female life expectancy at birth would rise by 6.4 years, from 84.0 in 2022 to 90.4 in 2070, leading to a further convergence between sexes. The largest increases in life expectancies at birth, for both males and females, are projected to take place in the Member States that currently have the lowest life expectancy.

In 2022, male life expectancy at birth was the lowest in Bulgaria, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, and Slovakia, ranging between 70 and 75 years. In these countries, male life expectancy would increase by 9-12 years by 2070. For females, gains in life expectancy of 8-10 years are expected in Bulgaria, Latvia, Lithuania, Hungary, Poland, Romania, and Slovakia, from a life expectancy of around 80 years in 2022. As a result of this catching-up, the difference between the countries with the highest and the lowest life expectancy would narrow from 11.2 and 8.8 years in 2022 for men and women, respectively, to 4.6 and 3.8 years in 2070.

([5]) Mortality patterns are assumed to partially converge from the latest observed values towards a common (sex-specific) life table (the 'ultimate' life table), which incorporates some information from previous mortality trends of selected countries. The initial mortality patterns are derived from the period-cohort age- and sex-specific deaths reported by the country for the last years. In light of the impact of the COVID-19 pandemic, the assumptions formulated for mortality are based on the idea that in 2022 and 2023 the mortality rates have not completely aligned with levels observed before the pandemic but that they will fully return to that level by 2024. This means that for 2022, age- and sex-specific mortality rates are derived from the averages of the years 2018 to 2021, while those of 2024 are based on age- and sex-specific mortality rates from 2018 and 2019. 2023 rates are derived as their average. See https://ec.europa.eu/eurostat/cache/metadata/en/proj_23n_esms.htm.

When looking at the remaining life expectancy at the age of 65, average increases of 5.3 and 5.0 years are expected respectively for males and females in the EU over the projection period, implying a more modest narrowing of the gap between the two sexes than for life expectancy at birth.

By 2070, male life expectancy at 65 is expected to increase by 7 to 8 years in Bulgaria, Latvia, Lithuania, Hungary, Poland, Romania, and Slovakia. In these countries, remaining life expectancy at the age of 65 was 15 years or less in 2022, compared with an EU average of around 18 years. Gains of more than 6 years are projected for females aged 65 in the same countries. In 2022, female life expectancy at 65 was less than 20 years in these countries, compared to 21.8 years on average in the EU.

Table I.1.4: **Projection of life expectancy at birth and at 65, 2022-2070**

	Life expectancy at birth								*Life expectancy at 65*								
	Males				Females				Males				Females				
	2022	2050	2070	*change 2022-70*	2022	2050	2070	*change 2022-70*	2022	2050	2070	*change 2022-70*	2022	2050	2070	*change 2022-70*	
BE	79.5	83.8	86.4	*6.9*	84.6	88.2	90.5	*5.9*	18.7	21.7	23.6	*4.9*	22.3	25.1	26.9	*4.6*	BE
BG	70.5	78.5	82.8	*12.3*	77.7	84.2	87.7	*10.0*	13.5	18.5	21.3	*7.8*	17.5	22.0	24.6	*7.1*	BG
CZ	75.9	81.6	84.8	*8.9*	81.9	86.6	89.2	*7.3*	15.9	20.0	22.4	*6.5*	19.7	23.5	25.7	*6.0*	CZ
DK	79.9	83.8	86.4	*6.5*	83.6	87.7	90.1	*6.5*	18.7	21.5	23.4	*4.7*	21.3	24.5	26.5	*5.2*	DK
DE	79.0	83.3	86.0	*7.0*	83.8	87.6	90.0	*6.2*	18.3	21.3	23.3	*5.0*	21.5	24.4	26.4	*4.9*	DE
EE	74.3	80.4	84.1	*9.8*	83.0	87.2	89.8	*6.8*	15.8	19.7	22.2	*6.4*	20.9	24.2	26.3	*5.4*	EE
IE	80.8	84.5	86.9	*6.1*	84.6	88.3	90.6	*6.0*	19.4	22.1	23.9	*4.5*	22.1	25.0	27.0	*4.9*	IE
EL	78.8	83.7	86.5	*7.7*	84.2	88.1	90.4	*6.2*	18.7	22.0	23.9	*5.2*	21.7	24.8	26.7	*5.0*	EL
ES	80.8	84.8	87.1	*6.3*	86.5	89.7	91.5	*5.0*	19.5	22.4	24.1	*4.6*	23.6	26.2	27.7	*4.1*	ES
FR	79.7	84.1	86.7	*7.0*	85.9	89.3	91.3	*5.4*	19.7	22.4	24.1	*4.4*	23.8	26.2	27.7	*3.9*	FR
HR	74.9	80.8	84.2	*9.3*	81.2	86.1	88.9	*7.7*	15.6	19.5	22.0	*6.4*	19.3	23.0	25.3	*6.0*	HR
IT	81.1	85.0	87.1	*6.0*	85.5	89.0	91.0	*5.5*	19.5	22.3	24.0	*4.5*	22.7	25.5	27.2	*4.5*	IT
CY	80.5	84.4	86.8	*6.3*	84.6	88.1	90.3	*5.7*	19.1	21.9	23.7	*4.6*	21.8	24.6	26.4	*4.6*	CY
LV	70.3	78.0	82.5	*12.2*	79.8	85.2	88.4	*8.6*	14.1	18.6	21.5	*7.4*	19.0	23.0	25.4	*6.4*	LV
LT	70.8	78.5	82.8	*12.0*	80.5	85.9	88.9	*8.4*	14.4	18.9	21.7	*7.3*	19.5	23.4	25.7	*6.2*	LT
LU	80.7	84.5	86.9	*6.2*	85.0	88.6	90.8	*5.8*	19.4	22.1	23.9	*4.5*	22.5	25.3	27.1	*4.6*	LU
HU	72.5	79.5	83.6	*11.1*	79.3	85.2	88.5	*9.2*	14.5	19.0	21.8	*7.3*	18.4	22.7	25.4	*7.0*	HU
MT	80.9	84.7	87.0	*6.1*	84.6	88.5	90.8	*6.2*	19.5	22.2	24.0	*4.5*	22.5	25.3	27.1	*4.6*	MT
NL	80.3	84.3	86.7	*6.4*	83.6	87.6	90.0	*6.4*	18.8	21.7	23.6	*4.8*	21.3	24.4	26.4	*5.1*	NL
AT	79.5	83.8	86.3	*6.8*	84.2	88.0	90.2	*6.0*	18.6	21.6	23.5	*4.9*	21.8	24.7	26.6	*4.8*	AT
PL	73.2	80.3	84.1	*10.9*	81.3	86.6	89.5	*8.2*	15.4	19.9	22.4	*7.0*	19.8	23.9	26.1	*6.3*	PL
PT	79.6	84.6	86.9	*7.3*	85.0	88.3	90.4	*5.4*	18.9	22.4	24.0	*5.1*	22.3	24.9	26.7	*4.4*	PT
RO	70.9	79.0	83.3	*12.4*	78.6	85.0	88.5	*9.9*	14.2	19.2	22.0	*7.8*	18.1	22.7	25.4	*7.3*	RO
SI	78.5	83.2	86.0	*7.5*	84.4	88.2	90.5	*6.1*	17.8	21.2	23.3	*5.5*	21.7	24.9	26.7	*5.0*	SI
SK	73.4	80.3	84.1	*10.7*	80.4	86.0	89.1	*8.7*	15.1	19.6	22.2	*7.1*	19.0	23.4	25.8	*6.8*	SK
FI	79.0	83.5	86.1	*7.1*	84.1	88.2	90.4	*6.3*	18.3	21.6	23.4	*5.1*	21.6	25.0	26.8	*5.2*	FI
SE	81.5	84.8	87.0	*5.5*	85.4	88.6	90.7	*5.3*	19.7	22.2	23.9	*4.2*	22.5	25.2	26.9	*4.4*	SE
NO	82.1	85.2	87.3	*5.2*	85.1	88.5	90.7	*5.6*	20.2	22.5	24.2	*4.0*	22.3	25.1	26.9	*4.6*	NO
EA	79.6	84.0	86.5	*6.9*	84.8	88.5	90.7	*5.8*	18.9	21.9	23.7	*4.8*	22.4	25.2	27.0	*4.6*	EA
EU	78.4	83.3	86.1	*7.7*	84.0	88.0	90.4	*6.4*	18.2	21.5	23.5	*5.3*	21.8	24.9	26.8	*5.0*	EU

Source: EUROPOP2023 (Eurostat).

1.4. DEVELOPMENTS AND ASSUMPTIONS FOR NET MIGRATION

Because of high historical volatility over time and between countries, assumptions on migration are methodologically the most difficult when preparing demographic projections. On the basis of the latest projections, annual net migration inflows into the EU are expected to return to pre-2022 levels, that is around 1 million people per year (0.2-0.3% of the population) during most of the projection period after the exceptional level of around 1% of the population in 2022.

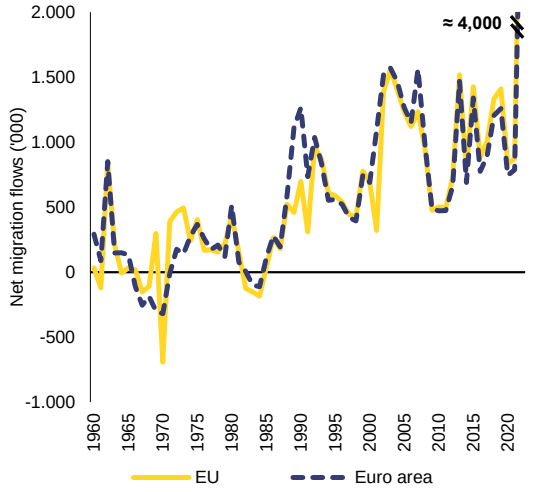
1.4.1. Past trends and driving forces

Graph I.1.2 shows the net migration flows to the EU, the euro area and Norway during the last six decades. ([6]) From 1960 through the mid-1980s, net migration was mostly positive with annual net inflows averaging around 130 000, though certain years saw large net outflows. Since 1985, annual net migration

([6]) Data available at https://ec.europa.eu/eurostat/databrowser/view/DEMO_GIND.

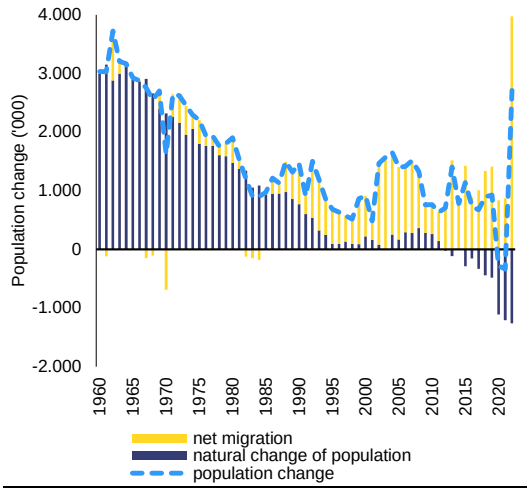
has been consistently positive for the EU. Despite high volatility, it rose significantly: annual net entries averaged 622 000 people in 1990-1999 and around 1.1 million in 2000-2008. Following a slowdown to around 500 000 people in 2009-2011 in the wake of the global economic crisis, net migration started to rise again, peaking at more than 1.5 million in 2013, mainly due to the increase in Italy following the statistical adjustment linked to the post-2011 census corrections (+966 000). ([7]) In 2015, several Member States saw large inflows because of instability in North Africa and the Middle East. Net inflows were 1 to 1.5 million people between 2017 and 2019 before decreasing again to below 1 million. In 2022, net migration increased again, based on the latest estimates, to around 4 million ([8]) mainly due to the inflow of displaced people fleeing Ukraine.

Graph I.1.2: **Net migration flows (including statistical adjustment), 1960-2022**



Source: European Commission based on Eurostat data.

Graph I.1.3: **EU population change (natural change (births-deaths) + net migration), 1960-2022**



Source: European Commission based on Eurostat data.

Net migration flows per country ([9]) between 1960 and 2021 are shown in Table I.1.5, in absolute terms and relative to the population size. Over this period, Germany, Spain, France, and Italy recorded the largest total net inflows in absolute terms. When relating migration flows to the 1960 population, the largest overall inflows were in Luxembourg (+83%), Sweden (+25%), Cyprus (+25%), Norway (+22%), Spain (+22%), Austria (+21%), Malta (+19%), Germany (+19%), the Netherlands (+16%) and Belgium (+15%). At the opposite end are Romania, Poland, Bulgaria, Portugal, Lithuania and Croatia, which saw the largest outflows in absolute terms. Relative to population size, net outflows were the largest in Romania (-18%), Lithuania (-16%), Bulgaria (-13%), Croatia (-11%) and Portugal (-8%). Between 2000 and 2021, net migration was negative on average in Lithuania (with annual outflows representing 0.6% of the 2000 population), Latvia (-0.6%), Romania (-0.4%), Bulgaria (-0.2%), Croatia (-0.2%) and Estonia (-0.1%), with very small outflows in Slovakia and Poland. In the latter two countries, as well as in Estonia, net migration has been positive and rising for several years.

([7]) This purely statistical correction may be revised following the conclusion of the 2021 census.
([8]) Eurostat online table on decisions granting temporary protection by citizenship, age and sex – annual data (migr_asytpfa).
([9]) Due to difficulties in producing good statistics on migration flows for all Member States, net migration is measured as the difference between the total population stocks on 31 December and 1 January for a given calendar year, minus the natural change (the difference between births and deaths). The population stocks that Member States transmit to Eurostat represents the number of persons with usual residence in the country for at least 12 months (or legal or registered persons), including refugees and, in some cases, asylum seekers who are resident in the country for at least 12 months. This method is different from the approach of subtracting recorded emigration flows from immigration flows, which not only incorporates errors due to the difficulty of registering migration flows, but also includes all possible errors and adjustments in other demographic variables.

Following the 2008 crisis, net migration turned temporarily negative in several countries. This was the case in, for example, Ireland, Greece, Spain, Cyprus, and Portugal. For most Member States, net migration was already the highest in the period 2018-2021 since 2009, increasing further to exceptionally high levels in 2022.

Between 1960 and 2020, the total EU population rose consistently, though the size of the increase had been trending lower. In 2020 and 2021, the population change turned negative but bounced back to highly positive figures in 2022 (see Graph I.1.3). This is the result of counteracting developments. A volatile but overall slightly increasing trend of net migration inflows (that then increased substantially in 2022), on the one hand, and an overall more clearly decreasing trend of natural population change on the other hand. The latter turned negative only in 2012 in light of the impact of decreasing mortality rates on deaths partly offsetting the impact of decreasing fertility rates on births.

Table I.1.5: **Average annual net migration flows (including statistical adjustment), 1960-2021**

	1960-1979 (%1960 pop)		1980-1999 (%1980 pop)		2000-2021 (%2000 pop)		total 1960-2021 (%1960 pop)		highest value in 2009-2021 (year)	
BE	11.857	(0.1)	7.705	(0.1)	46.281	(0.5)	1.409.408	(15.4)	86.413	(2010)
BG	-7.717	(-0.1)	-25.036	(-0.3)	-17.423	(-0.2)	-1.038.362	(-13.2)	30.715	(2020)
CZ	-9.108	(-0.1)	42	(0)	23.476	(0.2)	335.143	(3.5)	49.969	(2021)
DK	2.567	(0.1)	8.433	(0.2)	17.334	(0.3)	601.333	(13.1)	41.886	(2015)
DE	127.417	(0.2)	342.158	(0.4)	276.963	(0.3)	13.526.185	(18.6)	1.165.772	(2015)
EE	7.603	(0.6)	-3.965	(-0.3)	-775	(-0.1)	55.692	(4.6)	7.071	(2018)
IE	-3.821	(-0.1)	-6.238	(-0.2)	23.024	(0.6)	305.328	(10.8)	43.966	(2018)
EL	-11.493	(-0.1)	41.774	(0.4)	-829	(0)	587.392	(7.1)	35.168	(2019)
ES	-30.654	(-0.1)	55.646	(0.1)	283.552	(0.7)	6.737.988	(22.1)	452.909	(2019)
FR	136.844	(0.3)	36.617	(0.1)	94.295	(0.2)	5.543.709	(12.1)	134.420	(2021)
HR	-1.140	(0)	-9.615	(-0.2)	-10.114	(-0.2)	-437.617	(-10.6)	888	(2009)
IT	-45.135	(-0.1)	8.372	(0)	210.997	(0.4)	3.906.680	(7.8)	1.183.877	(2013)
CY	-3.844	(-0.7)	3.794	(0.7)	6.168	(0.9)	134.689	(23.5)	18.142	(2011)
LV	12.376	(0.6)	-4.541	(-0.2)	-13.141	(-0.6)	-132.427	(-6.2)	-286	(2021)
LT	4.847	(0.2)	-5.446	(-0.2)	-19.961	(-0.6)	-451.129	(-16.2)	34.734	(2021)
LU	2.067	(0.7)	2.623	(0.7)	7.568	(1.7)	260.321	(82.9)	11.159	(2015)
HU	-191	(0)	-699	(0)	15.175	(0.1)	316.050	(3.2)	33.562	(2019)
MT	-3.606	(-1.1)	1.014	(0.3)	5.206	(1.3)	62.672	(19.2)	20.343	(2019)
NL	18.990	(0.2)	28.458	(0.2)	39.608	(0.2)	1.820.321	(15.8)	107.627	(2019)
AT	6.745	(0.1)	18.383	(0.2)	43.187	(0.5)	1.452.680	(20.6)	114.237	(2015)
PL	-35.689	(-0.1)	-23.546	(-0.1)	-7.217	(0)	-1.343.487	(-4.5)	22.147	(2018)
PT	-51.042	(-0.6)	1.734	(0)	12.202	(0.1)	-717.711	(-8.1)	44.506	(2019)
RO	-11.167	(-0.1)	-40.519	(-0.2)	-100.880	(-0.4)	-3.253.073	(-17.7)	-13.887	(2013)
SI	3.282	(0.2)	953	(0.1)	5.872	(0.3)	213.892	(13.5)	18.365	(2020)
SK	969	(0)	-3.670	(-0.1)	-232	(0)	-59.123	(-1.5)	4.347	(2020)
FI	-9.030	(-0.2)	4.922	(0.1)	12.804	(0.2)	199.524	(4.5)	22.513	(2021)
SE	14.869	(0.2)	17.848	(0.2)	55.514	(0.6)	1.875.655	(25.1)	117.693	(2016)
NO	1.767	(0)	7.689	(0.2)	26.800	(0.6)	778.714	(21.7)	47.142	(2012)
EA	109.521	(0)	486.462	(0.2)	1.025.591	(0.3)	34.482.673	(12.8)	1.468.940	(2013)
EU	152.556	(0)	390.317	(0.1)	1.008.652	(0.2)	33.047.804	(9.3)	1.518.409	(2013)

CY: 1961-1979 average.
Source: European Commission based on Eurostat data.

1.4.2. Latest Eurostat population projections

Compared to fertility and mortality, migration is the most volatile component of population projections. Immigration and emigration are generally determined by push and pull factors that are not explicitly modelled in population projections. Past examples include the debt and financial crisis, the wars in Afghanistan and Syria, and the impact of measures taken amid the COVID-19 pandemic. More recently, there is the inflow of displaced persons fleeing Ukraine (see Box I.1.1.). In the future, climate change is expected to become a prominent driver of demographic changes, specifically of global migration

flows. ([10]) Trends derived from past data are used to capture the overall development of immigration and emigration flows in the EUROPOP projections. Table I.1.6 presents the net migration flows in the EUROPOP2023 projections.

Table I.1.6: **Projection of net migration flows, 2022-2070**

	Net migration ('000)				*Net migration (% of population)*				
	2022	2030	2050	2070	2022	2030	2050	2070	2022-70 (%2022)[(1)]
BE	116	37	32	29	1.0	0.3	0.3	0.2	15.1
BG	160	-3	13	16	2.3	0.0	0.2	0.3	9.1
CZ	471	-2	26	25	4.4	0.0	0.2	0.2	13.6
DK	55	12	12	13	0.9	0.2	0.2	0.2	11.7
DE	1631	250	266	236	1.9	0.3	0.3	0.3	17.6
EE	45	1	4	4	3.4	0.1	0.3	0.3	15.5
IE	93	17	14	12	1.8	0.3	0.2	0.2	16.0
EL	22	-4	8	20	0.2	0.0	0.1	0.2	3.3
ES	677	221	196	194	1.4	0.4	0.4	0.4	23.6
FR	275	80	83	99	0.4	0.1	0.1	0.1	6.6
HR	14	2	7	10	0.4	0.1	0.2	0.3	7.0
IT	348	270	240	240	0.6	0.5	0.4	0.4	20.9
CY	18	0	2	2	2.0	0.0	0.2	0.2	9.7
LV	33	-7	0	2	1.7	-0.4	0.0	0.1	-3.3
LT	82	-8	3	6	2.9	-0.3	0.1	0.3	4.8
LU	15	8	5	4	2.3	1.0	0.6	0.4	45.2
HU	48	19	25	26	0.5	0.2	0.3	0.3	12.3
MT	11	9	6	4	2.2	1.6	0.8	0.5	64.6
NL	235	45	42	42	1.3	0.2	0.2	0.2	14.3
AT	104	36	37	35	1.1	0.4	0.4	0.4	20.2
PL	1001	-44	62	69	2.6	-0.1	0.2	0.2	7.0
PT	82	16	27	39	0.8	0.2	0.3	0.4	13.3
RO	79	-38	6	28	0.4	-0.2	0.0	0.2	-0.1
SI	15	6	6	6	0.7	0.3	0.3	0.3	14.8
SK	96	-1	9	8	1.8	0.0	0.2	0.2	6.7
FI	77	11	14	13	1.4	0.2	0.2	0.3	13.1
SE	99	50	42	32	0.9	0.5	0.3	0.3	20.7
NO	36	27	27	26	0.7	0.5	0.4	0.4	23.8
EA	3990	990	1001	1002	1.1	0.3	0.3	0.3	15.6
EU	5902	985	1187	1212	1.3	0.2	0.3	0.3	14.0

(1) Cumulative net migration as % of 2022 population.
Source: EUROPOP2023 (Eurostat).

In 2022, which is the starting year of the projections, net migration was exceptionally high mainly due to the inflow of displaced people fleeing Ukraine. The projection, published on 30 March 2023 ([11]), calculates with an overall net migration figure of almost 6 million people (1.3% of the EU population). Recent data suggest significantly less but still exceptionally high inflows in 2022 (see Section 1.4.1.).

For the EU, annual net inflows are assumed to return to pre-2022 levels as of the mid-2020s, to around 1 million people (0.2-0.3% of the EU population). Total net migration in the period up to 2070 would amount to 63 million people in cumulated terms, equivalent to 14% of the 2022 population. Net migration would converge to a level of about 0.3% of the EU population.

([10]) While expected developments are still unclear and hard to predict, the potential impact of climate change on global migration flows has been widely acknowledged. See, for example, International Organization for Migration (2008).
([11]) The projections include official statistics for 2021 and are based on the population published for 1 January 2022, while additional data covering 2022 could be taken into account until March 2023.

The countries with the highest cumulative net migration as a share of population are expected to be Malta, Luxembourg, Norway, Spain, Italy, Sweden, and Austria, with cumulative inflows of at least 20% of the 2022 population over the projection period. While net migration is assumed to turn positive in all countries during the projection period, cumulative net migration in 2022-2070 would nevertheless be negative for Latvia and Romania, the only countries together with Lithuania with net migration outflows after 2035.

1.5. OVERALL RESULTS OF THE POPULATION PROJECTIONS

Table I.1.7: **Projected total population, 2022-2070**

	Total population (annual average - millions)			*% change*		
	2022	2045	2070	2022-2045	2045-2070	2022-2070
BE	11.7	12.5	12.7	7%	2%	9%
BG	6.9	6.0	5.3	-13%	-12%	-23%
CZ	10.7	10.7	10.6	0%	-2%	-2%
DK	5.9	6.1	6.2	4%	1%	5%
DE	83.9	85.0	84.2	1%	-1%	0%
EE	1.4	1.3	1.3	-1%	-2%	-3%
IE	5.1	5.9	6.1	15%	3%	19%
EL	10.4	9.2	7.8	-12%	-16%	-25%
ES	47.7	50.5	47.7	6%	-6%	0%
FR	68.0	70.7	69.7	4%	-1%	2%
HR	3.9	3.4	3.0	-12%	-11%	-22%
IT	59.0	58.1	53.3	-2%	-8%	-10%
CY	0.9	1.0	1.0	7%	2%	9%
LV	1.9	1.5	1.3	-19%	-17%	-33%
LT	2.8	2.4	2.0	-15%	-17%	-29%
LU	0.7	0.9	1.0	33%	12%	49%
HU	9.7	9.3	9.0	-4%	-3%	-7%
MT	0.5	0.7	0.8	37%	13%	54%
NL	17.7	18.8	18.7	6%	0%	6%
AT	9.0	9.5	9.5	5%	1%	6%
PL	38.1	35.2	31.8	-8%	-9%	-16%
PT	10.4	9.8	9.0	-5%	-9%	-14%
RO	19.0	16.8	15.0	-12%	-11%	-21%
SI	2.1	2.1	2.0	0%	-5%	-5%
SK	5.5	5.2	4.8	-4%	-8%	-12%
FI	5.6	5.5	5.2	-1%	-5%	-6%
SE	10.5	11.9	12.9	13%	8%	23%
NO	5.4	6.1	6.5	12%	7%	20%
EA	348.2	354.1	341.1	2%	-4%	-2%
EU	449.1	450.1	431.9	0%	-4%	-4%

Source: European Commission based on EUROPOP2023 (Eurostat).

The EU population is projected to decline from 449 million people in 2022 to 432 million in 2070. During this period, Member States' population will age dramatically given the dynamics in fertility, mortality and migration. The median age would rise by 4 years over the next decades.

Table I.1.7 presents an overview of the population projections for the period 2022-2070. ([12]) These provide the basis for the age-related expenditure projections in the 2024 Ageing Report.

According to the baseline demographic projections, the EU population would reach a peak during this decade. It is projected to rise from about 449 million people in 2022 to 453 million people in 2026. Thereafter, the population would start to shrink, falling below 432 million in 2070. This is a projected decline by 4% compared to the base year level, most of which would take place in the last third of the projection period. The overall downward trend comprises rather heterogeneous developments at the country level.

For 13 Member States and Norway the total population is projected to increase between 2022 and 2070, while 14 Member States would see the number of inhabitants shrink. Compared to the base year, the sharpest declines are projected in Latvia, Lithuania, Greece, Bulgaria, Croatia, and Romania, with a fall of between 21% and 33%. In these countries, the population is expected to dwindle steadily throughout the projection period. Among the countries with a rising population between 2022 and 2070, Malta, Luxembourg, Sweden, and Ireland would see their inhabitants increase by 19% to 54%, mainly in the first part of the projection period.

In 2022, Germany was the Member State with the largest population (84 million people), followed by France (68 million), Italy (59 million), Spain (48 million) and Poland (38 million). In 2070, this order would remain the same with population declines projected in Italy and Poland, and limited population growth in Germany, France and Spain.

([12]) The population projections published by Eurostat refer to the population on 1 January. The projections in this table (and used throughout this report) for year t are calculated as the average of the Eurostat projections on 1 January for year t and those for year t+1, as done in previous projection exercises.

In all Member States, the share in the overall population of the age groups above 65 years is projected to rise by 2070 (see Table I.1.8), from 21% in 2022 to 30% in 2070 for the EU. Increases range from 6 pps in Sweden to 16 pps in Lithuania, where people aged 65 or more would represent 36% of the population in 2070. Shares in Italy, Malta, Portugal, Spain, and Greece would be similar, with one in three persons being at least 65 years old at the end of the projection period.

Table I.1.8: **Composition of the population by age group**

	2022				*2070*				*pps change 2022-2070*			
	(0-19)	(20-64)	(65+)	(80+)	(0-19)	(20-64)	(65+)	(80+)	(0-19)	(20-64)	(65+)	(80+)
BE	22%	58%	20%	6%	19%	53%	28%	11%	-3.3	-5.1	8.5	5.8
BG	19%	59%	22%	5%	18%	51%	31%	14%	-1.4	-7.8	9.2	9.0
CZ	21%	58%	20%	4%	19%	53%	27%	12%	-1.7	-5.3	7.0	7.6
DK	22%	58%	20%	5%	20%	51%	29%	11%	-2.3	-6.3	8.6	5.8
DE	19%	59%	22%	7%	19%	52%	29%	12%	0.1	-6.8	6.7	4.4
EE	22%	58%	20%	6%	18%	52%	30%	13%	-3.3	-6.2	9.5	7.3
IE	26%	59%	15%	4%	18%	52%	29%	12%	-7.8	-6.2	14.0	8.7
EL	19%	58%	23%	7%	17%	50%	33%	16%	-1.8	-8.5	10.2	9.1
ES	19%	61%	20%	6%	16%	51%	33%	15%	-3.7	-9.3	12.9	8.8
FR	24%	55%	21%	6%	20%	51%	29%	13%	-3.7	-4.5	8.2	6.5
HR	19%	58%	23%	5%	16%	52%	32%	13%	-3.4	-6.3	9.7	7.6
IT	17%	59%	24%	8%	15%	51%	34%	15%	-2.6	-7.2	9.8	6.9
CY	21%	62%	17%	4%	18%	53%	29%	12%	-3.2	-9.4	12.6	7.8
LV	21%	58%	21%	6%	18%	51%	31%	15%	-3.5	-6.8	10.3	8.9
LT	20%	60%	20%	6%	15%	49%	36%	15%	-4.5	-11.1	15.7	9.6
LU	21%	64%	15%	4%	18%	53%	29%	11%	-3.0	-11.4	14.4	7.2
HU	20%	60%	21%	5%	19%	52%	28%	11%	-0.4	-7.4	7.8	6.8
MT	18%	63%	19%	4%	15%	51%	34%	12%	-2.6	-11.8	14.4	8.1
NL	21%	59%	20%	5%	19%	52%	29%	11%	-2.4	-6.7	9.1	6.1
AT	19%	61%	20%	6%	18%	52%	30%	12%	-1.6	-8.7	10.3	6.3
PL	21%	60%	19%	4%	17%	50%	32%	15%	-3.2	-9.8	13.0	10.7
PT	18%	58%	24%	7%	17%	50%	34%	15%	-1.0	-8.8	9.8	7.8
RO	22%	59%	20%	4%	19%	52%	29%	13%	-2.9	-6.5	9.5	8.6
SI	20%	59%	21%	6%	17%	52%	30%	14%	-2.2	-6.7	8.8	8.1
SK	21%	61%	18%	3%	19%	51%	30%	14%	-1.8	-10.9	12.7	10.5
FI	21%	56%	23%	6%	16%	51%	32%	13%	-4.4	-4.7	9.0	7.3
SE	23%	56%	20%	5%	20%	53%	27%	11%	-3.1	-3.4	6.4	5.3
NO	23%	59%	18%	4%	18%	53%	29%	11%	-4.8	-5.8	10.6	6.9
EA	20%	58%	22%	6%	18%	52%	31%	13%	-2.3	-6.9	9.2	6.5
EU	20%	59%	21%	6%	18%	52%	30%	13%	-2.3	-7.0	9.3	7.0

Source: European Commission based on EUROPOP2023 (Eurostat).

The share of people aged 80 years and above would more than double in all Member States between 2022 and 2070, with the exception of Germany and Italy. For the EU, this share would rise from 6% in 2022 to 13% in 2070. The projected increase is the highest in Poland and Slovakia.

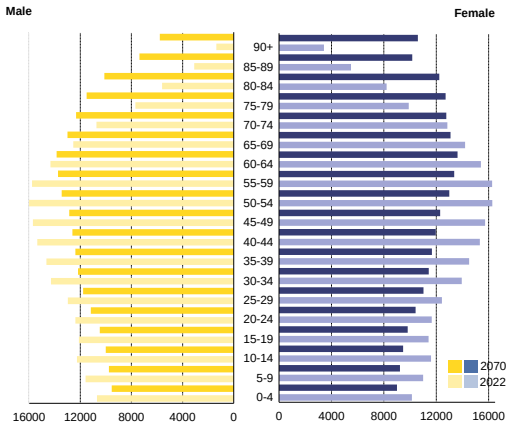
The population share of the age group 0-19 would shrink in all Member States during the projection period. The share in the EU population of this youngest group would decrease from 20% in 2022 to 18% in 2070. The dwindling – also in absolute numbers for most countries – of the 0-19 age group is the sharpest in Ireland, Norway, Lithuania, and Finland.

Finally, the population at working age (20-64 year-olds), would shrink in all Member States relative to the overall population. Whereas in 2022, people at working age represented 59% of the EU population, this share would fall to 52% in 2070. The decrease exceeds 10 pps in Lithuania, Luxembourg, Malta, and Slovakia.

The drivers of these trends are manifold. First, the increasing share of the population in the older age groups is due to the combination of the large cohorts born in the 1950s and 1960s and continued gains in life expectancy. Second, the size of the groups aged 25-59 (the bulk of the working-age population, see Graph I.1.4) shrinks significantly between 2022 and 2070 due to the low fertility rates and a shrinking number of women in childbearing ages. Finally, net migration flows would not suffice to offset the trends towards an ageing population.

The strong upward shift in the age distribution over the next decades is shown in Graph I.1.4. While in 2022 the largest age group for both males and females were people aged 50-54, in 2070 the 60-64 age group would be the largest in both cases. Overall, the median age will rise from 44.4 years in 2022 to 48.8 years in 2070, with a relatively steeper increase by around 2040. For men it increases from 42.8 to 47.6 years, for women from 45.9 to 50.1 years (see Graph I.1.5).

Graph I.1.4: **EU population by age group and sex ('000)**

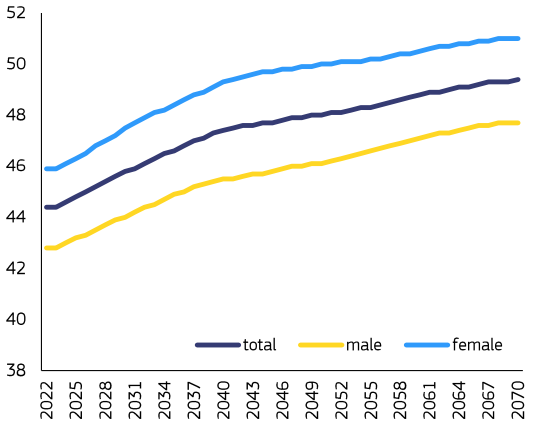


Source: European Commission based on EUROPOP2023 (Eurostat).

Because of the demographic shift from younger to older age groups, demographic dependency ratios are projected to increase significantly in all countries (see Table I.1.9).

The old-age dependency ratio (OADR), i.e. the number of people aged at least 65 divided by those aged 20-64, gives an idea about the relative shift between potential retirees and potential workers and thus of how an ageing population alters the beneficiary-contributor balance. ([13]) The OADR is projected to increase from 36% in 2022 to 59% in 2070 for the EU as a whole. This increase would predominantly take place during the first half of the projection period. The change in the OADR means that the EU would move from having, for every person aged over 65 years, nearly three (2.8) people at working age to less than two (1.7).

Graph I.1.5: **Median age in the EU, 2022-2070**



Source: EUROPOP2023 (Eurostat).

The Member States with the highest projected increase in the OADR are Lithuania, Malta, Luxembourg, Poland, Spain, and Slovakia, with increases of at least 30 pps. In 2070, the OADR would surpass 65% in Greece, Italy, Lithuania, Malta, and Portugal: for every two persons aged 65 or more, there would be only three individuals between 20 and 64 years old. The OADR would stay below 55% in 2070 in Sweden, Norway, Czechia, Belgium, Hungary, and Germany.

Similarly, the very old-age dependency ratio (people aged 80 or above relative to those aged 20-64) is projected to rise considerably, from 10% to 25% on average in the EU. Broadly the same countries come to the fore as for the standard old-age dependency ratio.

Finally, the total dependency ratio (the sum of people younger than 20 and older than 64 years relative to the population aged 20-64) is projected to rise from 71% in 2022 to 94% in 2070 for the EU. This measure relates the theoretical inactive population – people that have not yet entered or have already left the labour market – to the theoretical contributory base. Again, broadly the same countries record the largest changes for the total dependency ratio as for the narrower definitions. In 2070, it is expected that the number of people outside the working-age population will have surpassed the working-age population in Lithuania and Portugal, with a total dependency ratio of more than 100%. In contrast, the ratio would

([13]) Economic dependency ratios are discussed in Chapter 2.

stay below 90% in Belgium, Czechia, Norway, Luxembourg, and Sweden. This compares to a maximum value of 81% in France in 2022.

Table I.1.9: **Dependency ratios (%), 2022-2070**

	Old-age dependency ratio (65+/20-64)				*Very old-age dependency ratio (80+/20-64)*				*Total dependency ratio ((0-19 & 65+)/20-64)*				
	2022	2045	2070	2022-2070 (pps change)	2022	2045	2070	2022-2070 (pps change)	2022	2045	2070	2022-2070 (pps change)	
BE	33.7	44.9	53.0	19.2	9.5	16.4	21.3	11.8	72.0	81.1	88.7	16.6	BE
BG	36.6	53.6	60.3	23.6	8.0	15.1	26.8	18.8	69.6	87.1	95.5	25.9	BG
CZ	34.9	48.9	51.5	16.6	7.3	14.2	22.4	15.0	71.2	85.0	88.1	16.9	CZ
DK	35.4	46.8	56.5	21.1	8.8	16.4	21.2	12.4	73.4	85.3	94.7	21.2	DK
DE	37.4	49.2	55.0	17.6	12.3	18.7	22.4	10.1	69.0	83.4	90.8	21.9	DE
EE	34.9	46.2	57.3	22.4	10.3	15.6	25.6	15.4	72.0	79.8	92.5	20.5	EE
IE	25.7	42.4	55.6	29.8	6.2	13.0	23.4	17.2	70.2	79.1	90.5	20.3	IE
EL	39.0	68.7	66.0	27.0	12.2	23.7	32.4	20.2	70.9	102.2	99.8	28.9	EL
ES	33.3	60.1	64.5	31.2	10.0	20.2	29.0	19.0	64.9	90.1	94.6	29.8	ES
FR	38.2	51.6	57.8	19.7	10.9	19.9	24.8	13.9	81.0	92.8	97.2	16.2	FR
HR	38.9	53.1	62.2	23.3	9.4	18.2	25.2	15.8	72.0	83.6	92.8	20.9	HR
IT	40.8	64.9	65.5	24.7	13.0	23.2	28.2	15.2	70.6	93.9	94.4	23.8	IT
CY	26.7	38.8	55.5	28.8	6.4	13.3	22.4	16.0	61.1	71.9	90.0	28.8	CY
LV	36.0	53.2	61.0	25.0	10.4	18.1	29.2	18.8	72.3	86.1	95.4	23.0	LV
LT	33.1	53.7	72.4	39.3	9.3	18.6	31.0	21.6	65.7	82.4	103.1	37.5	LT
LU	23.1	36.3	55.4	32.3	6.1	11.3	21.0	14.9	56.0	69.2	89.6	33.6	LU
HU	34.5	47.7	54.3	19.8	7.8	13.2	21.9	14.1	67.4	83.1	91.1	23.6	HU
MT	30.5	32.8	65.4	34.9	6.8	11.1	24.1	17.4	58.2	57.9	94.3	36.1	MT
NL	34.3	46.3	56.3	22.0	8.3	16.9	21.1	12.8	70.3	82.9	92.4	22.0	NL
AT	32.0	48.4	57.0	25.0	9.6	17.2	23.2	13.6	63.7	80.9	90.9	27.3	AT
PL	31.9	47.9	63.7	31.9	7.1	16.1	29.8	22.6	65.9	79.4	98.1	32.2	PL
PT	40.7	65.9	67.8	27.0	11.9	23.6	29.8	17.9	71.3	99.0	101.8	30.5	PT
RO	33.5	52.2	55.8	22.3	7.6	14.5	25.1	17.5	70.5	89.3	91.9	21.3	RO
SI	36.1	54.5	57.5	21.5	9.5	19.2	26.3	16.7	69.3	87.2	90.9	21.6	SI
SK	28.5	48.4	59.7	31.2	5.5	14.7	27.5	21.9	62.7	83.0	97.7	35.0	SK
FI	41.2	47.8	62.4	21.3	10.5	18.7	25.6	15.1	78.2	79.9	94.3	16.1	FI
SE	36.0	41.2	50.4	14.4	9.6	14.4	20.2	10.6	77.2	79.6	88.4	11.2	SE
NO	31.2	43.1	54.4	23.2	7.6	14.8	21.3	13.7	69.7	77.4	88.0	18.4	NO
EA	36.9	54.1	59.6	22.7	11.1	19.7	25.3	14.2	71.1	88.3	93.9	22.9	EA
EU	36.1	52.8	59.1	23.0	10.3	18.7	25.3	14.9	70.7	87.1	93.8	23.1	EU

Source: European Commission based on EUROPOP2023 (Eurostat).

1.6. DEMOGRAPHIC AGEING IN A GLOBAL CONTEXT

The EU's share of the world population is projected to shrink from 5.7% in 2020 to 3.8% by 2070. The projected increase in dependency ratios is comparatively high for the EU, in particular given the current demographic balance compared to 'younger' continents.

The UN population statistics and projections provide a global perspective of demographic trends. ([14]) The combined share of EU Member States in the world population halved since 1960, when the EU represented almost 12% of the world population (see Table I.1.10). While the EU population grew by 25% over the past six decades, demographic growth was faster in the rest of the world, with the global population increasing by more than 150% over the same period. The shares of China, Japan, Russia and the US in the global population also declined compared to 1960, in contrast with the rising shares of India, Latin America and, particularly, Africa.

Given that fast population growth is expected to continue, the African continent's share in the world population would increase further, to about 31% in 2070. While staying the most populous continent, Asia's share would decline over the next five decades to around 50%. This fall is driven by China, India

([14]) The United Nations Population Division updates its global population projections every two years. The latest projections are the UN World Population Prospects 2022.

and Japan – in particular China, whose share would decrease by more than a third in 2020-2070 – with a broadly stable share of about 40% for the other Asian countries.

Table I.1.10: **Geographical distribution of world population, % of total population, 1960-2070**

	1960	1980	2000	2020	2045	2070	(pps change) 1960-2020	2020-2070
Africa	9.4%	10.8%	13.3%	17.4%	24.2%	31.1%	7.9	13.8
Asia	56.3%	59.3%	60.8%	59.5%	55.4%	50.5%	3.2	-8.9
China	21.7%	22.1%	20.6%	18.2%	14.3%	10.5%	-3.5	-7.6
Japan	3.1%	2.6%	2.1%	1.6%	1.1%	0.9%	-1.5	-0.7
India	14.8%	15.7%	17.2%	17.8%	17.4%	16.4%	3.0	-1.4
Europe	20.1%	15.6%	11.8%	9.5%	7.5%	6.3%	-10.5	-3.2
EU	11.8%	9.1%	6.9%	5.7%	4.5%	3.8%	-6.1	-1.9
EA	8.9%	6.9%	5.3%	4.4%	3.5%	2.9%	-4.5	-1.5
Russian Federation	4.0%	3.1%	2.4%	1.9%	1.4%	1.2%	-2.1	-0.7
Latin America and the Caribbean	7.3%	8.2%	8.5%	8.3%	7.8%	7.2%	1.0	-1.1
Northern America	6.4%	5.6%	5.1%	4.8%	4.4%	4.2%	-1.7	-0.5
US	5.8%	5.0%	4.6%	4.3%	3.9%	3.8%	-1.6	-0.5
Oceania	0.5%	0.5%	0.5%	0.6%	0.6%	0.6%	0.0	0.1

Source: UN World Population Prospects 2022.

By 2070, the EU's share in the global population is expected to reach 3.8%, shrinking by 2 pps relative to the current situation. ([15]) This is comparable to the projected share of the US, whose share would remain broadly stable.

Looking at the age structure in the UN projections, the EU currently has already a comparatively high OADR (see Table I.1.11). At 35%, it is below the Japanese ratio of 55% but considerably above that in other large countries, with a higher increase in recent decades. Ratios and projected changes for the EU are comparable to those based on the Eurostat projections, although the UN projects an even faster population ageing for the EU (see Table I.1.11).

Table I.1.11: **Global demographic dependency ratios, % (1960-2070)**

	Old-age dependency ratio (65+/20-64)						*Very old-age dependency ratio (80+/20-64)*					
	1960	2000	2020	2070	(pps change) 1960-2020	2020-2070	1960	2000	2020	2070	(pps change) 1960-2020	2020-2070
World	10.2	12.9	16.5	36.5	6.3	19.9	1.3	2.2	3.4	12.3	2.1	8.9
Africa	7.2	7.5	7.6	14.5	0.4	6.9	0.7	0.9	1.0	2.7	0.3	1.7
Asia	7.9	10.8	15.4	44.8	7.5	29.4	0.8	1.6	2.9	15.5	2.1	12.7
China	8.4	11.5	19.7	74.2	11.4	54.4	0.7	1.6	3.5	32.9	2.8	29.3
Japan	10.6	28.7	54.8	83.2	44.2	28.4	1.3	6.5	18.3	41.6	17.0	23.4
India	7.0	8.9	11.5	41.7	4.5	30.2	0.7	1.2	1.8	12.0	1.2	10.2
Europe	15.2	24.3	31.9	60.2	16.7	28.3	2.2	4.8	8.9	26.5	6.6	17.6
EU	16.7	25.8	35.1	65.2	18.3	30.1	2.5	5.5	10.2	29.1	7.7	18.9
EA	17.7	26.7	36.0	67.3	18.3	31.3	2.7	5.9	11.0	30.4	8.3	19.4
Russian Federation	10.5	20.3	24.7	47.8	14.1	23.2	1.4	3.1	6.2	20.7	4.8	14.5
Latin America and the Caribbean	7.5	10.9	14.9	48.9	7.4	34.0	0.9	1.9	2.9	16.4	2.0	13.5
North America	17.3	20.8	27.8	52.3	10.5	24.5	2.7	5.1	6.4	20.7	3.7	14.2
US	17.5	20.8	27.6	51.9	10.1	24.3	2.7	5.2	6.3	20.5	3.6	14.1
Oceania	14.1	17.2	21.7	41.2	7.6	19.5	2.2	3.8	5.2	15.2	3.0	10.0

Source: UN World Population Prospects 2022.

Globally, the UN demographic projections expect the OADR to rise by 20 pps, from 16.5% in 2020 to 36.5% in 2070. The EU ratio would increase by 30 pps, reaching 65% in 2070. All continents are expected to see an increase and in some cases, e.g. Asia and Latin America, the projected change in the balance between potential retirees and potential contributors is similar to what is anticipated for the EU. However, given that the current situation is generally more favourable in other regions, it can be concluded that EU Member States will on average undergo a more radical ageing process than the rest of

([15]) The UN projections and Eurostat's EUROPOP2023 projections differ notably due to the different methodologies. The former expects the EU population to peak in 2023 before falling to 388 million people in 2070, i.e. 44 million below the Eurostat baseline (see Table I.1.8). The UN figures show a larger decline (or a smaller increase) for a majority of Member States.

the world, notable exceptions such as Japan and China aside. Looking at developments for the very old-age dependency ratio leads to broadly the same conclusion.

Global ageing shows in the projected changes of median ages. In 2020, the median age in the EU was 43 years, up from 30 years in 1960. This compares to 38 years in Northern America, 31 years in Asia and 30 years in Latin America. By 2070, half of the EU population would be above 49 years according to the UN projections, compared to 45 years in Latin America, 46 years in Northern America and 44 years in Asia. ([16])

1.7. COMPARISON WITH THE DEMOGRAPHIC PROJECTIONS IN THE 2021 AGEING REPORT

In 2070, the EU would count 7.9 million people more than assumed in the 2021 Ageing Report. The starting point is broadly similar because the impact of the COVID-19 pandemic, especially on older age groups, is offset, in particular for younger age groups, by the exceptional migration inflow in 2022. At the same time, higher projections for age groups other than the youngest one and higher net migration lead to a bigger increase and a larger population by 2070. As a result, the old-age dependency ratio based on the new demographic projections is lower in the first half of the projection period but increases faster thereafter, reaching a similar level in 2070 as in the previous edition.

This section compares the latest Eurostat demographic projections, EUROPOP2023, with those underlying the 2021 Ageing Report, EUROPOP2019.

In the base year 2022, the EU population counted 193 000 more people than anticipated in the 2019-based demographic projections (see Table I.1.12). This difference is the result of two counteracting effects. On the one hand, there is the impact of the COVID-19 pandemic, especially on older age groups. On the other hand, there is the exceptional migration inflow, in particular for the younger age groups, induced by Russia's invasion of Ukraine in 2022. Overall, the starting point is significantly lower than in the previous projection in Italy, Spain, Greece, and Croatia, while it is significantly higher in Germany, France, Poland, Romania, and the Netherlands.

In 2070, the total EU population would be some 7.9 million people larger (2%) than previously projected in light of increasingly higher projections for the working-age and older age groups and lower projections for the young age groups in parallel to higher net migration. The upward revision corresponds to at least 10% of the previous 2070 population projection for Estonia, Lithuania, Luxembourg, Malta, and Romania. Downward revisions concern only six Member States and Norway but were only significant in Greece (-9%), Cyprus (-9%) and Ireland (-7%).

Developments for broad age groups (0-19, 20-64 and above 65), show that the higher population projection is driven by differences for the 20-64 and 65+ age groups, which in 2070 would on average be 3% and 2% larger, respectively, than projected in EUROPOP2019.

– In 2070, the projected number of people younger than 20 years is more than 10% lower than the previous number in the cases of Ireland and Cyprus. For this age group Luxembourg, Poland and Romania have significantly higher figures in the EUROPOP2023 projection.

– For the working-age population (20-64 year-olds), only for Greece and Cyprus the figures are more than 10% below the previous projection in 2070. They are higher by more than 10% for Estonia, Luxembourg, Malta, and Romania.

([16]) Data available at https://population.un.org/wpp/Download/Standard/MostUsed/.

– For the population above 65 years, only for Greece figures are lower by around 10% in 2070, while they are more than 10% higher for Lithuania, Luxembourg and Malta.

Table I.1.12: **Population - difference between EUROPOP2023 and EUROPOP2019 ('000)**

	Total population			Population 0-19			Population 20-64			Population 65+			
	2022	2070	*Difference in 2070 (%) (1)*	2022	2070	*Difference in 2070 (%) (1)*	2022	2070	*Difference in 2070 (%) (1)*	2022	2070	*Difference in 2070 (%) (1)*	
BE	78	857	*7%*	26	87	*4%*	67	516	*8%*	-15	254	*8%*	BE
BG	72	263	*5%*	35	35	*4%*	75	151	*6%*	-39	77	*5%*	BG
CZ	-28	359	*4%*	23	13	*1%*	-14	304	*6%*	-36	42	*1%*	CZ
DK	58	31	*1%*	4	-64	*-5%*	55	4	*0%*	-1	91	*5%*	DK
DE	513	2.526	*3%*	159	-114	*-1%*	437	1.605	*4%*	-83	1.035	*4%*	DE
EE	24	117	*10%*	11	22	*10%*	16	69	*11%*	-3	27	*7%*	EE
IE	-14	-426	*-7%*	1	-225	*-17%*	-13	-185	*-5%*	-3	-15	*-1%*	IE
EL	-175	-809	*-9%*	-72	-132	*-9%*	-33	-428	*-10%*	-71	-249	*-9%*	EL
ES	-258	642	*1%*	-95	-502	*-6%*	-44	413	*2%*	-119	731	*5%*	ES
FR	427	234	*0%*	131	-541	*-4%*	355	282	*1%*	-60	493	*2%*	FR
HR	-136	-16	*-1%*	-15	-27	*-5%*	-107	29	*2%*	-14	-18	*-2%*	HR
IT	-1111	-614	*-1%*	-117	-625	*-7%*	-747	21	*0%*	-248	-10	*0%*	IT
CY	8	-102	*-9%*	2	-32	*-15%*	10	-63	*-11%*	-4	-7	*-2%*	CY
LV	16	79	*7%*	7	6	*3%*	15	55	*9%*	-5	18	*5%*	LV
LT	68	190	*10%*	10	-11	*-4%*	61	83	*9%*	-2	118	*20%*	LT
LU	10	188	*24%*	4	38	*28%*	7	98	*24%*	-1	51	*22%*	LU
HU	-47	103	*1%*	1	68	*4%*	-15	114	*2%*	-33	-79	*-3%*	HU
MT	-9	104	*15%*	-4	11	*10%*	-3	50	*14%*	-2	44	*19%*	MT
NL	105	759	*4%*	19	-22	*-1%*	109	434	*5%*	-24	347	*7%*	NL
AT	66	298	*3%*	6	-7	*0%*	65	161	*3%*	-5	145	*5%*	AT
PL	283	1.040	*3%*	262	634	*13%*	161	633	*4%*	-139	-227	*-2%*	PL
PT	99	493	*6%*	-45	8	*1%*	44	277	*7%*	101	209	*7%*	PT
RO	130	1.363	*10%*	217	399	*16%*	-9	899	*13%*	-78	66	*2%*	RO
SI	0	64	*3%*	0	5	*1%*	0	46	*5%*	-1	14	*2%*	SI
SK	12	104	*2%*	19	75	*9%*	12	69	*3%*	-18	-40	*-3%*	SK
FI	41	199	*4%*	15	25	*3%*	27	108	*4%*	-2	66	*4%*	FI
SE	-38	-183	*-1%*	-30	-131	*-5%*	-1	-60	*-1%*	-7	9	*0%*	SE
NO	-19	-201	*-3%*	-11	-121	*-9%*	-8	-96	*-3%*	0	16	*1%*	NO
EA	-238	4.887	*1%*	60	-1.962	*-3%*	279	3.638	*2%*	-577	3.212	*3%*	EA
EU	193	7.864	*2%*	572	-1.009	*-1%*	531	5.683	*3%*	-910	3.191	*2%*	EU

(1) Difference in 2070 as percentage of EUROPOP2019 projection for 2070.
Source: European Commission based on EUROPOP2023 and EUROPOP2019 (Eurostat).

These changes result in a lower projected old-age dependency ratio throughout the projections for almost all Member States, reaching significantly lower levels in the middle of the projection in numerous countries before coming relatively closer to the previously projected figures in most of the cases. However, notable differences persist even by the end of the projection period for Czechia, Estonia, Croatia, Latvia, Hungary, Poland, Romania, and Slovakia (see Table I.1.13). The largest upward revisions by the end of the projection period are for Denmark, Ireland, Cyprus, Lithuania, and Malta.

The broad differences in the population projections described above can be related to changes in the assumptions regarding fertility, mortality and net migration with clearly greater roles of the latter two due to the COVID-19 pandemic and Russia's war of aggression against Ukraine. Furthermore, a simplification of the derivation of net migration and new input data underlying the assumptions drive differences in the long term (see Box I.1.1).

Fertility

Fertility rates are very similar to those assumed in the previous demographic projections with small differences only in a handful of Member States (see Table I.1.15).

Table I.1.13: **Old-age dependency ratio – difference between EUROPOP2023 and EUROPOP2019 (pps)**

	2022	2045	2070	2022-2070
BE	-0.6	-2.8	-0.3	0.2
BG	-1.7	-2.2	-0.5	1.1
CZ	-0.5	-2.4	-2.2	-1.7
DK	-0.6	-1.4	2.8	3.4
DE	-0.5	-3.0	0.4	0.9
EE	-1.0	-3.2	-2.0	-1.0
IE	0.0	0.2	2.6	2.6
EL	-0.9	4.6	0.8	1.7
ES	-0.4	-1.2	1.9	2.3
FR	-0.5	-1.6	0.9	1.5
HR	1.2	-0.6	-2.3	-3.5
IT	0.2	-0.5	-0.1	-0.2
CY	-1.2	2.0	4.8	6.0
LV	-1.0	-4.2	-2.5	-1.6
LT	-1.4	-5.2	6.4	7.7
LU	-0.7	-5.4	-0.7	0.0
HU	-0.5	-1.9	-3.1	-2.6
MT	-0.3	-6.5	3.0	3.3
NL	-0.6	-3.0	1.1	1.7
AT	-0.5	-1.0	1.1	1.6
PL	-0.8	-1.6	-4.1	-3.2
PT	1.4	0.0	0.5	-0.9
RO	-0.7	-3.4	-6.3	-5.6
SI	0.0	-1.4	-1.2	-1.2
SK	-0.6	-1.4	-3.4	-2.8
FI	-0.4	-2.0	0.0	0.4
SE	-0.1	-0.6	0.6	0.7
NO	0.1	0.5	1.9	1.9
EA	-0.3	-1.7	0.6	0.9
EU	-0.4	-1.7	-0.1	0.3

Old-age dependency ratio: persons aged 65 and over in relation to persons aged 20-64.
Source: European Commission based on EUROPOP2023 and EUROPOP2019 (Eurostat).

Table I.1.14: **Life expectancy at birth – difference between EUROPOP2023 and EUROPOP2019 (years)**

	Males			Females		
	2022	2070	change 2022-2070	2022	2070	change 2022-2070
BE	-0.4	0.1	0.5	0.0	0.2	0.2
BG	-1.8	-0.1	1.7	-1.6	0.0	1.6
CZ	-1.0	0.0	1.0	-0.7	0.0	0.7
DK	0.1	0.3	0.2	0.0	0.3	0.3
DE	-0.4	0.0	0.4	-0.2	0.1	0.3
EE	-0.6	-0.2	0.4	-0.4	-0.1	0.3
IE	-0.2	0.1	0.3	-0.1	0.2	0.3
EL	-0.7	0.1	0.8	-0.4	0.1	0.5
ES	-0.5	0.0	0.5	-0.3	0.1	0.4
FR	-0.6	0.0	0.6	-0.6	-0.1	0.5
HR	-0.8	-0.1	0.7	-0.7	0.1	0.8
IT	-0.4	0.1	0.5	-0.4	0.1	0.5
CY	-0.5	0.2	0.7	-0.6	0.1	0.7
LV	-0.8	-0.1	0.7	-0.7	-0.1	0.6
LT	-0.9	-0.1	0.8	-0.8	0.1	0.9
LU	0.2	0.3	0.1	-0.2	0.0	0.2
HU	-1.0	0.0	1.0	-1.0	0.0	1.0
MT	0.1	0.2	0.1	-0.2	0.2	0.4
NL	-0.5	0.1	0.6	-0.3	0.1	0.4
AT	-0.5	0.0	0.5	-0.4	0.0	0.4
PL	-1.5	-0.2	1.3	-1.2	0.0	1.2
PT	0.7	1.2	0.5	0.0	0.0	0.0
RO	-1.7	-0.2	1.5	-1.3	0.0	1.3
SI	-0.5	0.1	0.6	-0.4	0.1	0.5
SK	-1.3	0.0	1.3	-1.1	0.1	1.2
FI	-0.6	0.0	0.6	-0.9	0.0	0.9
SE	0.0	0.2	0.2	0.5	0.4	-0.1
NO	0.6	0.4	-0.2	0.2	0.4	0.2
EA	-0.5	0.0	0.6	-0.4	0.0	0.4
EU	-0.6	0.0	0.7	-0.5	0.0	0.5

Source: European Commission based on EUROPOP2023 and EUROPOP2019 (Eurostat).

Life expectancy

Due to the impact of the COVID-19 pandemic, life expectancy at birth in the EU was significantly lower in 2022 for both males and females than expected in EUROPOP2019 (see Table I.1.14). The expected average increase in male and female longevity from that lower starting point is then assumed to be faster, reaching similar levels in 2070 as in the previous projections.

Better outcomes for males in 2022 only concern Denmark, Luxembourg, Malta, Portugal, and Norway. Conversely, life expectancy was one year or more lower for Bulgaria, Czechia, Hungary, Poland, Romania, and Slovakia. For females, the extent of the revisions was slightly lower but the overall picture is the same.

Net migration

Net migration flows in 2022 were exceptionally high due to Russia's invasion of Ukraine and significantly higher for all Member States than the numbers projected in EUROPOP2019 (see Table I.1.15). The higher net migration for the EU of around 4.8 million people in 2022 based on the

EUROPOP2023 projection ([17]) corresponded to more than 1% of the EU population. The difference was significant throughout the EU and the highest as a percentage of the 2022 population in Czechia, Estonia, Lithuania, Poland, Bulgaria, and Latvia, with higher net migration exceeding 2% of the total population.

Over the entire projection period 2022-2070, cumulative net migration is expected to count about 14 million more people as compared to the EUROPOP2019 projections. This corresponds to more than 3% of the previous population projection for 2070. Looking at the period between 2025 (the year by which figures are projected to return to pre-2022 levels) and 2070, thereby omitting the most exceptional years from the comparison, net migration is projected to be much less but still visibly higher, by about 4.5 million people (1%). For almost all countries, the new migration projections entail an upward revision. This revision exceeds 10% of the former 2070 population size in the cases of Latvia, Lithuania, Luxembourg, and Malta. Net migration over the entire projection period was only revised downward for Greece and Cyprus.

Table I.1.15: **Total fertility rates and net migration - difference between EUROPOP2023 and EUROPOP2019**

	Fertility rate			Net migration ('000)						
	2022	2070	avg 2022-2070	2022	2070	2022[(1)]	sum 2022-2070	sum 2022-2070[(2)]	*sum 2025-2070*	*sum 2025-2070 [(2)]*
BE	0.0	0.0	0.0	86	8	0.7%	766	6.5%	*627*	*5.3%*
BG	0.0	0.0	0.0	164	6	2.4%	410	8.1%	*220*	*4.4%*
CZ	0.0	0.0	0.0	442	7	4.1%	606	5.9%	*54*	*0.5%*
DK	0.0	0.0	0.0	47	2	0.8%	123	2.0%	*27*	*0.4%*
DE	0.0	0.0	0.0	1349	22	1.6%	3.324	4.1%	*547*	*0.7%*
EE	0.1	0.0	0.0	43	1	3.2%	106	8.9%	*47*	*4.0%*
IE	-0.2	-0.1	-0.2	60	1	1.2%	35	0.5%	*-105*	*-1.6%*
EL	0.1	0.0	0.0	10	-6	0.1%	-546	-6.4%	*-570*	*-6.6%*
ES	-0.1	-0.1	-0.1	399	25	0.8%	2.329	4.9%	*789*	*1.7%*
FR	0.0	0.0	0.0	204	18	0.3%	883	1.3%	*334*	*0.5%*
HR	0.0	0.0	0.0	19	4	0.5%	185	6.1%	*172*	*5.7%*
IT	-0.1	-0.1	-0.1	154	34	0.3%	1.791	3.3%	*984*	*1.8%*
CY	0.0	0.0	0.0	14	0	1.5%	-55	-5.0%	*-82*	*-7.5%*
LV	-0.1	0.0	0.0	40	1	2.1%	119	10.1%	*90*	*7.7%*
LT	-0.2	-0.1	-0.1	86	3	3.1%	322	17.7%	*218*	*11.9%*
LU	0.0	0.0	0.0	10	1	1.5%	129	16.3%	*94*	*11.9%*
HU	0.1	0.0	0.0	22	2	0.2%	48	0.5%	*-43*	*-0.5%*
MT	0.0	0.0	0.0	2	0	0.3%	89	12.5%	*57*	*8.1%*
NL	0.0	0.0	0.0	182	9	1.0%	860	4.8%	*417*	*2.3%*
AT	0.0	0.0	0.0	76	9	0.9%	427	4.6%	*271*	*2.9%*
PL	0.0	0.1	0.1	982	-3	2.6%	500	1.6%	*-613*	*-2.0%*
PT	0.0	0.0	0.0	64	20	0.6%	709	8.4%	*575*	*6.8%*
RO	0.2	0.0	0.1	143	7	0.8%	640	4.7%	*596*	*4.4%*
SI	0.0	0.0	0.0	7	1	0.3%	72	3.7%	*44*	*2.3%*
SK	0.0	0.0	0.0	92	0	1.7%	98	2.1%	*-8*	*-0.2%*
FI	0.0	0.0	0.0	64	0	1.1%	138	2.7%	*6*	*0.1%*
SE	0.0	0.0	0.0	36	2	0.3%	74	0.6%	*-132*	*-1.0%*
NO	-0.1	0.0	-0.1	8	3	0.2%	40	0.6%	*-17*	*-0.3%*
EA	0.0	0.0	0.0	2960	152	0.8%	11.781	3.5%	*4.505*	*1.3%*
EU	0.0	0.0	0.0	4796	175	1.1%	14.182	3.3%	*4.614*	*1.1%*

(1) Difference in total net migration in 2022 as a percentage of EUROPOP2019 population projection for 2022.
(2) Difference in total net migration (2022-2070) as a percentage of EUROPOP2019 population projection for 2070.
Source: European Commission based on EUROPOP2023 and EUROPOP2019 (Eurostat).

([17]) More recent estimates suggest somewhat lower but still exceptional figures.

Box I.1.1: Methodology for the migration assumptions in the EUROPOP2023 projections – impact of displaced people from Ukraine

The models used by Eurostat to produce immigration and emigration projections, which combine into net migration, take account of past migration trends, the most recent data, underlying demographic factors and assumptions about future developments in migration flows. The models are built around a nowcast component, a trend extrapolation and a long-term convergence module. In the case of the immigration model, also a working-age population feedback mechanism is applied. The main elements of the methodology were explained in detail in the previous edition of the Ageing Report. ([1]) In comparison, the EUROPOP2023 methodology was slightly simplified, modelling intra-EU migration flows no longer separately, as described below. In addition, the expected in- and outflows of people fleeing Ukraine who currently benefit from temporary protection were modelled explicitly.

Immigration assumptions

Total immigration in EUROPOP2023 consists of three components:

1. **Immigration derived from past immigration trends.** This is the largest component of immigration and is modelled separately for (i) immigration from non-EU countries and (ii) immigration from EU countries. The model is split into two periods: 2023-2027 and 2028-2100. For the years 2023 to 2027, the values are derived from a linear interpolation between the nowcast level of 2022 and the average of past immigration used to estimate expected immigration in 2027 (average of 2003-2022; 2013-2022 for Member States that joined since 2004). As of 2027, immigration levels are estimated through linear interpolation between the long-term average and the immigration per capita value for the EU in 2027.

2. **A working-age feedback mechanism.** In case of a decline in the working-age population (people aged 15-64), 10% of the decrease is assumed to be compensated by additional non-EU immigration.

3. **In 2022 and 2023, inflows of displaced people from Ukraine under temporary protection**. The large influx of displaced people from Ukraine following the Russian war of aggression triggered the activation of the *Directive on Temporary Protection* in March 2022. The rights of beneficiaries of temporary protection include a residence permit for the entire duration of the protection (one to three years) and the possibility to move to another Member State before the issuance of a residence permit. People fleeing Ukraine under temporary protection are included in the base population for the purpose of population projections. The stocks of beneficiaries of temporary protection at the end of December 2022 was used to measure the total inflow of refugees in 2022. For 2023, the total inflow of people under temporary protection is projected to be 15% of the inflows observed in 2022. There are no further inflows estimated after 2023, nor further inflows due to family reunions.

Emigration assumptions

Total emigration in EUROPOP2023 results from two projection components:

1. **Emigration derived from past emigration trends**. It is modelled similarly to immigration (see above). 2027 emigration levels are converted into country-specific probabilities of emigration that are assumed to linearly converge between 2027 and 2100 towards the EU average (2013-2022).

([1]) See 2021 Ageing Report: Underlying Assumptions and Projection Methodologies.

(Continued on the next page)

Box (continued)

2. **Outflows in 2024-2033 of Ukrainian refugees who arrived under temporary protection in 2022-2023**. Surveys indicate that a relevant share of displaced people from Ukraine intends to stay in their current host country. ([2]) The emigration projections assume that 33% of refugees will remain permanently in the host country, with 67% returning. The return period is modelled over 10 years, such that the number of returns per year decreases linearly, until 33% of the total inflows in 2022-2023 is left in 2033.

([2]) In a UNHCR survey among Ukrainian refugees in 43 countries from August-September 2022, 81% of the respondents indicated their wish to return to Ukraine eventually. A survey conducted in Germany between August and October 2022 indicated that 37% of the refugees from Ukraine would like to stay permanently, another 34% indicated their intention to stay at least until the end of the war, 27% were undecided, and just 2% planned to leave within a year. In Finland, a survey conducted in June and July 2022 showed that 27% of the refugees would not return to Ukraine in any event, 33% stated that they would return once the war has ended, while 39% were uncertain.

2. LABOUR FORCE PROJECTIONS

Labour force participation among the population aged 20 to 64 years in the EU is projected to rise from around 79% in 2022 to 83% in 2070. Higher participation of older workers and of women in general is the main drivers behind the rising trend in the projections. The labour supply is, however, projected to decline by 12% by 2070, as higher labour force participation can only partly offset the expected fall in the working-age population. Over the same period, the employment rate is projected to increase from 75% to 79% in the EU. Overall, the number of hours worked would fall by 9% on average and economic dependency ratios would rise.

2.1. INTRODUCTION

The macroeconomic implications of the demographic trends described in the previous chapter will depend in large part on labour force developments, namely how many people take part in the labour market and for how long. More people working and doing so for a longer time broadens the contributory basis, generating more resources to finance the rising pension and healthcare and long-term care costs associated with population ageing, without crowding out other public spending priorities.

How long people will work in the future depends, among other factors, on the incentives created by public and private pension programmes. It is therefore important to consider the likely impact of adopted pension reforms on labour market exit behaviour. ([18])

This chapter starts with a comparison of recent trends in labour force participation, followed by an overview of the estimated effects of legislated pension reforms. Thereafter, the participation rate and employment rate projections are discussed. ([19]) An analysis of the economic dependency ratio and a comparison with the 2021 Ageing Report conclude the chapter. The boxes and annexes focus on the underlying assumptions and methodology.

2.2. PAST TRENDS AND MAIN DRIVERS OF LABOUR MARKET DEVELOPMENTS

The composition of the labour force has changed fundamentally in recent decades. Younger cohorts have tended to enter the labour market later, and women and older people have steadily increased labour market participation. These dynamics have several drivers:

- Demographic factors, e.g. a delay in childbearing and decline in fertility rates.
- Sociocultural factors, e.g. longer schooling and the fading of the breadwinner model.
- Institutional factors, e.g. increases in legal retirement ages and stricter labour market regulation.
- Economic factors, e.g. more part-time employment and a shift to a service-based economy.

The labour market participation among people of working age (20-64) in the EU rose from 72% in 2000 to 75% in 2010 and to 78% in 2021 (see Table I.2.1). Compared to 2010, participation rose in all Member States, with the largest increase recorded in Hungary and Malta, at about 15-20 pps. Fluctuations in the upward trend in labour market participation coincide with the business cycle, e.g. in 2008-2011 (global financial crisis) and 2020-2021 (COVID-19 pandemic).

([18]) Other aspects that may affect labour supply are health and disability trends, and active labour market policies that may increase demand for older workers and the flexibility of working in old age.

([19]) To project participation rates by sex and single age, the Cohort Simulation Model (CSM) developed by the European Commission (DG ECFIN) is used. The labour force projections are based on a 'no-policy-change' assumption (see Box I.2.1).

Rising female labour force participation has been the predominant driver of the trend increase. Male labour participation in the EU was stable at around 82% in the 2000s but has been rising slowly since. Given the fast rise in female participation, the difference between male and female participation has narrowed (from 19 pps in 2000 to 11 pps in 2021). Yet, a clear gap remains and convergence slowed down in recent years as also male participation picked up. Even though female participation has been steadily increasing, it stays below male participation for all age groups in nearly all countries. In general:

- Prime-age male workers (aged 25-54) have the highest participation rates of all age groups, at over 90% in nearly all countries.

- The participation rates of men aged 55 to 64 years rose considerably since 2000, given higher statutory retirement ages and reduced early exit possibilities. For women aged 55-64, the increase was even stronger, though starting from a lower level, with a convergence in retirement conditions to those for men in most countries.

- The participation rates of young people (aged 20-24) have declined in most countries as people tend to study longer.

- Given these trends, a further increase in total labour market participation is expected, driven by prime-age women and older workers in general.

Table I.2.1: **Historical participation rates: total (%)**

	total (20-64y)			young (20-24y)			prime-age (25-54y)			older (55-64y)			
	2000	2010	2021	2000	2010	2021	2000	2010	2021	2000	2010	2021	
BE	70.8	73.5	75.1	60.7	55.2	47.4	82.8	86.3	85.4	25.9	39.2	57.1	BE
BG	67.1	71.9	77.2	48.5	51.3	35.8	81.6	82.9	84.7	25.1	49.3	67.9	BG
CZ	77.4	75.7	82.2	69.3	51.5	49.5	88.5	87.8	88.7	38.1	49.7	71.6	CZ
DK	81.4	80.6	82.9	79.1	75.2	73.1	87.9	88.4	87.1	56.9	58.9	75.3	DK
DE	74.6	80.6	82.3	71.1	69.9	71.5	85.4	87.3	87.2	42.9	62.6	74.1	DE
EE	77.6	80.2	84.5	64.7	60.8	68.8	88.0	88.3	88.8	47.3	64.3	76.6	EE
IE	73.0	76.2	79.5	73.6	78.1	71.4	78.4	80.7	84.3	46.3	55.1	66.4	IE
EL	69.6	73.0	73.4	63.1	51.4	42.1	78.3	83.2	83.1	40.9	45.2	54.4	EL
ES	69.8	77.8	79.2	60.9	64.6	53.2	78.0	85.7	87.1	40.8	50.7	64.4	ES
FR	74.9	75.8	79.2	59.3	61.6	64.6	86.4	88.7	88.0	31.7	42.2	59.7	FR
HR	67.6	69.9	73.5	63.1	56.5	51.9	80.2	80.8	85.3	24.5	41.8	50.7	HR
IT	63.6	66.3	69.3	55.8	46.8	43.1	74.2	76.9	77.3	28.6	37.9	56.5	IT
CY	75.6	80.0	82.0	72.6	69.4	69.1	81.6	86.9	87.7	51.2	59.1	66.9	CY
LV	73.7	79.6	81.6	64.8	65.0	61.3	85.5	88.6	87.1	39.0	56.9	72.2	LV
LT	78.6	78.2	83.5	64.6	52.3	60.7	89.3	88.4	90.1	45.6	56.5	74.1	LT
LU	69.0	73.8	77.9	56.3	40.8	52.0	79.8	85.7	89.2	27.6	40.6	48.8	LU
HU	65.0	67.4	82.0	57.6	44.7	55.4	77.3	80.9	90.1	22.6	36.5	64.7	HU
MT	60.5	64.0	81.7	79.5	73.8	74.4	64.2	72.9	89.5	29.5	33.3	53.9	MT
NL	76.0	79.7	84.6	80.6	77.1	83.6	83.6	87.8	88.7	38.6	55.3	73.8	NL
AT	74.1	77.5	80.4	71.7	73.4	73.8	85.3	87.1	89.0	31.4	42.2	58.4	AT
PL	72.9	71.1	78.0	63.7	57.9	55.5	82.7	84.1	87.4	32.1	36.7	56.0	PL
PT	76.4	79.1	81.2	63.7	59.1	51.5	84.6	88.7	90.4	53.2	54.3	66.9	PT
RO	75.9	69.7	70.8	60.9	47.2	46.7	84.4	81.9	80.6	52.5	42.1	45.6	RO
SI	73.4	75.8	79.8	59.4	57.7	52.8	87.7	90.0	92.2	23.7	36.5	54.9	SI
SK	76.5	75.2	80.0	70.1	52.7	46.4	88.3	86.9	88.8	24.6	45.1	64.1	SK
FI	79.6	79.0	82.7	77.7	69.7	68.1	88.1	87.5	87.9	45.5	60.2	73.8	FI
SE	80.7	84.5	87.5	61.3	72.0	72.8	86.8	89.8	91.1	68.4	74.8	82.5	SE
NO	82.9	82.1	83.0	74.6	72.3	73.0	87.7	87.3	86.6	66.2	69.6	75.9	NO
EA	72.0	75.8	78.4	64.1	62.2	60.8	82.2	85.2	85.7	37.2	49.2	64.7	EA
EU	72.4	75.0	78.4	63.6	60.5	59.6	82.6	85.0	85.9	37.9	48.1	64.0	EU

Croatia: 2002 instead of 2000.
Source: Eurostat, LFS.

Table I.2.2: **Historical participation rates: men (%)**

	total (20-64y)			young (20-24y)			prime-age (25-54y)			older (55-64y)			
	2000	2010	2021	2000	2010	2021	2000	2010	2021	2000	2010	2021	
BE	80.1	79.8	79.5	65.5	59.5	49.8	92.1	92.2	89.7	36.3	47.6	62.5	BE
BG	73.4	76.8	81.8	58.3	58.2	43.7	84.4	86.1	88.4	39.9	56.6	73.5	BG
CZ	86.2	84.9	89.5	77.3	60.0	58.8	95.0	95.5	95.8	54.5	62.5	78.1	CZ
DK	85.7	84.5	86.4	84.4	77.0	75.2	91.5	91.8	90.5	64.5	65.1	79.8	DK
DE	82.9	86.8	86.5	74.6	72.5	73.8	93.7	93.2	91.4	52.5	70.8	78.6	DE
EE	83.3	83.8	87.0	75.8	67.2	70.2	91.6	91.8	91.9	54.4	64.3	76.1	EE
IE	86.2	83.9	85.1	79.2	81.0	72.5	92.0	88.9	90.2	64.6	64.3	73.6	IE
EL	85.1	84.4	81.7	69.3	56.3	43.9	94.5	94.2	90.6	57.7	60.2	66.5	EL
ES	84.4	85.4	83.7	65.2	67.4	55.6	93.2	92.4	91.3	60.3	63.7	70.9	ES
FR	81.9	80.7	82.7	63.2	65.9	67.0	94.3	94.2	92.3	35.5	45.0	61.7	FR
HR	75.2	75.8	78.9	69.5	63.8	60.7	86.9	84.1	89.3	34.2	54.4	57.4	HR
IT	78.6	78.4	79.2	61.9	54.1	50.0	90.4	89.4	87.3	42.2	49.5	67.2	IT
CY	89.2	87.2	88.5	78.2	68.8	73.4	95.3	93.4	93.1	69.5	74.3	78.9	CY
LV	80.5	82.5	85.1	74.7	68.7	66.9	88.5	91.0	90.9	53.8	58.5	73.2	LV
LT	82.8	80.6	84.7	70.0	57.4	64.0	90.4	89.0	91.0	59.0	62.6	74.1	LT
LU	82.2	82.1	81.3	61.5	42.6	53.2	94.2	94.8	92.5	38.6	48.8	54.4	LU
HU	73.6	74.0	87.4	66.0	49.5	60.1	84.3	87.3	93.6	34.3	42.2	76.6	HU
MT	85.8	83.2	89.7	81.7	77.9	75.9	93.5	94.5	96.6	52.9	52.3	68.1	MT
NL	85.8	85.9	88.7	82.5	77.6	81.7	93.8	93.3	92.2	50.8	66.2	82.1	NL
AT	83.2	83.0	85.0	75.3	76.5	78.4	93.6	91.9	92.3	44.5	51.4	66.4	AT
PL	79.4	78.6	85.3	68.3	65.3	63.4	88.4	89.6	92.5	41.1	48.9	69.3	PL
PT	84.8	83.8	84.3	70.0	61.4	55.3	92.4	92.7	92.3	64.6	62.0	73.3	PT
RO	82.6	79.1	81.6	67.2	54.7	56.5	91.0	90.9	90.7	58.4	52.3	57.9	RO
SI	78.0	79.9	82.8	63.4	63.3	56.9	90.7	91.7	94.1	33.5	47.5	59.3	SI
SK	84.7	83.4	84.4	78.0	62.3	57.1	94.0	92.9	92.4	41.0	59.7	67.7	SK
FI	82.6	81.4	84.4	82.2	72.4	70.3	91.1	90.5	90.0	46.4	60.1	73.8	FI
SE	83.1	88.0	90.3	64.8	75.3	75.6	88.6	92.9	93.9	72.1	79.3	85.1	SE
NO	87.4	85.2	85.7	78.8	74.6	72.8	91.7	90.1	89.2	72.7	73.5	80.4	NO
EA	82.4	83.0	83.6	68.7	66.2	63.9	92.9	92.3	90.8	48.4	58.0	70.7	EA
EU	81.9	82.3	84.0	68.6	65.1	63.6	92.0	91.8	91.2	48.7	57.2	70.8	EU

Croatia: 2002 instead of 2000.
Source: Eurostat, LFS.

Table I.2.3: **Historical participation rates: women (%)**

	total (20-64y)			young (20-24y)			prime-age (25-54y)			older (55-64y)			
	2000	2010	2021	2000	2010	2021	2000	2010	2021	2000	2010	2021	
BE	61.3	67.1	70.8	55.8	51.0	44.8	73.2	80.4	81.1	15.8	30.9	51.8	BE
BG	61.0	67.0	72.5	38.5	43.9	27.6	78.9	79.6	80.7	12.5	42.9	62.7	BG
CZ	68.8	66.4	74.7	61.5	42.5	39.7	81.9	79.8	81.1	23.3	38.0	65.2	CZ
DK	77.1	76.7	79.4	74.2	73.3	70.9	84.3	85.0	83.7	48.2	52.8	70.9	DK
DE	66.2	74.5	78.1	67.8	67.3	68.9	77.0	81.3	82.8	33.4	54.6	69.6	DE
EE	72.3	76.8	82.0	52.8	54.3	67.5	84.5	84.8	85.4	41.9	64.3	77.0	EE
IE	59.9	68.5	74.0	67.9	75.3	70.3	64.9	72.6	78.5	27.7	45.7	59.5	IE
EL	54.6	61.8	65.1	57.1	46.6	40.2	62.2	72.4	75.4	25.9	31.1	43.6	EL
ES	55.2	70.1	74.7	56.6	61.8	50.7	62.7	78.8	83.0	22.5	38.4	58.3	ES
FR	68.1	71.0	75.8	55.7	57.3	62.1	78.6	83.4	84.0	28.2	39.5	57.9	FR
HR	60.4	64.1	68.2	56.5	49.0	42.5	73.7	77.4	81.2	16.0	30.2	44.6	HR
IT	48.9	54.6	59.4	49.9	39.2	35.6	57.9	64.5	67.3	15.9	26.9	46.5	IT
CY	62.8	73.4	75.9	68.0	70.1	65.1	68.6	81.0	82.7	33.6	44.3	55.2	CY
LV	67.6	77.0	78.2	54.7	61.2	55.5	82.7	86.3	83.3	28.0	55.7	71.4	LV
LT	74.7	76.0	82.3	59.1	47.0	57.1	88.3	87.8	89.2	35.4	51.7	74.0	LT
LU	55.5	65.3	74.3	51.0	39.0	50.7	64.9	76.4	85.9	16.8	32.0	42.9	LU
HU	56.7	61.0	76.6	49.0	39.6	50.4	70.5	74.6	86.6	13.2	31.7	54.3	HU
MT	35.1	44.3	72.4	77.1	69.5	72.6	34.5	50.6	81.2	8.6	14.6	39.0	MT
NL	66.0	73.5	80.6	78.7	76.5	85.6	73.0	82.2	85.1	26.4	44.4	65.6	NL
AT	65.1	71.9	75.8	68.1	70.5	69.2	76.8	82.4	85.6	18.9	33.6	50.7	AT
PL	66.7	63.6	70.7	59.2	50.1	47.3	77.1	78.6	82.1	24.4	25.9	44.0	PL
PT	68.4	74.7	78.4	57.4	56.9	47.5	77.1	84.9	88.7	43.1	47.4	61.3	PT
RO	69.4	60.2	59.8	54.9	39.1	36.4	77.9	72.7	70.0	47.5	33.1	34.1	RO
SI	68.8	71.5	76.6	55.1	50.8	48.1	84.7	88.1	90.1	14.8	25.5	50.6	SI
SK	68.5	67.0	75.6	62.3	42.8	35.2	82.5	80.9	85.0	11.1	32.3	60.8	SK
FI	76.6	76.6	80.9	73.3	66.9	65.6	85.1	84.4	85.6	44.6	60.3	73.9	FI
SE	78.3	81.0	84.7	57.7	68.5	69.6	84.9	86.6	88.2	64.6	70.2	79.9	SE
NO	78.3	79.0	80.2	70.4	70.0	73.3	83.5	84.3	83.9	59.7	65.5	71.3	NO
EA	61.7	68.6	73.2	59.6	58.2	57.5	71.5	78.1	80.6	26.6	40.9	59.0	EA
EU	63.1	67.8	72.9	58.7	55.7	55.4	73.1	78.1	80.6	27.9	39.6	57.5	EU

Croatia: 2002 instead of 2000.
Source: Eurostat, LFS.

2.3. THE IMPACT OF PENSION REFORMS ON THE PARTICIPATION RATE OF OLDER WORKERS

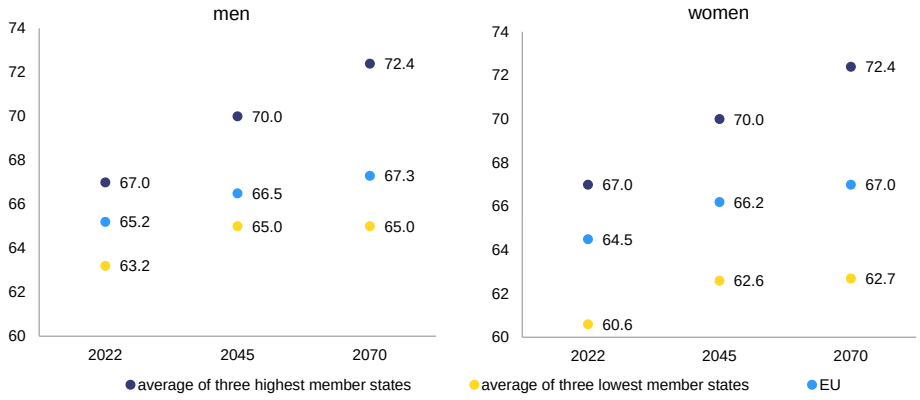
Tighter eligibility criteria and stronger retirement disincentives will induce older workers to stay longer in the workforce and delay retirement. As a result, participation among older age groups is expected to rise strongly in many countries and effective labour market exit ages are projected to increase by about two years on average in the EU by 2070.

Pension reforms in EU Member States

Most Member States have legislated pension reforms in recent decades. Sometimes reforms are systemic and revise the design of the public pension scheme, for example when moving from the traditional defined benefit scheme to a point system or notional defined contribution scheme. Most changes are parametric, though. Two broad types can be distinguished: tightening pension eligibility requirements such as age and contributory period or making benefits less generous by adapting the pension formula and indexation rules. Some countries also increased the contributions for current workers to strengthen the internal financial balance of their pension systems or created pension reserve funds.

Among eligibility measures, the most frequent reform consists in raising the statutory and early retirement ages. It is the measure with the largest direct impact on labour market exit behaviour as it forces people to delay retirement. Nearly all Member States have already increased their early and statutory retirement ages or are in the process of doing so in the coming years (see Annex 4 - Table II.A4.2). As a result, the average statutory retirement age for men (women) is expected to rise from 65.2 years (64.5) in 2022 to 66.5 years (66.2) years in 2045, and to 67.3 years (67) in 2070 (see Graph I.2.1), with often similar increases in the early retirement age.

Graph I.2.1: **Legislated change in statutory retirement ages**



For a comprehensive overview, see Table II.A4.2 in Annex 4.
Source: European Commission, EPC.

At the same time, adopted reforms have been reversed in several countries. This was for example the case in Poland, Czechia, Croatia, and Slovakia. ([20]) In other cases, the impact of legislated reforms was

([20]) In *Poland*, the 2016 reform lowered the statutory retirement age to 60 years for women and to 65 years for men, restoring the situation from before the 2012 reform, which gradually raised the statutory retirement age to 67 years. In *Czechia*, the 2017 reform capped the statutory retirement age at 65 years, undoing the permanent increase in the retirement age, which was roughly equivalent to changes in life expectancy, adopted in 2011. In *Croatia*, the 2019 reform capped the early/statutory retirement age at 60/65 years as of 2030, lowered the penalty for early retirement and reversed the acceleration of the equalisation of retirement ages between men and women. As a result, the 2018 and the earlier 2014 reforms, which would have increased the early/statutory retirement age to 62/67 years by 2038, were partly reversed. In *Slovakia*, the 2019 reform capped the statutory retirement age at 64 years, lower for mothers, thus abolishing the link to life expectancy adopted in 2012. However, in 2023 the link to longevity was reintroduced (see Box I.2.2.

delayed, e.g. the application of the index for pension revaluation and the sustainability factor in Spain ([21]) and the temporary possibility to retire early in Italy in 2019 but extended since.

Some countries have introduced an automatic link between retirement ages and gains in life expectancy to make their pension system more robust to a continuous increase in longevity (see Table I.2.4). The adoption of an automatic balancing mechanism within the pension system or a sustainability factor, which adjust the pension benefit itself for changes in life expectancy, are other built-in mechanisms found in some Member States but they have at most an indirect impact on labour market participation.

Box I.2.2 at the end of the chapter provides an overview of ongoing reforms with an expected impact on effective retirement ages in the 27 Member States and Norway. These reforms are incorporated in the Cohort Simulation Model used to project future participation rates (see Box I.2.1).

Table I.2.4: **Automatic adjustment mechanisms**

	Automatic balancing mechanism	Sustainability factor[4]	Retirement age linked to life expectancy	Legislated
IT		X	X	1995 & 2010
LV		X		1996
SE[1]	X	X	X	1998, 2001 & 2021
PL		X		1999
FR[2]		X		2003
DE	X			2004
FI		X	X	2005 & 2015
PT[1]		X	X	2007 & 2013
EL			X	2010
DK[3]			X	2011
CY			X	2012
LU	X			2012
NL[1]			X	2012
LT	X			2016
EE			X	2018
SK			X	2023

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

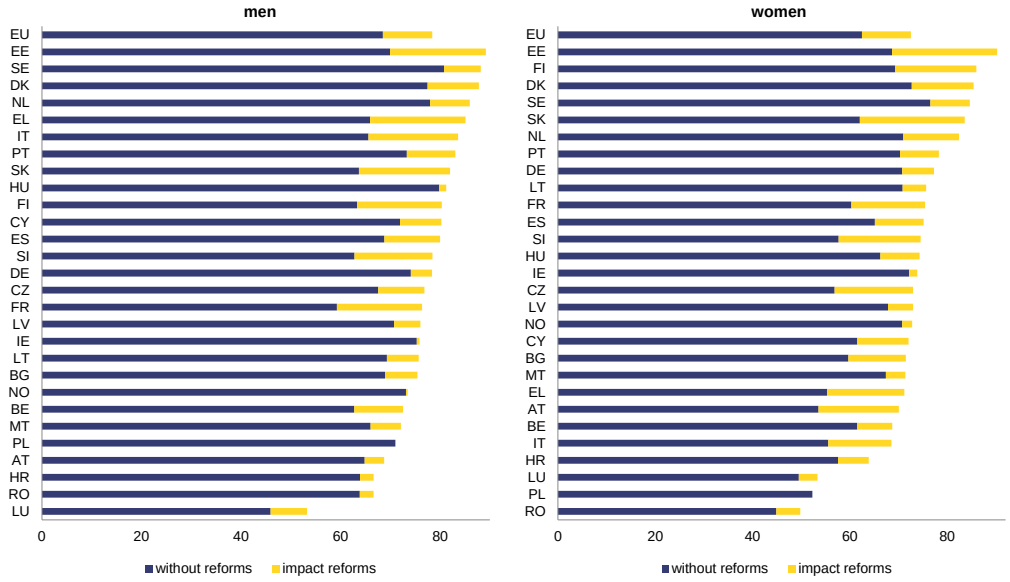
Reform-induced changes in participation rates and exit ages

The age group 55-64 is the most affected by measures aimed at postponing retirement. Table I.2.1 showed how the participation rates for this age bracket already increased from 38% in 2000 to 64% in 2021. Graph I.2.2 shows the estimated impact of pension reforms by 2070. Adopted reforms should lift the projected participation rate among both men and women aged 55-64 years by about 10 pps on average by 2070. Also for the age group 65-74 (see Graph I.2.3), legislated reforms push up projected participation rates, with an average increase of 8 pps for men and 7 pps for women by 2070, though mainly in countries that adjust their legal retirement ages to life expectancy.

Average exit ages from the labour market can be derived from the participation rates of the oldest age brackets. Graph I.2.4 shows the change in the average exit age for men and women by 2070. It provides a summary measure of the long-term impact of enacted pension reforms. The projections show an average increase of around two years in the age at which people exit the labour market, which can be considered an approximation for the effective retirement age.

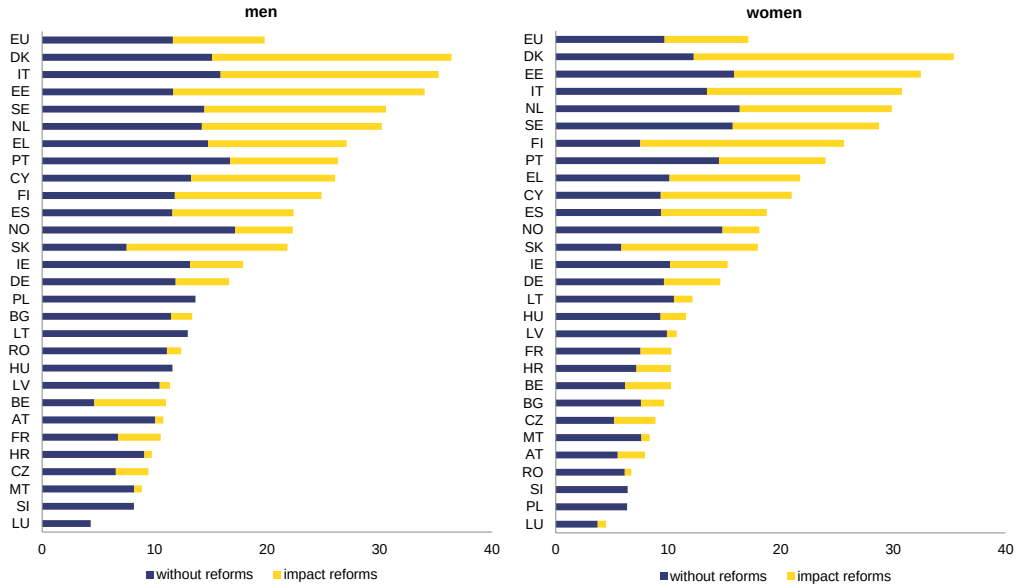
([21]) Both the IPR and the sustainability factor were eventually abolished in 2021.

Graph I.2.2: **Impact of pension reforms on the participation rate of the age group 55-64 in 2070 (%)**



The reform impact is the difference between the participation rate projection in the baseline and that in the 'constant retirement age scenario' (see Chapter 5).
Source: European Commission, EPC.

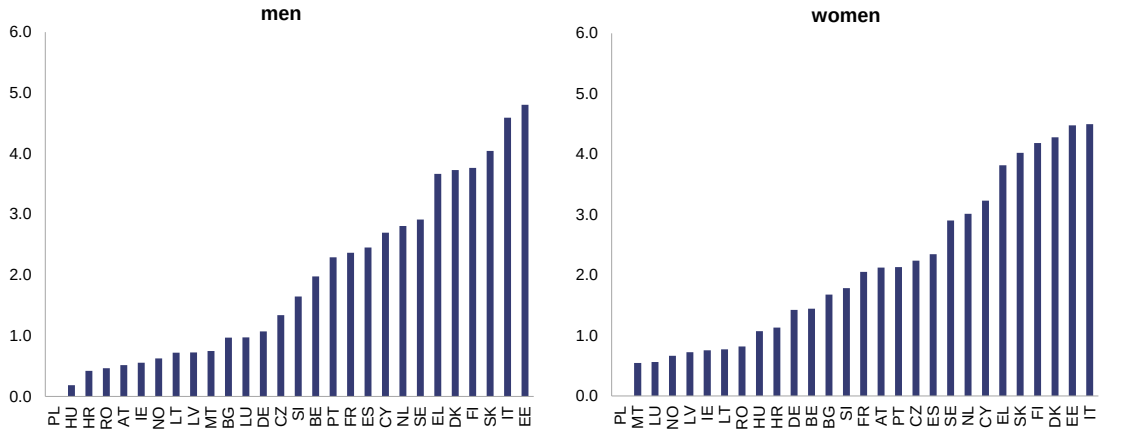
Graph I.2.3: **Impact of pension reforms on the participation rate of the age group 65-74 in 2070 (%)**



Source: European Commission, EPC.

For countries such as Austria, Czechia, Croatia, and Bulgaria the increase for women is higher than that for men because of a progressive convergence of legal retirement ages for women to that of men. Countries that introduced an automatic link between retirement ages and gains in life expectancy show the highest increases (see Table I.2.4).

Graph I.2.4: **Projected change of the average labour market exit age by 2070 (years)**



Based on the age group 51-74.
Source: European Commission, EPC.

2.4. LABOUR MARKET PARTICIPATION AND LABOUR SUPPLY PROJECTIONS

Social and institutional factors such as a higher attachment to the labour market of younger women and adopted pension reforms are expected to push up participation rates. This increase would partly offset the impact of a decrease in the working-age population on the labour supply.

2.4.1. Participation rate projections

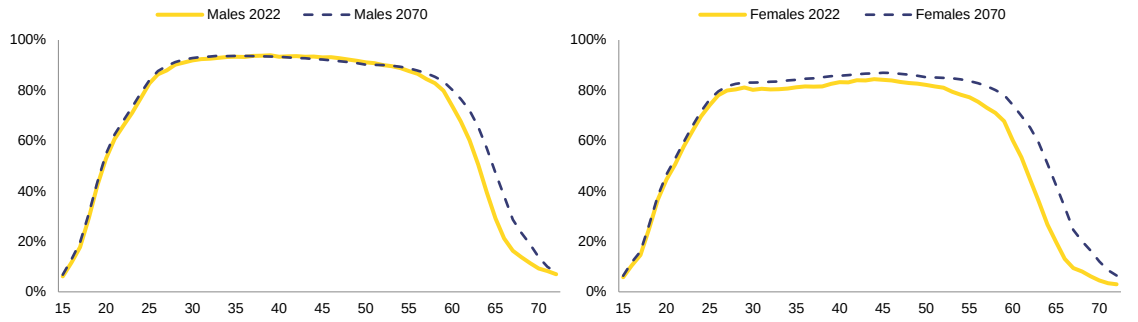
The total participation rate in the EU is projected to increase by around 3 pps by 2070, with female labour market participation anticipated to rise by 5 pps and the largest increases (by 10 pps) among the older age groups.

As discussed in Chapter 1, the population at working age is projected to decline substantially in the coming decades as large cohorts of retiring people are replaced by smaller cohorts of younger workers. Other things being equal and given the age profile of participation rates, the increasing share of older workers in the labour force puts downward pressure on the total participation rate.

The projections nevertheless reveal a rightward shift in the age profile of both male and female participation rates, particularly at ages over 60 years (see Graph I.2.5). For female participation, there is in addition a general upward shift. These broad trends reflect the combined effect of pension reforms and the rising attachment of younger generations of women to the labour market.

Tables I.2.5, I.2.7 and I.2.8 provide an overview of the main projected developments for the participation rates, broken down by broad age groups and sex. In the EU, the overall labour participation by the population at working age (20-64y) would increase by 3.3 pps between 2022 and 2070: from 79.4% in 2022 to 82.7% in 2070. This increase is predominantly the result of rising female participation, with a change of 5.2 pps compared to 1.3 pps for men. With 79% of the female working-age population expected to be active in the labour market in 2070, female participation would nevertheless remain 7 pps below male participation, compared with about 11 pps at present.

Graph I.2.5: **Age profile of participation rate by sex (EU)**



Source: European Commission, EPC.

Czechia is the only country for which overall participation is expected to decrease, though only slightly. In addition to a decrease in the participation rate among prime-age Czech people, this results from a higher share of population groups with a relatively lower participation. The largest increases are projected for Croatia, Italy and Estonia, at over 5 pps. Estonia is also the country with the highest projected participation rate among people aged 20 to 64 years in 2070, at nearly 92%. This compares with rates below 80% for Greece, Italy, Luxembourg, Poland, and Romania in 2070.

When comparing projections for male and female participation for the 20-64 age group, aside from Latvia, Lithuania and Romania, all Member States show a higher increase for women. Despite the resulting convergence, overall female participation would remain lower than that of men throughout the projection period in all Member States, except for Estonia and Luxembourg, which would see participation reach 92% and 78%, respectively, for both sexes.

Participation among the youngest age bracket (20-24y) is expected to rise in all countries, by 2 pps on

Table I.2.5: **Participation rate projections by age group – total (%)**

	total		young		prime-age		older		change 2022-2070 (pps)				
	20-64		20-24		25-54		55-64		total	young	prime-age	older	
	2022	2070	2022	2070	2022	2070	2022	2070	20-64	20-24	25-54	55-64	
BE	76.1	80.3	48.4	51.2	86.1	88.2	59.1	70.6	4.1	2.8	2.1	11.5	BE
BG	79.1	80.5	41.6	43.4	85.9	88.9	71.0	73.5	1.3	1.8	3.0	2.5	BG
CZ	83.1	81.5	50.7	52.7	89.1	88.3	74.7	75.0	-1.6	2.0	-0.8	0.3	CZ
DK	83.6	88.0	75.1	78.6	87.7	89.8	75.5	86.6	4.4	3.5	2.1	11.1	DK
DE	83.3	85.2	73.6	73.9	87.8	89.3	75.3	77.9	1.9	0.3	1.4	2.6	DE
EE	86.5	91.7	75.2	79.4	90.8	94.3	77.1	89.7	5.1	4.2	3.5	12.6	EE
IE	81.6	85.8	74.4	77.6	86.1	91.6	69.0	74.8	4.3	3.2	5.5	5.8	IE
EL	75.4	79.9	46.6	50.0	85.3	85.2	57.4	78.2	4.5	3.4	-0.1	20.8	EL
ES	79.6	81.6	55.3	56.5	87.4	86.9	65.4	77.5	2.0	1.2	-0.5	12.1	ES
FR	79.6	84.3	66.8	69.2	88.2	89.8	60.4	75.9	4.7	2.5	1.5	15.5	FR
HR	74.9	81.2	55.5	61.9	86.0	90.1	53.0	65.4	6.2	6.4	4.1	12.4	HR
IT	70.4	76.3	45.2	45.6	78.6	80.4	57.9	76.3	5.8	0.4	1.8	18.4	IT
CY	83.2	86.1	68.8	72.1	89.4	91.4	68.0	76.1	3.0	3.3	1.9	8.1	CY
LV	82.7	83.3	67.4	70.5	87.7	88.9	73.7	74.6	0.6	3.2	1.2	0.9	LV
LT	84.2	85.4	64.1	65.8	90.0	92.0	75.3	75.7	1.2	1.7	2.0	0.4	LT
LU	77.6	78.4	46.9	53.9	89.8	90.5	48.4	53.3	0.8	7.0	0.7	4.9	LU
HU	83.2	86.6	54.5	56.7	91.0	94.1	68.0	77.8	3.4	2.2	3.1	9.8	HU
MT	83.3	87.0	80.0	80.3	90.6	93.7	55.3	71.8	3.8	0.3	3.2	16.5	MT
NL	85.4	90.4	85.4	89.1	89.1	92.8	75.3	84.2	5.0	3.7	3.7	8.9	NL
AT	80.9	85.1	75.9	77.9	89.6	91.6	58.6	69.4	4.1	2.0	2.0	10.7	AT
PL	79.1	79.3	57.9	59.0	87.8	89.1	57.8	61.9	0.2	1.1	1.3	4.1	PL
PT	82.5	86.1	53.6	54.4	91.3	92.6	69.3	80.6	3.6	0.8	1.3	11.3	PT
RO	72.1	72.5	44.6	45.5	82.0	81.8	48.6	58.5	0.4	0.9	-0.2	9.9	RO
SI	81.4	85.4	56.6	59.2	92.9	92.8	57.3	76.6	4.0	2.7	-0.1	19.4	SI
SK	81.7	84.8	47.6	49.1	89.9	91.2	67.1	82.8	3.1	1.6	1.3	15.7	SK
FI	83.7	85.6	68.9	71.8	88.1	88.5	77.0	83.1	1.9	3.0	0.4	6.0	FI
SE	87.8	89.1	73.2	75.1	91.6	92.3	82.2	86.5	1.3	2.0	0.7	4.3	SE
NO	83.0	84.5	74.2	76.9	86.6	89.8	75.5	73.2	1.5	2.7	3.2	-2.3	NO
EA	79.3	83.1	63.0	65.1	86.4	88.1	65.9	77.0	3.8	2.0	1.6	11.0	EA
EU	79.4	82.7	61.6	63.7	86.7	88.2	65.4	75.5	3.3	2.1	1.5	10.1	EU

Source: European Commission, EPC.

average. Differences between countries and between sexes remain substantial for this age group considering the cohort approach used to project participation (see Box I.2.1).

For the prime-age group (25-54y) an average increase of 1.5 pps is projected in the EU, with a maximum rise of 5.5 pps in Ireland and a mild decrease of up to 0.8 pps in Czechia, Greece, Spain, Romania, and Slovenia. By 2070, only Italy and Romania would have prime-age participation rates below 85% and fourteen Member States would have a participation rate over 90% among people aged 25-54.

Table I.2.6: **Participation rate projections – 65-74y, total (%)**

	2022	2070	change
BE	4.6	10.6	6.0
BG	11.8	11.4	-0.4
CZ	9.4	9.2	-0.3
DK	14.8	35.9	21.1
DE	13.1	15.6	2.5
EE	25.5	33.3	7.8
IE	14.2	16.5	2.4
EL	9.9	24.3	14.4
ES	7.3	20.5	13.2
FR	6.3	10.4	4.1
HR	5.5	10.0	4.4
IT	9.5	33.0	23.5
CY	15.2	23.4	8.2
LV	19.6	11.1	-8.5
LT	18.7	12.5	-6.2
LU	5.0	4.3	-0.7
HU	9.6	11.6	2.0
MT	8.7	8.6	-0.1
NL	16.2	30.0	13.9
AT	7.4	9.3	1.9
PL	8.9	10.0	1.1
PT	14.1	25.1	11.0
RO	3.7	9.6	5.8
SI	6.7	6.6	-0.1
SK	6.4	19.9	13.4
FI	12.9	25.2	12.3
SE	18.2	29.7	11.5
NO	21.1	20.2	-0.9
EA	10.0	19.3	9.4
EU	9.8	18.4	8.6

Source: European Commission, EPC.

The picture for males in the 25-54 age bracket is generally one of broad stabilisation, with the EU average participation rate unchanged at about 92% and projected changes limited to ±2 pps with more marked changes in Bulgaria (+3.6 pps), Ireland (+2.6 pps), Croatia (+2.3 pps), Lithuania (+2.2 pps) and Greece (-2.4 pps). In contrast, female participation is projected to rise by 3 pps on average among the same age group, with an increase in all countries aside from Czechia, Romania and Slovenia. The average difference in male and female participation for prime-age people would still amount to 7 pps in 2070. Only in Finland, women aged 20 to 54 years are projected to be more active than men of the same age.

Participation among the group of older workers (55-64y) is expected to increase in all EU Member States, often substantially. The EU average rises by 10 pps by 2070, to more than 75%. The projected increase exceeds 15 pps in Greece, France, Italy, Malta, Slovenia, and Slovakia. In 2070, only Croatia, Luxembourg, Austria, Poland, and Romania would still have participation rates below 70% among people aged between 55 and 64 years. With higher increases for female (+13 pps) than for male older workers (+6 pps), the gender gap is projected to narrow substantially and even to be closed for several countries by 2070.

As Graph I.2.5 showed, the increase in labour market participation extends beyond the age of 65. Indeed, when considering the 65-74 age group, there is a similar upward trend in participation between 2023 and 2070 (see Table I.2.6). The average participation rate rises to 18% in 2070, though with large differences between Member States. The largest increases occur for countries with a link to life expectancy (led by Italy, Denmark and Greece). Also for this age group, in most countries increases are substantially higher for women than for men (see Statistical Annex in Part III).

Table I.2.7: **Participation rate projections by age group – men (%)**

	total		young		prime-age		older		change 2022-2070 (pps)				
	20-64		20-24		25-54		55-64		total	young	prime-age	older	
	2022	2070	2022	2070	2022	2070	2022	2070	20-64	20-24	25-54	55-64	
BE	80.3	82.9	51.1	54.9	90.2	91.0	64.2	72.5	2.6	3.8	0.8	8.3	BE
BG	83.2	84.1	48.9	50.0	89.1	92.7	76.4	75.5	0.9	1.1	3.6	-0.9	BG
CZ	90.2	87.7	58.9	61.3	96.2	95.6	80.7	76.9	-2.5	2.4	-0.7	-3.9	CZ
DK	86.3	89.3	76.7	79.8	90.1	91.3	79.6	87.8	3.1	3.1	1.1	8.2	DK
DE	87.4	87.4	76.1	76.7	92.2	92.0	79.5	78.4	0.0	0.6	-0.2	-1.1	DE
EE	88.5	91.6	72.3	77.3	93.9	94.8	75.7	89.2	3.1	5.0	0.8	13.5	EE
IE	87.5	88.1	76.5	78.0	92.0	94.6	77.6	75.9	0.6	1.5	2.6	-1.8	IE
EL	84.3	85.6	49.8	53.1	93.2	90.8	71.1	85.1	1.3	3.3	-2.4	14.0	EL
ES	84.2	84.6	57.9	59.0	91.6	90.2	72.1	80.0	0.3	1.1	-1.4	7.9	ES
FR	82.9	86.0	69.1	71.8	92.3	91.7	62.1	76.4	3.0	2.7	-0.6	14.3	FR
HR	79.4	83.1	61.9	68.9	89.3	91.6	58.8	66.6	3.7	7.0	2.3	7.8	HR
IT	80.4	83.8	52.1	52.4	88.6	88.1	68.7	83.6	3.5	0.3	-0.4	14.9	IT
CY	89.0	90.2	72.3	77.4	94.3	95.1	79.6	80.3	1.1	5.2	0.8	0.7	CY
LV	85.6	86.3	73.4	77.6	90.9	91.8	73.4	76.0	0.7	4.3	0.9	2.6	LV
LT	85.0	86.3	64.0	66.4	91.1	93.3	75.0	75.7	1.2	2.4	2.2	0.7	LT
LU	80.9	78.3	44.8	52.3	92.7	90.6	56.2	53.2	-2.6	7.5	-2.0	-3.0	LU
HU	88.4	89.0	59.4	62.5	94.3	95.6	79.6	81.2	0.6	3.0	1.3	1.6	HU
MT	90.0	88.9	80.7	80.7	96.3	96.5	67.0	72.1	-1.1	0.0	0.2	5.1	MT
NL	89.3	92.2	84.8	89.9	92.6	94.6	82.1	85.9	2.9	5.1	2.0	3.8	NL
AT	85.3	86.3	78.8	78.7	92.6	93.4	67.1	68.7	1.0	-0.1	0.8	1.6	AT
PL	85.8	84.5	65.4	65.9	92.2	92.4	71.1	71.0	-1.3	0.4	0.2	-0.1	PL
PT	85.3	87.1	57.3	57.4	93.2	92.7	74.3	83.0	1.8	0.2	-0.5	8.8	PT
RO	82.3	82.6	54.6	55.4	91.3	92.7	60.8	66.6	0.3	0.8	1.4	5.8	RO
SI	84.6	87.9	61.3	64.2	95.0	95.1	61.7	78.4	3.3	2.9	0.1	16.8	SI
SK	85.8	86.0	58.8	60.2	93.3	91.5	69.9	82.0	0.2	1.4	-1.8	12.0	SK
FI	84.7	84.7	70.7	73.6	89.4	88.0	77.0	80.3	0.0	2.9	-1.3	3.3	FI
SE	90.5	91.2	76.8	79.1	94.1	94.2	84.9	88.2	0.8	2.3	0.1	3.3	SE
NO	86.0	85.5	75.3	78.5	89.2	90.9	80.7	73.5	-0.5	3.3	1.7	-7.3	NO
EA	85.1	87.8	64.2	70.1	93.6	92.4	70.6	82.3	2.7	5.9	-1.3	11.7	EA
EU	84.8	86.1	65.6	67.6	91.8	91.7	72.1	78.4	1.3	2.0	0.0	6.3	EU

Source: European Commission, EPC.

Table I.2.8: **Participation rate projections by age group – women (%)**

	total		young		prime-age		older		change 2022-2070 (pps)				
	20-64		20-24		25-54		55-64		total	young	prime-age	older	
	2022	2070	2022	2070	2022	2070	2022	2070	20-64	20-24	25-54	55-64	
BE	71.9	77.6	45.6	47.3	82.0	85.3	53.9	68.7	5.6	1.7	3.3	14.8	BE
BG	75.0	76.7	33.9	36.2	82.5	84.9	66.1	71.5	1.7	2.3	2.4	5.4	BG
CZ	75.8	74.8	42.3	43.6	81.6	80.3	68.8	73.0	-1.0	1.3	-1.3	4.2	CZ
DK	80.8	86.5	73.4	77.3	85.3	88.3	71.5	85.5	5.7	3.9	3.0	14.0	DK
DE	79.0	82.8	70.8	70.7	83.4	86.4	71.1	77.3	3.8	-0.1	3.0	6.2	DE
EE	84.5	91.7	78.2	81.6	87.4	93.8	78.2	90.3	7.1	3.3	6.3	12.0	EE
IE	75.8	83.6	72.3	77.3	80.4	88.6	60.8	73.8	7.8	5.0	8.2	13.1	IE
EL	66.6	73.9	43.3	46.6	77.4	79.1	44.8	71.2	7.3	3.3	1.7	26.4	EL
ES	75.0	78.7	52.6	54.0	83.3	83.7	59.0	75.1	3.7	1.4	0.4	16.2	ES
FR	76.3	82.6	64.3	66.6	84.3	87.8	58.8	75.5	6.3	2.2	3.5	16.7	FR
HR	70.5	78.9	48.6	54.1	82.6	88.3	47.7	63.9	8.4	5.5	5.7	16.2	HR
IT	60.5	68.0	37.5	38.0	68.6	71.8	47.6	68.5	7.4	0.5	3.2	20.9	IT
CY	77.7	82.0	65.4	66.6	85.0	87.5	56.8	72.1	4.3	1.2	2.5	15.3	CY
LV	79.9	80.0	61.1	62.9	84.4	85.7	73.9	73.0	0.1	1.8	1.3	-1.0	LV
LT	83.4	84.2	64.2	65.2	88.9	90.4	75.6	75.7	0.8	0.9	1.5	0.1	LT
LU	74.1	78.4	49.2	55.7	86.8	90.3	40.1	53.3	4.3	6.4	3.5	13.3	LU
HU	78.1	84.1	49.3	50.6	87.7	92.6	57.8	74.3	6.0	1.3	4.9	16.5	HU
MT	75.5	84.8	79.1	79.9	83.7	90.4	43.0	71.4	9.3	0.8	6.7	28.4	MT
NL	81.5	88.6	85.9	88.2	85.5	90.8	68.5	82.4	7.1	2.3	5.3	13.9	NL
AT	76.6	83.9	72.9	77.0	86.6	89.8	50.4	70.1	7.3	4.2	3.1	19.7	AT
PL	72.5	73.9	50.1	51.9	83.4	85.6	45.8	52.3	1.3	1.8	2.2	6.5	PL
PT	79.9	85.2	49.7	51.2	89.5	92.4	64.9	78.3	5.3	1.5	2.9	13.4	PT
RO	61.7	61.5	34.0	34.8	72.4	69.9	37.6	49.8	-0.3	0.8	-2.5	12.2	RO
SI	77.9	82.4	51.2	53.7	90.4	90.0	52.9	74.5	4.5	2.5	-0.4	21.7	SI
SK	77.5	83.6	35.9	37.7	86.3	90.9	64.4	83.6	6.0	1.8	4.6	19.2	SK
FI	82.6	86.5	66.9	69.9	86.8	89.0	77.1	86.0	3.9	2.9	2.3	8.9	FI
SE	85.0	86.8	69.0	70.8	88.9	90.1	79.4	84.6	1.9	1.8	1.3	5.2	SE
NO	79.8	83.5	73.1	75.2	83.8	88.6	70.0	72.8	3.6	2.1	4.8	2.8	NO
EA	75.1	81.8	57.9	63.3	83.8	85.9	59.4	77.6	6.6	5.4	2.2	18.2	EA
EU	74.0	79.1	57.4	59.4	81.5	84.5	59.1	72.6	5.2	2.1	3.0	13.5	EU

Source: European Commission, EPC.

2.4.2. Breakdown of changes in participation rates

Table I.2.9 applies a shift-share analysis to the change in the total participation rate by 2070 along age and sex dimension. The overall participation rate is algebraically broken down in a pure participation rate effect, a demographic effect and a residual interaction effect.

The participation rate effect captures changes in participation rates of specific age and gender groups and is positive for all Member States. This reflects the trend rise in the participation rates of women and older workers, with a small decrease in participation among prime-aged people in some countries.

The demographic effect, capturing changes in the structure of the working-age population, is negative in most Member States because of shrinking cohorts of prime-aged people and women in general. Women are thus associated with both positive participation and negative demographic effects. The former reflects the upward transmission of younger cohorts' higher participation rates, as captured by the CSM. The latter reflects the ageing of the population, with a stronger impact on women, mostly because they leave the labour force on average earlier than men.

Table I.2.9: **Breakdown of overall change in labour market participation (pps)**

		Contribution of group-specific changes in participation rates												Demographic effect							
		Total				*Men*				*Women*											
	Change in participation rate 2022-2070 (pps)	Total working-age (20-64)	Young (20-24)	Prime-age (25-54)	Older (55-64)	Total working-age (20-64)	Young (20-24)	Prime-age (25-54)	Older (55-64)	Total working-age (20-64)	Young (20-24)	Prime-age (25-54)	Older (55-64)	Total working-age (20-64)	Young (20-24)	Prime-age (25-54)	Older (55-64)	Men	Women	Interaction effect	
BE	***4.1***	***4.3***	0.3	1.4	2.6	1.4	0.2	0.3	0.9	2.9	0.1	1.1	1.7	***-0.3***	0.0	-1.0	0.7	0.1	-0.1	***0.1***	BE
BG	***1.3***	***2.8***	0.1	2.1	0.6	1.2	0.0	1.3	-0.1	1.5	0.1	0.8	0.6	***-1.4***	0.9	-4.4	2.1	0.6	-0.6	***0.0***	BG
CZ	***-1.6***	***-0.3***	0.2	-0.6	0.1	-0.5	0.1	-0.3	-0.4	0.0	0.1	-0.5	0.4	***-1.3***	1.1	-4.7	2.3	1.3	-1.1	***0.1***	CZ
DK	***4.4***	***4.3***	0.4	1.4	2.5	1.5	0.2	0.4	0.9	2.8	0.2	1.0	1.6	***0.1***	-0.9	0.9	0.1	1.1	-1.0	***0.0***	DK
DE	***1.9***	***1.6***	0.0	0.9	0.7	-0.2	0.0	-0.1	-0.1	1.8	0.0	1.0	0.8	***0.4***	0.6	2.6	-2.9	0.9	-0.8	***-0.1***	DE
EE	***5.1***	***5.5***	0.3	2.5	2.8	1.9	0.2	0.3	1.4	3.7	0.1	2.2	1.4	***-0.7***	1.4	-4.7	2.6	1.6	-1.5	***0.3***	EE
IE	***4.3***	***5.3***	0.3	3.8	1.1	0.8	0.1	0.9	-0.2	4.5	0.3	2.9	1.3	***-1.1***	-0.5	-5.2	4.6	0.3	-0.3	***0.0***	IE
EL	***4.5***	***5.1***	0.3	-0.1	4.9	0.9	0.1	-0.8	1.6	4.0	0.1	0.6	3.3	***-0.9***	0.7	-2.4	0.8	1.6	-1.3	***0.3***	EL
ES	***2.0***	***2.6***	0.1	-0.3	2.8	0.4	0.0	-0.5	0.9	2.1	0.1	0.1	1.9	***-1.0***	0.3	-3.6	2.3	0.0	0.0	***0.5***	ES
FR	***4.7***	***4.8***	0.3	1.0	3.6	1.5	0.1	-0.2	1.6	3.3	0.1	1.2	2.0	***-0.3***	-0.3	-0.9	0.9	0.7	-0.6	***0.2***	FR
HR	***6.2***	***6.4***	0.6	2.7	3.1	2.0	0.3	0.8	0.9	4.2	0.2	1.9	2.1	***-0.2***	-0.2	-0.6	0.6	3.6	-3.2	***0.1***	HR
IT	***5.8***	***5.9***	0.0	1.2	4.7	1.7	0.0	-0.1	1.9	3.8	0.0	1.0	2.8	***-0.4***	0.1	-1.2	0.8	1.9	-1.4	***0.2***	IT
CY	***3.0***	***3.3***	0.4	1.4	1.5	0.6	0.3	0.3	0.1	2.4	0.1	0.9	1.5	***-0.5***	-0.5	-1.9	1.9	2.1	-1.9	***0.2***	CY
LV	***0.6***	***1.3***	0.2	0.8	0.2	0.7	0.2	0.3	0.3	0.4	0.1	0.4	-0.1	***-0.7***	1.7	-3.6	1.2	3.1	-2.9	***0.0***	LV
LT	***1.2***	***1.6***	0.1	1.3	0.1	0.9	0.1	0.7	0.1	0.6	0.0	0.5	0.0	***-0.4***	0.3	-2.0	1.4	5.7	-5.6	***0.0***	LT
LU	***0.8***	***2.1***	0.6	0.5	1.0	-0.7	0.4	-0.7	-0.3	2.8	0.3	1.2	1.3	***-1.5***	-0.1	-3.2	1.8	-0.1	0.1	***0.1***	LU
HU	***3.4***	***4.3***	0.2	2.2	2.0	0.8	0.1	0.5	0.2	3.5	0.1	1.7	1.7	***-1.2***	0.7	-4.0	2.2	1.2	-1.1	***0.2***	HU
MT	***3.8***	***5.3***	0.0	2.3	3.0	0.6	0.0	0.1	0.5	4.8	0.0	2.2	2.5	***-2.6***	-0.4	-6.4	4.2	0.9	-0.8	***1.0***	MT
NL	***5.0***	***4.9***	0.4	2.4	2.1	1.4	0.3	0.7	0.4	3.5	0.1	1.7	1.6	***0.1***	-1.1	1.4	-0.2	0.4	-0.4	***0.0***	NL
AT	***4.1***	***4.1***	0.2	1.3	2.6	0.5	0.0	0.3	0.2	3.6	0.2	1.0	2.4	***0.1***	0.5	0.0	-0.3	0.5	-0.4	***0.0***	AT
PL	***0.2***	***1.9***	0.1	0.9	0.8	0.1	0.0	0.1	0.0	1.6	0.1	0.8	0.7	***-1.8***	0.9	-5.2	2.5	1.5	-1.2	***0.1***	PL
PT	***3.6***	***3.7***	0.1	0.9	2.7	0.8	0.0	-0.2	1.0	2.8	0.1	1.0	1.7	***-0.1***	0.0	-0.3	0.2	1.5	-1.4	***0.0***	PT
RO	***0.4***	***1.9***	0.1	-0.2	2.0	1.1	0.0	0.5	0.6	0.5	0.0	-0.9	1.3	***-2.0***	0.6	-4.7	2.2	1.4	-1.0	***0.5***	RO
SI	***4.0***	***4.8***	0.2	-0.1	4.6	2.2	0.1	0.0	2.0	2.5	0.1	-0.1	2.6	***-1.1***	1.0	-2.9	0.8	1.4	-1.3	***0.3***	SI
SK	***3.1***	***4.3***	0.1	0.9	3.3	0.6	0.1	-0.7	1.2	3.7	0.1	1.6	2.1	***-1.6***	1.1	-4.4	1.7	0.9	-0.8	***0.4***	SK
FI	***1.9***	***2.0***	0.3	0.3	1.4	0.1	0.1	-0.5	0.4	1.9	0.1	0.7	1.0	***-0.2***	-0.5	-2.1	2.4	0.8	-0.8	***0.2***	FI
SE	***1.3***	***1.6***	0.2	0.5	0.9	0.5	0.1	0.0	0.3	1.1	0.1	0.4	0.5	***-0.3***	0.5	-2.4	1.6	0.7	-0.6	***0.1***	SE
NO	***1.5***	***2.0***	0.3	2.2	-0.5	0.0	0.2	0.6	-0.8	2.0	0.1	1.6	0.3	***-0.3***	-0.8	-2.4	2.9	0.4	-0.3	***-0.2***	NO
EA	***3.8***	***3.9***	0.2	1.1	2.7	0.9	0.1	-0.1	0.9	3.0	0.1	1.1	1.8	***-0.1***	0.2	-0.5	0.2	0.9	-0.8	***0.0***	EA
EU	***3.3***	***3.6***	0.2	1.0	2.4	0.8	0.1	0.0	0.7	2.7	0.1	1.0	1.6	***-0.4***	0.3	-1.4	0.7	1.0	-0.9	***0.1***	EU

Source: European Commission, EPC.

2.4.3. Projection of labour supply

The total labour supply in the EU is expected to decrease by 12% over the projection period, with a decrease of at least 25% in several Member States.

By multiplying the participation rates by single age and sex with the demographic projections provides the labour supply projections. The labour force in the EU is expected to decrease substantially over the projection period. By 2070, the labour supply would shrink by almost 12% as compared to 2022, with an average annual decrease of 0.3% (see Table I.2.10). This entails a fall in the number of workers of 24.5 million: 13.4 million fewer male workers (-12%) and 11.2 million fewer female workers (-11.5%).

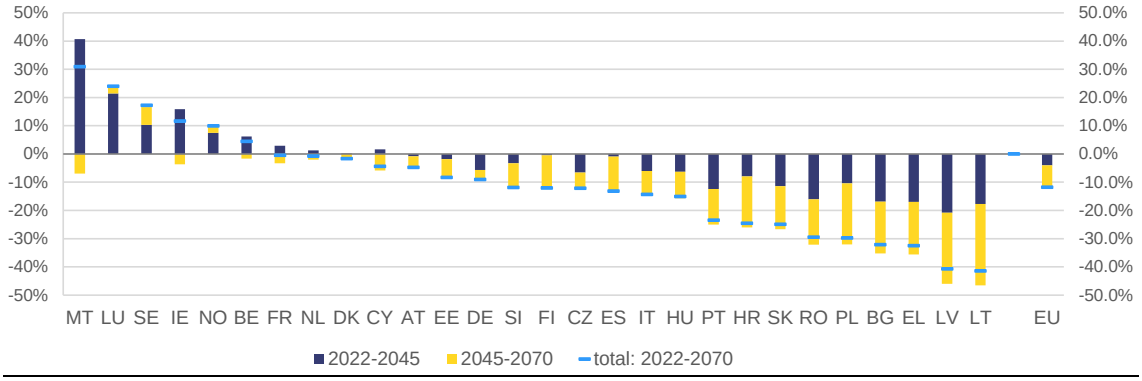
Graph I.2.6 highlights the substantial differences in labour supply projections across Member States, ranging from an increase of 31% in Malta to a decrease of 41% in Latvia and Lithuania in the period up to 2070. The labour force in 2070 would exceed that in 2022 for only six countries. In the cases of Croatia, Slovakia, Romania, Poland, Bulgaria, Greece, Latvia, and Lithuania, it would shrink by a quarter or more. These steep declines in the labour force reverberate in the potential growth estimates, discussed in Chapter 3. The decline by 4% on average in the first half of the projection period is followed by another decline of 8% in the second half. The countries with the sharpest fall in the labour supply in 2022-2045 also show the steepest decline in 2045-2070.

Table I.2.10: **Labour supply projections - total**

	Total labour force (20-64y, '000 persons)		Change (2070/2022)	Avg annual growth rate (2022-2070)	Impact on potential output growth(1)
	2022	2070			
BE	5.167	5.398	4%	0.1%	0.2%
BG	3.215	2.181	-32%	-0.8%	-0.4%
CZ	5.214	4.579	-12%	-0.3%	0.0%
DK	2.843	2.796	-2%	0.0%	0.1%
DE	41.343	37.601	-9%	-0.2%	0.0%
EE	680	623	-8%	-0.2%	0.1%
IE	2.452	2.737	12%	0.2%	0.3%
EL	4.606	3.111	-32%	-0.8%	-0.4%
ES	23.032	20.005	-13%	-0.3%	0.0%
FR	29.923	29.790	0%	0.0%	0.2%
HR	1.681	1.268	-25%	-0.6%	-0.2%
IT	24.377	20.890	-14%	-0.3%	0.0%
CY	473	452	-4%	-0.1%	0.1%
LV	905	536	-41%	-1.1%	-0.5%
LT	1.442	845	-41%	-1.1%	-0.6%
LU	325	403	24%	0.4%	0.5%
HU	4.817	4.089	-15%	-0.3%	-0.1%
MT	277	363	31%	0.6%	0.5%
NL	8.881	8.812	-1%	0.0%	0.2%
AT	4.463	4.253	-5%	-0.1%	0.1%
PL	18.156	12.755	-30%	-0.7%	-0.3%
PT	4.994	3.822	-23%	-0.6%	-0.2%
RO	8.044	5.670	-30%	-0.7%	-0.3%
SI	1.015	895	-12%	-0.3%	0.0%
SK	2.751	2.066	-25%	-0.6%	-0.2%
FI	2.619	2.304	-12%	-0.3%	0.0%
SE	5.205	6.103	17%	0.3%	0.4%
NO	2.663	2.929	10%	0.2%	0.3%
EA	161.408	146.173	-9%	-0.2%	0.0%
EU	208.903	184.347	-12%	-0.3%	0.0%

(1) Impact of labour force growth differential relative to the EU average.
Source: European Commission, EPC.

Graph I.2.6: **Change in the labour force (20-64y; %)**



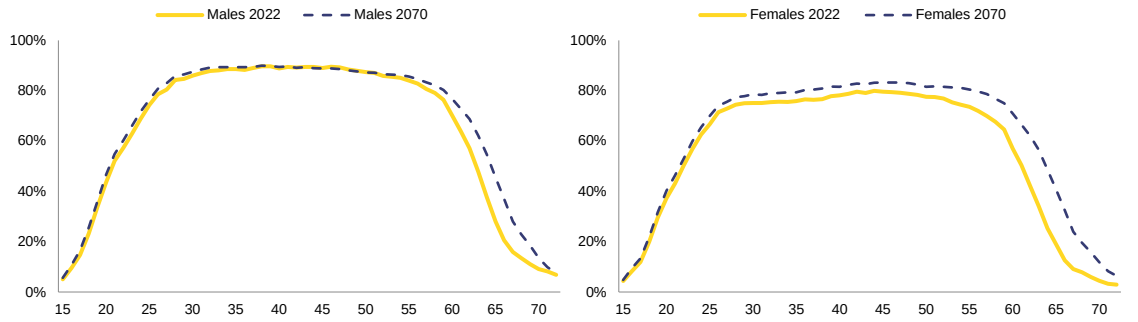
Source: European Commission, EPC.

2.5. EMPLOYMENT PROJECTIONS

Employment in the EU is projected to increase from around 75% of the working-age population in 2022 to around 79% in 2070. This change mostly reflects higher employment rates among older people and women in general, given higher participation among these groups and the assumption of declining unemployment over time.

Employment is calculated as a residual variable, being determined by the population projections from Eurostat (see Chapter 1), participation rates projected by the CSM (see Section 2.4) and the unemployment rate assumptions (see Box I.2.3).

Graph I.2.7: **Age profile of employment rate by sex (EU)**



Source: European Commission, EPC.

The employment rate among people aged 20-64 is expected to rise from around 74.5% in 2022 to 78.5% in 2070 in the EU (see Table I.2.11). This overall increase in the employment rate by 4 pps includes a nearly 6 pps increase in the female employment rate and a smaller increase of about 2 pps in the male one (see Tables I.2.12 and I.2.13). The age profile in Graph I.2.7 tracks that of participation, with a rightward shift for both male and female employment and higher female employment at most ages by 2070. Despite this strong increase in female employment, a higher share of the male population aged 20-64 would nevertheless be employed in 2070: 82% compared to 75% for women.

Employment among older workers is expected to rise considerably over the projection period for both sexes, with increases of 6 pps and 13 pps in the respective employment rates of men and women aged 55-64. This reflects how recent pension and labour market reforms in many Member States incentivise older workers to retire later. Only few Member States show a decrease in the employment rate for this age bracket. By 2070, the employment rate for people aged 55-64 would be inferior to 65% in Croatia, Luxembourg, Poland, and Romania, which under current legislation all cap the statutory retirement at 65 years – less in the case of Romanian and Polish women – with early retirement possible at 60 or younger in most cases (see Table II.A4.2 in Annex 4).

As a result of these projections the share of older workers in total employment at EU level is expected to rise from around 20% in 2022 to about 23% in 2070, with a minimum of 16% in Luxembourg and a maximum of 28% in Italy (see Table I.2.14). The share of the older workers rises generally more for women, due to cohort effects and reflecting the need for staying longer in employment to fulfil qualifying conditions for retirement because of a later labour market entrance or interrupted working careers. Exceptions are countries where older women are working currently more often than men, e.g. the Baltic countries, or countries with more favourable retirement conditions for women, e.g. Poland and Slovakia.

Table I.2.11: **Employment rate projections by age group – total (%)**

	total		young		prime-age		older		change 2022-2070 (pps)				
	20-64		20-24		25-54		55-64		total	young	prime-age	older	
	2022	2070	2022	2070	2022	2070	2022	2070	20-64	20-24	25-54	55-64	
BE	72.1	75.8	41.4	43.3	81.9	83.6	56.9	67.8	3.7	1.9	1.7	10.9	BE
BG	75.8	76.6	37.8	39.0	82.3	84.6	68.5	70.5	0.8	1.2	2.3	2.0	BG
CZ	81.3	79.4	48.3	49.7	87.3	86.1	73.2	73.2	-1.9	1.4	-1.2	0.0	CZ
DK	80.2	84.8	68.1	71.9	84.6	86.9	73.3	84.3	4.6	3.8	2.3	11.0	DK
DE	80.7	81.9	69.9	69.2	85.2	86.0	73.3	75.2	1.2	-0.7	0.7	2.0	DE
EE	81.8	86.1	63.9	66.7	86.5	89.5	73.4	85.0	4.3	2.8	3.0	11.6	EE
IE	78.2	81.3	68.3	69.5	82.8	87.0	66.7	71.6	3.1	1.2	4.2	4.9	IE
EL	66.1	74.7	33.0	42.6	75.1	79.8	52.2	74.5	8.6	9.6	4.7	22.3	EL
ES	69.6	76.4	40.9	49.3	77.2	81.7	57.6	72.9	6.8	8.3	4.5	15.2	ES
FR	74.0	79.0	56.5	59.7	82.7	84.7	56.9	71.9	5.0	3.2	1.9	14.9	FR
HR	70.0	76.1	47.2	52.9	80.6	84.7	50.4	62.3	6.1	5.7	4.1	11.9	HR
IT	64.8	71.3	35.6	37.8	72.4	75.1	55.1	73.3	6.5	2.1	2.7	18.2	IT
CY	77.5	80.8	57.4	60.7	84.0	86.4	64.6	72.5	3.3	3.3	2.4	7.9	CY
LV	77.0	78.0	58.3	62.2	81.8	83.4	69.5	70.6	1.0	3.9	1.7	1.1	LV
LT	79.1	79.8	57.2	58.4	85.1	86.7	70.1	70.3	0.8	1.2	1.6	0.1	LT
LU	74.5	74.5	40.9	45.7	86.7	86.8	46.3	50.2	0.0	4.8	0.1	4.0	LU
HU	80.3	83.6	49.7	51.9	88.1	91.2	65.9	75.5	3.3	2.2	3.1	9.6	HU
MT	81.0	83.5	74.9	71.6	88.3	90.2	54.3	70.0	2.5	-3.3	1.9	15.7	MT
NL	82.9	87.7	80.5	83.8	86.8	90.4	73.1	81.6	4.8	3.3	3.5	8.4	NL
AT	77.3	81.4	69.8	71.9	85.8	87.8	56.5	67.1	4.2	2.1	2.1	10.7	AT
PL	76.9	76.9	52.3	53.2	85.6	86.8	56.8	60.7	0.1	0.9	1.2	3.9	PL
PT	77.6	80.7	44.9	45.2	86.4	87.3	65.8	76.4	3.1	0.3	0.9	10.6	PT
RO	68.3	68.3	36.4	36.5	78.2	77.6	46.8	56.3	0.0	0.1	-0.7	9.4	RO
SI	78.3	80.6	51.5	51.9	89.6	88.1	55.1	72.4	2.3	0.4	-1.5	17.3	SI
SK	76.8	79.7	40.1	41.2	84.8	86.0	64.0	79.2	2.9	1.1	1.2	15.2	SK
FI	78.3	80.3	61.1	64.1	83.2	83.8	71.5	77.2	2.0	3.0	0.6	5.8	FI
SE	82.3	84.2	63.0	66.0	86.4	87.7	77.8	82.4	1.9	3.0	1.3	4.6	SE
NO	80.8	82.0	68.9	70.7	84.4	87.3	74.5	72.1	1.3	1.8	2.9	-2.4	NO
EA	74.1	78.6	54.7	57.9	81.0	83.6	62.5	73.5	4.6	3.3	2.6	11.0	EA
EU	74.7	78.5	53.7	56.7	81.8	84.0	62.3	72.3	3.8	3.0	2.2	10.0	EU

Source: European Commission, EPC.

Table I.2.12: **Employment rate projections by age group – men (%)**

	total		young		prime-age		older		change 2022-2070 (pps)				
	20-64		20-24		25-54		55-64		total	young	prime-age	older	
	2022	2070	2022	2070	2022	2070	2022	2070	20-64	20-24	25-54	55-64	
BE	75.9	78.0	42.9	45.5	85.6	86.1	61.7	69.5	2.2	2.6	0.4	7.8	BE
BG	79.6	79.8	44.4	44.9	85.3	88.1	73.4	72.2	0.2	0.5	2.8	-1.2	BG
CZ	88.6	85.8	56.3	58.1	94.8	93.8	79.3	75.3	-2.8	1.8	-1.0	-4.1	CZ
DK	82.8	86.2	70.0	73.5	86.9	88.3	77.1	85.3	3.3	3.4	1.4	8.2	DK
DE	84.6	83.8	71.9	71.4	89.3	88.4	77.2	75.5	-0.7	-0.5	-0.9	-1.7	DE
EE	83.2	85.6	59.9	63.3	89.2	89.6	71.6	83.9	2.3	3.4	0.4	12.3	EE
IE	83.9	83.5	70.2	69.9	88.6	90.0	75.0	72.6	-0.5	-0.4	1.4	-2.4	IE
EL	76.6	81.4	38.2	46.9	85.1	86.5	66.1	82.0	4.8	8.6	1.4	15.9	EL
ES	75.0	79.8	43.5	51.7	82.5	85.5	64.6	75.9	4.8	8.2	3.0	11.2	ES
FR	77.0	80.4	57.5	61.0	86.6	86.5	58.5	72.2	3.4	3.5	0.0	13.7	FR
HR	74.8	78.5	54.2	60.4	84.4	86.8	56.2	63.6	3.7	6.3	2.4	7.4	HR
IT	74.7	79.0	41.7	43.9	82.7	83.2	65.3	80.3	4.3	2.2	0.5	14.9	IT
CY	83.6	85.2	60.7	65.6	89.5	90.9	75.5	76.3	1.5	4.9	1.3	0.8	CY
LV	78.7	79.9	61.7	66.9	84.0	85.4	68.3	71.2	1.2	5.2	1.4	2.9	LV
LT	79.5	80.3	56.2	57.9	85.8	87.5	69.6	70.0	0.8	1.8	1.7	0.4	LT
LU	77.7	74.4	39.0	44.2	89.5	87.0	53.8	50.1	-3.3	5.2	-2.5	-3.7	LU
HU	85.2	85.8	53.6	56.6	91.3	92.6	77.0	78.7	0.6	3.0	1.4	1.7	HU
MT	87.3	84.9	73.8	68.6	93.9	92.8	65.6	69.8	-2.4	-5.2	-1.0	4.2	MT
NL	86.9	89.6	79.7	84.3	90.5	92.4	80.1	83.6	2.7	4.6	1.9	3.6	NL
AT	81.2	82.2	71.6	71.8	88.5	89.5	64.2	65.8	1.1	0.2	1.0	1.6	AT
PL	83.4	82.0	59.3	59.5	90.0	90.1	69.7	69.5	-1.4	0.2	0.1	-0.2	PL
PT	80.6	82.0	48.3	48.1	88.6	87.8	71.1	79.3	1.4	-0.2	-0.8	8.2	PT
RO	77.7	77.5	45.3	45.3	86.7	87.5	58.3	63.7	-0.2	0.0	0.8	5.4	RO
SI	81.6	83.3	56.9	57.8	92.0	90.8	59.1	73.7	1.7	0.9	-1.2	14.6	SI
SK	80.9	81.0	49.9	50.9	88.3	86.6	67.0	78.6	0.1	1.1	-1.7	11.6	SK
FI	78.9	79.0	61.4	64.4	84.3	83.2	70.1	73.4	0.1	3.0	-1.1	3.3	FI
SE	85.1	86.4	67.3	70.6	89.2	89.9	80.2	83.8	1.4	3.2	0.7	3.6	SE
NO	83.5	82.8	69.1	71.2	86.9	88.3	79.7	72.3	-0.7	2.1	1.4	-7.3	NO
EA	79.0	82.4	56.6	60.0	85.3	86.1	67.5	75.0	3.5	3.4	0.7	7.5	EA
EU	80.0	81.9	57.1	60.0	87.0	87.6	68.7	75.1	1.8	3.0	0.5	6.4	EU

Source: European Commission, EPC.

Table I.2.13: **Employment rate projections by age group – women (%)**

	total		young		prime-age		older		change 2022-2070 (pps)				
	20-64		20-24		25-54		55-64		total	young	prime-age	older	
	2022	2070	2022	2070	2022	2070	2022	2070	20-64	20-24	25-54	55-64	
BE	68.3	73.5	39.8	40.9	78.1	81.1	52.1	66.0	5.2	1.1	3.0	14.0	BE
BG	71.9	73.2	30.9	32.6	79.2	81.0	63.9	68.9	1.2	1.8	1.8	4.9	BG
CZ	73.7	72.3	39.9	40.7	79.4	77.7	67.3	71.1	-1.4	0.8	-1.7	3.8	CZ
DK	77.5	83.4	66.1	70.3	82.1	85.3	69.5	83.2	5.9	4.2	3.2	13.7	DK
DE	76.8	79.9	67.7	66.9	81.1	83.4	69.4	74.9	3.1	-0.8	2.3	5.5	DE
EE	80.4	86.7	68.1	70.3	83.6	89.4	75.0	86.3	6.3	2.2	5.8	11.3	EE
IE	72.6	79.1	66.4	69.2	77.3	84.1	58.7	70.6	6.5	2.8	6.8	11.9	IE
EL	55.7	67.6	27.4	37.9	65.0	72.4	39.4	66.9	11.9	10.5	7.4	27.5	EL
ES	64.1	73.0	38.3	46.7	71.8	77.9	51.0	70.1	8.9	8.4	6.1	19.1	ES
FR	71.1	77.6	55.5	58.4	79.0	82.8	55.5	71.6	6.5	2.9	3.8	16.1	FR
HR	65.2	73.2	39.7	44.6	76.7	82.1	45.2	60.7	8.0	4.8	5.4	15.5	HR
IT	55.0	62.9	28.9	30.9	62.1	66.0	45.3	65.8	8.0	2.0	4.0	20.5	IT
CY	71.7	76.3	54.2	55.5	78.9	81.7	54.1	68.8	4.5	1.3	2.8	14.8	CY
LV	75.3	75.8	54.6	57.0	79.5	81.2	70.4	69.9	0.5	2.4	1.7	-0.5	LV
LT	78.7	79.2	58.3	58.9	84.4	85.6	70.6	70.5	0.6	0.6	1.2	0.0	LT
LU	71.1	74.6	43.1	47.3	83.8	86.7	38.3	50.4	3.4	4.3	2.8	12.2	LU
HU	75.4	81.3	45.6	47.0	84.9	89.7	56.1	72.2	5.9	1.3	4.8	16.1	HU
MT	73.7	81.8	76.2	75.0	81.6	87.0	42.6	70.2	8.1	-1.2	5.4	27.6	MT
NL	79.0	85.7	81.2	83.2	83.2	88.3	66.3	79.5	6.8	2.0	5.1	13.2	NL
AT	73.3	80.6	67.9	72.0	83.0	86.1	48.9	68.5	7.3	4.1	3.2	19.6	AT
PL	70.4	71.6	45.1	46.6	81.2	83.3	45.0	51.4	1.2	1.5	2.1	6.4	PL
PT	74.8	79.5	41.3	42.1	84.4	86.8	61.2	73.6	4.6	0.9	2.4	12.4	PT
RO	58.8	58.3	27.0	27.1	69.5	66.8	36.4	48.2	-0.6	0.1	-2.7	11.8	RO
SI	74.7	77.4	45.5	45.5	86.9	84.9	51.1	70.9	2.7	-0.1	-2.0	19.7	SI
SK	72.7	78.3	29.9	31.1	81.1	85.4	61.3	79.9	5.6	1.3	4.3	18.6	SK
FI	77.8	81.7	60.8	63.8	82.1	84.5	72.8	81.3	3.9	3.0	2.4	8.6	FI
SE	79.3	81.7	58.0	60.9	83.4	85.3	75.3	80.8	2.5	2.9	1.9	5.5	SE
NO	77.8	81.2	68.7	70.1	81.8	86.2	69.1	71.8	3.3	1.4	4.4	2.7	NO
EA	69.9	77.2	52.0	55.2	75.8	80.2	57.1	71.3	7.4	3.2	4.4	14.3	EA
EU	69.3	75.0	50.1	53.1	76.6	80.3	56.1	69.5	5.7	3.0	3.7	13.3	EU

Source: European Commission, EPC.

Table I.2.14: **Share of older workers (55-64y) in total employment (20-64y) (%)**

	total			men			women			
	2022	2045	2070	2022	2045	2070	2022	2045	2070	
BE	18.1	18.7	21.5	18.5	18.5	21.2	17.6	18.9	21.9	BE
BG	20.4	25.6	23.5	19.9	24.4	22.7	21.0	26.9	24.4	BG
CZ	18.6	22.6	21.8	17.9	21.0	20.7	19.4	24.7	23.4	CZ
DK	20.7	19.7	22.6	20.9	19.7	22.3	20.6	19.8	23.0	DK
DE	23.7	21.4	20.5	23.4	20.6	19.9	24.1	22.2	21.1	DE
EE	19.6	24.1	24.9	17.3	24.4	24.9	22.0	23.8	24.8	EE
IE	16.4	19.0	22.8	17.2	18.4	22.1	15.6	19.7	23.6	IE
EL	18.7	24.6	24.9	19.7	24.0	24.6	17.4	25.3	25.4	EL
ES	19.1	22.5	25.4	19.5	21.5	24.8	18.7	23.6	26.1	ES
FR	17.7	20.4	22.2	17.1	19.8	21.5	18.2	21.0	22.9	FR
HR	18.1	20.3	21.4	18.0	19.5	21.4	18.1	21.4	21.4	HR
IT	21.8	22.5	27.8	21.9	21.4	27.1	21.7	23.9	28.7	IT
CY	15.8	19.4	19.6	17.5	18.7	19.2	14.1	20.3	20.1	CY
LV	21.8	26.3	23.3	19.2	25.2	22.8	24.4	27.6	23.9	LV
LT	22.4	24.8	23.8	20.5	23.9	24.3	24.2	25.9	23.2	LT
LU	12.3	14.6	15.9	13.8	14.5	15.8	10.6	14.8	16.0	LU
HU	16.3	21.6	20.8	16.9	21.5	21.0	15.7	21.7	20.7	HU
MT	12.1	20.0	21.4	12.9	19.9	21.6	11.0	20.1	21.2	MT
NL	20.7	18.6	21.6	21.5	18.8	21.3	19.8	18.4	21.9	NL
AT	17.6	19.3	19.4	18.8	18.4	18.6	16.3	20.2	20.2	AT
PL	15.3	22.1	19.8	16.6	23.3	21.2	13.8	20.7	18.1	PL
PT	20.5	22.5	23.1	20.5	22.5	23.2	20.4	22.5	22.9	PT
RO	13.9	22.0	20.4	14.4	21.4	20.3	13.3	22.8	20.6	RO
SI	16.8	22.6	22.7	16.6	21.8	22.4	17.1	23.7	23.1	SI
SK	17.4	24.6	23.2	16.5	24.2	22.6	18.4	25.0	23.8	SK
FI	21.1	21.3	25.2	19.9	20.7	24.1	22.2	22.0	26.3	FI
SE	19.9	20.7	22.5	19.5	20.4	22.2	20.3	21.0	22.9	SE
NO	19.1	18.5	21.6	19.6	18.3	21.3	18.5	18.7	21.9	NO
EA	20.5	21.3	23.0	20.5	20.6	22.5	20.5	22.0	23.5	EA
EU	19.6	21.4	22.6	19.7	20.9	22.2	19.5	22.0	23.0	EU

Source: European Commission, EPC.

2.6. ECONOMIC DEPENDENCY RATIOS

The economic old-age dependency ratio (inactive elderly to employed people) is projected to increase significantly in all Member States, especially in the next decades. Similarly, the economic dependency ratio (total inactive population to employed people) would rise strongly amid demographic ageing. Variability across countries is large, though.

An important indicator to assess the impact of ageing on budgetary expenditure, particularly on its pension component, is the economic old-age dependency ratio. This indicator expresses the inactive elderly population (65+) as a share of total employment (aged 20-64 or 20-74). The economic old-age dependency ratio would rise sharply according to the labour force projections: from 46% in 2022 to 64% in 2045 and 70% in 2070 (from 45% to 61% and 66% in terms of employment in the 20-74 age group) (see Table I.2.15). This means that for every 10 inactive persons above 65 in 2070, there will be 14 employed persons, down from 22 in 2022 and 16 in 2045.

Across EU Member States, the projected economic old-age dependency ratio for 2070 ranges from a minimum of 53% in Sweden to a maximum of 87% in Lithuania. For most countries, the increase is concentrated in the first half of the projection period, i.e. 2022-2045. The largest total rise in the old-age dependency ratio is projected for Lithuania, Luxembourg, Poland, Malta, Latvia, and Slovakia.

Table I.2.15: **Economic old-age dependency ratio (%)**

	(inactive population 65+) / (employment 20-64y)					(inactive population 65+) / (employment 20-74y)					
	2022	2045	2070	*change 2022-2045*	*change 2045-2070*	2022	2045	2070	*change 2022-2045*	*change 2045-2070*	
BE	45	57	67	11	10	45	55	65	10	10	BE
BG	45	67	75	22	8	44	65	73	21	8	BG
CZ	40	59	63	19	4	39	57	61	18	4	CZ
DK	40	50	57	10	6	39	47	52	8	4	DK
DE	43	57	63	14	6	41	55	60	14	5	DE
EE	36	50	59	14	9	34	47	54	13	7	EE
IE	30	48	64	18	16	30	46	61	16	15	IE
EL	56	88	81	32	-7	55	83	76	28	-7	EL
ES	46	72	78	25	6	46	67	73	21	6	ES
FR	50	63	70	14	7	49	62	68	13	7	FR
HR	54	67	78	13	11	53	65	76	12	11	HR
IT	60	86	80	26	-6	58	79	72	21	-8	IT
CY	31	46	62	15	17	30	44	59	14	15	CY
LV	41	65	76	24	10	39	63	73	25	10	LV
LT	37	64	87	27	23	36	61	83	26	22	LT
LU	30	48	73	18	25	30	47	72	18	25	LU
HU	40	54	62	13	8	39	52	60	13	8	HU
MT	35	37	75	2	38	34	37	73	2	37	MT
NL	37	50	56	12	6	36	48	52	12	4	NL
AT	40	58	67	18	10	39	56	66	17	9	AT
PL	39	60	80	21	20	38	58	78	20	20	PL
PT	49	76	76	27	0	47	71	70	24	-1	PT
RO	48	73	79	25	6	47	71	77	23	6	RO
SI	44	66	70	22	4	43	65	69	21	4	SI
SK	35	59	70	24	10	35	57	66	22	9	SK
FI	48	57	70	8	13	47	55	65	8	11	FI
SE	39	44	53	5	9	38	42	50	5	7	SE
NO	34	49	61	15	12	32	47	58	14	11	NO
EA	47	65	70	18	5	46	62	66	16	4	EA
EU	46	64	70	18	6	45	61	66	16	5	EU

Source: European Commission, EPC.

Table I.2.16: **Total economic dependency ratio (%)**

	(total inactive population) / (employment 20-64y)					(total inactive population) / (employment 20-74y)					
	2022	2045	2070	*change 2022-2045*	*change 2045-2070*	2022	2045	2070	*change 2022-2045*	*change 2045-2070*	
BE	130	130	138	0	9	128	126	134	-2	8	BE
BG	116	139	146	24	7	112	134	142	22	8	BG
CZ	105	127	131	22	4	102	124	128	21	5	CZ
DK	102	106	110	5	3	98	100	100	2	0	DK
DE	100	115	121	15	6	97	111	116	15	5	DE
EE	96	102	107	6	5	90	97	99	7	3	EE
IE	106	108	120	1	13	104	104	115	0	12	IE
EL	141	163	152	22	-11	137	153	142	16	-11	EL
ES	120	134	140	14	7	118	125	132	7	7	ES
FR	132	134	137	2	3	130	131	133	1	3	FR
HR	135	132	142	-4	11	133	128	138	-6	10	HR
IT	151	163	153	12	-10	147	151	137	5	-14	IT
CY	96	106	121	11	14	93	103	114	10	11	CY
LV	110	129	140	20	11	104	125	136	21	11	LV
LT	98	119	143	21	24	93	114	137	21	23	LT
LU	102	119	146	17	27	101	118	144	17	26	LU
HU	102	112	121	10	9	99	108	118	9	9	HU
MT	88	79	123	-9	44	86	78	120	-8	42	MT
NL	89	97	100	8	3	86	93	92	7	-1	NL
AT	101	112	123	11	11	100	110	120	11	10	AT
PL	110	129	151	19	21	107	125	147	18	21	PL
PT	110	136	134	26	-2	106	127	125	22	-3	PT
RO	142	168	171	26	3	141	162	166	21	4	RO
SI	109	124	128	15	4	107	122	126	15	4	SI
SK	103	128	136	25	8	102	123	129	22	6	SK
FI	111	113	123	1	11	107	109	115	1	6	FI
SE	99	99	106	0	7	95	94	99	-1	5	SE
NO	96	104	115	8	11	92	100	109	8	9	NO
EA	119	129	132	11	3	116	124	125	8	2	EA
EU	117	129	134	12	5	114	124	127	9	3	EU

Source: European Commission, EPC.

The total economic dependency ratio, calculated as the ratio between the total inactive population and those in employment, gives a measure of the average number of individuals that each employed person 'supports' economically. It is relevant for potential GDP per capita growth. This broadest definition of the dependency ratio is expected to increase continuously over the projection period, from an average of 117% in 2022 to 134% in 2070 for the EU on average (see Table I.2.16).

The projected development of this indicator reflects the profound societal impact of changes in life expectancy and fertility rates over the next decades. There are, however, large cross-country differences. While the total economic dependency ratio would go up by more than 40 pps in Lithuania, Luxembourg and Poland, the increase for several other countries is much more limited.

2.7. PROJECTION OF TOTAL HOURS WORKED

The number of hours worked is expected to fall by 9% on average in the EU over the projection period, with a decrease projected in most countries. ([22])

([22]) The projection of weekly hours worked in Table I.2.17 is calculated using the CSM and differs from the projection of total hours worked in Chapter 3. Specifically, for the potential GDP projections until 2032, the growth rates of hours worked are estimated using the production function approach; thereafter the growth rates as estimated by the CSM are used (see Table I.3.2

Total hours worked are projected to decrease by 4% in 2022-2045 in the EU, followed by a similar decrease in the second half of the projection period (see Table I.2.17). ([23]) As a result, the number of hours falls by 9% on average in 2022-2070. The share of part-time work is assumed about stable at 11% of all hours worked.

There are notable differences across Member States, which reflect a varying demographic outlook, legislated pension reforms, unemployment rates and full- versus part-time practices. A fall in total hours worked by more than 30% by 2070 is projected for Bulgaria, Latvia and Lithuania. Eight countries are expected to see an increase in the number of hours people work in total, with an increase of 20-30% in Sweden, Luxembourg and Malta. The share of part-time work is assumed broadly unchanged so that the current large differences between countries would remain. Part-time labour accounts for less than 3% of total hours worked in Bulgaria, Croatia, Hungary, Romania, and Slovakia, as compared to about 30% in the Netherlands.

Table I.2.17: **Projection of total weekly hours worked (million) and breakdown in full- and part-time work**

	2022			2045			2070			% change (total)			
	Total	*Full-time*	*Part-time*	*Total*	*Full-time*	*Part-time*	*Total*	*Full-time*	*Part-time*	2022-2045	2045-2070	**2022-2070**	
BE	173.7	84.1%	15.9%	186.5	83.7%	16.3%	183.2	83.5%	16.5%	7.3	-1.7	**5.5**	BE
BG	124.6	99.2%	0.8%	98.0	99.1%	0.9%	84.1	99.1%	0.9%	-21.3	-14.2	**-32.5**	BG
CZ	198.3	96.5%	3.5%	179.2	96.5%	3.5%	172.8	96.5%	3.5%	-9.6	-3.6	**-12.9**	CZ
DK	99.7	86.6%	13.4%	103.0	86.6%	13.4%	103.5	86.9%	13.1%	3.4	0.5	**3.9**	DK
DE	1454.9	82.8%	17.2%	1372.1	82.7%	17.3%	1327.9	82.7%	17.3%	-5.7	-3.2	**-8.7**	DE
EE	25.4	92.4%	7.6%	24.3	92.2%	7.8%	23.4	92.0%	8.0%	-4.2	-3.6	**-7.7**	EE
IE	87.9	89.1%	10.9%	100.0	88.9%	11.1%	97.6	88.6%	11.4%	13.8	-2.5	**11.0**	IE
EL	164.7	95.8%	4.2%	139.7	95.6%	4.4%	123.8	95.7%	4.3%	-15.2	-11.4	**-24.8**	EL
ES	750.2	92.9%	7.1%	791.8	92.8%	7.2%	731.0	92.7%	7.3%	5.6	-7.7	**-2.6**	ES
FR	1040.5	89.6%	10.4%	1078.7	89.4%	10.6%	1051.3	89.4%	10.6%	3.7	-2.5	**1.0**	FR
HR	61.1	97.4%	2.6%	55.1	97.3%	2.7%	46.9	97.3%	2.7%	-9.8	-14.8	**-23.1**	HR
IT	837.5	89.2%	10.8%	811.8	89.2%	10.8%	791.6	89.3%	10.7%	-3.1	-2.5	**-5.5**	IT
CY	17.3	95.5%	4.5%	17.6	95.4%	4.6%	17.1	95.5%	4.5%	2.0	-2.8	**-0.9**	CY
LV	34.6	96.3%	3.7%	25.4	96.2%	3.8%	20.1	96.3%	3.7%	-26.6	-20.8	**-41.9**	LV
LT	54.6	96.9%	3.1%	42.1	97.0%	3.0%	31.8	97.0%	3.0%	-22.8	-24.6	**-41.8**	LT
LU	11.2	88.6%	11.4%	13.7	88.0%	12.0%	13.8	87.8%	12.2%	22.2	0.4	**22.7**	LU
HU	184.4	97.6%	2.4%	169.2	97.5%	2.5%	157.6	97.5%	2.5%	-8.3	-6.9	**-14.6**	HU
MT	10.4	93.5%	6.5%	14.7	93.3%	6.7%	13.4	93.0%	7.0%	41.1	-8.4	**29.3**	MT
NL	297.6	70.6%	29.4%	303.3	70.5%	29.5%	302.9	70.5%	29.5%	1.9	-0.1	**1.8**	NL
AT	150.2	81.3%	18.7%	150.0	80.8%	19.2%	144.4	80.9%	19.1%	-0.1	-3.7	**-3.8**	AT
PL	714.8	97.0%	3.0%	608.6	96.8%	3.2%	504.3	96.9%	3.1%	-14.9	-17.1	**-29.5**	PL
PT	185.2	96.8%	3.2%	158.9	96.8%	3.2%	146.9	96.8%	3.2%	-14.2	-7.6	**-20.7**	PT
RO	307.6	97.8%	2.2%	249.4	97.6%	2.4%	219.5	97.6%	2.4%	-18.9	-12.0	**-28.6**	RO
SI	38.4	95.2%	4.8%	35.5	95.0%	5.0%	33.2	94.9%	5.1%	-7.5	-6.6	**-13.6**	SI
SK	99.6	97.7%	2.3%	86.2	97.7%	2.3%	77.3	97.7%	2.3%	-13.5	-10.3	**-22.4**	SK
FI	90.6	90.3%	9.7%	88.9	90.5%	9.5%	82.1	90.4%	9.6%	-1.9	-7.7	**-9.4**	FI
SE	185.3	86.6%	13.4%	211.8	86.4%	13.6%	224.2	86.3%	13.7%	14.3	5.9	**21.0**	SE
NO	94.1	86.0%	14.0%	100.9	86.3%	13.7%	103.1	86.2%	13.8%	7.2	2.1	**9.5**	NO
EA	5585.6	87.7%	12.3%	5496.3	87.3%	12.7%	5259.8	87.3%	12.7%	-1.6	-4.3	**-5.8**	EA
EU	7400.3	89.5%	10.5%	7115.6	88.9%	11.1%	6725.8	88.9%	11.1%	-3.8	-5.5	**-9.1**	EU

Hours worked by people aged 15-74.
Source: European Commission, EPC.

in Chapter 3). Due to the different data sources and projection models, there may be some differences between the two projections.

([23]) The total number of hours worked is the product between employment and hours worked per person. Regarding hours worked, the following assumptions are made: (i) total amount of hours worked per person (in the base year 2022) are kept constant by sex and type of work (part-time versus full-time); and (ii) the part-time share of total work by sex and age group (20-24, 25-54 and 55-74) are kept constant over the entire projection period.

2.8. COMPARING THE LABOUR MARKET PROJECTIONS WITH THE 2021 AGEING REPORT

Labour market indicators for base year 2022 were generally better than assumed in the 2021 Ageing Report. The improved starting point for employment, participation and unemployment rates reverberates in the labour market projections, which are, for most countries, more favourable than in the previous exercise.

This section provides a comparison of the main labour market assumptions discussed higher with those underlying the 2021 Ageing Report, as projected by the Cohort Simulation Model. In most countries, the labour force and employment were larger in 2022 than anticipated in the previous update (see Table I.2.18). In the EU, 4.6 million more people were employed in 2022 than projected, with the labour force counting 1.8 million additional people, meaning that 60% of the higher employment in 2022 comes from people previously assumed unemployed. It should be noted that the macroeconomic assumptions for the 2021 Ageing Report were prepared amid the height of the COVID-19 pandemic in spring 2020, when uncertainty about the economic outlook was high.

Table I.2.18: **Labour force revisions: 2024 Ageing Report vs 2021 Ageing Report (thousands)**

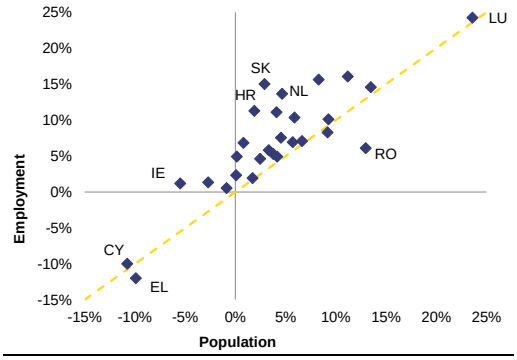
	labour force (20-64)		employment (20-64)	
	2022	2070	2022	2070
BE	64	699	103	690
BG	97	196	118	195
CZ	53	259	124	289
DK	84	141	98	127
DE	514	1801	587	1819
EE	32	85	32	81
IE	64	2	111	31
EL	7	-441	140	-397
ES	-238	124	618	354
FR	770	1766	1322	1792
HR	-25	125	-21	121
IT	-965	400	-433	446
CY	15	-53	17	-47
LV	16	47	25	46
LT	76	62	83	61
LU	6	80	11	75
HU	94	161	186	175
MT	2	47	5	44
NL	390	937	505	1028
AT	91	243	88	224
PL	653	1036	909	1239
PT	74	254	84	238
RO	-346	406	-342	308
SI	-2	63	11	59
SK	127	258	138	254
FI	57	108	52	102
SE	13	88	51	32
NO	17	36	48	38
EA	2878	7918	5069	8087
EU	1820	9063	4623	9385

Source: European Commission, EPC.

The employment rate – which also accounts for the difference in population size – was 1.6 pps higher on average in 2022 than projected in the 2021 Ageing Report (see Table I.2.19). Only in Romania it came out lower. The biggest upward revisions for the base year were for the Netherlands, Ireland, Slovakia, Poland, and Hungary. Actual employment rates among people aged 55-64 were also higher in 2022 for most countries. As shown in Table I.2.19, participation rates were on average 0.5 pps higher in 2022 than previously projected. Unemployment came in lower than anticipated, with a 1.4 pps lower unemployment rate on average.

Table I.2.20 provides a breakdown of the change in the employment projection for 2070 between the 2024 and 2021 Ageing Reports. For the EU, total employment in 2070 was revised up by 5.5% (9.4 million, see Table I.2.18) given higher projections for population (+2.6%) and the participation rate (+2.5%) and a slightly lower unemployment rate (-0.4%). The exceptions to the general upward revision in employment concern Greece and Cyprus, with lower working-age population projections resulting in lower employment by 2070. Conversely, the biggest upward revisions are found in Luxembourg, Estonia, Belgium, Slovakia, and Malta. These revisions primarily reflect the new demographic projections and to a lesser extent higher participation rate projections because of the better starting point. In the case of Slovakia, the upward revision in the participation projections is also due to newly enacted pension reforms. The breakdown of revisions in employment levels underscores the close link between employment/labour force and population. Graph I.2.8 visualises the high correlation between revisions in the employment and population projections.

Graph I.2.8: **Population and employment projections: 2024 Ageing Report vs 2021 Ageing Report, 2070 (% change)**



Source: European Commission, EPC.

Table I.2.19: **Labour force revisions: 2024 Ageing Report vs 2021 Ageing Report (pps)**

	employment rate				participation rate				unemployment rate		
	(20-64)		(55-64)		(20-64)		(55-64)		(20-64)		
	2022	2070	2022	2070	2022	2070	2022	2070	2022	2070	
BE	0.8	4.8	-1.1	6.9	0.2	4.6	-1.9	6.6	-0.8	-0.6	BE
BG	1.5	3.1	6.8	6.1	0.9	2.9	6.3	5.8	-0.8	-0.4	BG
CZ	2.2	0.9	8.6	4.9	1.0	0.2	7.7	4.3	-1.4	-0.9	CZ
DK	1.6	3.9	0.8	4.6	1.1	4.3	0.5	5.0	-0.7	0.3	DK
DE	0.5	1.2	1.5	1.9	0.3	1.0	1.4	1.8	-0.2	-0.2	DE
EE	2.5	3.6	3.7	2.3	2.4	3.7	3.4	2.1	-0.2	-0.2	EE
IE	4.0	5.4	5.2	4.7	2.4	4.8	4.4	4.4	-2.1	-1.1	IE
EL	2.6	-1.8	4.8	-1.9	0.5	-2.3	3.6	-2.6	-2.9	-0.4	EL
ES	1.5	0.1	3.8	-0.8	-0.7	-0.9	-0.5	-1.2	-3.6	-1.2	ES
FR	2.8	4.5	2.6	8.6	1.3	4.4	1.7	8.9	-2.1	-0.5	FR
HR	2.3	6.4	5.1	9.8	2.3	6.6	6.0	10.9	-0.1	-0.4	HR
IT	0.1	1.6	-4.7	0.1	-1.2	1.4	-5.3	0.4	-1.8	-0.3	IT
CY	1.7	0.7	5.0	-2.9	1.2	0.3	4.2	-4.0	-0.7	-0.5	CY
LV	1.3	0.6	6.1	5.9	0.4	0.3	4.7	5.1	-1.1	-0.4	LV
LT	2.1	-0.6	8.2	1.2	1.5	-1.0	8.3	1.2	-0.9	-0.4	LT
LU	1.2	0.4	2.9	6.7	0.1	0.8	3.1	8.1	-1.4	0.5	LU
HU	3.4	1.7	0.1	-5.9	1.8	1.4	-0.3	-5.8	-2.0	-0.5	HU
MT	2.2	0.8	2.0	2.5	1.3	1.0	1.8	2.6	-1.2	0.2	MT
NL	4.0	6.9	4.8	6.9	2.9	5.8	3.5	5.6	-1.5	-1.5	NL
AT	0.7	1.9	1.8	5.1	0.7	2.2	2.0	5.5	0.0	0.2	AT
PL	3.4	4.9	5.6	7.6	2.3	3.5	5.0	6.7	-1.6	-2.0	PL
PT	0.8	0.3	4.0	2.6	0.6	0.4	3.5	2.2	-0.3	0.0	PT
RO	-3.0	-4.4	-4.0	0.6	-3.0	-3.5	-3.9	1.3	0.2	1.4	RO
SI	0.8	2.3	1.4	11.7	-0.1	2.4	0.4	12.1	-1.2	0.0	SI
SK	3.8	8.4	8.0	22.9	3.5	8.4	7.6	23.1	-0.7	-0.6	SK
FI	1.0	0.6	4.8	1.3	1.1	0.6	5.6	1.7	0.0	0.0	FI
SE	0.9	1.2	1.9	6.3	0.2	2.0	1.8	7.6	-0.7	0.8	SE
NO	1.7	3.3	2.2	2.9	0.8	3.3	1.9	2.9	-1.2	-0.1	NO
EA	1.6	2.4	0.8	3.3	0.4	2.1	0.1	3.3	-1.5	-0.4	EA
EU	1.6	2.3	1.4	3.6	0.5	2.0	0.8	3.6	-1.4	-0.4	EU

Source: European Commission, EPC.

Table I.2.21 provides an overview of the revisions in the participation rates in 2070 by age group. The 2 pps higher participation rate for the working-age population in the EU is the result of upward revisions for all broad age groups. Pension reforms legislated since the previous Ageing Report (see Box I.2.2) come to the fore in the revisions for the oldest age group, for example for Slovakia, Sweden and France. In other cases, upward revisions for the 55-64 age group result from higher participation at younger age, which the CSM passes through to subsequent age brackets, or from a reassessment of earlier adopted pension measures, for example for Croatia and Slovenia.

Table I.2.20: **Breakdown of revisions in employment projection for 2070: 2024 Ageing Report vs 2021 Ageing Report (20-64y; %)**

	E	P	PR	UR	(1)-(2)-(3)+(4)
	(1)≈(2)+(3)-(4)	(2)	(3)	(4)	
BE	14.6%	8.0%	5.9%	-0.6%	0.0%
BG	9.9%	5.7%	3.7%	-0.4%	0.0%
CZ	6.7%	5.6%	0.3%	-0.9%	0.0%
DK	4.8%	0.1%	5.0%	0.3%	0.0%
DE	5.2%	3.7%	1.2%	-0.2%	0.0%
EE	14.9%	10.6%	4.1%	-0.2%	0.0%
IE	1.2%	-5.7%	5.7%	-1.1%	0.1%
EL	-12.8%	-10.4%	-2.8%	-0.4%	0.0%
ES	1.9%	1.7%	-1.1%	-1.2%	0.1%
FR	6.6%	0.8%	5.3%	-0.5%	0.0%
HR	10.7%	1.9%	8.5%	-0.4%	0.0%
IT	2.3%	0.1%	1.9%	-0.3%	0.0%
CY	-10.5%	-11.4%	0.3%	-0.5%	0.0%
LV	9.6%	8.9%	0.4%	-0.4%	0.0%
LT	8.0%	8.8%	-1.2%	-0.4%	0.0%
LU	21.7%	21.2%	1.1%	0.5%	0.0%
HU	4.5%	2.4%	1.6%	-0.5%	0.0%
MT	13.6%	12.7%	1.2%	0.2%	0.0%
NL	12.8%	4.6%	6.7%	-1.5%	0.1%
AT	5.7%	3.3%	2.6%	0.2%	0.0%
PL	10.6%	4.0%	4.5%	-2.0%	0.1%
PT	6.9%	6.4%	0.4%	0.0%	0.0%
RO	5.9%	12.2%	-4.8%	1.4%	-0.1%
SI	7.3%	4.4%	2.8%	0.0%	0.0%
SK	14.0%	2.9%	10.4%	-0.6%	0.0%
FI	4.8%	4.1%	0.7%	0.0%	0.0%
SE	0.6%	-0.9%	2.3%	0.8%	0.0%
NO	1.4%	-2.7%	4.0%	-0.1%	0.0%
EA	6.0%	3.0%	2.6%	-0.4%	0.0%
EU	5.5%	2.6%	2.5%	-0.4%	0.0%

The labour force identity L = E + U can be written as E = P x PR x (1-UR) where L is the labour force, E is employment, U is unemployment, P is the population, PR is the participation rate, and UR is the unemployment rate. Taking the logarithm of the above expression, revisions in employment level can be approximated as follows:

$$\ln\left({}^{E_1}/_{E_0}\right) \approx \ln\left({}^{P_1}/_{P_0}\right) + \ln\left({}^{PR_1}/_{PR_0}\right) - (UR_1 - UR_0)$$

where indices 0 and 1 refer to two distinct projection exercises

Source: European Commission, EPC.

Table I.2.21: **Participation rate revisions for 2070: 2024 Ageing Report vs 2021 Ageing Report (pps)**

	20-64	20-24	25-54	55-64	
BE	4.6	-1.6	4.9	6.6	BE
BG	2.9	-1.0	2.5	5.8	BG
CZ	0.2	-0.7	-1.1	4.3	CZ
DK	4.3	3.9	4.1	5.0	DK
DE	1.0	2.6	0.4	1.8	DE
EE	3.7	5.1	4.1	2.1	EE
IE	4.8	4.7	5.4	4.4	IE
EL	-2.3	4.2	-3.0	-2.6	EL
ES	-0.9	0.4	-0.9	-1.2	ES
FR	4.4	5.6	2.6	8.9	FR
HR	6.6	6.4	5.0	10.9	HR
IT	1.4	0.2	1.9	0.4	IT
CY	0.3	5.2	0.9	-4.0	CY
LV	0.3	0.6	-1.3	5.1	LV
LT	-1.0	0.1	-1.8	1.2	LT
LU	0.8	-0.6	-1.8	8.1	LU
HU	1.4	-0.6	4.1	-5.8	HU
MT	1.0	1.1	0.8	2.6	MT
NL	5.8	10.6	5.2	5.6	NL
AT	2.2	2.9	1.1	5.5	AT
PL	3.5	-2.6	3.0	6.7	PL
PT	0.4	-4.4	0.2	2.2	PT
RO	-3.5	-4.5	-5.0	1.3	RO
SI	2.4	-0.3	-0.8	12.1	SI
SK	8.4	-3.1	5.0	23.1	SK
FI	0.6	-2.8	0.7	1.7	FI
SE	2.0	-0.1	0.5	7.6	SE
NO	3.3	4.6	3.5	2.9	NO
EA	2.1	2.6	1.6	3.3	EA
EU	2.0	1.7	1.5	3.6	EU

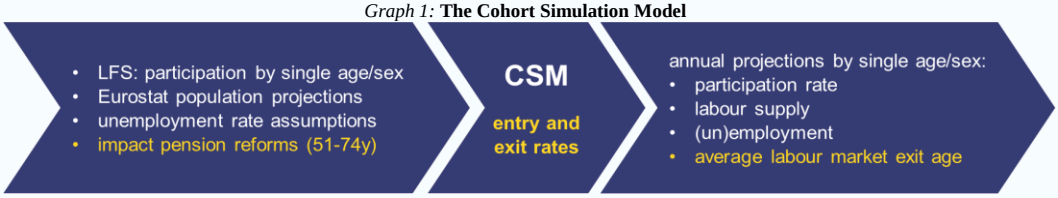
Source: European Commission, EPC.

Box I.2.1: **Cohort Simulation Model (CSM)**

The cohort simulation model (CSM) as developed by the European Commission (DG ECFIN) ([1]) has been used since the 2006 Ageing Report to project participation rates by gender and single age. The rationale for using the CSM is to reflect the substantial changes in labour market behaviour in recent decades across different cohorts and sexes. This methodology accounts, for instance, for the significant rise in female labour force participation in recent decades, as younger women, with a much stronger attachment to the labour force, gradually replace older women with relatively low participation rates. Simultaneously, the cohort methodology also caters for a – generally small – decline in the participation rate of men in recent generations in several countries, opposite to the trend observed for women.

The central feature of the CSM is the estimation of labour market exit and entry rates for a 'synthetic' cohort. ([2]) Because no individual longitudinal data on labour market transitions is available, participation data by single age is used to estimate labour market transitions, namely whether people either entered or exited the labour market between two consecutive ages. These probabilities are calculated on the basis of participation rates for the past ten years − 2013-2022 for the 2024 Ageing Report. This reference period provides thus a 'synthetic' cohort for base year 2022. An unweighted 10-year average is used to avoid that the choice of a particular year unduly influences the calculation of entry and exit rates through cyclical fluctuations or statistical errors.

Graph 1: **The Cohort Simulation Model**



The entry and exit rates are then used to project future participation rates as older generations are progressively replaced by younger ones. For those Member States having legislated pension reforms, average exit rates for the age group 51-74 are adjusted to account for the reform impact. Otherwise, both average entry and exit rates are kept constant throughout the projection period, reflecting a no-policy-change assumption. By keeping rates constant, the cohort effect is captured: in the long term, we arrive at a population with the same individual characteristics as the cohorts who enter the labour force now as measured through the 10-year average.

The 2024 Ageing Report projections build on the latest Eurostat demographic projections (see Chapter 1), prepared independently by Eurostat with consultation of National Statistical Institutes. Together with the participation rate projections, the population projections determine the labour force assumptions.

([1]) The methodology was initially developed at the OECD, see Burniaux et al. (2003).
([2]) A more detailed description of the methodology can be found in Annexes 1 and 2.

(Continued on the next page)

Box (continued)

The following assumptions are made:

- Base year for the labour market projections is 2022, the projection period covers 2023-2070.
- Average entry/exit rate are calculated, as a ten-year average (2013-2022), using participation rates by sex and single age (15-74) from the harmonised EU Labour Force Survey of Member States as compiled by Eurostat.
- A corrective mechanism for young cohorts (15-24) is applied, in order to avoid that any increase in education enrolment rates (and the corresponding decline in participation rates) feeds into future declines of participation rates for prime-age workers. This assumption means that participation rates at each single year of age between 15 and 19 remain constant at the 10-year average. Participation rates between ages 20 and 24 are allowed to increase if this is the outcome of the model. Otherwise, the rates are kept constant at the 10-year average.
- Pension reforms are modelled through their estimated impact on the labour market exit rates of older workers (aged 51-74). This is based on a best-reasoned judgment, using the probabilistic nature of the CSM. Specifically, the historical average exit rates of older workers, calculated separately for both sexes, are adjusted to account for the expected effects of enacted pension reforms. The estimation of the adjustment takes into account country-specific information about the relationship between retirement behaviour and the parameters of the pension system, as well as cross-country evidence. This framework for analysis is able to incorporate a broad typology of measures, inter alia, increases in the statutory or early retirement age, the convergence of lower female statutory retirement ages to that of men, the linking of the statutory retirement age to changes in life expectancy, and changes in financial incentives for early or delayed retirement. Moreover, policy changes can be incorporated as one-off measures or be phased in progressively within a specified period.

Additional assumptions on labour input

The production function methodology to project GDP growth (see Chapter 3), uses total hours worked as labour input variable. The split between full-time and part-time work (for the age groups 15-24, 25-54, 55-64 and 65-74), as well as the corresponding weekly hours worked, is fixed at the average values for the last available year (2022) for the entire projection period.

Although work rates and weekly hours worked are frozen per age group over the projection period, total hours worked changes due to compositional effects that mostly reflect the projected increase in female labour force participation, given the higher incidence of part-time work among women.

Box I.2.2: **Legislated pension measures incorporated in the labour force projections**

This box lists the most recent pension reforms legislated by the Member States that are considered to have *a direct impact on the labour market exit behaviour of the oldest workers* and that are thus relevant for the participation rates as projected through the CSM model. For a more exhaustive overview of Member States' pension systems, see Annexes 4 and 5. This box describes the situation on 30 September 2023.

The countries with the most significant new reforms since the 2021 Ageing Report are France, Slovakia and Sweden.

Belgium

The 2015 reform raised the minimum early retirement age to 63 years and the minimum required career length to 42 years. Exceptions apply to people aged 60/61 with a career of at least 44/43 years. The reform also raised the statutory retirement age in the three main public old-age pension schemes (wage earners, self-employed and civil servants), from 65 years to 66 years in 2025 and to 67 years in 2030. A career of 45 years remains required for drawing a full pension.

Bulgaria

The statutory retirement age is rising to 65 years following the 2015 reform: by 2029 for men and by 2037 for women (63 years in 2029). After 2037, the statutory retirement age is supposed to increase in line with gains in life expectancy, though no clear rule has been legislated. Therefore, such mechanism is not included in the projections. The retirement age for workers in the defence and security sector is gradually increasing, to 55 years in 2029.

The required career length for workers in normal work conditions to qualify for retirement is rising by two months annually, until it reaches 40 years for men and 37 years for women in 2027.

People within 12 months of the statutory retirement age can retire early, in which case the benefit is reduced by 0.4% for each month of anticipation. Early retirement is also possible for people working under hazardous and unhealthy working conditions or special groups such as teachers, military and police officers (55-60y).

Czechia

Statutory retirement ages are determined in function of a person's birth year and, in the case of women, the number of children raised. In 2017, a reform was adopted that caps the increase in the statutory retirement age at 65, reversing the 2011 reform that increased retirement ages approximately in line with gains in life expectancy. In 2030, the retirement age will be 65 years for men and women with maximum 1 child. As of 2036, it will be 65 years for all.

Early retirement is possible 3 year prior to the statutory retirement age, with a minimum insurance period of 40 years (2023 reform, 35 years before). The insurance period includes non-contributory periods.

Denmark

The standard retirement age reached 67 years in 2022. The statutory retirement age and the VERP age (voluntary early retirement pension with minimum 30 contributory years) increase on the basis of life expectancy for a 60-year-old, with the period on old-age pension targeted at 14.5 years (17.5 years including VERP).

Adjustments to life expectancy have to be confirmed by Parliament 15 years before they take effect (12 years for changes in the VERP age). Increases to 68 years in 2030 and to 69 years in 2035 were confirmed in 2015 and 2020, with further updates every to be confirmed every 5 years. The maximum increase in the retirement age is restricted to 1 year for every update.

In 2020, a new early retirement scheme was created for people with long careers: people with 44 years of labour market seniority (at the age of 61 years) obtain the right to retire 3 years before the standard pension age. People with respectively 42 years and 43 years of labour market seniority can retire 1 and 2 years early.

In 2019, a new right to disability pension was created for people 6 years or less removed from the statutory retirement age, on the conditions of at least 20-25 years of labour activity and a reduced work ability. The scheme took effect in 2020 and replaced a similar senior disability pension.

(Continued on the next page)

Box (continued)

Germany

As a result of the 2007 reform, the statutory retirement age is gradually increasing, reaching 67 years in 2031.

Early retirement is possible (i) at the age of 63 for people with an insurance record of at least 35 years, with a permanent reduction of 0.3% for each month below the statutory retirement age; (ii) 2 years ahead of the statutory retirement age without a penalty, for people with a contribution history of 45 years.

Since 2023, it is possible to combine an early pension with additional earnings without any loss of pension entitlements.

Estonia

The retirement age for men and women was equalised in 2016 at 63 years and is rising to 65 by 2026. The 2018 reform introduced a link to changes in the 5-year average life expectancy at the age of 65. This link is applied starting 2027, with a maximum annual increase of three months. The change in the retirement age will be known two years in advance.

The old bonus/malus system was replaced by an actuarially neutral system in 2021. The early retirement age (previously 3 years before the statutory retirement age) is 1/2/3/4/5 year(s) lower, for contribution periods of 20/25/30/35/40 years. Drawing a pension benefit can be combined with work.

Ireland

The legislated increase in the state pension age to 67 years in 2021 and to 68 in 2028 was repealed at the end of 2020, fixing the state pension age at 66. To get a State Contributory Pension one needs to have started paying contributions before the age of 56, with a minimum of 260 weekly contributions and a yearly average of at least 10 contributions.

A pathway to early retirement was opened in 2021, through the introduction of a new benefit for 65-year-olds, equal to the unemployment benefit.

Greece

The 2012 and 2014 reforms increased the statutory retirement age from 65 to 67 years (with at least 15 contribution years) and the early retirement age from 60 to 62 (full pension with 40 years of contributions) for the whole social security system. Since 2021, retirement ages are linked to changes in life expectancy at the age of 65, with updates every three years.

Spain

The statutory retirement age is increasing to 67 years in 2027 and the contributory career for a full pension to 37 years. Workers with a contributory period of at least 38.5 years can retire at the age of 65 with a full pension.

Early retirement for voluntary retirees requires a minimum age of 65 (as of 2027), a minimum contributory period of 35 years and the resulting benefit should be at least the minimum pension.

Early retirement for involuntary retirees (collective dismissals) requires a minimum retirement age of 63 years (as of 2027) and a minimum contributory period of 33 years.

Early partial retirement is available for workers of different ages depending on the number of years of contributions: 63 years in 2027 with a contributory period of at least 36.5 years, 65 years in case of 33-36.5 contribution years. Below 33 contribution years early partial retirement is not possible.

Early retirement is penalised in function of the distance to the statutory retirement age and the contribution period. People working beyond their earliest retirement age increase their benefits by 4% per extra year of work, regardless of the contribution history. People can opt for a lump sum payment or a mixed pay-out.

France

People can retire from the moment they reach the earliest retirement age, with a penalty if they do not meet the required contribution period. They can also delay their retirement to obtain a full-rate pension which is granted to people with the required contribution period or are 67 years old.

Following the 2023 reform, the earliest retirement age for all schemes will rise gradually from the standard 62 in 2022 to 64 years in 2032. In addition, the required contribution period will rise to 43 years by 2027 instead of 2035 under the 2013 reform. In

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Box (continued)

the public sector, for some special branches with 'active service' (e.g. policemen and nurses), the earliest retirement age is 57 years, rising to 59 years following the 2023 reform.

Disabled people and working mothers of 3 children are granted a full pension at 65. People suffering from a professional disease or an accident that resulted in a permanent incapacity of at least 20% can retire at 60 with a full pension. Below 20% the retirement age goes up to 62 following the 2023 reform.

Early retirement for long careers (since September 2023): people who paid 5 quarters of contributions before the age of 18/20/21 and accumulated at least 169 quarters can retire at the age of 60/60-62/63.

Croatia

The statutory retirement age is 65 years (63 for women in 2022, rising to 65 in 2030), with 41 insurance years needed for a full pension. Early retirement is possible at the age of 60 (58 for women in 2022, rising to 60 in 2030) with a minimum contributory period of 35 years (33 years for women in 2022, rising to 35y in 2030). Penalisation of 0.2% per month of anticipation, i.e. maximum 12%. Bonus of 0.45% per month beyond the statutory retirement age since 2023 (0.34% before). Bonus in case of long career (41 years): 0.15%.

In 2016, war pensions (disability and survivor pensions) represented 5-6% of pensioners (71.000). By 2040 these are assumed to be fully disappeared from the working-age population.

Italy

Since the latest update to life expectancy in 2019, the statutory retirement age is 67 years for men and women in all sectors, with a minimum of 20 contributory years. The indexation to changes in life expectancy at 65 has been applied since 2013 and, since 2019, is applied every two years, with a maximum increase of three months (in case of increases in life expectancy exceeding three months, the surplus is absorbed in subsequent updates). The updates for 2021, 2023 and 2025 did not result in an increase. The next Directorial Decree with update for 2027 will be enacted in 2025.

Early retirement is possible with 42 years and 10 months of contributions for men and 41 years and 10 months for women, irrespective of their age. Starting from 2027, indexation to changes in life expectancy of the contributory requirement will be reinstated. Once requirements for early retirement are met, workers need to wait an additional 'window' period of three months before they can receive their pension.

Workers may receive an early retirement allowance ('*APE Sociale'*) before meeting the old-age pension requirements when they are 63 years old and have accrued (i) 30 years of contributions, subject to additional requirements (i.e. being unemployed under certain circumstances, being a caregiver, having a disability degree equal to or more than 74%) or (ii) employees with 36 years of contributions of which at least 7 of the last 10 or 6 of the last 7 in an arduous job. ([1]) This experimental measure has been introduced in 2017 and its expiry date has been postponed several times. According to the Budget Law for 2023, it should expire at the end of 2023.

Precocious workers may retire with 41 years of contributions until 2026 subject to additional requirements (partially similar to those requested for '*APE Sociale*'). ([2]) Starting from 2027, indexation to changes in life expectancy of the contributory requirement will be reinstated. Once requirements for early retirement are met, workers need to wait an additional 'window' period of three months before they can receive their pension.

An additional early retirement scheme has been introduced for 2023, '*Quota 103*': people can retire at 62 in case of a contributory period of 41 years. This temporary scheme follows the experimental temporary schemes '*Quota 100*' (2019-2021: 62+38 years) and '*Quota 102*' (2022: 64+38 years).

'Opzione donna': in 2023, women who have reached the age of 60 (59/58 with one/at least two children) with 35 years of contribution by 2022 may retire earlier, under more stringent conditions than in the past (similar to those requested for '*APE Sociale*'). Workers may receive their pensions 12 months (18 if self-employed) after requirements are met. Early

([1]) 32 years in the construction sector.

([2]) Precocious workers are workers who have paid at least one year of contribution before turning 19.

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Box (continued)

retirement is subject to benefits being entirely computed according to the Notional Defined Contribution (NDC) rules, instead of the mix of Defined Benefit and NDC rules that would normally apply to these workers. ([3])

Cyprus

The 2012 pension reform introduced a link between the statutory retirement age and changes in life expectancy. The mechanism applies since 2018, with updates every five years (first revision will cover the period 2018-2023). There is no early retirement possibility, aside from miners.

Latvia

As a result of the 2012 pension reform, the retirement age increases by three months every year, until reaching 65 years and a minimum contributory period of 20 years as of 2025 (15 years until then). The early retirement age – with an insurance record of at least 30 years – is two years lower than the statutory one, thus rising to 63 years by 2025. The early retirement benefit is 50% of the normal benefit. The full pension is restored upon reaching the statutory retirement age.

Lithuania

The 2011 reform raises the statutory retirement age to 65 years by 2026, with annual increases of 4 months for women and 2 months for men. The 2016 pension reform increases the eligibility requirements for the full general pension component from 30 years (33 years in 2023) to 35 years by 2027.

Early retirement is possible five years prior to the statutory retirement age on the condition of meeting the eligibility requirements for a full general pension. The pension benefit is reduced by 0.32% for each month of anticipation – i.e. maximum 24% – and the reduced pension is paid also after reaching the statutory retirement age.

After reaching the retirement age, people can continue to work and combine a salary with the old-age pension. In case of deferred retirement the pension benefit is increased by 0.67% per month (8% per year).

Luxembourg

To be eligible for an old-age pension, an insured person needs to be at least 65 years old and have accumulated a total of 10 years of contributory periods. An insured person that is at least 60 years old and has accumulated a combined total of 40 years of contributory periods (work) and credited non-contributory periods qualifies for early retirement, provided that contributions have been paid for at least 10 years. Individuals that are at least 57 years old gain access to early old-age benefits if they accumulated a total of 40 years of contributory periods (work).

Hungary

The statutory retirement age has been 65 years since 2022 for both men and women. There is no early retirement scheme, though women can retire with 40 contribution years (work+childcare years) regard-less of their age.

Malta

The 2006 reform entails a gradual increase in the statutory retirement age to 65 years by 2027 (for people born as of 1962). In addition, the contributory period increases to 41 years by 2030.

Early retirement is possible as of the age of 61 provided that the retiree will not remain in any gainful employment and has the required contribution history. People eligible for early retirement are awarded a progressive bonus for each year that they continue working up to the age of 65. Those who continue working beyond the retirement age can do so without forfeiting their pension while in employment.

The Netherlands

The 2019 reform modified the speed at which the statutory retirement age rises to 67 years. The latter will be reached in 2024, compared to 2023 under the

([3]) This experimental measure was first introduced in 2004 and has been extended several times, most recently in 2019 (DL n. 4/2019) until 2022. In the latest Budget Law for 2023 the requirements for '*Opzione Donna*' have been significantly tightened with a new expiry date at the end of 2023.

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Box (continued)

2012 reform. Thereafter, it will be linked to 2/3rd of the rise in the remaining life expectancy at 65, instead of the full link envisaged under the 2012 reform. The duration of social security arrangements for people below the retirement age (disability pensions, survivors' pensions, unemployment schemes and social assistance) will be extended in line with the increase in the statutory retirement age.

Austria

The statutory retirement age is 65 years for men and all civil servants and 60 years for women, with a minimum contribution period of 15 years. As of 2024, the female retirement age will increase by six months every year, reaching 65 years in 2033. Several early retirement schemes exist:

- While the early retirement scheme 'Korridorpension' can still be accessed by men at the age of 62 years, it requires 40 insurance years since 2017, when the penalty for early retirement was increased from 4.2% to 5.1% per year for people born as of 1955. For women only relevant as of 2028.
- The early old-age pension scheme for long-term contributors 'Hacklerregelung' (45 years of contributions) was tightened by increasing the minimum retirement age to 62 for men born as of 1954 and for women born as of 1966. Penalty: 4.2% per year.
- For the heavy worker 'Schwerarbeitspension', the early retirement age is 60 (for women relevant as of 2024), with a minimum of 45 insurance years (at least 10 years of hard labour in the last 20 years before retirement). Penalty: 1.8% per year.
- For the early old-age pension for long-term contributors in combination with heavy worker regulation ('Hackler-Schwerarbeit'), the minimum retirement age is 55 years for women (born in 1959-1963) and 60 years for men (born in 1954-1958). Required insurance years are 40 for women and 45 for men. Penalty: 1.8% per year.

As of 2022, the early retirement possibilities without deductions in case of 540 contribution months that existed in 2020 and 2021, have been abolished again for all pension types.

In 2014, comprehensive new regulations for invalidity and occupational disability pensions came into effect. The temporary invalidity pension was replaced by medical and job-related rehabilitation and was completely abolished for people born after 1963. These people will receive special unemployment benefits ('Rehabilitationsgeld') instead. Therefore, the temporary invalidity pension is phased out.

Poland

The retirement age is 65 years for men and 60 years for woman. No minimum contribution requirements apply. There is no early retirement possibility, except for special schemes such as miners and teachers, who can retire up to 5 years early. No penalty or bonus applies.

Since 2022, there is an income taxation exemption for labour income up to PLN 85 528 per year for women over 60 men over 65 who remain professionally active while not receiving a pension benefit.

Portugal

Since 2015, the statutory retirement age changes in line with two thirds of the change in life expectancy at the age of 65. It was at 66 year and 7 months in 2022 but fell to 66 year and 4 months in 2023 and 2024 because of this adjustment. The statutory retirement age is reduced by four months for each contributory year above 40 years, with a minimum retirement age of 65 years.

Early retirement is possible at the age of 60 with 40 contributory years. These conditions are not adjusted for gains in life expectancy. A penalty of 0.5% per month of anticipated retirement applies.

Romania

Old-age retirement is possibly when reaching the standard retirement age (65 for men, rising to 63 for women by 2030) with a minimum contribution period of 15 years.

For 'service pensions' (army, police, intelligence, penitentiary staff), the eligibility criteria are an age of 60 years, with at least 25 years of contribution, of which at least 15 years in service.

Since 2022, people who have lived for at least 30 years in areas affected by residual pollution (due to mining or various chemical activities) benefit from

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Box (continued)

a reduced standard retirement age of 2 years. The list of towns that benefit from this has been expanded to almost 100.

Early retirement is possible up to 5 years before the standard retirement age, with at least 35 contribution years. Penalties apply in case of less than 43 contribution years.

Slovenia

The right to an old-age pension depends on two parameters that both need to be met: the age of the insured person (65 years for both men and women) and the pension qualifying period (minimum 15 years). Early retirement is possible at the age of 60 in case of 40 contribution years. The penalty for early retirement is 0.3% for each month of retirement before the age of 65, i.e. maximum 18%. The earliest retirement age is reduced for childcare, compulsory military service, employment between the ages of 15 and 18, and arduous labour with a detriment to health.

People that qualify for retirement (old-age or early) but continue to work can earn a bonus of 3% per year for 3 years and receive part of the accrued pension benefit (minimum 12.5%, 50% in case of half-time work, 75% in case of working 25%).

Slovakia

The statutory retirement age for people born up to 1966 is defined by a fixed table based on age, cohort, sex and number of raised children (for women with children, the retirement age can be decreased by 6 months for each of the first three children). It is set to increase by two months for each subsequent cohort, reaching 64 years in 2030.

The 2022 reform restored the link to average life expectancy from 2030 onwards (for people born as of 1967), which was abandoned in the 2019 reform.

Pensioners are allowed to retire two years before reaching the statutory retirement age if the benefit is at least 1.6 times the subsistence minimum. In that case, their old-age pension is reduced by 0.5% per month. The pension benefit is increased by 0.5% for every additional month of work beyond the retirement age.

In addition, early retirement is also possible with a career of 40 years (not adjusted to life expectancy), with a requirement of 1.6 times the subsistence minimum. A penalty applies, amounting to 0.3% for every month below the statutory retirement age.

Finland

The lowest old-age retirement age in the earnings-related scheme is rising by three months for each age cohort, from 63 years in 2018 to 65 in 2027. The upper age limit is currently 68 years and it will be raised to 69 for those born in 1958–1961 and to 70 for those born in 1962 or later.

The lowest old-age retirement age will be linked to life expectancy as of 2030 so that the time spent working in relation to the time spent in retirement will remain at the 2025 level. The annual increase of the retirement age is limited to two months.

Sweden

The retirement age is flexible and individuals can claim benefits as of a minimum age without any upper limit.

The 2022 reform increased the earliest age for an old-age pension from 62 years to 63 years in 2023 and to 64 years in 2026. The earliest age for a guarantee pension was raised from 65 years to 66 years in 2023 and to 67 years in 2026. The upper age for employment protection was increased to 69 years in 2023 and to 70 years in 2026.

As of 2026 an ‘indicative age’ will be introduced, which will increase by one year every time the expected remaining life expectancy at the age of 65 increases by 1.5 years (so that the indicative age increases with 2/3rd of the remaining lifetime). When the indicative age increases by a full year all age limits will automatically be increased by one year.

Norway

The statutory retirement age is fixed at 67 years but serves rather as a reference age since flexible retirement is possible from the age of 62. In order to receive a full guarantee pension, one must have been a member of the National Insurance Scheme for 40 years, otherwise the benefit is reduced accordingly. The guarantee part of the pension can be drawn only from the age of 67.

Box I.2.3: **Assumptions on structural unemployment**

Structural unemployment is the 'natural' rate of unemployment to which, in the absence of shocks, the economy is estimated to settle in the long run. Empirically, structural unemployment cannot be observed. However, it is typically estimated via methods that pin down its statistical and theoretical properties. Its level is usually determined by both institutional and fiscal factors (e.g. unemployment benefits or tax rates) which influence the minimum wage needed for a worker to take up work (the 'reservation wage'). To proxy for structural unemployment, the Ageing Report uses estimates of the 'non-accelerating wage rate of unemployment' (NAWRU): the unemployment rate that corresponds with stable wage growth, i.e. real wage growth equals productivity growth. ([1])

As a rule, actual unemployment rates are assumed to converge to NAWRU rates by 2027, in line with the assumption of output gap closure in T+5 (see Chapter 3). Thereafter, actual unemployment rates coincide with the NAWRU. In turn, NAWRU rates are assumed to gradually ([2]) converge to the minimum of country-specific 'anchors' ([3]) or the median of national *anchors*, whichever is the lowest. ([4])

Anchor values are country-specific values for the NAWRU that are calculated on the basis of the coefficients of a panel estimation model in which the short-term NAWRU for EU Member States is regressed on a set of structural variables (unemployment benefit net replacement rates, expenditure on active labour market policies, the degree of union density, the labour tax wedge, and a demographic index), together with a set of cyclical variables (total factor productivity, the long-term real interest rate, a measure of construction activity, and a measure of industrial confidence). ([5]) To derive country-specific anchors, the non-structural variables are set at their average values over the estimation sample.

Capping country-specific NAWRU values to the median is done to avoid extrapolating very high unemployment rates into the far future. It should be noted that this cap on unemployment rates is a crucial assumption for some countries that currently register high unemployment. Higher long-term unemployment assumptions would, through weaker employment growth, lead to lower potential output growth. Capping unemployment rates, as done in some cases, leads to higher employment and GDP growth, and essentially assumes the implementation of future policy measures in the labour market. ([6])

To account for changes in total/average unemployment rates because of the interaction between cohort-specific structural unemployment rates and the structure of the labour force, age-specific unemployment rates by gender are calculated as follows for each projection year:

$$u_{a,g}^{t} = \frac{u_{total}^{t}}{\sum_{a,g}\{u_{a,g}^{2022} * l_{a,g}^{t}\}} * u_{a,g}^{2022}$$

where

([1]) For further details on the NAWRU methodology, developed by the Output Gap Working Group attached to the Economic Policy Committee (EPC-OGWG), see Hristov et al. (2017) and Havik et al. (2014).
([2]) In addition, if the estimated NAWRU ten years ahead (2032) is lower than the country-specific anchor, the former is assumed to replace the anchor. For countries whose NAWRU is higher than the EU median, the gradual convergence is assumed to be completed by 2050.
([3]) Under the guidance of the EPC-OGWG and with the twin objectives of improving the medium-term framework for fiscal surveillance up to T+10 (currently 2032), DG ECFIN carried out econometric work (see Hristov and Roeger (2020); Hristov et al. (2017)) leading to the estimation of anchor values for the NAWRU.
([4]) Anchors are country-specific values for the NAWRU that are calculated assuming that non structural variables are set at their average values, thereby averaging out the impact of cyclical fluctuations, while structural variables are assumed to remain unchanged at their last observed values (i.e. 'no policy change' principle).
([5]) See Hristov and Roeger (2020) for detailed definitions of the explanatory variables included in the analysis.
([6]) This assumption reflects the partial convergence assumption used in the projections and implies that some policy measures are adopted to support such a decline in some countries.

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Box (continued)

$$l_{a,g}^{t} = \frac{LF_{a,g}^{t}}{LF_{total}^{t}}$$

where $u_{a,g}^{t}$ is the unemployment rate in age group a with gender g in period t; u_{total}^{t} is the total unemployment rate in period t; and $l_{a,g}^{t}$ is the share in the total labour force. This means that the unemployment rate structure by age and gender observed in base year 2022 is kept unchanged throughout the projection period, with age/gender values adjusted proportionally to satisfy a given total unemployment rate target.

Table 1 summarises the unemployment rate assumptions. In the EU, the unemployment rate is projected to increase from 5.7% on average in 2022 to 6.7% in 2032 before declining again to 5.6% as of 2050. The decline is expected to be particularly significant for countries such as Spain (-6.2%) and Greece (-5.8%).

Table 1: **Unemployment rate projections (15-64y, %)**

	2022	2032	2050	2060	2070
BE	5.6	5.9	5.9	5.9	5.9
BG	4.3	5.0	5.0	5.0	5.0
CZ	2.2	2.8	2.8	2.8	2.8
DK	4.5	4.0	4.0	4.0	4.0
DE	3.1	4.1	4.1	4.1	4.1
EE	5.6	6.5	6.5	6.5	6.5
IE	4.5	5.7	5.7	5.7	5.7
EL	12.5	10.2	6.8	6.6	6.6
ES	12.9	11.5	6.8	6.6	6.6
FR	7.3	7.5	6.7	6.6	6.6
HR	7.0	7.1	6.6	6.6	6.6
IT	8.1	9.6	6.7	6.6	6.6
CY	6.8	8.7	6.7	6.6	6.6
LV	6.9	7.4	6.7	6.6	6.6
LT	6.0	6.8	6.6	6.6	6.6
LU	4.6	5.7	5.7	5.7	5.7
HU	3.6	3.6	3.6	3.6	3.6
MT	2.9	4.5	4.5	4.5	4.5
NL	3.5	3.6	3.6	3.6	3.6
AT	4.8	4.6	4.6	4.6	4.6
PL	2.9	3.1	3.1	3.1	3.1
PT	6.0	6.5	6.5	6.5	6.5
RO	5.6	6.2	6.2	6.2	6.2
SI	4.0	5.9	5.9	5.9	5.9
SK	6.1	6.3	6.3	6.3	6.3
FI	6.8	6.6	6.6	6.6	6.6
SE	7.5	6.7	6.6	6.6	6.6
NO	3.3	3.7	3.6	3.6	3.6
EA	6.3	6.7	6.0	5.9	5.9
EU	5.7	6.1	5.6	5.6	5.6

Source: European Commission, EPC.

3. LABOUR PRODUCTIVITY AND POTENTIAL GDP PROJECTIONS

3.1. INTRODUCTION

To project potential GDP growth in the long term, a production function framework with the standard specification of the Cobb-Douglas production function with constant returns to scale is used. In this framework, potential GDP growth is driven by long-term developments in labour input and labour productivity.

Projections of labour productivity are based on assumptions about long-run developments in its underlying determinants, namely labour-augmenting total factor productivity (TFP) and the capital stock per worker (also referred to as capital deepening). The long-run projection is based on the central assumption of convergence of all Member States towards the same value of labour productivity by the end of the projection horizon, while accounting for cross-country GDP per capita differences in the short to medium term. Labour input projections are based on assumptions taken from Eurostat's latest population projections (see Chapter 1) and the labour market participation rate projected by the Commission's Cohort Simulation Model (see Chapter 2).

A detailed description of the production function framework and the key assumptions underpinning the long-term GDP projections presented in this section are summarised in Annex 3. All assumptions have been approved by the EPC, including the methodology developed by the EPC's Output Gap Working Group (OGWG) to calculate potential GDP over the first 10 years of the projection period. Indeed, following the practice used for previous Ageing Reports, the OGWG T+10 methodology is used for projecting potential growth and its components over the medium term – namely up to 2032 (Annex 3). The long-term projections, and T+10 projections, in this report are based on the Commission 2023 spring forecast.([24]) Thus, the EPC's working groups, the OGWG and the AWG, are fully aligned. ([25])

The rest of this section summarises (i) the long-term GDP projections in the baseline (Section 3.2.1), (ii) the results of the higher and lower TFP growth scenarios (Section 3.2.2) ([26]) and (iii) the main differences between these projections and those of the 2021 Ageing Report (Section 3.3).

([24]) The Commission 2023 spring forecast was published on 15 May 2023 and took account of all available information at that time. The revisions in the national accounts published in autumn 2023 are therefore not included in the assumptions presented in this report. The 2022 nominal GDP in the EU was estimated to be 0.6% higher than in the spring 2023 update. For a number of Member States the revision was downward.

([25]) Since the 2024 Ageing Report, the T+10 methodology and the long-term projections adopted by the Ageing Working Group are based on the same population projections, namely EUROPOP2023. Moreover, the T+10 projections used in this report reflect the impact of the latest pension reforms on labour market participation rates.

([26]) These alternative scenarios are also described in Chapter 5, together with other stress tests.

Table I.3.1: **Potential GDP growth rate - period average (%)**

	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	1.4	1.3	1.5	1.3	1.2	**1.3**
BG	2.0	1.5	1.3	1.2	1.2	**1.4**
CZ	1.4	1.4	1.6	1.5	1.5	**1.5**
DK	1.2	1.3	1.7	1.4	1.1	**1.3**
DE	0.8	1.1	1.4	1.1	1.2	**1.1**
EE	1.5	1.8	1.8	1.4	1.5	**1.6**
IE	5.2	1.9	1.3	1.3	1.1	**2.1**
EL	1.0	0.7	1.2	1.2	1.2	**1.1**
ES	1.2	1.1	1.4	1.3	1.1	**1.2**
FR	0.8	0.9	1.4	1.3	1.1	**1.1**
HR	2.3	1.5	1.5	1.2	0.9	**1.5**
IT	0.8	0.8	1.4	1.4	1.2	**1.1**
CY	2.3	1.7	1.7	1.2	1.2	**1.6**
LV	1.6	1.4	0.8	0.5	1.1	**1.1**
LT	2.3	1.4	0.9	0.3	0.6	**1.1**
LU	2.2	1.8	2.0	1.5	1.3	**1.8**
HU	2.4	1.8	1.7	1.5	1.3	**1.7**
MT	4.2	3.1	1.8	0.9	0.8	**2.1**
NL	1.3	1.1	1.7	1.4	1.1	**1.3**
AT	1.4	1.4	1.4	1.1	1.1	**1.3**
PL	2.6	2.0	1.0	0.9	1.0	**1.5**
PT	1.4	0.7	1.3	1.5	1.2	**1.2**
RO	2.6	1.9	1.3	1.4	1.2	**1.7**
SI	2.6	1.9	1.1	1.2	1.2	**1.6**
SK	1.7	1.6	1.4	1.2	1.3	**1.4**
FI	1.1	1.3	1.3	1.0	0.9	**1.1**
SE	1.6	1.8	1.8	1.6	1.4	**1.6**
NO	1.6	1.4	1.7	1.4	1.2	**1.5**
EA	1.2	1.1	1.4	1.2	1.1	**1.2**
EU	1.3	1.2	1.4	1.3	1.1	**1.3**

Source: European Commission, EPC.

3.2. LONG-TERM POTENTIAL GDP PROJECTIONS

Relatively stable potential annual GDP growth of almost 1½% is projected over the long term in the EU. This is much lower than in previous decades and involves downside risks should future TFP growth develop less favourably than assumed, especially over the medium term.

3.2.1. Baseline

Annual potential GDP growth is projected to average 1.3% in the EU over the period 2022-2070. It would average 1.3% up to 2030, falling slightly to 1.2% during 2031-40 after which it rises again to 1.4% in the 2040s. It is then expected to fall in the 2050s to 1.3% and in the 2060s to 1.1% (see Table I.3.1). The projections for the euro area follow a similar, though slightly lower, trajectory at the beginning of the projection period, with annual growth of 1.2% through 2030, 1.1% in 2031-40, rising to 1.4% during the 2040s, and then falling to 1.2% in the 2050s and to 1.1% in the final decade. Overall, average growth in the euro area over the period 2022-2070 is projected at 1.2%.

The contribution of labour input – total hours worked – to potential growth in the EU and the euro area is projected to be negative as of the late 2020s. The demographic assumptions result in a decline in the working-age population and, by extension, a negative contribution of labour input to potential growth for most EU countries. The projected increase in participation and employment rates would not be sufficient to counterbalance the decline in the working-age population (see Chapter 2). After a recovery in the first years of the projection, total hours worked fall in the EU and the euro area, by 0.3% and 0.2% respectively over the period 2030-2070 (see Table I.3.2). As a result, potential GDP growth in the EU and the euro area become entirely driven by labour productivity.

Table I.3.2: **Total hours worked growth rate - period average (%)**

	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	0.9	0.3	0.0	-0.1	-0.1	**0.2**
BG	-0.5	-1.0	-1.0	-0.8	-0.2	**-0.7**
CZ	0.2	-0.5	-0.5	-0.2	0.1	**-0.2**
DK	0.1	0.1	0.2	0.1	-0.2	**0.1**
DE	-0.2	-0.2	0.0	-0.2	-0.1	**-0.1**
EE	0.3	-0.1	-0.2	-0.3	0.1	**0.0**
IE	1.3	0.4	-0.1	0.0	-0.2	**0.3**
EL	-0.1	-0.9	-0.9	-0.6	-0.2	**-0.6**
ES	0.7	-0.1	-0.4	-0.3	-0.3	**-0.1**
FR	0.6	0.1	0.0	-0.1	-0.2	**0.1**
HR	0.4	-0.6	-0.7	-0.7	-0.6	**-0.4**
IT	0.2	-0.2	-0.2	-0.1	-0.1	**-0.1**
CY	0.8	0.0	0.1	-0.2	-0.1	**0.1**
LV	-0.9	-1.3	-1.3	-1.3	-0.3	**-1.0**
LT	-0.3	-1.2	-1.1	-1.4	-0.8	**-1.0**
LU	2.5	0.9	0.6	0.2	0.0	**0.8**
HU	0.0	-0.6	-0.5	-0.4	-0.1	**-0.3**
MT	2.1	1.3	0.4	-0.5	-0.5	**0.5**
NL	0.8	0.0	0.2	0.1	-0.2	**0.2**
AT	0.5	0.1	0.0	-0.2	-0.1	**0.0**
PL	-0.2	-0.8	-1.1	-0.9	-0.4	**-0.7**
PT	-0.1	-0.9	-0.7	-0.3	-0.2	**-0.4**
RO	-0.7	-1.1	-1.0	-0.5	-0.3	**-0.7**
SI	0.4	-0.2	-0.5	-0.3	-0.1	**-0.1**
SK	-0.5	-0.7	-0.7	-0.6	-0.1	**-0.5**
FI	0.0	-0.1	-0.2	-0.3	-0.3	**-0.2**
SE	0.8	0.6	0.4	0.2	0.2	**0.4**
NO	0.9	0.5	0.3	0.1	0.0	**0.3**
EA	0.3	-0.2	-0.2	-0.2	-0.2	**-0.1**
EU	0.2	-0.3	-0.3	-0.3	-0.2	**-0.2**

Source: European Commission, EPC.

Table I.3.3: **Hourly labour productivity growth rate - period average (%)**

	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	0.5	1.0	1.4	1.3	1.3	**1.1**
BG	2.5	2.6	2.3	1.9	1.5	**2.2**
CZ	1.2	1.9	2.1	1.8	1.4	**1.7**
DK	1.1	1.2	1.4	1.3	1.3	**1.3**
DE	1.0	1.3	1.4	1.3	1.3	**1.3**
EE	1.2	1.9	2.0	1.7	1.4	**1.6**
IE	3.8	1.5	1.4	1.3	1.3	**1.8**
EL	1.1	1.6	2.1	1.8	1.4	**1.6**
ES	0.5	1.2	1.8	1.6	1.3	**1.3**
FR	0.2	0.8	1.4	1.3	1.3	**1.0**
HR	1.9	2.0	2.2	1.9	1.4	**1.9**
IT	0.6	1.1	1.6	1.4	1.3	**1.2**
CY	1.5	1.6	1.6	1.5	1.3	**1.5**
LV	2.5	2.7	2.1	1.8	1.4	**2.1**
LT	2.6	2.6	2.0	1.7	1.4	**2.1**
LU	-0.3	0.9	1.4	1.3	1.3	**0.9**
HU	2.5	2.4	2.2	1.9	1.4	**2.0**
MT	2.0	1.8	1.4	1.3	1.3	**1.6**
NL	0.5	1.1	1.4	1.3	1.3	**1.1**
AT	0.8	1.2	1.4	1.3	1.3	**1.2**
PL	2.9	2.8	2.1	1.8	1.4	**2.2**
PT	1.5	1.6	2.0	1.8	1.4	**1.7**
RO	3.4	3.0	2.3	1.9	1.5	**2.4**
SI	2.2	2.1	1.7	1.5	1.3	**1.7**
SK	2.2	2.4	2.1	1.8	1.4	**2.0**
FI	1.1	1.4	1.4	1.3	1.3	**1.3**
SE	0.8	1.2	1.4	1.3	1.3	**1.2**
NO	0.9	1.0	1.4	1.3	1.3	**1.2**
EA	0.9	1.3	1.6	1.4	1.3	**1.3**
EU	1.1	1.5	1.7	1.5	1.3	**1.4**

Source: European Commission, EPC.

Annual growth in labour productivity per hour worked is projected to increase in the period to the 2030s, from 1.1% to 1.5%, while reaching 1.7% in the 2040s. Thereafter annual growth in labour productivity is projected to fall to 1.5% in the 2050s and 1.3% in the 2060s. As a result, the average annual growth rate is projected at 1.4% over 2022-2070. A similar trajectory is envisaged in the euro area, with labour productivity rising from an average of 0.9% up to 2030 to about 1.6% in the 2040s, with an overall average of 1.3% over the entire period (see Table I.3.3).

Total factor productivity (TFP) growth explains around two-thirds of labour productivity growth during the projection period. Annual TFP growth converges to 0.8% by 2070 at the latest for all Member States. For the EU, TFP growth averages 0.7% per year over 2022-30, rising to just above 1% in 2031-40 and converging to 0.8% by the end of the projection horizon. The resulting average annual growth rate over 2022-70 is 0.9% (Table I.3.4). The annual TFP growth rate in the euro area follows a similar path, albeit from a lower starting point over 2022-30 (0.6%) and rising more slowly in the coming decades, with an average growth rate of 0.9% over 2022-70.

The contribution of capital deepening to labour productivity for the EU averages 0.5% per year during 2022-2070 (see Table I.3.5). The contribution rises from 0.4% in the 2020s to 0.6% in the 2040s and falls afterwards to 0.5%. For the euro area, the contribution from capital deepening averages just 0.3% per year during 2022-30 and rises to 0.6% before falling back to 0.5% in the 2050s and 2060s. The average is

0.4% for the entire projection period. For countries whose GDP per capita is below the EU average, the capital deepening contribution is projected to be considerably higher than the EU average in the first part of the projection period, reflecting the assumed catching-up process.

Table I.3.4: **TFP growth rate - period average (%)**

	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	0.3	0.7	0.9	0.9	0.8	**0.7**
BG	1.7	1.5	1.5	1.3	0.9	**1.4**
CZ	0.6	1.2	1.4	1.2	0.9	**1.1**
DK	0.5	0.9	0.9	0.9	0.8	**0.8**
DE	0.7	0.9	0.9	0.9	0.8	**0.8**
EE	0.5	1.2	1.3	1.1	0.9	**1.0**
IE	3.6	0.9	0.9	0.9	0.8	**1.4**
EL	0.8	1.1	1.3	1.2	0.9	**1.1**
ES	0.3	0.8	1.2	1.0	0.9	**0.8**
FR	0.0	0.6	0.9	0.9	0.8	**0.7**
HR	1.2	1.2	1.4	1.2	0.9	**1.2**
IT	0.4	0.7	1.0	0.9	0.8	**0.8**
CY	0.7	0.9	1.1	0.9	0.8	**0.9**
LV	1.4	1.7	1.4	1.1	0.9	**1.3**
LT	1.2	1.5	1.3	1.1	0.9	**1.2**
LU	-0.2	0.6	0.9	0.9	0.8	**0.6**
HU	1.4	1.5	1.4	1.2	0.9	**1.3**
MT	1.2	1.1	0.9	0.9	0.8	**1.0**
NL	0.3	0.7	0.9	0.9	0.8	**0.7**
AT	0.5	0.8	0.9	0.9	0.8	**0.8**
PL	1.6	1.7	1.4	1.2	0.9	**1.4**
PT	1.2	1.0	1.3	1.1	0.9	**1.1**
RO	1.7	1.9	1.5	1.3	0.9	**1.4**
SI	1.6	1.4	1.1	1.0	0.8	**1.2**
SK	1.3	1.5	1.4	1.2	0.9	**1.2**
FI	0.5	0.9	0.9	0.9	0.8	**0.8**
SE	0.4	0.8	0.9	0.9	0.8	**0.8**
NO	0.6	0.7	0.9	0.9	0.8	**0.8**
EA	0.6	0.8	1.0	0.9	0.8	**0.9**
EU	0.7	1.0	1.1	1.0	0.9	**0.9**

Source: European Commission, EPC.

Table I.3.5: **Annual contribution of capital deepening - period average (%)**

	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	0.1	0.3	0.5	0.5	0.4	**0.4**
BG	0.9	1.1	0.8	0.7	0.5	**0.8**
CZ	0.6	0.7	0.8	0.6	0.5	**0.6**
DK	0.6	0.4	0.5	0.5	0.4	**0.5**
DE	0.3	0.4	0.5	0.5	0.4	**0.4**
EE	0.8	0.7	0.7	0.6	0.5	**0.6**
IE	0.3	0.6	0.5	0.5	0.4	**0.4**
EL	0.3	0.6	0.7	0.6	0.5	**0.5**
ES	0.2	0.4	0.6	0.6	0.5	**0.5**
FR	0.2	0.3	0.5	0.5	0.4	**0.4**
HR	0.6	0.8	0.8	0.7	0.5	**0.7**
IT	0.2	0.3	0.6	0.5	0.5	**0.4**
CY	0.8	0.8	0.6	0.5	0.5	**0.6**
LV	1.1	1.0	0.7	0.6	0.5	**0.8**
LT	1.4	1.1	0.7	0.6	0.5	**0.9**
LU	-0.1	0.3	0.5	0.5	0.4	**0.3**
HU	1.0	0.9	0.8	0.6	0.5	**0.8**
MT	0.9	0.6	0.5	0.5	0.4	**0.6**
NL	0.2	0.4	0.5	0.5	0.4	**0.4**
AT	0.3	0.4	0.5	0.5	0.4	**0.4**
PL	1.2	1.1	0.8	0.6	0.5	**0.8**
PT	0.3	0.6	0.7	0.6	0.5	**0.5**
RO	1.7	1.2	0.8	0.7	0.5	**1.0**
SI	0.6	0.6	0.6	0.5	0.5	**0.6**
SK	1.0	0.8	0.7	0.6	0.5	**0.7**
FI	0.5	0.5	0.5	0.5	0.4	**0.5**
SE	0.3	0.4	0.5	0.5	0.4	**0.4**
NO	0.3	0.3	0.5	0.5	0.4	**0.4**
EA	0.3	0.4	0.6	0.5	0.5	**0.4**
EU	0.4	0.5	0.6	0.5	0.5	**0.5**

Source: European Commission, EPC.

A summary of the relative contribution to potential GDP growth of labour productivity and labour utilisation (and their determinants) in the baseline over the entire projection horizon 2022-70 is provided by the standard growth accounting framework reported in Table I.3.6.

Table I.3.6: **Breakdown of potential GDP growth (baseline), 2022-2070**

	GDP growth 2022-2070	*labour prod. (GDP per hour worked)*	*TFP*	*capital deepening*	*labour input*	*total population*	*employment rate*	*share of working-age population (1)*	*change in average hours worked*	GDP per capita growth 2022-2070
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6
BE	**1.3**	**1.1**	0.7	0.4	**0.2**	0.2	0.1	-0.1	0.0	**1.1**
BG	**1.4**	**2.2**	1.4	0.8	**-0.7**	-0.5	0.1	-0.3	0.0	**2.0**
CZ	**1.5**	**1.7**	1.1	0.6	**-0.2**	0.0	0.0	-0.2	0.0	**1.5**
DK	**1.3**	**1.3**	0.8	0.5	**0.1**	0.1	0.1	-0.2	0.0	**1.2**
DE	**1.1**	**1.3**	0.8	0.4	**-0.1**	0.0	0.0	-0.2	0.0	**1.1**
EE	**1.6**	**1.6**	1.0	0.6	**0.0**	0.0	0.2	-0.2	0.0	**1.6**
IE	**2.1**	**1.8**	1.4	0.4	**0.3**	0.4	0.0	-0.1	0.0	**1.7**
EL	**1.1**	**1.6**	1.1	0.5	**-0.6**	-0.6	0.3	-0.3	0.0	**1.7**
ES	**1.2**	**1.3**	0.8	0.5	**-0.1**	0.0	0.1	-0.2	0.0	**1.2**
FR	**1.1**	**1.0**	0.7	0.4	**0.1**	0.1	0.2	-0.2	0.0	**1.1**
HR	**1.5**	**1.9**	1.2	0.7	**-0.4**	-0.6	0.3	-0.2	0.0	**2.0**
IT	**1.1**	**1.2**	0.8	0.4	**-0.1**	-0.2	0.3	-0.2	0.0	**1.3**
CY	**1.6**	**1.5**	0.9	0.6	**0.1**	0.2	0.1	-0.2	0.0	**1.4**
LV	**1.1**	**2.1**	1.3	0.8	**-1.0**	-0.8	0.1	-0.2	0.0	**1.9**
LT	**1.1**	**2.1**	1.2	0.9	**-1.0**	-0.7	-0.1	-0.3	0.0	**1.7**
LU	**1.8**	**0.9**	0.6	0.3	**0.8**	0.9	0.1	-0.2	0.0	**0.9**
HU	**1.7**	**2.0**	1.3	0.8	**-0.3**	-0.2	0.1	-0.2	-0.1	**1.9**
MT	**2.1**	**1.6**	1.0	0.6	**0.5**	0.9	0.0	-0.3	-0.1	**1.2**
NL	**1.3**	**1.1**	0.7	0.4	**0.2**	0.1	0.2	-0.2	0.0	**1.2**
AT	**1.3**	**1.2**	0.8	0.4	**0.0**	0.1	0.1	-0.2	0.0	**1.1**
PL	**1.5**	**2.2**	1.4	0.8	**-0.7**	-0.3	0.0	-0.3	0.0	**1.8**
PT	**1.2**	**1.7**	1.1	0.5	**-0.4**	-0.3	0.1	-0.3	0.0	**1.5**
RO	**1.7**	**2.4**	1.4	1.0	**-0.7**	-0.5	0.0	-0.2	0.0	**2.2**
SI	**1.6**	**1.7**	1.2	0.6	**-0.1**	-0.1	0.2	-0.2	0.0	**1.7**
SK	**1.4**	**2.0**	1.2	0.7	**-0.5**	-0.3	0.1	-0.3	0.0	**1.7**
FI	**1.1**	**1.3**	0.8	0.5	**-0.2**	-0.1	0.1	-0.2	0.0	**1.2**
SE	**1.6**	**1.2**	0.8	0.4	**0.4**	0.4	0.1	-0.1	0.0	**1.2**
NO	**1.5**	**1.2**	0.8	0.4	**0.3**	0.4	0.1	-0.1	0.0	**1.1**
EA	**1.2**	**1.3**	0.9	0.4	**-0.1**	0.0	0.1	-0.2	0.0	**1.2**
EU	**1.3**	**1.4**	0.9	0.5	**-0.2**	-0.1	0.1	-0.2	0.0	**1.3**

(1) Working-age population refers to people aged 15-74.
Source: European Commission, EPC.

For the EU and for the euro area, the total population and the change in total hours worked over the entire projection period are projected to remain quite stable, while an assumed increase in employment rates makes a positive contribution to potential growth (0.1 pp). However, this is more than offset by a decline in the share of the working-age population, which is a substantial negative drag on growth, with an annual average of -0.2 pps. As a result, labour input contributes negatively to annual potential output growth on average over the projection period (by 0.2 pps in the EU and by 0.1 pp in the euro area). Hence, growth in labour productivity (production per hour worked) becomes the sole source of potential output growth in both the EU and the euro area, averaging 1.4 pps and 1.3 pps, respectively. As a result, over the projection horizon, annual potential GDP growth in the EU and euro area will average 1.3% and 1.2%, respectively.

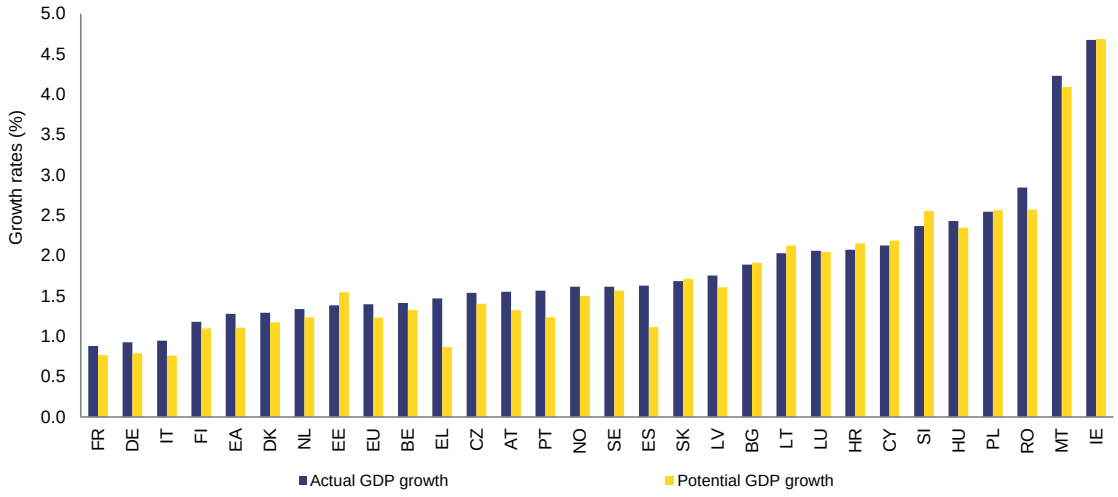
While the majority EU Member States are projected to experience a slowdown in the contribution of labour input (total hours worked) to potential growth rates due to the adverse impact of demographic developments ([27]), overall potential growth rates differ substantially across countries over the projection horizon. This is mainly explained by differences in productivity developments, especially in the first half of the projection period, reflecting different productivity growth rates at the outset of the projection and the assumed different future paths given the catching-up potential (see description in Box I.3.1).

In particular, *for countries with GDP per capita below the EU average*, growth rates are projected to be higher. Indeed, TFP growth is above 1% for those countries with GDP per capita below the EU average, which are thus assumed to have high catch-up potential. For these countries, annual TFP growth peaks during the 2040s before gradually falling to 0.8% by 2070.

([27]) However, under the baseline, average labour input growth is positive for some countries including Belgium, Denmark, Ireland, France, Cyprus, Luxembourg, Malta, the Netherlands, Sweden, and Norway (see also Table I.3.6).

By contrast, *for countries with GDP per capita above the EU average*, annual TFP growth is generally below 1%, before converging to 1% by 2040, 0.9% by 2048, and to 0.8% by 2070.

Graph I.3.1: **Average actual and potential GDP growth rates 2022-2032**



Source: European Commission, EPC.

Finally, the GDP growth projections consider the position of the economies in the business cycle, differentiating between potential and actual GDP growth. The commonly agreed rule is that the output gap is closed at the latest three years after the end of the 2023 spring forecast, i.e in 2027 for the 2024 Ageing Report. As in most member states in 2021 potential GDP was higher than actual GDP, actual GDP *growth* is projected to be higher than potential GDP *growth* until the output gap is closed in 2027 (see Graph I.3.1).

Table I.3.7: **Breakdown of potential GDP growth (higher TFP growth scenario), 2022-2070**

	GDP growth 2022-2070	labour productivity	TFP	capital deepening	labour input	GDP growth 2022-2070
	1=2+5	**2=3+4**	*3*	*4*	**5**	Baseline
BE	**1.4**	**1.2**	0.8	0.4	**0.2**	1.3
BG	**1.5**	**2.2**	1.4	0.8	**-0.7**	1.4
CZ	**1.6**	**1.8**	1.1	0.7	**-0.2**	1.5
DK	**1.5**	**1.4**	0.9	0.5	**0.1**	1.3
DE	**1.3**	**1.4**	0.9	0.5	**-0.1**	1.1
EE	**1.7**	**1.7**	1.1	0.7	**0.0**	1.6
IE	**2.2**	**1.9**	1.5	0.5	**0.3**	2.1
EL	**1.1**	**1.7**	1.1	0.6	**-0.6**	1.1
ES	**1.3**	**1.4**	0.9	0.5	**-0.1**	1.2
FR	**1.2**	**1.1**	0.7	0.4	**0.1**	1.1
HR	**1.5**	**2.0**	1.3	0.7	**-0.4**	1.5
IT	**1.2**	**1.3**	0.9	0.5	**-0.1**	1.1
CY	**1.7**	**1.6**	1.0	0.7	**0.1**	1.6
LV	**1.2**	**2.2**	1.3	0.8	**-1.0**	1.1
LT	**1.2**	**2.2**	1.3	0.9	**-1.0**	1.1
LU	**1.9**	**1.1**	0.7	0.4	**0.8**	1.8
HU	**1.8**	**2.1**	1.3	0.8	**-0.3**	1.7
MT	**2.2**	**1.7**	1.1	0.6	**0.5**	2.1
NL	**1.4**	**1.3**	0.8	0.4	**0.2**	1.3
AT	**1.4**	**1.3**	0.9	0.5	**0.0**	1.3
PL	**1.6**	**2.3**	1.4	0.9	**-0.7**	1.5
PT	**1.3**	**1.7**	1.2	0.6	**-0.4**	1.2
RO	**1.7**	**2.5**	1.5	1.0	**-0.7**	1.7
SI	**1.7**	**1.8**	1.2	0.6	**-0.1**	1.6
SK	**1.5**	**2.1**	1.3	0.8	**-0.5**	1.4
FI	**1.2**	**1.4**	0.9	0.5	**-0.2**	1.1
SE	**1.8**	**1.3**	0.9	0.5	**0.4**	1.6
NO	**1.6**	**1.3**	0.9	0.4	**0.3**	1.5
EA	**1.3**	**1.4**	0.9	0.5	**-0.1**	1.2
EU	**1.4**	**1.5**	1.0	0.5	**-0.2**	1.3

Source: European Commission, EPC.

3.2.2. Higher and lower TFP growth scenarios

Two scenarios with alternative TFP growth paths are evaluated: a higher TFP growth scenario with assumptions closer to those of the 2021 Ageing Report and a lower TFP growth scenario reflecting more conservative assumptions regarding TFP growth rates based on the visible trend decline in TFP growth over the last decades (see Box I.3.1 for more details on these two scenarios).

For the EU, GDP growth between 2022 and 2070 is projected to be on average 1.4% in the higher TFP growth scenario while it is projected at 1.1% in the lower TFP growth scenario, compared to 1.3% in the baseline (see Tables I.3.7 and I.3.8). For the euro area the projected growth rates are slightly lower at 1.3% for the higher TFP growth scenario, while being 1% in the lower TFP growth scenario compared to 1.2% in the baseline.

In the higher and lower TFP growth scenarios, average GDP growth is impacted through two

channels compared to the baseline. Firstly, the contribution of TFP growth itself on GDP growth is higher by assumption as TFP is one of the inputs of the production function (see Annex 3). Secondly, as TFP growth feeds over the long-run assumption into capital growth (see Box I.3.1 for details), the contribution of capital deepening to GDP growth also changes according to differing TFP growth.

Table I.3.8: **Breakdown of potential GDP growth (lower TFP growth scenario), 2022-2070**

	GDP growth 2022-2070	labour productivity	TFP	capital deepening	labour input	GDP growth 2022-2070
	1=2+5	**2=3+4**	*3*	*4*	**5**	Baseline
BE	**1.1**	**0.9**	0.6	0.3	**0.2**	1.3
BG	**1.2**	**1.9**	1.2	0.7	**-0.7**	1.4
CZ	**1.3**	**1.5**	0.9	0.6	**-0.2**	1.5
DK	**1.1**	**1.1**	0.7	0.4	**0.1**	1.3
DE	**0.9**	**1.1**	0.7	0.4	**-0.1**	1.1
EE	**1.4**	**1.4**	0.9	0.6	**0.0**	1.6
IE	**1.9**	**1.6**	1.2	0.4	**0.3**	2.1
EL	**0.8**	**1.4**	0.9	0.5	**-0.6**	1.1
ES	**1.0**	**1.1**	0.7	0.4	**-0.1**	1.2
FR	**0.9**	**0.8**	0.5	0.3	**0.1**	1.1
HR	**1.3**	**1.7**	1.1	0.6	**-0.4**	1.5
IT	**0.9**	**1.0**	0.7	0.4	**-0.1**	1.1
CY	**1.4**	**1.3**	0.7	0.5	**0.1**	1.6
LV	**0.9**	**1.9**	1.1	0.7	**-1.0**	1.1
LT	**0.9**	**1.8**	1.1	0.8	**-1.0**	1.1
LU	**1.5**	**0.7**	0.5	0.3	**0.8**	1.8
HU	**1.5**	**1.8**	1.1	0.7	**-0.3**	1.7
MT	**1.9**	**1.3**	0.8	0.5	**0.5**	2.1
NL	**1.1**	**0.9**	0.6	0.3	**0.2**	1.3
AT	**1.1**	**1.0**	0.7	0.4	**0.0**	1.3
PL	**1.3**	**2.0**	1.2	0.8	**-0.7**	1.5
PT	**1.0**	**1.4**	1.0	0.5	**-0.4**	1.2
RO	**1.5**	**2.2**	1.3	0.9	**-0.7**	1.7
SI	**1.4**	**1.5**	1.0	0.5	**-0.1**	1.6
SK	**1.2**	**1.8**	1.1	0.7	**-0.5**	1.4
FI	**0.9**	**1.1**	0.7	0.4	**-0.2**	1.1
SE	**1.4**	**1.0**	0.6	0.4	**0.4**	1.6
NO	**1.3**	**1.0**	0.6	0.3	**0.3**	1.5
EA	**1.0**	**1.1**	0.7	0.4	**-0.1**	1.2
EU	**1.1**	**1.2**	0.8	0.4	**-0.2**	1.3

Source: European Commission, EPC.

For the higher TFP growth scenario that means that the growth rate in labour productivity is 1.5% for the EU and 1.4% for the euro area compared with 1.4% and 1.3% for the EU and the euro area respectively in the baseline (see Table I.3.7). For the lower TFP growth scenario the values are 1.2% for the EU and 1.1% for the euro area (see Table I.3.8).

3.3. COMPARING THE 2024 AND 2021 GDP PROJECTIONS

Over the whole projection period, potential GDP growth is slightly lower in the 2024 exercise compared with the 2021 one, mainly due to the lower TFP convergence paths. There are, however, some differences for the sub-periods.

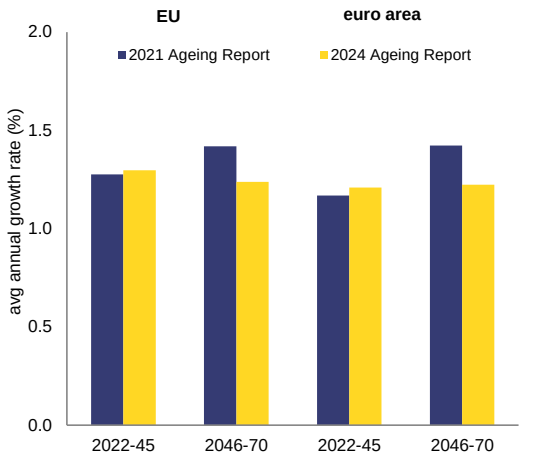
In particular, under the baseline of the 2024 Ageing Report, the annual average potential GDP growth rate over the period 2022-2070 in the EU and in the euro area is projected to be 1.3% and 1.2%, 0.1 pp lower than in the 2021 Ageing Report (Table I.3.9).

For the EU and the euro area, the annual contribution from labour productivity growth during 2022-70 is 0.2 pps lower than in the 2021 projection exercise. Labour input growth (hours worked) is projected to be 0.1 pp higher than in the 2021 Ageing Report for both the EU and the euro area.

However, there is some variation across countries in the differences between the 2024 and 2021 potential GDP growth projections under the baseline. The largest downward revisions in average annual potential GDP growth rates are for Cyprus, Denmark, and Greece (-0.3 pps) due to the contributions of both labour productivity (for Denmark) and labour input (for Cyprus and Greece) being lower than in the 2021 exercise. The largest upward revisions concern Croatia and Ireland (+0.4 pps). Ireland benefits from stronger labour productivity projections, while Croatia benefits from a higher projected labour input than in the 2021 Ageing Report. The latter is driven by higher projected participation rates in the 2024 Ageing Report for Croatia.

The differences between the 2024 and 2021 potential GDP growth projections under the baseline materialise primarily in the second part of the projections (2045-2070), particularly for the euro

Graph I.3.2: **GDP potential growth rates 2022-2070 - period average (%)**



Source: European Commission, EPC.

area (Graph I.3.2). For the EU, annual potential GDP growth over the period 2022-45 is now projected to average 1.3% (the same as in the 2021 projection). Over the period 2046-70, average GDP growth is projected in the 2024 Ageing Report at 1.2%, while it was projected in 2021 to be 1.4%. For the euro area, annual potential GDP growth over the period 2022-45 is projected in the 2024 Ageing Report to average 1.2% (close to the 2021 Ageing Report average). Over the period 2046-70, it is projected to be 1.2% (versus 1.4% in the 2021 Ageing Report).

Table I.3.9: **2024 and 2021 baseline projections compared (pps), 2022-2070**

	GDP growth in 2022-2070	**labour prod. (GDP per hour worked)**	TFP	capital deepening	**labour input**	total population	employment rate	share of working-age population	change in average hours worked	**GDP per capita growth in 2022-2070**
	1=2+5	**2=3+4**	*3*	*4*	**5=6+7+8+9**	*6*	*7*	*8*	*9*	**10=1-6**
BE	**0.1**	**-0.2**	-0.1	-0.1	**0.3**	0.1	0.1	0.0	0.0	**0.0**
BG	**0.2**	**0.0**	0.0	0.0	**0.2**	0.1	0.1	0.0	0.0	**0.1**
CZ	**-0.1**	**-0.3**	-0.2	-0.1	**0.2**	0.1	0.0	0.0	0.0	**-0.2**
DK	**-0.3**	**-0.2**	-0.2	0.0	**-0.1**	0.0	-0.1	0.0	0.0	**-0.3**
DE	**-0.1**	**-0.2**	-0.1	-0.1	**0.1**	0.1	0.0	0.0	0.0	**-0.2**
EE	**-0.2**	**-0.5**	-0.3	-0.2	**0.3**	0.2	0.0	0.0	0.1	**-0.4**
IE	**0.4**	**0.3**	0.3	0.0	**0.1**	-0.1	0.2	0.0	0.0	**0.5**
EL	**-0.3**	**0.0**	0.0	0.0	**-0.3**	-0.2	0.0	0.0	0.0	**-0.1**
ES	**-0.2**	**-0.2**	-0.2	-0.1	**0.0**	0.0	-0.1	0.0	0.0	**-0.3**
FR	**-0.2**	**-0.3**	-0.2	-0.1	**0.1**	0.0	0.0	0.0	0.0	**-0.2**
HR	**0.4**	**0.0**	0.1	0.0	**0.4**	0.0	0.3	0.0	0.0	**0.4**
IT	**0.0**	**-0.2**	-0.1	-0.1	**0.2**	0.0	0.1	0.0	0.0	**0.0**
CY	**-0.3**	**0.0**	0.0	0.0	**-0.3**	-0.2	-0.1	0.0	0.0	**-0.1**
LV	**-0.1**	**-0.2**	-0.1	-0.1	**0.1**	0.1	0.0	0.0	0.0	**-0.2**
LT	**0.0**	**-0.1**	-0.1	0.0	**0.1**	0.2	-0.1	0.0	0.0	**-0.2**
LU	**-0.1**	**-0.3**	-0.2	-0.1	**0.2**	0.4	-0.2	0.0	0.0	**-0.5**
HU	**0.0**	**0.0**	0.0	0.0	**0.0**	0.0	0.0	0.0	-0.1	**0.0**
MT	**0.0**	**-0.2**	-0.2	-0.1	**0.2**	0.3	-0.1	0.0	0.0	**-0.3**
NL	**0.0**	**-0.3**	-0.2	-0.1	**0.3**	0.1	0.2	0.0	0.0	**-0.1**
AT	**-0.1**	**-0.2**	-0.1	-0.1	**0.1**	0.1	0.1	0.0	0.0	**-0.1**
PL	**0.0**	**-0.1**	-0.1	0.0	**0.1**	0.1	0.1	0.0	0.0	**0.0**
PT	**0.1**	**-0.1**	0.0	-0.1	**0.2**	0.1	0.0	0.0	0.0	**0.0**
RO	**0.1**	**-0.1**	-0.1	0.0	**0.2**	0.2	0.0	0.0	0.0	**-0.1**
SI	**0.0**	**-0.2**	-0.1	-0.1	**0.2**	0.1	0.1	0.0	0.0	**-0.1**
SK	**0.1**	**-0.1**	-0.1	-0.1	**0.2**	0.1	0.2	0.0	0.0	**0.1**
FI	**-0.1**	**-0.2**	-0.1	-0.1	**0.1**	0.1	0.0	0.0	0.0	**-0.2**
SE	**-0.2**	**-0.2**	-0.1	0.0	**0.0**	0.0	0.0	0.0	0.0	**-0.2**
NO	**-0.2**	**-0.3**	-0.2	-0.1	**0.1**	-0.1	0.1	0.0	0.0	**-0.1**
EA	**-0.1**	**-0.2**	-0.1	-0.1	**0.1**	0.0	0.0	0.0	0.0	**-0.1**
EU	**-0.1**	**-0.2**	-0.1	-0.1	**0.1**	0.0	0.0	0.0	0.0	**-0.1**

(1) Working age populations refers to the total population aged 15-74.
Source: European Commission, EPC.

Box I.3.1: Assumptions on the components of the production function used for long-run potential growth projections

In 2022-2032 potential growth estimates are based on the T+10 methodology described in Annex 3. The long-run projection is based on a similar production function, with a number of convergence rules for labour productivity growth. Using common methodologies for all Member States allows for cross-country comparability.

1. KEY ASSUMPTIONS ON TOTAL FACTOR PRODUCTIVITY (TFP)

Concerning total factor productivity growth, the AWG and EPC decided to lower the long-run TFP growth rate in comparison to the 2021 Ageing Report, namely from 1% to 0.8%. This decision was taken considering the trend decline in TFP growth over the last decades, especially in recent times. ([1]) As done in the previous projection exercise, countries with below average GDP per capita in 2032 are assumed to have higher TFP growth, thus acknowledging the catching-up potential. To avoid undue changes in relative GDP per capita terms, the catching up potential is evaluated in 2040. The labour share is assumed to stay constant at 0.65 over the projection period (see Annex 3 for details). In the long term, labour productivity broadly coincides with TFP growth divided by the labour share, i.e. 1.2%. Scenarios consider higher and lower TFP growth rate targets.

Table 1: **GDP per capita (2032)**

	GDP per capita (% of EU27)
IE	355.1
LU	298.5
DK	171.0
SE	160.2
NL	140.3
FI	137.3
AT	136.9
BE	127.1
DE	122.1
EA	*107.9*
FR	107.7
EU27	**100.0**
MT	98.0
IT	93.3
CY	88.2
SI	84.3
ES	79.0
PT	66.2
EE	65.8
EL	63.1
LT	62.9
CZ	61.3
SK	59.3
LV	58.8
PL	56.5
HU	54.8
HR	53.8
RO	44.6
BG	30.0

Source: European Commission, EPC.

Baseline

The baseline assumption for TFP is that country-specific growth rates converge to 0.8%. The speed and the year of convergence to the common growth rate are determined by Member States' income position relative to the EU average (see Table 1). Hence, the lower the GDP per capita, the higher the real catching-up potential.

The specific assumptions agreed for the baseline by the AWG and EPC are as follows (see Table 2):

- The 'leader group' includes countries that have a GDP per capita above the EU average in 2032. For these countries, TFP growth is assumed to converge from the estimated value in 2032 to a 1% growth rate by 2040, and to 0.9% in 2048.
- The 'follower group' comprises the countries with GDP per capita below the EU average in 2032. A differentiation is made depending on the distance to the average, with 1.5% as an upper limit and 1% as a lower limit in 2040 and 1.5% and 0.9% in 2048.
- For both groups TFP growth converges from the 2048 value to 0.8% in 2070 by linear interpolation.

Higher and lower TFP growth scenarios

In the higher TFP growth scenario, the 'leader' group is projected to converge to a TFP growth of 1% by 2040 from their 2032 values and to stay at this value until 2070. For the 'follower' group there is again a

([1]) See European Commission (2023), 'Prospects for long-term productivity growth' in Quarterly Report on the Euro Area, European Economy, Institutional Paper No 201.

(Continued on the next page)

Box (continued)

differentiation made depending on their distance to the EU average with 1.5% and 1% as upper and lower limits until 2048, with TFP growth converging to 1% in 2070.

In the lower TFP growth scenario, the 'leader' group of countries is projected to converge to a TFP growth of 0.8% by 2040 from their 2032 values, to 0.7% in 2048, and to 0.6% in 2070. For the 'follower' group there is again a differentiation made depending on their distance to the EU average with upper and lower limits of 1.3% and 0.8% until 2040, 1.3% and 0.7% until 2048, with TFP growth converging to 0.7% in 2070.

In the long term, labour productivity broadly coincides with TFP growth divided by the labour share, namely 1.5% for the higher TFP growth scenario and 0.9% for the lower TFP growth scenario.

Table 2: **TFP growth: baseline assumptions on the speed of convergence**

2033-2040	
GDP/cap > EU27 (2032) BE, DK, DE, IE, FR, LU, NL, AT, FI, SE, NO	*GDP/cap < EU27 (2032)* BG, CZ, EE, EL, ES, HR, IT, CY, LV, LT, HU, MT, PL, PT, RO, SI, SK
From value in 2032 to 1%, by linear interpolation	From value in 2032 to $\frac{1.5\% \times \left(1 - \frac{GDPcap_{i,2032}}{GDPcap_{EU,2032}}\right) + 1\% \times \left(\frac{GDPcap_{i,2032}}{GDPcap_{EU,2032}} - 0.5\right)}{0.5}$ with a maximum of 1.5%, by linear interpolation

2041-2048	
GDP/cap > EU27 (2040) BE, DK, DE, IE, FR, LU, MT, NL, AT, FI, SE, NO	*GDP/cap < EU27 (2040)* BG, CZ, EE, EL, ES, HR, IT, CY, LV, LT, HU, PL, PT, RO, SI, SK
From value in 2040 to 0.9%, by linear interpolation	From value in 2040 to $\frac{1.5\% \times \left(1 - \frac{GDPcap_{i,2040}}{GDPcap_{EU,2040}}\right) + 0.9\% \times \left(\frac{GDPcap_{i,2040}}{GDPcap_{EU,2040}} - 0.5\right)}{0.5}$ with a maximum of 1.5%, by linear interpolation

2049-2070
All Member States
From value in 2048 to 0.8%, by linear interpolation

Source: European Commission, EPC.

2. KEY ASSUMPTIONS ON CAPITAL FORMATION

With regard to capital deepening, the assumption is unchanged from previous updates, namely a constant capital-to-labour ratio in efficiency units in the long term. It is assumed therefore that in the long run, the capital stock adjusts to the steady state path according to the 'capital rule': the growth rate of capital is equal to the sum of labour and labour-augmenting technical progress. This fulfils the steady state property, as the ratio of capital to labour expressed in efficiency unit remains constant over time. Consequently, labour productivity growth coincides with that of labour-augmenting technical progress. As done in the 2021 Ageing report a transition between the investment rule and the capital rule is applied to smooth the investment profile:

- First, the transition to the constant capital/labour (in efficiency units) ratio is introduced gradually in the period 2032-2042 in a linear manner *('transition rule'*).
- Second, the capital/labour (in efficiency units) ratio is constant as of 2042 *('capital rule')*.

The transition rule was introduced in the 2021 Ageing Report to avoid too pessimistic productivity projections for many of the catching-up countries, which have comparatively higher investment rates, while making little difference for countries that are already close to their long-run TFP growth rate.

4. INFLATION AND INTEREST RATE ASSUMPTIONS

This chapter describes the interest rates and inflation assumptions used in the 2024 Ageing Report. Interest rate assumptions, described in Section 4.1, are particularly relevant for the purpose of projecting pension fund assets. Section 4.2 presents the baseline inflation assumptions. A higher alternative inflation scenario is also included in the 2024 Ageing Report (see Chapter 5).

4.1. INTEREST RATE ASSUMPTIONS AND USE FOR PENSION FUND PROJECTIONS

4.1.1. Interest rate assumptions

Since the 2021 Ageing Report, interest rate assumptions are set in line with financial markets' country-specific expectations for the medium term, while using common convergence values for the long term. Long-term market interest rates are assumed to converge linearly from the country-specific forecast values (T+2) to country-specific market-based forward nominal rates by T+10. ([28]) Beyond T+10, they are assumed to converge to a common value of 2% in real terms by T+30, corresponding to 4% in nominal terms for most EU Member States. ([29]) This value is set to stay constant thereafter (see Table I.4.1).

Such interest rate assumptions have a double rationale. On the one hand, the linear convergence principle allows accounting for country-specific situations in the short run, while still maintaining the assumption of a common real interest rate in the long run. On the other hand, market-based methods represent an evidence-based, simple, tried-and-tested approach to project nominal interest rates. They notably allow capturing evolving macroeconomic conditions, that have changed substantially over the past few decades, as acknowledged in a vast amount of literature.

Overall, under these assumptions, the interest-growth rate differential (r-g) in the EU/EA would converge from current negative values to a positive gap of about 1 pp in 2070 (see Graph I.4.1). ([30])

Table I.4.1: **Long-term interest rate projections: baseline based on Commission 2023 spring forecast**

	T+2 2024	T+10 2032	T+30 2052
BE	3.5	3.8	4.0
BG	2.6	2.5	4.0
CZ	3.0	4.7	4.0
DK	-0.2	2.7	4.0
DE	2.0	2.6	4.0
EE	6.4	3.3	4.0
IE	1.8	3.7	4.0
EL	2.5	4.5	4.0
ES	1.9	4.5	4.0
FR	1.6	3.7	4.0
HR	2.4	4.7	4.0
IT	3.9	4.6	4.0
CY	2.5	4.7	4.0
LV	7.1	3.6	4.0
LT	3.7	2.9	4.0
LU	2.2	3.3	4.0
HU	8.6	7.0	5.0
MT	5.3	4.4	4.0
NL	1.8	2.8	4.0
AT	3.2	3.2	4.0
PL	3.8	6.4	4.5
PT	10.7	4.1	4.0
RO	2.8	9.1	4.5
SI	2.9	4.2	4.0
SK	3.0	4.1	4.0
FI	7.8	3.2	4.0
SE	2.3	2.4	4.0
EA	2.6	3.5	4.0

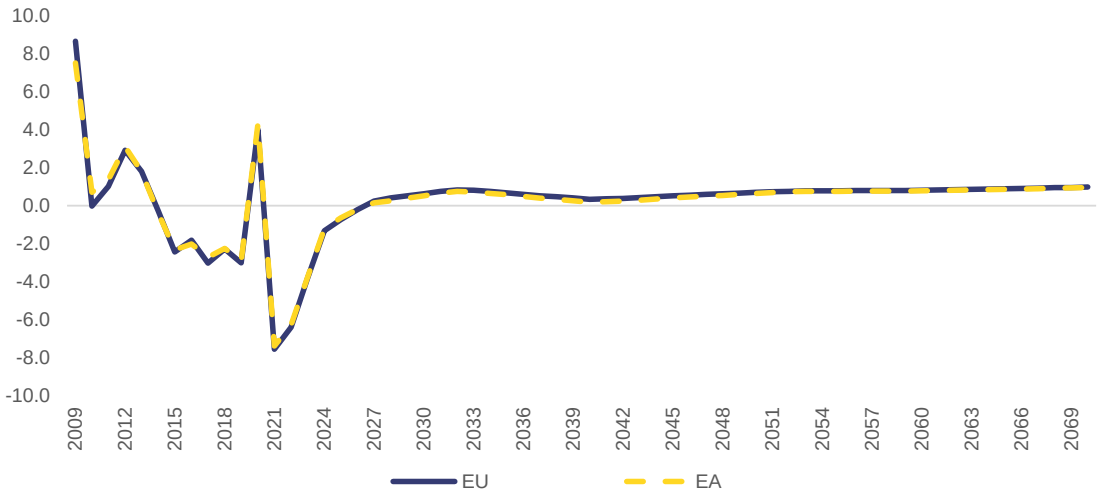
Source: European Commission, EPC.

([28]) Short-term interest rates are assumed to converge linearly from country-specific forecast values (T+2) to country-specific market-based forward nominal rates by T+10. This approach is similar to that used in the Commission forecast. For more details, see Chapter 3 and Box 3.1 in the Debt Sustainability Monitor 2019 (European Commission, 2020).

([29]) 4.5% nominal for Poland and Romania, and 5% nominal for Hungary, given these countries' central banks have higher inflation targets.

([30]) See for example Abbas et al. (2020) and Blanchard (2019).

Graph I.4.1: **(r-g) based on long-term market interest rates - EU and euro area (%)**



(r-g) series are based on historical and projected long-term nominal market interest rates and the growth rate of nominal GDP in national currency, between 2001 and 2070.
Source: European Commission, EPC.

4.1.2. Pension fund projections

Assumptions regarding the development of long-term interest rates over the projection period influence the projections of pension funds' asset position and the related flows (e.g. property income or rate of return). In the 2024 Ageing Report, the reporting on pension fund assets and returns has become mandatory, when public funds exist and are sizeable. ([31])

Considering the rising importance of pre-funded or partially funded public pension schemes across Member States and the central role they already fulfil in a number of them, it is important to ensure consistent and comparable projections (i.e. based on common assumptions) of the asset position of these schemes and the related flows. These projections are central for the assessment of public pension schemes and their sustainability, especially for Member States where these funds play a significant role. ([32])

The pension funds' rate of return assumption for the 2024 Ageing Report is unchanged compared with previous reports. They are determined by the long-term interest rate assumptions as described in Section 4.1.1. Returns generated by the (public) pension assets are generally reinvested in the funds and need to be considered in the projections.

Table I.4.2: **Selected macroeconomic assumptions for the 2024 Ageing Report**

Long-term market interest rate	Inflation target	Potential GDP growth
Linear convergence to: - country-specific forward market rates in T+10 (2032) - 2% real by T+30 (2052); 4% nominal in all MS except PL, RO (4.5%) and HU (5%) - maintained for the remainder of the projection period	2% for all MS as of 2027, except PL, RO (2.5%) and HU (3%)	1.1% (EU average real GDP growth in 2070)[(1)]

(1) Growth rates are country-specific. See Chapter 3.
Source: European Commission, EPC.

([31]) The reporting for private pension funds remains voluntary.
([32]) This is the case for Finland, Luxembourg and Sweden.

4.2. INFLATION ASSUMPTIONS

The inflation assumptions for the 2024 Ageing Report are unchanged from previous updates. After the end of the Commission 2023 spring forecast in T+2 (2024), inflation is assumed to converge linearly to the inflation targets of the central banks by T+5 (2027). This target is 2% for euro area countries, Bulgaria, Czechia, Denmark and Sweden, 2.5% for Poland and Romania, and 3% for Hungary.

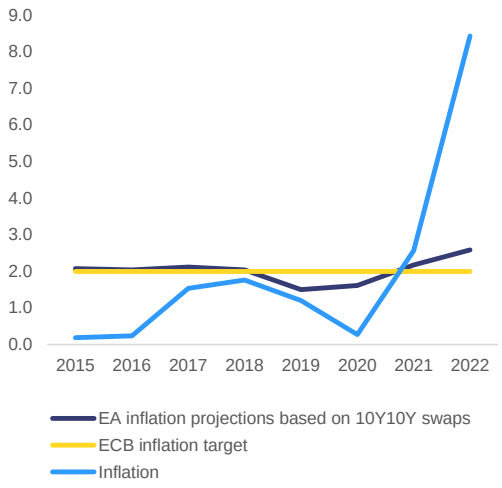
Despite a severe adverse supply shock, inflation expectations have only slightly increased above the ECB's monetary policy target of 2% in 2023. Moreover, some studies show that, when adjusted for the risk premium, inflation expectations remain overall well-anchored to the ECB's 2% target, as also shown by survey-based measures. ([33])

Table I.4.3: **Inflation projections: baseline based on Commission 2023 spring forecast**

	T+2 2024	T+5 2027
BE	3.5	2.0
BG	4.2	2.0
CZ	3.4	2.0
DK	2.5	2.0
DE	2.7	2.0
EE	2.8	2.0
IE	2.6	2.0
EL	2.4	2.0
ES	2.7	2.0
FR	2.5	2.0
HR	2.2	2.0
IT	2.9	2.0
CY	2.5	2.0
LV	1.7	2.0
LT	2.2	2.0
LU	2.6	2.0
HU	4.0	3.0
MT	2.8	2.0
NL	3.3	2.0
AT	3.8	2.0
PL	6.0	2.5
PT	2.7	2.0
RO	4.6	2.5
SI	3.8	2.0
SK	5.7	2.0
FI	2.1	2.0
SE	1.9	2.0
EA	2.8	2.0

Source: European Commission, EPC.

Graph I.4.2: **Evolution of market-based inflation projections (past inflation expectations) vs outturn CPI inflation and ECB target, euro area**



The graph shows (i) (dark blue line) inflation projections given by market-based inflation expectations 10 years before (i.e. projections based on the average inflation markets expected at that point over the window between 10 and 20 years ahead); (ii) (light blue line) outturn CPI inflation and (iii) (yellow line) the ECB's inflation target.
Source: Bloomberg, Ameco spring 2023 and European Commission calculations.

([33]) See ECB (2023). At the same time, for some countries where inflation is currently well above the ECB target and given some structural trends (e.g. population ageing, climate change, deglobalisation), a convergence to the target in three years' time may be relatively fast. The 2024 Ageing Report includes a (higher) inflation scenario to cater for uncertainties related to (long-term) inflationary pressures and for cross-country differences (see Chapter 5).

5. SENSITIVITY TESTS AND ALTERNATIVE SCENARIOS

5.1. INTRODUCTION

The baseline projections attempt to measure how population ageing influences economic and budgetary developments in the long term. However, given the inherent uncertainty surrounding long-run projections, it is essential to conduct sensitivity tests to evaluate the responsiveness of the projections to changes in the macroeconomic and demographic assumptions.

The sensitivity tests introduce a change to a specific variable. For each test, a uniform shock is applied to all Member States. The assessment of the impact of population ageing on the different expenditure items should be made with reference to all projections, meaning baseline plus sensitivity tests. This way the key factors driving the projection results and potential risks to the baseline can be identified. The sensitivity tests include both unfavourable and favourable changes in the underlying assumptions.

In addition, specific policy scenarios are considered for each expenditure item to reflect the impact of potential future policy changes. These scenarios reflect the impact of deviating from the constant policy assumption applied in the baseline. Rather than attaching probabilities that the assumed policy is effectively implemented, the policy scenarios provide a 'what-if' view to enrich the analysis. The next section provides the policy scenarios for the pension projections. The specific scenarios conducted for health care, long-term care and education are presented in the respective chapters in Part II.

5.2. PROJECTIONS UNDER DIFFERENT SENSITIVITY TESTS AND ALTERNATIVE POLICY SCENARIOS

The macroeconomic projections for the different sensitivity tests are provided in Tables I.5.2 to I.5.11. The assumptions are described in the following section and summarised in Table I.5.1.

Table I.5.1: **Overview of the common sensitivity tests and policy scenarios for pensions**

Demography			Inflation	Labour force	Productivity	Pension policy scenarios		
Higher life expectancy	**Lower/higher migration**	**Lower fertility**	**Higher inflation**	**Higher employment rate older workers**	**Lower/higher TFP growth**	**Link retirement age to life expectancy**	**Constant retirement age**	**Constant benefit ratio**
Additional gain in life expectancy at birth of two years by 2070.	*33% less/more non-EU immigration over the entire projection period.*	*20% lower fertility rate over the entire projection period.*	*Converge to 2% by T+30 (T+5 in baseline).*	*Employment rate of older workers (55-74y) 10 pps higher than assumed in the baseline projection.*	*TFP growth converges to 0.6%/1.0% (instead of 0.8%).*	*Effective retirement age shifts in line with 3/4 th of the expected change in life expectancy.*	*The early and statutory retirement ages, as well as career require-ments, are frozen at the situation in 2023.*	*When the benefit ratio declines by 10% relative to the base year, measures are taken to stabilise the benefit ratio from that point onwards.*

Source: European Commission, EPC.

Following the procedure for the baseline assumptions, a bottom-up approach is followed: from population through labour input to GDP growth projections. Each sensitivity test therefore involves recalculating all assumptions and rerunning the labour force model and the production function.

The selection of sensitivity tests draws on the previous cycles. In general, the standard tests applied in the 2021 Ageing Report were appropriate for conducting a broad sensitivity analysis of the baseline expenditure dynamics. Changes are therefore limited. They concern the design of the migration scenarios, the introduction of a higher inflation scenario, and changes in the name of some of the tests and scenarios.

Sensitivity tests ([34])

The following sensitivity tests are conducted for all Member States:

- ***Higher life expectancy:*** the age-specific mortality rates are reduced linearly to achieve an additional increase in life expectancy at birth of two years by 2070 compared to the baseline.

- ***Lower/higher migration:*** immigration is, respectively, 33% lower and 33% higher than the baseline over the entire projection period. Whereas in previous rounds the shocks were applied to overall net migration, for the 2024 update the shocks are applied to the non-EU immigration flows. Since some countries have negative net migration in the baseline because of intra-EU emigration, the modified approach increases comparability of the scenario across countries.

- ***Lower fertility:*** the fertility rate is 20% lower than the baseline during the entire projection period.

- ***Higher inflation***: inflation rates converge more slowly to central banks' targets, given the high increases in consumer prices of recent years. While in the baseline these targets are reached by 2027 for all Member States (see Chapter 4), the sensitivity test assumes inflation to converge linearly from current country-specific values to market-based inflation rates by 2032. Thereafter, inflation rates would converge by 2052 to the central bank targets: 2% for euro area countries, Bulgaria, Czechia, Denmark and Sweden, 2.5% for Poland and Romania, and 3% for Hungary.

- ***Higher employment rate of older workers:*** through a reduction in the inactive population, the employment rate of older workers (55 to 74) is increased by 10 pps over the period 2024-2036 and remain at this higher level for the remainder of the projection period.

- ***Lower/higher productivity growth***: total factor productivity growth (TFP) converges to a steady-state growth rate of 0.6%/1.0%, compared to a baseline assumption of 0.8%. The convergence speed follows the same principles and time points as under the baseline, with a period of fast convergence for 'followers' (see Box I.3.1 in Chapter 3). The lower TFP test was called 'TFP risk' in the 2021 Ageing Report.

Policy scenarios

In addition to the above sensitivity tests, three policy scenarios are formulated for the pension projections:

- ***Linking retirement age to life expectancy***: This scenario considers the adoption of a mechanism to automatically update the statutory and early retirement ages in line with gains in life expectancy at the age of 65 according to the EUROPOP2023 projections. As a result, effective retirement ages rise gradually. To this end, the labour market exit ages as estimated by the Cohort Simulation Model are adjusted. To account for the fact that people might have a higher risk of becoming (partially) disabled at higher ages or would use alternative pathways to leave the labour force and retire, the applied increase in retirement ages equals ¾th of the increase in life expectancy. For those countries where a *full* link between the retirement age and the increase in life expectancy is already legislated — and thus included in the baseline — this scenario is not run and the macroeconomic assumptions coincide with the baseline. This is the case for Denmark, Estonia, Greece, Italy, Cyprus, Slovakia, and Finland.

([34]) The four demographic sensitivity tests are based on demographic projections prepared by Eurostat around the baseline demographic projections (EUROPOP2023) discussed in Chapter 1.

– ***Constant retirement age***: this scenario assumes that the main eligibility requirements (early and statutory retirement age, career requirements) are unchanged over the projection period from current conditions. It allows to isolate the expected impact of already legislated but not yet applicable reforms, e.g. links to life expectancy. In this sense, the scenario also measures the budgetary impact of reversing already planned reforms once their implementation date approaches.

– ***Constant benefit ratio***: this scenario assumes policy measures are taken once the earnings-related public pension benefit ratio decreases by more than 10% relative to the base year according to the baseline projection. In this scenario the benefit ratio is kept constant at this 10% lower point for the remainder of the projection period. For countries that report private schemes, the change in the total benefit ratio provides the benchmark, though the adjustment to keep the latter at 90% of the base year level is done through the public benefit ratio. This scenario was called 'offset declining pension benefit ratio' in the 2021 Ageing Report. ([35])

Table I.5.2: **Sensitivity test: higher life expectancy**

	Average real GDP growth in 2022-2070										
		Labour productivity (GDP per hour worked)			Labour input					Real GDP per capita growth in 2022-2070	
			TFP	*capital deepening*		*total population*	*employment rate*	*share of working-age population*	*change in average hours worked*		
	1=2+5	2=3+4	*3*	*4*	5=6+7+8+9	*6*	*7*	*8*	*9*	10=1-6	
BE	1.3	1.1	0.7	0.4	0.2	0.2	0.1	-0.2	0.0	1.1	BE
BG	1.4	2.2	1.4	0.8	-0.7	-0.5	0.1	-0.3	0.0	1.9	BG
CZ	1.5	1.7	1.1	0.6	-0.2	0.0	0.0	-0.2	0.0	1.5	CZ
DK	1.4	1.3	0.8	0.5	0.1	0.1	0.2	-0.2	0.0	1.2	DK
DE	1.1	1.3	0.8	0.4	-0.1	0.1	0.0	-0.2	0.0	1.1	DE
EE	1.6	1.6	1.0	0.6	0.0	0.0	0.2	-0.2	0.0	1.6	EE
IE	2.1	1.8	1.4	0.4	0.3	0.4	0.0	-0.2	0.0	1.7	IE
EL	1.1	1.6	1.1	0.5	-0.5	-0.6	0.4	-0.3	0.0	1.7	EL
ES	1.2	1.3	0.8	0.5	-0.1	0.1	0.1	-0.3	0.0	1.2	ES
FR	1.1	1.0	0.7	0.4	0.1	0.1	0.2	-0.2	0.0	1.0	FR
HR	1.5	1.9	1.2	0.7	-0.4	-0.5	0.3	-0.2	0.0	2.0	HR
IT	1.2	1.2	0.8	0.4	0.0	-0.2	0.4	-0.2	0.0	1.4	IT
CY	1.7	1.5	0.9	0.6	0.2	0.2	0.1	-0.3	0.0	1.4	CY
LV	1.1	2.1	1.3	0.8	-1.0	-0.8	0.0	-0.3	0.0	1.9	LV
LT	1.1	2.1	1.2	0.9	-1.0	-0.6	-0.1	-0.3	0.0	1.7	LT
LU	1.7	0.9	0.6	0.3	0.8	0.9	0.1	-0.2	0.0	0.9	LU
HU	1.7	2.0	1.3	0.8	-0.3	-0.1	0.1	-0.3	-0.1	1.8	HU
MT	2.1	1.6	1.0	0.6	0.5	0.9	0.0	-0.3	-0.1	1.2	MT
NL	1.3	1.1	0.7	0.4	0.2	0.2	0.2	-0.2	0.0	1.2	NL
AT	1.3	1.2	0.8	0.4	0.0	0.2	0.1	-0.2	0.0	1.1	AT
PL	1.5	2.2	1.4	0.8	-0.7	-0.3	0.0	-0.4	0.0	1.8	PL
PT	1.3	1.6	1.1	0.5	-0.4	-0.2	0.1	-0.3	0.0	1.5	PT
RO	1.7	2.4	1.4	1.0	-0.7	-0.5	0.0	-0.3	0.0	2.1	RO
SI	1.6	1.7	1.2	0.6	-0.1	-0.1	0.2	-0.3	0.0	1.7	SI
SK	1.5	2.0	1.2	0.7	-0.5	-0.2	0.1	-0.4	0.0	1.7	SK
FI	1.2	1.3	0.8	0.5	-0.1	-0.1	0.2	-0.2	0.0	1.2	FI
SE	1.7	1.2	0.8	0.4	0.5	0.5	0.1	-0.1	0.0	1.2	SE
NO	1.5	1.2	0.8	0.4	0.3	0.4	0.1	-0.2	0.0	1.1	NO
EA	1.2	1.3	0.9	0.4	-0.1	0.0	0.2	-0.2	0.0	1.2	EA
EU	1.3	1.4	0.9	0.5	-0.1	0.0	0.1	-0.2	0.0	1.3	EU

Source: European Commission, EPC.

([35]) Since this scenario is activated in function of the baseline projections, no separate macroeconomic assumptions are prepared.

Table I.5.3: **Sensitivity test: lower migration**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
	Labour productivity (GDP per hour worked)				Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.2	1.1	0.7	0.4	0.0	0.0	0.1	-0.2	0.0	1.1	BE
BG	1.3	2.2	1.4	0.8	-0.9	-0.7	0.1	-0.3	0.0	2.0	BG
CZ	1.4	1.7	1.1	0.6	-0.3	-0.1	0.0	-0.2	0.0	1.5	CZ
DK	1.2	1.3	0.8	0.5	-0.1	-0.1	0.1	-0.2	0.0	1.2	DK
DE	1.0	1.3	0.8	0.5	-0.3	-0.1	0.0	-0.2	0.0	1.1	DE
EE	1.5	1.7	1.0	0.7	-0.2	-0.2	0.2	-0.2	0.0	1.6	EE
IE	1.9	1.9	1.4	0.5	0.0	0.2	0.0	-0.1	0.0	1.7	IE
EL	0.8	1.6	1.1	0.6	-0.8	-0.8	0.3	-0.3	0.0	1.6	EL
ES	0.9	1.3	0.8	0.5	-0.4	-0.3	0.1	-0.3	0.0	1.2	ES
FR	1.0	1.0	0.7	0.4	-0.1	-0.1	0.2	-0.2	0.0	1.0	FR
HR	1.3	1.9	1.2	0.7	-0.6	-0.7	0.3	-0.2	0.0	2.0	HR
IT	0.9	1.2	0.8	0.4	-0.3	-0.4	0.3	-0.2	0.0	1.3	IT
CY	1.3	1.5	0.9	0.7	-0.2	-0.1	0.1	-0.3	0.0	1.4	CY
LV	0.9	2.1	1.3	0.8	-1.2	-1.0	0.1	-0.3	0.0	1.9	LV
LT	0.9	2.1	1.2	0.9	-1.2	-0.9	-0.1	-0.3	0.0	1.7	LT
LU	1.7	1.0	0.6	0.3	0.8	0.8	0.1	-0.2	0.0	0.9	LU
HU	1.6	2.1	1.3	0.8	-0.5	-0.3	0.1	-0.3	-0.1	1.9	HU
MT	1.8	1.6	1.0	0.7	0.2	0.6	0.0	-0.3	-0.1	1.2	MT
NL	1.2	1.2	0.7	0.4	0.0	0.0	0.2	-0.2	0.0	1.2	NL
AT	1.1	1.2	0.8	0.5	-0.1	0.0	0.1	-0.2	0.0	1.1	AT
PL	1.4	2.2	1.4	0.8	-0.8	-0.4	0.0	-0.3	0.0	1.8	PL
PT	1.1	1.7	1.1	0.5	-0.6	-0.4	0.1	-0.3	0.0	1.5	PT
RO	1.6	2.4	1.4	1.0	-0.9	-0.6	0.0	-0.3	0.0	2.2	RO
SI	1.3	1.8	1.2	0.6	-0.4	-0.4	0.2	-0.3	0.0	1.7	SI
SK	1.4	2.0	1.2	0.7	-0.6	-0.3	0.1	-0.3	0.0	1.7	SK
FI	1.0	1.3	0.8	0.5	-0.3	-0.2	0.1	-0.2	0.0	1.2	FI
SE	1.4	1.2	0.8	0.5	0.2	0.2	0.1	-0.1	0.0	1.2	SE
NO	1.4	1.2	0.8	0.4	0.2	0.2	0.1	-0.2	0.0	1.1	NO
EA	1.0	1.3	0.9	0.5	-0.3	-0.2	0.1	-0.2	0.0	1.2	EA
EU	1.1	1.4	0.9	0.5	-0.4	-0.2	0.1	-0.2	0.0	1.3	EU

Source: European Commission, EPC.

Table I.5.4: **Sensitivity test: higher migration**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
	Labour productivity (GDP per hour worked)				Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.5	1.1	0.7	0.4	0.4	0.3	0.1	-0.1	0.0	1.1	BE
BG	1.5	2.1	1.4	0.8	-0.6	-0.4	0.1	-0.3	0.0	2.0	BG
CZ	1.7	1.7	1.1	0.6	0.0	0.1	0.0	-0.2	0.0	1.5	CZ
DK	1.5	1.3	0.8	0.5	0.3	0.3	0.1	-0.1	0.0	1.2	DK
DE	1.3	1.2	0.8	0.4	0.1	0.2	0.0	-0.1	0.0	1.1	DE
EE	1.7	1.6	1.0	0.6	0.1	0.1	0.2	-0.2	0.0	1.6	EE
IE	2.3	1.8	1.4	0.4	0.5	0.6	0.0	-0.1	0.0	1.7	IE
EL	1.2	1.6	1.1	0.5	-0.3	-0.5	0.3	-0.2	0.0	1.7	EL
ES	1.5	1.3	0.8	0.4	0.2	0.3	0.1	-0.2	0.0	1.2	ES
FR	1.2	1.0	0.7	0.4	0.2	0.2	0.2	-0.1	0.0	1.1	FR
HR	1.6	1.9	1.2	0.7	-0.2	-0.4	0.3	-0.2	0.0	2.0	HR
IT	1.3	1.2	0.8	0.4	0.1	0.0	0.3	-0.2	0.0	1.4	IT
CY	1.9	1.5	0.9	0.6	0.4	0.5	0.1	-0.2	0.0	1.4	CY
LV	1.2	2.1	1.3	0.8	-0.9	-0.7	0.1	-0.2	0.0	1.9	LV
LT	1.3	2.0	1.2	0.8	-0.8	-0.5	-0.1	-0.2	0.0	1.8	LT
LU	1.8	0.9	0.6	0.3	0.8	0.9	0.1	-0.2	0.0	0.9	LU
HU	1.9	2.0	1.3	0.8	-0.2	0.0	0.1	-0.2	-0.1	1.9	HU
MT	2.4	1.5	1.0	0.5	0.9	1.2	0.0	-0.2	-0.1	1.2	MT
NL	1.4	1.1	0.7	0.4	0.3	0.3	0.2	-0.2	0.0	1.2	NL
AT	1.4	1.2	0.8	0.4	0.2	0.3	0.2	-0.2	0.0	1.1	AT
PL	1.6	2.2	1.4	0.8	-0.6	-0.2	0.0	-0.3	0.0	1.8	PL
PT	1.4	1.6	1.1	0.5	-0.3	-0.2	0.1	-0.2	0.0	1.5	PT
RO	1.8	2.4	1.4	0.9	-0.6	-0.4	0.0	-0.2	0.0	2.2	RO
SI	1.8	1.7	1.2	0.5	0.1	0.1	0.2	-0.2	0.0	1.7	SI
SK	1.5	2.0	1.2	0.7	-0.5	-0.2	0.1	-0.3	0.0	1.7	SK
FI	1.2	1.3	0.8	0.5	-0.1	0.0	0.2	-0.2	0.0	1.2	FI
SE	1.8	1.2	0.8	0.4	0.6	0.6	0.1	-0.1	0.0	1.2	SE
NO	1.7	1.2	0.8	0.4	0.5	0.5	0.1	-0.1	0.0	1.1	NO
EA	1.4	1.3	0.8	0.4	0.1	0.1	0.2	-0.2	0.0	1.3	EA
EU	1.4	1.4	0.9	0.5	0.0	0.1	0.1	-0.2	0.0	1.3	EU

Source: European Commission, EPC.

Table I.5.5: **Sensitivity test: lower fertility**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
		Labour productivity (GDP per hour worked)			Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.2	1.1	0.7	0.4	0.0	0.0	0.1	-0.1	0.0	1.2	BE
BG	1.2	2.2	1.4	0.8	-0.9	-0.7	0.1	-0.2	0.0	2.0	BG
CZ	1.3	1.7	1.1	0.6	-0.3	-0.2	0.0	-0.2	0.0	1.6	CZ
DK	1.2	1.3	0.8	0.5	-0.1	-0.1	0.1	-0.1	0.0	1.3	DK
DE	1.0	1.3	0.8	0.4	-0.3	-0.2	0.0	-0.1	0.0	1.1	DE
EE	1.4	1.6	1.0	0.6	-0.2	-0.2	0.2	-0.2	0.0	1.7	EE
IE	1.9	1.8	1.4	0.4	0.1	0.2	0.0	-0.1	0.0	1.7	IE
EL	0.9	1.6	1.1	0.5	-0.7	-0.8	0.3	-0.2	0.0	1.7	EL
ES	1.1	1.3	0.8	0.5	-0.2	-0.1	0.1	-0.2	0.0	1.2	ES
FR	0.9	1.0	0.7	0.4	-0.1	-0.2	0.2	-0.1	0.0	1.1	FR
HR	1.3	1.9	1.2	0.7	-0.6	-0.7	0.3	-0.2	0.0	2.0	HR
IT	1.0	1.2	0.8	0.4	-0.2	-0.4	0.3	-0.2	0.0	1.4	IT
CY	1.5	1.5	0.9	0.6	0.0	0.1	0.1	-0.2	0.0	1.4	CY
LV	0.9	2.1	1.3	0.8	-1.2	-1.0	0.0	-0.2	0.0	1.9	LV
LT	0.9	2.1	1.2	0.9	-1.1	-0.8	-0.1	-0.2	0.0	1.8	LT
LU	1.6	0.9	0.6	0.3	0.7	0.7	0.1	-0.2	0.0	0.9	LU
HU	1.6	2.0	1.3	0.8	-0.5	-0.4	0.1	-0.2	-0.1	1.9	HU
MT	2.0	1.6	1.0	0.6	0.4	0.8	0.0	-0.2	-0.1	1.2	MT
NL	1.1	1.1	0.7	0.4	0.0	-0.1	0.2	-0.1	0.0	1.2	NL
AT	1.1	1.2	0.8	0.4	-0.1	0.0	0.1	-0.2	0.0	1.2	AT
PL	1.3	2.2	1.4	0.8	-0.9	-0.5	-0.1	-0.3	0.0	1.8	PL
PT	1.1	1.7	1.1	0.5	-0.6	-0.5	0.1	-0.2	0.0	1.5	PT
RO	1.5	2.4	1.4	1.0	-0.9	-0.7	0.0	-0.2	0.0	2.2	RO
SI	1.4	1.7	1.2	0.6	-0.3	-0.3	0.2	-0.2	0.0	1.7	SI
SK	1.3	2.0	1.2	0.7	-0.7	-0.5	0.1	-0.3	0.0	1.7	SK
FI	1.0	1.3	0.8	0.5	-0.3	-0.3	0.1	-0.1	0.0	1.2	FI
SE	1.5	1.2	0.8	0.4	0.3	0.2	0.1	-0.1	0.0	1.2	SE
NO	1.3	1.2	0.8	0.4	0.2	0.2	0.1	-0.1	0.0	1.1	NO
EA	1.1	1.3	0.9	0.4	-0.2	-0.2	0.1	-0.2	0.0	1.3	EA
EU	1.1	1.4	0.9	0.5	-0.3	-0.3	0.1	-0.2	0.0	1.4	EU

Source: European Commission, EPC.

Table I.5.6: **Sensitivity test: higher inflation**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
		Labour productivity (GDP per hour worked)			Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.3	1.1	0.7	0.4	0.2	0.2	0.1	-0.1	0.0	1.1	BE
BG	1.4	2.2	1.4	0.8	-0.7	-0.5	0.1	-0.3	0.0	2.0	BG
CZ	1.5	1.7	1.1	0.6	-0.2	0.0	0.0	-0.2	0.0	1.5	CZ
DK	1.3	1.3	0.8	0.5	0.1	0.1	0.1	-0.2	0.0	1.2	DK
DE	1.1	1.3	0.8	0.4	-0.1	0.0	0.0	-0.2	0.0	1.1	DE
EE	1.6	1.6	1.0	0.6	0.0	0.0	0.2	-0.2	0.0	1.6	EE
IE	2.1	1.8	1.4	0.4	0.3	0.4	0.0	-0.1	0.0	1.7	IE
EL	1.1	1.6	1.1	0.5	-0.6	-0.6	0.3	-0.3	0.0	1.7	EL
ES	1.2	1.3	0.8	0.5	-0.1	0.0	0.1	-0.2	0.0	1.2	ES
FR	1.1	1.0	0.7	0.4	0.1	0.1	0.2	-0.2	0.0	1.1	FR
HR	1.5	1.9	1.2	0.7	-0.4	-0.6	0.3	-0.2	0.0	2.0	HR
IT	1.1	1.2	0.8	0.4	-0.1	-0.2	0.3	-0.2	0.0	1.3	IT
CY	1.6	1.5	0.9	0.6	0.1	0.2	0.1	-0.2	0.0	1.4	CY
LV	1.1	2.1	1.3	0.8	-1.0	-0.8	0.1	-0.2	0.0	1.9	LV
LT	1.1	2.1	1.2	0.9	-1.0	-0.7	-0.1	-0.3	0.0	1.7	LT
LU	1.8	0.9	0.6	0.3	0.8	0.9	0.1	-0.2	0.0	0.9	LU
HU	1.7	2.0	1.3	0.8	-0.3	-0.2	0.1	-0.2	-0.1	1.9	HU
MT	2.1	1.6	1.0	0.6	0.5	0.9	0.0	-0.3	-0.1	1.2	MT
NL	1.3	1.1	0.7	0.4	0.2	0.1	0.2	-0.2	0.0	1.2	NL
AT	1.3	1.2	0.8	0.4	0.0	0.1	0.1	-0.2	0.0	1.1	AT
PL	1.5	2.2	1.4	0.8	-0.7	-0.3	0.0	-0.3	0.0	1.8	PL
PT	1.2	1.7	1.1	0.5	-0.4	-0.3	0.1	-0.3	0.0	1.5	PT
RO	1.7	2.4	1.4	1.0	-0.7	-0.5	0.0	-0.2	0.0	2.2	RO
SI	1.6	1.7	1.2	0.6	-0.1	-0.1	0.2	-0.2	0.0	1.7	SI
SK	1.4	2.0	1.2	0.7	-0.5	-0.3	0.1	-0.3	0.0	1.7	SK
FI	1.1	1.3	0.8	0.5	-0.2	-0.1	0.1	-0.2	0.0	1.2	FI
SE	1.6	1.2	0.8	0.4	0.4	0.4	0.1	-0.1	0.0	1.2	SE
NO	1.5	1.2	0.8	0.4	0.3	0.4	0.1	-0.1	0.0	1.1	NO
EA	1.2	1.3	0.9	0.4	-0.1	0.0	0.1	-0.2	0.0	1.2	EA
EU	1.3	1.4	0.9	0.5	-0.2	-0.1	0.1	-0.2	0.0	1.3	EU

Source: European Commission, EPC.

Table I.5.7: **Sensitivity test: higher employment rate of older workers**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
		Labour productivity (GDP per hour worked)			Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.4	1.1	0.7	0.3	0.3	0.2	0.2	-0.1	0.0	1.2	BE
BG	1.5	2.1	1.4	0.8	-0.6	-0.5	0.2	-0.3	0.0	2.0	BG
CZ	1.6	1.7	1.1	0.6	-0.1	0.0	0.1	-0.2	0.0	1.6	CZ
DK	1.4	1.3	0.8	0.4	0.1	0.1	0.2	-0.2	0.0	1.3	DK
DE	1.2	1.2	0.8	0.4	-0.1	0.0	0.1	-0.2	0.0	1.2	DE
EE	1.7	1.6	1.0	0.6	0.0	0.0	0.2	-0.2	0.0	1.7	EE
IE	2.2	1.8	1.4	0.4	0.4	0.4	0.1	-0.1	0.0	1.8	IE
EL	1.1	1.6	1.1	0.5	-0.5	-0.6	0.4	-0.3	0.0	1.7	EL
ES	1.3	1.3	0.8	0.4	0.0	0.0	0.2	-0.2	0.0	1.3	ES
FR	1.2	1.0	0.7	0.3	0.2	0.1	0.3	-0.2	0.0	1.1	FR
HR	1.5	1.9	1.2	0.6	-0.3	-0.6	0.4	-0.2	0.0	2.1	HR
IT	1.2	1.2	0.8	0.4	0.0	-0.2	0.4	-0.2	0.0	1.4	IT
CY	1.7	1.5	0.9	0.6	0.2	0.2	0.2	-0.2	0.0	1.5	CY
LV	1.1	2.1	1.3	0.8	-0.9	-0.8	0.1	-0.2	0.0	2.0	LV
LT	1.1	2.0	1.2	0.8	-0.9	-0.7	0.1	-0.3	0.0	1.8	LT
LU	1.8	0.9	0.6	0.3	0.9	0.9	0.2	-0.2	0.0	1.0	LU
HU	1.8	2.0	1.3	0.7	-0.2	-0.2	0.2	-0.2	-0.1	1.9	HU
MT	2.2	1.5	1.0	0.6	0.7	0.9	0.1	-0.3	-0.1	1.3	MT
NL	1.4	1.1	0.7	0.4	0.2	0.1	0.3	-0.2	0.0	1.2	NL
AT	1.3	1.2	0.8	0.4	0.1	0.1	0.2	-0.2	0.0	1.2	AT
PL	1.6	2.1	1.4	0.8	-0.6	-0.3	0.1	-0.3	0.0	1.9	PL
PT	1.3	1.6	1.1	0.5	-0.3	-0.3	0.2	-0.3	0.0	1.6	PT
RO	1.7	2.4	1.4	0.9	-0.6	-0.5	0.1	-0.2	0.0	2.2	RO
SI	1.7	1.7	1.2	0.5	0.0	-0.1	0.3	-0.2	0.0	1.8	SI
SK	1.5	1.9	1.2	0.7	-0.4	-0.3	0.2	-0.3	0.0	1.7	SK
FI	1.2	1.3	0.8	0.5	-0.1	-0.1	0.2	-0.2	0.0	1.3	FI
SE	1.7	1.2	0.8	0.4	0.5	0.4	0.2	-0.1	0.0	1.3	SE
NO	1.6	1.2	0.8	0.4	0.4	0.4	0.2	-0.1	0.0	1.2	NO
EA	1.3	1.3	0.9	0.4	0.0	0.0	0.2	-0.2	0.0	1.3	EA
EU	1.3	1.4	0.9	0.5	-0.1	-0.1	0.2	-0.2	0.0	1.4	EU

Source: European Commission, EPC.

Table I.5.8: **Sensitivity test: lower productivity growth**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
		Labour productivity (GDP per hour worked)			Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.1	0.9	0.6	0.3	0.2	0.2	0.1	-0.1	0.0	0.9	BE
BG	1.2	1.9	1.2	0.7	-0.7	-0.5	0.1	-0.3	0.0	1.7	BG
CZ	1.3	1.5	0.9	0.6	-0.2	0.0	0.0	-0.2	0.0	1.3	CZ
DK	1.1	1.1	0.7	0.4	0.1	0.1	0.1	-0.2	0.0	1.0	DK
DE	0.9	1.1	0.7	0.4	-0.1	0.0	0.0	-0.2	0.0	0.9	DE
EE	1.4	1.4	0.9	0.6	0.0	0.0	0.2	-0.2	0.0	1.4	EE
IE	1.9	1.6	1.2	0.4	0.3	0.4	0.0	-0.1	0.0	1.5	IE
EL	0.8	1.4	0.9	0.5	-0.6	-0.6	0.3	-0.3	0.0	1.5	EL
ES	1.0	1.1	0.7	0.4	-0.1	0.0	0.1	-0.2	0.0	1.0	ES
FR	0.9	0.8	0.5	0.3	0.1	0.1	0.2	-0.2	0.0	0.8	FR
HR	1.3	1.7	1.1	0.6	-0.4	-0.6	0.3	-0.2	0.0	1.8	HR
IT	0.9	1.0	0.7	0.4	-0.1	-0.2	0.3	-0.2	0.0	1.1	IT
CY	1.4	1.3	0.7	0.5	0.1	0.2	0.1	-0.2	0.0	1.2	CY
LV	0.9	1.9	1.1	0.7	-1.0	-0.8	0.1	-0.2	0.0	1.7	LV
LT	0.9	1.8	1.1	0.8	-1.0	-0.7	-0.1	-0.3	0.0	1.5	LT
LU	1.5	0.7	0.5	0.3	0.8	0.9	0.1	-0.2	0.0	0.7	LU
HU	1.5	1.8	1.1	0.7	-0.3	-0.2	0.1	-0.2	-0.1	1.7	HU
MT	1.9	1.3	0.8	0.5	0.5	0.9	0.0	-0.3	-0.1	1.0	MT
NL	1.1	0.9	0.6	0.3	0.2	0.1	0.2	-0.2	0.0	1.0	NL
AT	1.1	1.0	0.7	0.4	0.0	0.1	0.1	-0.2	0.0	0.9	AT
PL	1.3	2.0	1.2	0.8	-0.7	-0.3	0.0	-0.3	0.0	1.6	PL
PT	1.0	1.4	1.0	0.5	-0.4	-0.3	0.1	-0.3	0.0	1.3	PT
RO	1.5	2.2	1.3	0.9	-0.7	-0.5	0.0	-0.2	0.0	2.0	RO
SI	1.4	1.5	1.0	0.5	-0.1	-0.1	0.2	-0.2	0.0	1.5	SI
SK	1.2	1.8	1.1	0.7	-0.5	-0.3	0.1	-0.3	0.0	1.5	SK
FI	0.9	1.1	0.7	0.4	-0.2	-0.1	0.1	-0.2	0.0	1.0	FI
SE	1.4	1.0	0.6	0.4	0.4	0.4	0.1	-0.1	0.0	1.0	SE
NO	1.3	1.0	0.6	0.3	0.3	0.4	0.1	-0.1	0.0	0.9	NO
EA	1.0	1.1	0.7	0.4	-0.1	0.0	0.1	-0.2	0.0	1.0	EA
EU	1.1	1.2	0.8	0.4	-0.2	-0.1	0.1	-0.2	0.0	1.1	EU

Source: European Commission, EPC.

Table I.5.9: **Sensitivity test: higher productivity growth**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
		Labour productivity (GDP per hour worked)			Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.4	1.2	0.8	0.4	0.2	0.2	0.1	-0.1	0.0	1.2	BE
BG	1.5	2.2	1.4	0.8	-0.7	-0.5	0.1	-0.3	0.0	2.0	BG
CZ	1.6	1.8	1.1	0.7	-0.2	0.0	0.0	-0.2	0.0	1.6	CZ
DK	1.5	1.4	0.9	0.5	0.1	0.1	0.1	-0.2	0.0	1.4	DK
DE	1.3	1.4	0.9	0.5	-0.1	0.0	0.0	-0.2	0.0	1.2	DE
EE	1.7	1.7	1.1	0.7	0.0	0.0	0.2	-0.2	0.0	1.7	EE
IE	2.2	1.9	1.5	0.5	0.3	0.4	0.0	-0.1	0.0	1.8	IE
EL	1.1	1.7	1.1	0.6	-0.6	-0.6	0.3	-0.3	0.0	1.8	EL
ES	1.3	1.4	0.9	0.5	-0.1	0.0	0.1	-0.2	0.0	1.3	ES
FR	1.2	1.1	0.7	0.4	0.1	0.1	0.2	-0.2	0.0	1.2	FR
HR	1.5	2.0	1.3	0.7	-0.4	-0.6	0.3	-0.2	0.0	2.1	HR
IT	1.2	1.3	0.9	0.5	-0.1	-0.2	0.3	-0.2	0.0	1.5	IT
CY	1.7	1.6	1.0	0.7	0.1	0.2	0.1	-0.2	0.0	1.5	CY
LV	1.2	2.2	1.3	0.8	-1.0	-0.8	0.1	-0.2	0.0	2.0	LV
LT	1.2	2.2	1.3	0.9	-1.0	-0.7	-0.1	-0.3	0.0	1.8	LT
LU	1.9	1.1	0.7	0.4	0.8	0.9	0.1	-0.2	0.0	1.0	LU
HU	1.8	2.1	1.3	0.8	-0.3	-0.2	0.1	-0.2	-0.1	2.0	HU
MT	2.2	1.7	1.1	0.6	0.5	0.9	0.0	-0.3	-0.1	1.3	MT
NL	1.4	1.3	0.8	0.4	0.2	0.1	0.2	-0.2	0.0	1.3	NL
AT	1.4	1.3	0.9	0.5	0.0	0.1	0.1	-0.2	0.0	1.3	AT
PL	1.6	2.3	1.4	0.9	-0.7	-0.3	0.0	-0.3	0.0	1.9	PL
PT	1.3	1.7	1.2	0.6	-0.4	-0.3	0.1	-0.3	0.0	1.6	PT
RO	1.7	2.5	1.5	1.0	-0.7	-0.5	0.0	-0.2	0.0	2.2	RO
SI	1.7	1.8	1.2	0.6	-0.1	-0.1	0.2	-0.2	0.0	1.8	SI
SK	1.5	2.1	1.3	0.8	-0.5	-0.3	0.1	-0.3	0.0	1.8	SK
FI	1.2	1.4	0.9	0.5	-0.2	-0.1	0.1	-0.2	0.0	1.4	FI
SE	1.8	1.3	0.9	0.5	0.4	0.4	0.1	-0.1	0.0	1.3	SE
NO	1.6	1.3	0.9	0.4	0.3	0.4	0.1	-0.1	0.0	1.3	NO
EA	1.3	1.4	0.9	0.5	-0.1	0.0	0.1	-0.2	0.0	1.4	EA
EU	1.4	1.5	1.0	0.5	-0.2	-0.1	0.1	-0.2	0.0	1.4	EU

Source: European Commission, EPC.

Table I.5.10: **Policy scenario: link to life expectancy**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
		Labour productivity (GDP per hour worked)			Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.4	1.1	0.7	0.4	0.3	0.2	0.2	-0.1	0.0	1.2	BE
BG	1.6	2.2	1.4	0.8	-0.6	-0.5	0.2	-0.3	0.0	2.1	BG
CZ	1.6	1.7	1.1	0.6	0.0	0.0	0.1	-0.2	0.0	1.7	CZ
DK	1.3	1.3	0.8	0.5	0.1	0.1	0.1	-0.2	0.0	1.2	DK
DE	1.2	1.3	0.8	0.4	0.0	0.0	0.1	-0.2	0.0	1.2	DE
EE	1.6	1.6	1.0	0.6	0.0	0.0	0.2	-0.2	0.0	1.6	EE
IE	2.2	1.8	1.4	0.4	0.4	0.4	0.1	-0.1	0.0	1.8	IE
EL	1.1	1.6	1.1	0.5	-0.6	-0.6	0.3	-0.3	0.0	1.7	EL
ES	1.3	1.3	0.8	0.5	0.0	0.0	0.2	-0.2	0.0	1.3	ES
FR	1.2	1.0	0.7	0.4	0.2	0.1	0.2	-0.2	0.0	1.1	FR
HR	1.6	1.9	1.2	0.7	-0.3	-0.6	0.5	-0.2	0.0	2.2	HR
IT	1.1	1.2	0.8	0.4	-0.1	-0.2	0.3	-0.2	0.0	1.3	IT
CY	1.6	1.5	0.9	0.6	0.1	0.2	0.1	-0.2	0.0	1.4	CY
LV	1.2	2.1	1.3	0.8	-0.9	-0.8	0.2	-0.2	0.0	2.1	LV
LT	1.3	2.0	1.2	0.8	-0.8	-0.7	0.1	-0.3	0.0	1.9	LT
LU	1.9	0.9	0.6	0.3	0.9	0.9	0.2	-0.2	0.0	1.0	LU
HU	1.9	2.0	1.3	0.8	-0.1	-0.2	0.3	-0.2	-0.1	2.0	HU
MT	2.3	1.6	1.0	0.6	0.7	0.9	0.1	-0.3	-0.1	1.3	MT
NL	1.3	1.1	0.7	0.4	0.2	0.1	0.2	-0.2	0.0	1.2	NL
AT	1.4	1.2	0.8	0.4	0.2	0.1	0.3	-0.2	0.0	1.2	AT
PL	1.7	2.2	1.4	0.8	-0.5	-0.3	0.2	-0.3	0.0	2.0	PL
PT	1.3	1.7	1.1	0.5	-0.4	-0.3	0.1	-0.3	0.0	1.6	PT
RO	1.9	2.4	1.4	0.9	-0.5	-0.5	0.2	-0.2	0.0	2.4	RO
SI	1.7	1.7	1.2	0.6	0.0	-0.1	0.3	-0.2	0.0	1.8	SI
SK	1.4	2.0	1.2	0.7	-0.5	-0.3	0.1	-0.3	0.0	1.7	SK
FI	1.1	1.3	0.8	0.5	-0.2	-0.1	0.1	-0.2	0.0	1.2	FI
SE	1.7	1.2	0.8	0.4	0.5	0.4	0.1	-0.1	0.0	1.2	SE
NO	1.6	1.2	0.8	0.4	0.4	0.4	0.2	-0.1	0.0	1.2	NO
EA	1.3	1.3	0.9	0.4	0.0	0.0	0.2	-0.2	0.0	1.3	EA
EU	1.3	1.4	0.9	0.5	-0.1	-0.1	0.2	-0.2	0.0	1.4	EU

Source: European Commission, EPC.

Table I.5.11: **Policy scenario: constant retirement age**

	Average real GDP growth in 2022-2070									Real GDP per capita growth in 2022-2070	
		Labour productivity (GDP per hour worked)			Labour input						
			TFP	capital deepening		total population	employment rate	share of working-age population	change in average hours worked		
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6	
BE	1.3	1.1	0.7	0.4	0.1	0.2	0.0	-0.1	0.0	1.1	BE
BG	1.4	2.2	1.4	0.8	-0.8	-0.5	0.0	-0.3	0.0	1.9	BG
CZ	1.5	1.7	1.1	0.7	-0.3	0.0	-0.1	-0.2	0.0	1.5	CZ
DK	1.2	1.3	0.8	0.5	-0.1	0.1	-0.1	-0.2	0.0	1.1	DK
DE	1.1	1.3	0.8	0.4	-0.2	0.0	0.0	-0.2	0.0	1.1	DE
EE	1.4	1.7	1.0	0.7	-0.3	0.0	-0.1	-0.2	0.0	1.4	EE
IE	2.1	1.8	1.4	0.5	0.2	0.4	0.0	-0.1	0.0	1.7	IE
EL	0.9	1.6	1.1	0.6	-0.7	-0.6	0.2	-0.3	0.0	1.5	EL
ES	1.1	1.3	0.9	0.5	-0.2	0.0	0.0	-0.2	0.0	1.1	ES
FR	1.0	1.1	0.7	0.4	0.0	0.1	0.1	-0.2	0.0	1.0	FR
HR	1.4	1.9	1.2	0.7	-0.5	-0.6	0.3	-0.2	0.0	2.0	HR
IT	0.9	1.2	0.8	0.5	-0.3	-0.2	0.1	-0.2	0.0	1.1	IT
CY	1.5	1.5	0.9	0.6	0.0	0.2	0.0	-0.2	0.0	1.3	CY
LV	1.1	2.1	1.3	0.8	-1.0	-0.8	0.0	-0.2	0.0	1.9	LV
LT	1.0	2.1	1.2	0.9	-1.0	-0.7	-0.1	-0.3	0.0	1.7	LT
LU	1.7	1.0	0.6	0.3	0.8	0.9	0.1	-0.2	0.0	0.9	LU
HU	1.7	2.1	1.3	0.8	-0.4	-0.2	0.1	-0.2	-0.1	1.8	HU
MT	2.1	1.6	1.0	0.6	0.5	0.9	-0.1	-0.3	-0.1	1.2	MT
NL	1.2	1.1	0.7	0.4	0.1	0.1	0.1	-0.2	0.0	1.1	NL
AT	1.2	1.2	0.8	0.4	0.0	0.1	0.1	-0.2	0.0	1.1	AT
PL	1.5	2.2	1.4	0.8	-0.7	-0.3	0.0	-0.3	0.0	1.8	PL
PT	1.1	1.7	1.1	0.5	-0.5	-0.3	0.0	-0.3	0.0	1.4	PT
RO	1.6	2.4	1.4	1.0	-0.8	-0.5	0.0	-0.2	0.0	2.1	RO
SI	1.5	1.8	1.2	0.6	-0.2	-0.1	0.1	-0.2	0.0	1.6	SI
SK	1.3	2.0	1.2	0.7	-0.7	-0.3	-0.1	-0.3	0.0	1.5	SK
FI	0.9	1.3	0.8	0.5	-0.4	-0.1	0.0	-0.2	0.0	1.1	FI
SE	1.5	1.2	0.8	0.4	0.3	0.4	0.0	-0.1	0.0	1.1	SE
NO	1.5	1.2	0.8	0.4	0.3	0.4	0.1	-0.1	0.0	1.1	NO
EA	1.1	1.3	0.9	0.5	-0.2	0.0	0.0	-0.2	0.0	1.2	EA
EU	1.2	1.4	0.9	0.5	-0.3	-0.1	0.0	-0.2	0.0	1.3	EU

Source: European Commission, EPC.

Part II

Age-related expenditure items: coverage, projection methodologies and data sources

1. PENSIONS

1.1. MAIN FEATURES OF THE PENSION PROJECTIONS

Despite the varying set-up of national health care, long-term care and education systems across Member States, the European Commission and the AWG have successfully developed common models to project spending on these items. However, for pensions a different approach is taken since the diversity in public pension systems is difficult to capture within a single framework. As a result, Member States use their own national models to prepare pension expenditure projections, incorporating the demographic and macroeconomic assumptions described in Part I of this report.

On the one hand, this decentralised approach enables the integration of the specific institutional features and legal settings of each country's pension system to the best extent possible. ([36]) On the other hand, using distinct models may reduce the comparability of the results, despite relying on common methodologies and assumptions.

To ensure both high quality and comparability of the projections across countries, an extensive peer review is conducted by the AWG members and the Commission. This process intends to: (i) verify whether the Member States apply the agreed methodologies and the underlying demographic and macroeconomic assumptions; and (ii) examine how Member States interpret the existing pension legislation. If deemed necessary, the AWG can ask the Member State to revise the projections.

1.2. COVERAGE OF THE PENSION PROJECTIONS

The focus of the pension projection exercise is government expenditure on public pension schemes, with variables for private schemes (occupational, individual mandatory or individual non-mandatory) reported on a voluntary basis. Annex 5 provides a comprehensive description of the pension schemes covered in the projections.

Reporting is structured around the following items: gross pension expenditure by scheme and age; taxes paid on pension benefits; benefit ratios and gross average replacement rates; the number of pensions/pensioners by scheme, age and sex; contributions paid and the number of contributors; indexation coefficients; the breakdown of new pension expenditure; and possible assets and reserves of the public scheme.

Furthermore, Member States report administrative data for recent years on the number of new pensioners by sex and public scheme. Additionally, Member States can provide, on a voluntary basis, details on special pension schemes. These are preferential schemes that deviate from the standard regime in terms of eligibility criteria, benefit amount, or state funding. Such schemes should be included in the overall projections, which are exhaustive for public pension expenditure. The scope and nature of special schemes are discussed in the country fiche accompanying the updated projections. Detailed descriptions of special schemes are provided in the online PENSREF database.

([36]) For a complete description of pension schemes in the EU Member States, please consult the PENSREF database.

1.3. DEFINITION OF THE VARIABLES

1.3.1. Reporting norms and input data

Member States provide annual projections up to 2070, with base year 2022, and report historical data for the period 2000-2021. All expenditure figures are measured in current prices.

The GDP projections for each country over the period 2022-2070 are produced by the Commission by means of a production function and the agreed assumptions (see Part I, Chapter 3).

Average wages are calculated as the ratio of total gross wages from national account data and employed people (employees and self-employed) aged 15-74. The change in the gross wage total is projected for each country in accordance with labour productivity growth and changes in the number of hours worked. ([37])

Figures on the economy-wide average wage at retirement must be reported by the Member States. The assumptions underlying the projections for this variable are peer reviewed and detailed in the country fiche.

Member States should report historical data back to 2000 and discuss recent expenditure changes in the country fiche. This should clarify the reasons behind: (i) notable changes in pension spending; (ii) overall trends in pension spending in the recent past; and (iii) the possible implications of these changes and trends for the projections.

The pension projections include the impact of the most recent pension reforms that will have entered legislation by the cut-off date of the projections, i.e. 1 December 2023. To this end, in their country fiches Member States provide detailed descriptions of the projections, including: (i) recently introduced reforms; (ii) the implementation of these reforms; and (iii) how these reforms affect the projection results.

1.3.2. Variables: definitions and clarifications

Pension expenditure

Pension expenditure includes pensions and equivalent cash benefits granted for a long period (over 1 year) for old age, early retirement, disability, survivors (widows and orphans), and other specific purposes that should be considered as equivalents or substitutes for the above-mentioned types of pensions, i.e. pensions or pension-type benefits granted because of reduced work capacity or because of labour market conditions.

Pension expenditure is projected according to the current legislation in force. Pensions are defined in a broad sense: (i) earnings-related pensions; (ii) flat-rate pensions or basic pensions; (iii) means-tested benefits that aim at providing a social minimum pension; and (iv) supplements that are a part of the pension benefit and that are granted for an indefinite period on the basis of fulfilling certain criteria but which are not directly linked to the remuneration of costs (e.g. supplements to support the purchase of home or healthcare services are not included). Pensions and benefits can be paid out from specific schemes or directly from government budgets. Social assistance is included if it is equivalent to a minimum pension, thus representing a non-earnings-related minimum pension. Housing subsidies are excluded and considered as other means-tested social transfers. To ensure the consistency of the

([37]) In line with the assumption of a constant labour share. Gross wages include social security contributions paid by employers.

projections with the underlying assumptions, the reporting of pension expenditure should include pensions paid overseas.

Short-term disability benefits should be considered as sickness benefits, while prolonged unemployment benefits to older workers should be considered as unemployment benefits.

Pensions do not include social security contributions paid by pension schemes on behalf of their pensioners to other social protection schemes, notably to health schemes.

Pension expenditure by age

Many countries have introduced pension reforms that will increase the retirement age. To better understand the impact of these reforms, Member States report public pension spending disaggregated by age group: -54, 55-59, 60-64, 65-69, 70-74 and 75+. This breakdown increases transparency and consistency between the projections for population, labour force and number of pensioners.

New pension expenditure

To monitor reforms and increase transparency, Member States provide annual projections for spending on new pensions for each of the pension schemes: (i) old-age and early pensions (earnings-related, flat component or basic pensions, and minimum pensions); (ii) disability pensions; (iii) survivor pensions; and (iv) other pensions (see descriptions below).

Net pension expenditure

Net pension expenditure corresponds to gross pension expenditure minus taxes on pensions and compulsory social security contributions paid by beneficiaries from gross public pension expenditure. In countries where pensions are treated as non-taxable income, gross pensions equal net pensions. In general, taxes are projected in a way that tax revenues as a share of pension expenditure, the implicit average tax rate, stay constant over time.

Table II.1.1: **Typology of pension schemes in the Ageing Report**

PUBLIC PENSIONS	*PRIVATE PENSIONS*
Old-age and early pensions	***Occupational schemes***
- Basic and flat-rate pensions	***Individual mandatory schemes***
- Earnings-related pensions	***Individual voluntary schemes***
- Minimum pensions (non-contributory)	
Disability pensions	
Survivor pensions	
Other pension benefits	

Source: European Commission, EPC.

Public pensions

Public schemes and other public pensions are statutory schemes that are provided by the general government sector to insure against old age and other age-related risks. Typically it concerns social security schemes that cover the entire community, or large sections of the community, and are imposed,

controlled and financed by government units. Government employee schemes sometimes exist outside of the social security system. ([38])

The projections aim at covering those pension schemes that affect public finances, in other words schemes that are considered to belong to the general government sector in the national accounts system. Usually, there is a specific or general social security contribution to the scheme, which is defined as part of total taxes in the national accounting system. However, the scheme can also be financed, either partially or fully, through general taxation. Thus, ultimately, the government bears the financial cost and risk attached to the scheme. The pensions provided by the social security schemes can be either earnings-related, flat rate or means-tested. In addition, public pensions include pension benefits that are paid directly by the government budget or by another public sector entity. Cash benefits equivalent to pensions, notably social assistance benefitting mainly older, retired people should be included as well.

On the boundaries between public and occupational pensions – and the identification of pension schemes within these categories – see Annex 4.

Public pensions are split into four different categories: (i) old-age and early pensions; (ii) disability pensions; (iii) survivor pensions; and (iv) other types of pensions.

Old-age and early pensions

Old-age and early pensions include both earnings-related and non-earnings-related pensions. Earnings-related pensions reflect all those pensions for which entitlements depend on earnings or contributions to the scheme. Non-earnings-related pensions are often social-assistance benefits financed by taxes that nevertheless match the definition of pension expenditure.

Three sub-categories of old-age and early pensions are considered: basic pensions, earnings-related pensions, and non-contributory minimum pensions.

- **Basic pensions (flat component)** are projected separately from other earnings-related public pensions for the countries with a flat pension component. This concerns pensions benefits in flat amounts allocated to beneficiaries meeting certain requirements, for instance a minimum number of contributory years or residence.

- **Earnings-related benefits other than basic pensions** concern all pensions for which entitlements depend on personal earnings or contributions to the old-age pension scheme. Old-age and early pensions are considered as a single category given that in many countries no proper distinction between the two can be made, either because the early retirement is built-in in the old-age pension system, or because the standard retirement age varies in function of gender and will increase or become more flexible with time. Early pensions include – in addition to genuine (actuarial) early retirement schemes – other early retirement schemes that are not disability pensions and are granted, primarily based on reduced work capacity or labour market reasons, to a specific (age or work) group at an age below the statutory retirement age. This category also includes minimum pensions that are contributory based.

- **Non-contributory minimum pensions and minimum income guarantees** are projected separately. This category includes all pension expenditure for which entitlement does not depend on contribution requirements, e.g. means-tested minimum pensions. In line with the general definition of pension expenditure, through this variable the projections include social assistance equivalent to a minimum pension and targeted to older or retired people. If a non-contributory benefit is granted because of disability or other reasons, this benefit is projected under ‘Disability pensions’ or ‘Other pensions’.

([38]) See Eurostat (2020), Technical compilation guide for pension data in national accounts – 2020 edition.

Disability pensions

Expenditure related to disability does not distinguish between earnings- and non-earnings-related disability pensions. Some countries consider disability benefits as part of their sickness insurance scheme while in others they belong to the pension scheme. ([39]) While in some countries the pension classification remains unchanged between the time it is first granted and the moment payments cease, early disability pensions are generally transformed into old-age pension benefits upon reaching the statutory retirement age.

Care allowances (benefits paid to disabled people who need frequent or constant assistance to help them meet the extra costs of attendance) and integration support for people with disabilities (allowances paid when having work adapted to their condition, e.g. a sheltered workshop, or when they follow a vocational training) are not considered to be disability pensions.

The country fiche should provide a detailed description of the assumptions underlying the projection of disability pension expenditure, e.g. assumed developments in disability rates.

Survivor pensions

Survivor pensions, without any age limit, are covered by the projections. Such benefits include both earnings-related pensions and flat-rate or similar means-tested minimum pensions. The country fiche should provide a detailed description of the assumptions behind the projection of survivor pension expenditure, e.g. household composition, joint probability to survive.

Other pensions

All public earnings or non-earnings-related pensions not fitting in the three above categories should be covered under 'Other pensions'. Examples could be bonus pensions or pension-like benefits included in the Ageing Report projection exercise.

Private pensions

Private pension schemes are covered on a voluntary basis in the projections. Distinction is made between three types: (i) occupational private pensions; (ii) mandatory individual pensions; and (iii) voluntary individual pensions. Annexes 4 and 5 provide an overview of the extent to which such schemes exist in the Member States and whether the projections include them.

Occupational private pensions

Pensions provided by private occupational schemes are those that, rather than being statutory by law, are linked to an employment relationship with the scheme provider. They are based on contractual agreements between employers and employees, either at the company or sector/industry level. Private pension funds, insurance companies or the sponsoring companies themselves run the schemes.

These schemes can be (quasi) mandatory in the sense that, based on a nation- or industry-wide bargaining agreement, employers are obliged to provide their employees with an occupational pension scheme. Participation of an individual can also remain voluntary. Private occupational schemes can be equivalent to statutory earnings-related pension schemes or complementary to them. Of particular importance are the occupational schemes that play a role equivalent to social security schemes in the overall pension provision. The AWG agreed that the real rate of return on private funded pensions should reflect the real long-term interest rate assumptions (see Part I, Chapter 4).

([39]) In general, disability pensions as defined above should be covered by the pension projections, even though some countries consider them as part of their sickness insurance scheme.

Private individual pensions

In this case, access to the scheme does not require an employment relationship, even though in some cases the contribution is based on the wage. Insured persons have the ownership of pension assets so that they both enjoy the rewards and bear the risks associated to the assets' valuation. The insurance contract specifies a contribution schedule in exchange for which benefits will be paid when the member reaches a specific age. The scheme provider administers the scheme by managing the pension assets through a separate account on behalf of its members.

Private individual pension schemes are mostly non-mandatory, though some countries have also mandatory schemes (see Annex 4).

Mandatory private individual pensions

Mandatory private pension schemes are similar to public schemes in that they are compulsory. Transactions occur between the individual and the insurance provider. Transactions are not recorded as government revenues or government expenditure and, therefore, do not have an impact on the government balance. This category of private benefits mostly concerns pensions that were formerly part of the social security scheme but that have been switched to funded private schemes.

In some cases, there are government guarantees to these pension schemes. Nevertheless, such a guarantee is a contingent liability by nature, and these liabilities are not considered as economic transactions until they materialise. Thus, a government guarantee is not an adequate condition to classify such schemes as social security schemes.

Non-mandatory individual private pensions

Non-mandatory private pensions are based on individual insurance contracts between the individual and the private pension scheme provider, usually an insurance company or a pension fund. They include schemes for which membership is not required by law and is independent of any employment link (even if members are mostly employed people). However, in some cases employers or the State may contribute to the plan. Such schemes may also be joined through membership of an association.

The main difficulty in analysing individual saving provisions stems from the fact that it is difficult to distinguish among different types of savings those that are clearly for retirement purposes. Part of the savings that are not specifically labelled as pension savings may be used for retirement purposes, whereas part of the savings in retirement schemes may in practice not be converted into a periodic retirement income, e.g. one-off lump-sum benefits or early withdrawal possibilities. The extent to which these schemes are effectively retirement savings depends on the attached conditions. For example, the conditions could include: (i) tax incentives linked to the condition that savings must be converted into a rent rather than paid out as a lump sum; or (ii) the minimum age at which people can access their savings. In some cases, pension instruments are used as investment vehicles with noticeable tax advantages, for instance when a number of years of participation in the plan are required to benefit from a lower tax rate.

1.3.3. Benefit ratio and replacement rate at retirement

The benefit ratio and the replacement rate help interpret changes in average pension benefits.

Benefit ratio

The benefit ratio is the average pension benefit over the average wage. Changes in the ratio help understand the projection results since they reflect the legal features of the pension framework. If private pensions are reported, also a total benefit ratio is available.

The benefit ratio captures several dynamics. First, it reflects the increase in average pensions due to indexation rules, the maturation of the pension system (especially in case of phasing-in/out of schemes) and longer contribution periods, as well as changes in the pension formula. Second, it reflects the changes in average wages that result from the labour productivity assumptions. Third, it captures the changes in the structure of the respective population groups, namely the share of pensioners and workers in each year of the projection exercise.

Gross average replacement rate at retirement

The gross average replacement rate at retirement is the ratio of the first average pension over the average wage at retirement. The latter usually differs from the average wage unless a flat wage profile over the entire working career is assumed in the projection exercise. For public pension schemes, the gross average replacement rate reflects only earnings-related pensions, including the flat component.

The replacement rate provides insights in the decrease in income that results from moving from employment into retirement. The size of this decline is influenced, for example, by the contribution period, valorisation rules, bonuses/penalties in case of delayed/early retirement, and sustainability factors.

1.3.4. New public earnings-related pension

Changes in the flows of pensions and pension expenditure over time should properly reflect the impact of recently legislated reforms on the functioning of pension systems. Therefore, a disaggregation is made of the projected annual flow of new earnings-related old-age and early pension entitlements in its main drivers.

Publicly provided earnings-related pension schemes can be subdivided into the following three broad types: defined benefit (DB), notional defined contribution (NDC) and point system (PS). 16 countries have DB schemes, 6 have NDC systems and 8 are PS schemes (see Table II.1.2). ([40])

New pension expenditures for DB and NDC systems can be disaggregated as follows:

Table II.1.2: **Earnings-related public pension schemes**

BE	*DB*	LT	*PS*
BG	*DB*	LU	*DB*
CZ	*flate rate + DB*	HU	*DB*
DK	*flat rate + DB*	MT	*flat rate + DB*
DE	*PS*	NL	*flat rate + DB*
EE	*flat rate + PS*	AT	*DB*
IE	*flat rate + DB*	PL	*NDC*
EL(1)	*flat rate + DB + NDC*	PT	*DB*
ES	*DB*	RO	*PS*
FR(2)	*DB + PS*	SI	*DB*
HR	*PS*	SK	*PS*
IT	*NDC*	FI	*DB*
CY	*PS*	SE	*NDC*
LV	*NDC*	NO	*NDC*

(1) The NDC is an auxiliary mandatory pension scheme.
(2) PS refers to the complementary schemes AGIRC and ARRCO.
Source: European Commission, EPC.

([40]) Counting twice France (once in the DB group and once in the PS group) and Greece (once in the DB group and once in the NDC group).

$$P_{new} = N_{new} \times \overline{C_{new}} \times \overline{A_{new}} \times \overline{PE_{new}} \qquad (1.1)$$

where P_{new} is the overall spending on new pensions, N_{new} is the number of new pensions, $\overline{C_{new}}$ is the average contributory period of new pensions, $\overline{A_{new}}$ is the average effective accrual rate of new pensions, and $\overline{PE_{new}}$ are the average pensionable earnings over the contributory period of new pensions. For some countries, an additional sustainability factor or adjustment factor might apply. In the case of DB systems, the accrual rate is predefined. For NDC systems, it is determined by the contribution rate to the notional accounts and the annuity factor. ([41])

For point systems, the breakdown of equation 1.1 is neither feasible, because pensionable earnings are not explicitly considered but rather accounted for through the pension point accumulation, nor meaningful given how a point system operates. Therefore, an alternative formula is used to breakdown new spending in point systems:

$$P_{new} = N_{new} \times \overline{P_{new}} = N_{new} \times v_T \times \overline{pp_T} \qquad (1.2)$$

where the total new pension expenditure P_{new} is the product of the number of new pensioners N_{new} and the average new pension benefit $\overline{P_{new}}$. The latter equals the pension point value at retirement v_T multiplied by $\overline{pp_T}$ which is the average number of accumulated pension points of new pensioners. For some countries a sustainability factor or adjustment factor might apply.

The average number of pension points $\overline{pp_T}$ can be further disaggregated:

$$\overline{pp_T} = \overline{C_T} \times \overline{pp_t} \qquad (1.3)$$

Where $\overline{C_T}$ is the average contributory period and $\overline{pp_t}$ the average number of points accrued annually. The latter can be interpreted as the accrual rate in the case of point systems: the number of pension points at retirement divided by the contributory period.

If the old-age pension includes a flat component, the relevant subcomponents are projected separately.

1.3.5. Number of pensions and pensioners, contributions, and contributors

Number of pensions

The number of pensions totals all pensions paid out to individuals, with one person possibly receiving several pensions. Figures are reported by scheme and by age group and should be consistent with the projections for population, labour force and number of pensioners. To ensure the consistency of the exercise, the number of pensions should include pensions paid overseas.

Number of pensioners

The number of pensioners is reported for the overall public scheme as well as separately for each of the pension schemes, allowing for the fact that a person may be a recipient of several types of pensions. The number of pensioners should include pensions paid overseas. The projections should assume a constant

([41]) Contributions are credited to individual accounts. These accounts are notional since contributions are used to pay the pension benefits of current pensioners. At retirement, the accumulated notional balance is converted into an annuity by means of an annuity factor that accounts for the estimated remaining life expectancy and an assumed rate of return on the contributions.

ratio between pensions and pensioners in the absence of reforms affecting the pension take-up ratio or a process of merging/closing of pension schemes.

A breakdown of public pensioners by age and sex is provided as well, allowing to assess the consistency between demographic and labour market assumptions. The overall number of pensioners by age group should be consistent with agreed labour force figures. The share of pensioners in each age group should be below – but very close to – the number of inactive people in the same group.

The availability of data on pensioners (or pensions as a second best) is particularly relevant when disaggregating the pension expenditure-to-GDP ratio. In particular, this data allows for the calculation of the coverage ratio. The total coverage ratio is defined as the number of pensioners of all ages to the number of people aged 65 or older. The analysis of the coverage ratio, which is also disaggregated by age group, provides information about how the development of the effective exit age and the percentage of population covered by a pension scheme affect pension spending.

Contributions to pension schemes

Contributions to pension schemes paid by both employers and employees as well any legislated contribution by the state or other revenue sources (e.g. nuisance charges, people transferring rights and savings from private schemes to the public scheme) provide information on potential future financing gaps within the pension system, which is then to be covered by central government transfers. If the pension contribution is part of a general social security contribution rate, an estimate should be provided, if possible, for the share of the pension contribution, e.g. based on the most recent expenditure structure. If general tax revenues finance pensions, no estimate should be provided.

Contribution projections should assume that the implicit contribution rates (contributions over gross wage total) for the different components remain constant over the projection period or move in line with legislation.

Number of contributors

As is the case with the number of pensioners, the number of contributors to each type of pension should be considered separately, allowing for the fact that the same person may be a contributor to several schemes. This is the case, for instance, for pension systems in which statutory contributions are divided between a public scheme and a private pension scheme. However, the number of *total* contributors to the public scheme should be close to the number of employed people or the projected labour force.

1.3.6. Valorisation rules

Unless the pension benefit is based on the final salary, a flat-rate pension or depends on years of residence, pensionable earnings are to be adjusted for the change in living standards. This valorisation of accrued pension rights is an important variable when estimating new pension benefits. Consumer prices, wage growth, or a mixture of the two are the most common valorisation rules (see Annex 4).

1.3.7. Applied indexation

Member States report the indexation factors used to project the expenditure on earnings-related public pensions, the flat component of old-age pensions, and minimum pensions. This information is particularly

relevant for pension components for which the effectively assumed future indexation differs from the legally stipulated mechanism.

Of particular concern is the indexation factor used to project minimum pensions and the interpretation of the standard no-policy change assumption in this regard. When the legislated rule stipulates that lower-than-wage indexation (e.g. pure price indexation or a mixed rule) applies to minimum pensions/minimum income guarantees, expenditure on that specific item is projected to shrink rapidly over time. Past experience on such non-generous indexation rules for minimum pensions shows that in practice ad hoc interventions are regularly made to realign minimum pension benefits with changes in the standard of living, which is, ultimately, the main objective of providing a minimum pension scheme.

Therefore, since the 2018 projection round, a common methodology for the indexation of non-contributory minimum pensions has been applied in the projections. To ensure that the projections reflect the 'safety net' role of minimum pensions, benefits are assumed to evolve in line with average wage developments. In practice, all Member States should apply full wage indexation after a maximum of ten years. This concerns all Member States with below wage indexation (pure price indexation, partial wage indexation, indexation to GDP, no fixed rule, ...).

1.3.8. Assets and reserves of public schemes

Some countries accumulate surpluses of the public pension scheme in pension funds meant to finance future scheme deficits. In such cases, pre-funded or partially funded pension systems alleviate future sustainability concerns. Member States are expected to report assets accumulated in a social security fund or a dedicated pension/reserve fund within the general government, for example in the case of partially funded pension schemes, with the goal of providing the public pension scheme with a regular flow of financing at some point in the future. Aside from the stock of assets, flows directed to the funds are also to be reported.

2. HEALTH CARE

2.1. INTRODUCTION

Spending on health care, one of the components of public age-related expenditure, represented 7.8% of GDP in 2020 in the EU. ([42]) Standards of health care provision are overall high across the EU, with near universal access to health care services. Yet, the COVID-19 pandemic revealed certain deficiencies in the resilience of EU health systems. To cope with long-term structural trends such as population ageing and technological progress, while closing some of the resilience gaps identified, more public resources will be necessary. All this makes public spending on health care an integral part of the debates on the long-term sustainability of public finances. This chapter presents the methodology used to project public expenditure on health care in the 27 EU Member States and Norway up to 2070, including the baseline and alternative scenarios and stress tests.

2.2. OVERVIEW OF THE PROJECTION METHODOLOGY

General approach

The Commission (DG ECFIN) simulation model is used to project public health care expenditure. This simulation model is a stylised macro model, capturing future developments of the population structure, age-cost profiles, technological progress and standards of living. The model assumes that the entire population is divided into groups with certain characteristics (e.g. age, gender, per capita expenditure, health status). Changes in these groups lead to expenditure changes over time. This type of model is widely used to prepare long-term expenditure projections, especially when the precise micro information on the individuals and their transition rates from one health status to another is missing or unreliable.

The general methodology to project public health care expenditure involves four steps (see Graph II.2.1).

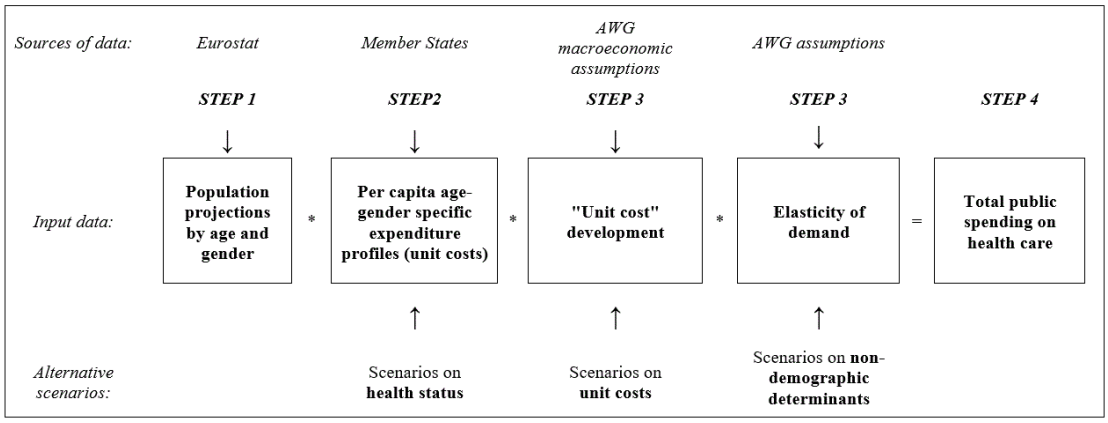
- ***Step 1***: take the baseline population projection (i.e. number of people) by age and gender provided by Eurostat for each year up to 2070.
- ***Step 2***: take age/gender-specific public health care expenditure per capita (i.e. the age/gender-specific expenditure profiles) provided by the Member States and Norway based on the latest available data.
- ***Step 3***: project age/gender expenditure profiles for each year up to 2070 based on different assumptions (i.e. the baseline and alternative scenarios).
- ***Step 4***: for each projection year, multiply the projected number of people in each age/gender group by the respective age/gender expenditure profile and sum all groups to obtain the total projected public expenditure on health care.

Key data input and treatment of reforms

The common elements of all scenarios are the EUROPOP2023 projections by Eurostat (see Part 1, Chapter 1) and the baseline assumptions on labour force and macroeconomic variables agreed by the EC and the AWG-EPC (see Part 1, Chapters 2 and 3). The age/gender-specific profiles of public health care expenditure per capita are provided by the Member States and Norway. Moreover, as for previous projection exercises, the age profiles of per capita expenditure on health care are adjusted − in the reference year − to match total public expenditure on health care as reported to international databases

([42]) Total public expenditure on health care includes capital formation and excludes long-term care (health).

Graph II.2.1: **Schematic overview of the health care projection methodology**



Source: European Commission, EPC.

and confirmed by the Member States in the health care questionnaire. ([43]) This adjustment (shift of the age-cost profile) is made by keeping the base year proportions between specific age cohorts constant.

Country-specific information on any relevant recent reform legislated and/or implemented that could have an impact on public health care expenditure (e.g. binding spending ceilings) is as much as possible taken into account in the projections. Information on legislated policy reforms and their quantification ([44]), both increases and reductions, is provided by the Member States. The annual percentage reduction/increase is deducted from/added to the level of spending, effectively changing the level of total health care spending.

Additional considerations

Three important aspects of the projection exercise need to be stressed. First, the baseline relies on a "no-policy change assumption": the analysis assumes that government health policy and behaviour of individual participants in the health care market remain unchanged (with respect to the legislated reforms considered). This means that health care provision is assumed to respond "automatically" to the needs resulting from changes in population structure and health status, as well as to changes in income.

Second, many of the determinants of health care expenditure, notably supply-side determinants of spending are either not quantifiable or depend on ad hoc policy decisions. Therefore, the methodology used to project public health care expenditure mainly reflects demand-side factors such as demographic structure, income and health status. However, in the risk scenario (see lower), the impact of non-demographic factors such as technology and institutional settings is taken into account and calibrated based on a regression analysis.

Third, given the important uncertainty surrounding long-term projections, a sensitivity analysis is conducted, through several alternative scenarios and stress tests, attempting to identify the impact of each quantifiable determinant separately based on different assumptions (an estimated guess or a "what if" scenario).

([43]) The total headline data on total expenditure may differ from the figures resulting from the combination of age cost profiles with underlying population. Differences between the two measures of health care expenditure can result from differences in their computation. While total expenditure is calculated from an aggregate budgetary perspective, costs per capita are in many countries estimated based on health insurance or hospital inpatient data, which in most countries do not cover all public expenses on health care.

([44]) Including COVID-19 and measures in Recovery and Resilience Plans.

2.3. DIFFERENT SCENARIOS FOR PROJECTING PUBLIC HEALTH CARE EXPENDITURE

The purpose of health care systems is to "improve the health of the population they serve; respond to people's expectations and provide financial protection against the costs of ill-health" (WHO, 2000). In the influential WHO report from 2000, health systems are attributed four vital functions: (1) service provision, i.e. the delivery of personal and non-personal health services; (2) financing, i.e. the revenue collection, the pooling of funds (insurance function) and purchase of services (the process by which pooled funds are paid to providers in order to deliver the health interventions to care users); (3) resource creation, i.e. investment in equipment, buildings and people (training); and (4) stewardship or oversight of all the functions, i.e. the careful and responsible management of the health system.

In this context, public health care expenditure depends on factors that affect the demand and supply of health services and goods. These include:

– The health status of the population.

– Economic growth and development.

– New technologies and medical progress.

– The organisation and financing of the health care system.

– Health care resource inputs, both human and capital.

The long-term projection scenarios for public health care expenditure, described below, capture demand and supply-side factors, and include demographic and non-demographic variables. ([45]) The choice of methodology and scenarios is constrained by the availability, accessibility, and quality of data. Therefore, the model may not include all the relevant factors identified as affecting health care spending. To reflect the effects of the different determinants on public expenditure on health care, changes are made to two main inputs: (1) the age-related expenditure profiles (capturing unit costs) and (2) assumptions regarding the development of unit costs over time driven by the macroeconomic variables or assumptions on health status. As in the 2021 projection exercise, the list of determinants to be modelled is not exhaustive.

The scenarios to project public expenditure on health care in the 2024 Ageing Report are summarised in Table II.2.1. Compared to the 2021 projection exercise, there are no changes in methodology for the baseline (formerly called 'AWG reference scenario') and the risk scenario (formerly called 'AWG risk scenario'). To align the approach in health care with that for pensions and other spending items, the starting point of the sensitivity analysis is now anchored to the baseline instead of to the formerly 'Demographic scenario'. This approach improves the coherence of the health care chapter of the Ageing Report by stress testing the baseline against alternative assumptions on both health care determinants, as well as demographic and macroeconomic developments. This change also allowed reducing the number of alternative scenarios. ([46]) A further streamlining led to the removal of two more scenarios used in previous Ageing Reports, namely the 'Death-related cost scenario' and the 'EU27 cost convergence scenario.'

([45]) See also Annex 9 for a mathematical illustration of the health care scenarios.
([46]) The new anchor made some scenarios used in previous Ageing Reports redundant, such as the 'High life expectancy scenario', the 'Income elasticity scenario' and the 'Non-demographic determinants scenario'.

Table II.2.1: **Overview of health care scenarios**

	Baseline(1)	**Demographic scenario**	**No healthy ageing scenario**	**Healthy ageing scenario**	**Labour intensity scenario**	**Sector-specific composite indexation scenario**	**Risk scenario**(2)	**Additional sensitivity tests**
	I	II	III	IV	V	VI	VII	
Population projection	Eurostat population projections	Eurostat population projections	Eurostat population projections	Eurostat population projections	Eurostat population projections	Eurostat population projections	Eurostat population projections	additional sensitivity tests
Age-related expenditure profiles	2022 profiles shift by half the change in age-specific life expectancy	2022 profiles shift by half the change in age-specific life expectancy	2022 profiles held constant over the projection period	2022 profiles shift in line with changes in age-specific life expectancy	2022 profiles shift by half the change in age-specific life expectancy	2022 profiles shift by half the change in age-specific life expectancy	2022 profiles shift by half the change in age-specific life expectancy	2022 profiles shift by half the change in age-specific life expectancy
Unit cost development	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per hour worked	Input-specific indexation	GDP per capita	additional sensitivity test scenarios
Elasticity of demand	Cost sensitivity of 1.1 in 2022 converging to 1 by 2070	1	Cost sensitivity of 1.1 in 2022 converging to 1 by 2070	Cost sensitivity of 1.1 in 2022 converging to 1 by 2070	Cost sensitivity of 1.1 in 2022 converging to 1 by 2070	1	Cost sensitivity of 1.5 in 2022 converging to 1 by 2070	Cost sensitivity of 1.1 in 2022 converging to 1 by 2070

Shaded cells indicate parameters that differ from the baseline assumptions.
(1) Baseline is the former AWG reference scenario.
(2) Risk scenario is the former AWG risk scenario.
Source: European Commission, EPC.

2.3.1. Baseline

The *baseline* corresponds to the former '*AWG reference scenario'*. It provides the reference scenario used in the context of EU fiscal surveillance. It shows the combined effect of a set of interrelated determinants of public expenditure on health care. It reflects (i) the demographic impact of population ageing, based on Eurostat projections, (ii) a "neutral" assumption on the evolution of health status, by assuming that half of the extra years of life gained through higher life expectancy are spent in good health, (iii) unit costs assumed to evolve in line with GDP per capita and (iv) the assumption of an income effect, which is modelled through a cost sensitivity of 1.1 in the base year converging to unity by 2070.

2.3.2. Demographic scenario

The aim of the *'Demographic scenario'* is to estimate the pure ageing effect on future public health care expenditure. The age/gender expenditure groups evolve in line with the population projections up to 2070. Compared with the baseline, this scenario assumes that unit costs – i.e. the health care expenditure per capita for each year of age – evolve only in line with real GDP per capita ([47]) without considering the impact of any non-demographical determinants. Such a cost development, applied to the baseline age/gender-specific per capita public expenditure profiles, can be considered neutral in macroeconomic terms – if the age and mortality structure of the population did not change, public health expenditure as a share of GDP would remain the same over the projection period. Other assumptions are unchanged compared with the baseline.

2.3.3. No healthy ageing scenario

The '*No healthy ageing scenario'* allows assessing the impact of the *expansion of morbidity* hypothesis on public health spending projections. It assumes that age/gender-specific morbidity rates and the structure of health care provision do not change over time. This, in turn, means that age/gender-specific per capita public health care expenditure profiles, which can be considered as proxies for the morbidity

([47]) Real GDP per capita at 2022 prices.

rates ([48]), remain constant in real terms over the whole projection period. As in the baseline, the scenario relies on the latest Eurostat population projections, assuming a gradual increase in life expectancy. This increase in life expectancy together with no change in the health status, as compared to today's health status, mean that all the gains in life expectancy are assumed to be spent in poor health. The number of years spent in good health remains constant. Other assumptions are unchanged compared with the baseline.

2.3.4. Healthy ageing scenario

The '*Healthy ageing scenario'* is based on the *relative compression of morbidity* hypothesis. It simulates an improvement in health status in line with declining mortality rates and increasing life expectancy. It assumes that the number of years spent in poor health during a lifetime remains constant over the projection period. This means that all future gains in life expectancy are assumed to be spent in good health. Consequently, the morbidity rate and therefore the age/gender-specific per capita public expenditure profiles decline with the mortality rate. ([49])

This 'outward' shift is proportional to the projected gains in life expectancy as given by the Eurostat population projections. For each projection year the change in life expectancy in relation to the base year is calculated. ([50]) Other assumptions are unchanged compared with the baseline.

2.3.5. Labour intensity scenario

The *'Labour intensity scenario*' aims at estimating the evolution of public health care expenditure considering that health care is and will remain a highly labour-intensive sector. Therefore, it is assumed that unit costs (age/gender specific per capita public expenditure profiles used in the baseline scenario) evolve in line with changes in labour productivity (modelled by real GDP per hours worked) ([51]), rather than real GDP per capita growth (as assumed in the baseline). This assumption implies that wages in the health sector grow in line with productivity in the overall economy and generally faster than GDP per capita. ([52]) Other assumptions are unchanged compared with the baseline.

2.3.6. Sector-specific composite indexation scenario

The *'Sector-specific composite indexation scenario*' explores the use of sector-specific rather than economy-wide indexation of unit costs in the model, given the specific features of the health care sector (high level of government regulation, investment in new technologies, high labour intensity, separate financing instruments in inpatient and outpatient care). In practice, this scenario looks at the past cost evolution of hospital care, outpatient care and outpatient pharmaceutical spending and indexes each of them in a separate way, creating a country-specific composite indexation for unit cost development.

([48]) Strictly speaking, age profiles of expenditure illustrate exclusively public health care spending per person of a given age cohort. As such it is not a measure of health status or morbidity. However, given the lack of reliable and comparable data on the latter, one can plausibly assume that the shape of the profile follows the evolution of health status over the lifespan, i.e. over time we assume that the same segments of the curve (early childhood, old age and motherhood) follow the same pattern.

([49]) In this scenario, the country-specific age/gender per capita expenditure profiles are progressively shifted outwards, in line with increasing life expectancy. The method is applied to those age/gender groups where expenditure per capita is growing. For the young and the oldest, the reference age/gender and therefore age/gender per capita public expenditure profile remains the same over the whole projection period.

([50]) The following example illustrates the approach: the life expectancy of a 50-year-old man in a given Member State is assumed to increase by 4 years from 30 years in year *t* to 34 years in year *t+20*. Then, the scenario assumes that in *t+20* a 50-year-old man will have a per capita public expenditure profile of a (50-4) = 46-year-old man in year *t* (the latter adjusted as usual with the GDP per capita growth rate over the last 20 years).

([51]) Real GDP per hours worked at 2022 prices.

([52]) In 2022, real GDP per hours worked in the EU was EUR 46 129 while real GDP per capita was EUR 35 202. The growth rate of the real GDP per hours worked is projected to grow on average by 0.1 pp faster than the real GDP per capita in 2022-2070.

To build this index, health care expenditure is disaggregated in its different components, broadly reflecting the different sectors of the health system, including: (1) inpatient care; (2) outpatient care and ancillary services; (3) pharmaceuticals and therapeutic appliances; (4) preventive care; (5) governance and administration; and (6) capital investment. ([53]) For each of these components, the share in total public health care expenditure is calculated and then applied to the age-specific per capita public expenditure. In doing this, each age-specific per capita public expenditure is divided (mechanically) into six sub-items of expenditure.

Next, the past change in public expenditure on each of those inputs is considered. The average annual growth of the expenditure on the other components over the past 10 years is calculated. Then, the ratio of each of these growth rates to GDP growth rate is calculated.

Due to the high volatility of the relative growth rates for the sub-components on prevention, governance and administration, and capital formation, these items are excluded from the indexation. The other three sub-items of the age-specific per capita expenditure (hospitals, outpatient care and medical goods) are multiplied by their respective growth rate (capped at their respective 25th and 75th percentiles, as in previous Ageing Reports). It is then assumed that the growth ratio multiplying each sub-item of expenditure converges to 1 in a certain year in the future (i.e. grows at the same pace as productivity or GDP). ([54])

Other assumptions are unchanged compared with the baseline.

2.3.7. Risk scenario

The *'Risk scenario*' (former '*AWG risk scenario*') aims at fully accounting for technological changes and institutional mechanisms, which have driven expenditure growth in recent decades. Econometric studies show that demographic factors such as ageing have a positive but relatively small impact on spending when compared with other drivers, such as income, technology, relative prices and institutional settings (Maisonneuve and Martins, 2013). By only considering past income effects, the baseline implicitly assumes a substantial progressive downward slope of past trends in health care spending, flattening out at the end of the period. To address this critical aspect, the risk scenario considers a stronger impact of non-demographic factors (e.g. technology or relative prices) on health care expenditure.

This scenario uses panel regression techniques to estimate the country-specific non-demographic cost of health care. The non-demographic cost is defined as the excess of growth in real per capita health care expenditure over the growth in real per capita GDP after controlling for demographic composition effects. Alternatively, the results can also be expressed in terms of country-specific average income elasticities of health care expenditure. A proxy for the non-demographic costs with an estimated EU average elasticity of 1.5, based on Commission research ([55]) endorsed by the Ageing Working Group and recalculated for the 2024 Ageing Report with the latest available data, is used in 2022 and then converges linearly to 1 by the end of the projection period.

([53]) In the 2021 and current projection exercise, they are largely based on the SHA 2011 classification of health care functions (see Annex 7, Table II.A7.1).

([54]) Assume that per capita public expenditure on health care for a 20-year-old man is EUR 2 000 in year t. Assume also that, in line with total public expenditure on health care, this is made up of 40% inpatient care, 30% outpatient care and ancillary services, 17% pharmaceuticals and therapeutic appliances, 3% preventive care, 5% governance and administration, and 5% capital investment. Therefore, the per capita public expenditure is divided into six sub-items: EUR 800 for inpatient care, EUR 600 for outpatient care and ancillary services, EUR 340 for pharmaceuticals and therapeutic appliances, EUR 60 for preventive care, EUR 100 for governance and administration, and EUR 100 for capital investment. Then, in year t+1, expenditure increases as follows: EUR 800 x 1.2 + EUR 600 x 1.1 + EUR 340 x 1.3 + EUR 60 x 1.0 + EUR 100 x 1.0 + EUR 100 x 1.0, where 1.2, 1.1, and 1.3 are the (illustrative) past growth ratios observed for the first three components, while the other items are not indexed by their past observed growth rates. As far as the pattern of convergence is concerned, we can use past observations to determine the convergence pattern of the growth ratios.

([55]) Medeiros and Schwierz (2013).

Other assumptions are unchanged compared with the baseline.

2.3.8. Other sensitivity scenarios

Alternative sensitivity tests are applied to the baseline to show the effect of key demographic and macroeconomic assumptions on long-term public health expenditure projections. These alternative sensitivity tests are applied to all age-related items and are therefore described in Part I, Chapter 5.

3. LONG-TERM CARE

3.1. INTRODUCTION

Long-term care, together with pensions and health care, is an important component of age-related public expenditure. Although it is currently the smallest of the three in terms of expenditure (representing an estimated 1.7% of GDP on average in the EU in 2022), it is the one expected to experience the largest increase according to past Ageing Reports. This chapter presents the methodology used to project long-term care spending in the 27 EU Member States and Norway up to 2070, including the baseline and several alternative scenarios and stress tests designed to assess the potential impact of each of the determinants of long-term care expenditure on future public expenditure. These explore the same dimensions as in the 2021 Ageing Report, although they have been restructured to be more transparent and easily comparable.

3.2. OVERVIEW OF THE PROJECTION METHODOLOGY

3.2.1. Methodology

As in previous projection exercises – conducted jointly by the European Commission and the Ageing Working Group (AWG) – the methodology to project long-term care expenditure is based on a stylised macro-simulation model. This model allows capturing future developments of the population structure, of age-cost profiles, of institutional set-up and of standards of living. It assumes that the whole population is divided into groups according to certain characteristics (e.g. age, gender, per capita expenditure, health status, need for care and type of care). If the (relative) size of these groups or their characteristics change over time, long-term care expenditure changes in line with them. These types of models are often used in long-term expenditure projections, in particular in cases where precise information at individual level and on their transition from one status to the next is not available or is unreliable.

The choice of methodology and the various scenarios to be run are limited by the availability, accessibility and quality of long-term care data. Expenditure data from the System of Health Accounts (SHA) are used where available, complemented with proxies calculated based on categories from the European System of Integrated Social Protection Statistics (ESSPROS) and supplemented by national data when necessary.

Dependency rates are based on EU-SILC data ([56]) and dependency is defined as difficulty in performing at least one activity of daily living (ADL) (Katz et al., 1963) ([57]) or at least one instrumental activity of daily living (IADL) (Lawton and Brody, 1969). ([58]) Long-term care is usually defined as a set of services required by people with a reduced degree of functional capacity (whether physical or cognitive) and who therefore depend on help to perform these activities for an extended period of time. The proportion of EU-SILC respondents that report having a severe difficulty in carrying out their daily activities due to a health problem lasting more than six months is used to obtain a proxy of 'dependency' rates. ([59])

Data on the number of recipients and expenditure per recipient are however only available from national sources.

([56]) EU-SILC: The European Statistics on Income and Living Conditions; see the Eurostat website at: http://epp.eurostat.ec.europa.eu/ortal/page/portal/microdata/eu_silc.

([57]) Activities of daily living (ADL) are the things people normally do in daily living, including any daily activity they perform for self-care (such as feeding, bathing or dressing), work, homemaking and leisure (see Webster's New World Medical Dictionary, Wiley Publishing, 2008). If a person has difficulty in performing at least one of them, he or she is considered ADL-dependent.

([58]) IADL includes shopping, laundry, vacuuming, cooking and performing housework, managing finances and using the telephone.

([59]) Note that this is a conservative proxy as EU-SILC is used to identify 'severe' disability and the AWG definition of long-term care is wider, encompassing people who have one IADL and whose level of disability is therefore relatively mild.

The approach aims at examining the impact of the main factors affecting future long-term care expenditure. Specifically, the methodology (described in Graph II.3.1 below) aims at analysing the impact of changes in the assumptions on:

- The number of elderly people (through changes in the population projections).
- The number of dependent people (through changes in the prevalence rates of dependency). ([60])
- The balance between formal and informal care provision (assuming changes in demand or exogenous changes in the availability of informal carers).
- The balance between home care and institutional care within the formal care system.
- The unit costs of care per recipient (and how they evolve over time for different care settings).

The methodology consists of the following steps:

Step 1: Make a **projection of the dependent and non-dependent population**, broken down by age and gender, using the baseline population projections from Eurostat. The dependent population is assumed to need some form of long-term care, while the non-dependent population is assumed not to be in need of long-term care. This projection is made by taking age- and gender-specific dependency rates ([61]) at the value observed in the base year (estimated using existing indicators of disability from comparable sources) and multiplying them by the baseline population projection ([62]) to obtain the number of dependent people over the projection period.

Step 2: Divide the projected dependent population by age and gender into four groups depending on the type of care they receive, namely (1) **informal care**, which is assumed to have no impact on public spending, (2) **in-kind care at home**, (3) **in-kind care in institutions** and (4) **cash benefits**, with the latter three all having an impact on public spending. The proportions of those in the dependent population that belong to groups 2 to 4 can be derived by dividing the numbers of recipients for each care setting reported by the Member States by the overall dependent population derived from EU-SILC data. ([63]) It is assumed that the difference between the total number of dependent people and the total number of people receiving formal care (at home, in institutions or as cash benefits) is the number of people who rely exclusively on informal care. The proportion of the dependent population that receives informal care can therefore be calculated as a residual by subtracting from the total the proportions of those that receive other types of care.

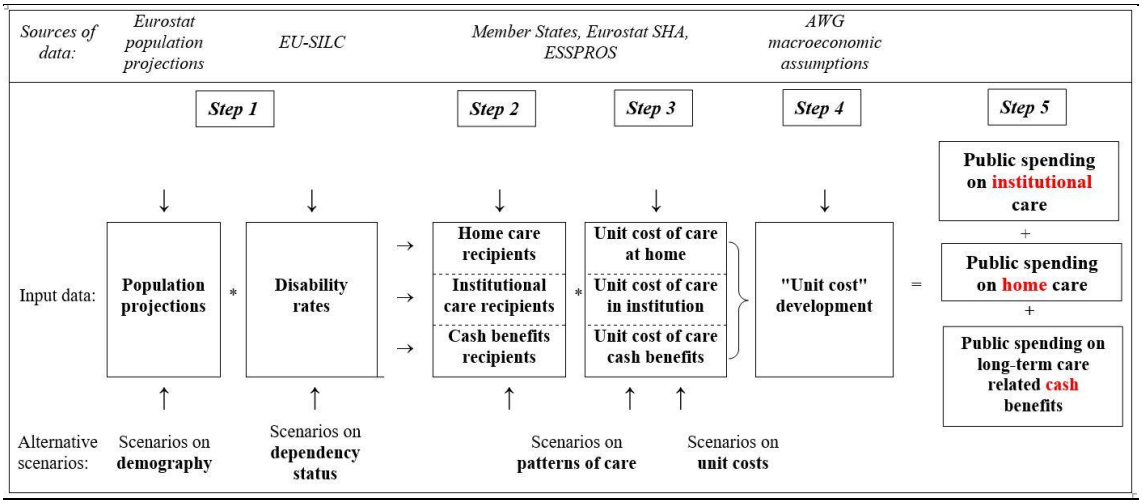
Step 3: Calculate the age-gender profiles of expenditure per capita for the three types of formal long-term care services based on Member States and Norway data, Eurostat SHA and ESSPROS data. For the base year of the projection, the total public expenditure on home care, institutional care and cash benefits for each age and sex group is divided by the number of people receiving in-kind care at home, in long-term care institutions and receiving cash benefits in that group (provided by Member States). This gives us a 'unit cost' for each type of care, age and sex group.

([60]) Based on the original proposal for the development of a long-term care expenditure projection model by Comas-Herrera et al. (2005) that led to the model currently used in the Ageing Report.
([61]) These dependency rates are averaged over the last five years, excluding data breaks.
([62]) The model has been set up so that the projected number of dependent people (i.e. people with disability) will not decrease due to increasing life expectancy, by ensuring that the number of dependent people in a five-year age class cannot be lower than in the preceding one. The practical impact of this adjustment may be rather small.
([63]) The model implicitly assumes that all those receiving home care, institutional care or cash benefits have difficulties with one or more ADLs or IADLs, and that all people classified as dependent receive either informal care, home care, institutional care or cash benefits.

Step 4: The unit costs for the base year calculated in Step 3 are projected by applying indexation assumptions. Cash benefits are generally indexed to GDP per capita, while in-kind benefits are generally indexed to GDP per hours worked. In both cases this is done over the whole projection period. This reflects the current imbalance of the care mix, with a relative deficit of formal care provision as well as the labour-intensive nature of long-term care provision. Exceptions apply for Germany, France and Slovenia, as discussed below in Section 3.2.3.

Step 5: Calculate public spending for the three care settings. For this purpose the number of people receiving each type of care (at home, in institutions and receiving cash benefits) is multiplied by the age-gender specific public expenditure per capita (respectively at home, in institutions and for cash benefits) per year. The total public expenditure on long-term care services is obtained by adding up the expenditure on each setting.

Graph II.3.1: **Schematic overview of the long-term care projection methodology**



Source: European Commission, EPC.

3.2.2. Estimating dependency

Overall, as it is possible to identify those affected by disability, the projection methodology described above is more precise than that used for health care expenditure for which there is no direct indicator of health status and the age-related expenditure profile is used as a proxy. However, an important caveat is that, while dependency rates are an indicator of the need for care, this need does not necessarily translate into actual public expenditure, for at least two reasons.

First, the links between disability levels and demand/use of long-term care are not straightforward. There is some uncertainty at each step involved. Many people with some form of disability can live completely independent lives without the need for care services. Furthermore, dependency also depends on a person's perception of their ability to perform activities associated to daily living. On the one hand, survey data can underestimate some forms of disability. People may not report certain socially stigmatised conditions, such as alcohol and drug-related conditions, schizophrenia and mental degeneration. On the other hand, disability data can be too inclusive and measure minor difficulties in functioning that do not require community care. To minimise these potential issues, the focus is on those dependency levels reported as 'severe' ([64]) according to EU-SILC.

([64]) This is because these people are most in need of income support and services, such as long-term care. This minimises the risk of mistakenly capturing people who are not dependent, although some people with lower levels of dependency may be missed.

Second, the coverage of long-term care systems is not universal in most EU Member States (eligibility conditions may, for example, exclude those with dependency below a certain threshold or those with financial means above a specific threshold) and a significant proportion of long-term care is still provided by unpaid informal carers. As a result, expenditure profiles contain information about the propensity to receive paid formal care, which depends on a number of factors other than dependency that affect the demand for paid care such as household type, availability of informal carers, income or housing situation. Most of these factors are also related to age.

3.2.3. Country-specific legislation on indexation rules of long-term care benefits

If countries can demonstrate that they apply price indexation by law, this is allowed for at least the first 10 years of the projection period. Such exceptions are described below.

Country-specific cases

There are three countries for which the general indexation rules described before are not strictly applied for both *cash* and *in-kind* benefits, given specific legislation. In **Germany**, there is a legislation on the ceiling of public long-term care expenditure. Moreover, under current German rules long-term care benefits *in-kind* and *cash* are indexed to prices. The difference between the amounts financed by the German government and the costs of long-term care is either covered by private insurance or paid by the beneficiaries themselves. The German government is required by law to check every three years the need and extent of adjusting long-term care benefits based on inflation. In **France** and **Slovenia**, *cash* benefits are generally required by law to be indexed to prices.

Although the legislation described above can justify that these Member States apply specific indexation rules, there are limits to the extent to which they can be taken into account in the projection. In an extreme case, indexing all benefits to prices for the duration of the projection period could lead to a significant reduction in long-term care expenditure as a share of GDP and in per capita terms compared to the standard assumptions. This would in fact represent a departure from the 'no policy change assumption' underpinning the baseline.

To account for this legislation; while preserving the realism of the projections, the following assumptions are used for the baseline projections, as in the 2021 Ageing Report:

- For **Germany**, two thirds of the *in-kind* benefit expenditure are indexed in line with the Ageing Report standard assumptions, and the remaining one third in line with prices over the whole projection period. For *cash* benefits, two thirds of the expenditure are indexed in line with prices over the whole projection period and the remaining one third in line with the standard assumptions.

- For **France**, price indexation is applied to *cash* benefit expenditure over the whole projection period, with the rest being indexed according to the standard assumptions.

- For **Slovenia**, price indexation is applied to *cash* benefit expenditure over the first 10 years of the projection, with the rest being indexed according to standard assumptions.

Therefore, this measure of dependency may underestimate the dependency rates for those EU Member States with comprehensive long-term care systems that cover as well relatively low levels of dependency.

3.3. DIFFERENT SCENARIOS FOR PROJECTING PUBLIC LONG-TERM CARE EXPENDITURE

Table II.3.1: **Overview of long-term care scenarios**

	Baseline*	**No healthy ageing scenario**	**Healthy ageing scenario**	**Coverage convergence scenario**	**Cost convergence scenario**	**Risk scenario**	**Additional sensitivity tests**
	I	II	III	IV	V	VI	
Population projection	**Eurostat population projections**	Eurostat population projections	Eurostat population projections	Eurostat population projections	Eurostat population projections	Eurostat population projections	Additional sensitivity tests
Dependency status	**Half of projected gains in life expectancy are spent without disability**	2019-2021 average dependency rates held constant over projection period	All projected gains in life expectancy are spent without disability	Half of projected gains in life expectancy are spent without disability	Half of projected gains in life expectancy are spent without disability	Half of projected gains in life expectancy are spent without disability	Half of projected gains in life expectancy are spent without disability
Age-related expenditure profiles	**2022 cost profiles**	2022 cost profiles	2022 cost profiles	2022 cost profiles	Cost profiles per Member State converge upwards to the EU average by 2070	Cost profiles per Member State converge upwards to the EU average by 2070	2022 cost profiles
Policy setting / Care mix	**Probability of receiving each type of care held constant at 2022 level**	Probability of receiving each type of care held constant at 2022 level	Probability of receiving each type of care held constant at 2022 level	Probability of receiving in-kind formal care converging until 2070 upwards to the EU average	Probability of receiving each type of care held constant at 2022 level	Probability of receiving in-kind formal care converging until 2070 upwards to the EU average	Probability of receiving each type of care held constant at 2022 level
Unit cost development	**In-kind: GDP per hours worked; cash benefits: GDP per capita. Country-specific indexation assumptions****	In-kind: GDP per hours worked; cash benefits: GDP per capita. Country-specific indexation assumptions**	In-kind: GDP per hours worked; cash benefits: GDP per capita. Country-specific indexation assumptions**	In-kind: GDP per hours worked; cash benefits: GDP per capita. Country-specific indexation assumptions**	In-kind: GDP per hours worked; cash benefits: GDP per capita. Country-specific indexation assumptions**	In-kind: GDP per hours worked; cash benefits: GDP per capita. Country-specific indexation assumptions**	Additional sensitivity tests
Elasticity of demand	**1 for top expenditure quartile MS in 2022, for rest 1.1 in 2022 converging to 1 by 2070**	1 for top expenditure quartile MS in 2022, for rest 1.1 in 2022 converging to 1 by 2070	1 for top expenditure quartile MS in 2022, for rest 1.1 in 2022 converging to 1 by 2070	1 for top expenditure quartile MS in 2022, for rest 1.1 in 2022 converging to 1 by 2070	1 for top expenditure quartile MS in 2022, for rest 1.1 in 2022 converging to 1 by 2070	1 for top expenditure quartile MS in 2022, for rest 1.1 in 2022 converging to 1 by 2070	1 for top expenditure quartile MS in 2022, for rest 1.1 in 2022 converging to 1 by 2070

Shaded cells indicate parameters that differ from the baseline assumptions.
* AWG reference scenario in previous reports.
** Unit cost development also includes different country-specific assumptions for Member States with specific legislation on the indexation of benefits. In the 2024 Ageing Report, these countries are France, Germany and Slovenia.
Source: European Commission, EPC.

3.3.1. The baseline

The baseline (previously named 'AWG reference scenario') is used by the European Commission in the context of fiscal surveillance and the European Semester. The main assumptions are described below.

- *Population projections* rely on the baseline population projections by Eurostat.

- *Dependency ratio*: it is assumed that half of the projected longevity gains up to 2070 will be spent in good health and free of disability/dependency. The age-gender specific dependency rates are shifted by ½ of the change in life expectancy (e.g. if life expectancy increases by 2 years by year 2070, then the dependency rate of 80-year-old men in 2070 is that of 79-year-old men in 2022).

- *Age-related expenditure profiles*: The age-related expenditure profiles from 2022 are used, uprated in terms of the unit cost development.

- *Public coverage*: the shares of the older disabled population who receive either informal care, cash benefits, formal care at home or institutional care that is provided or financed by the public sector are kept constant over the projection period.

- *Unit cost development*: Unit costs are generally indexed according to GDP per hour worked in the case of *in-kind* benefits and to GDP per capita in case of *cash* benefits. This reflects the current imbalance of the care mix, with a relative deficit of formal care provision. Furthermore, the sector is highly labour-intensive and productivity gains due to technology are difficult to achieve. Therefore, public expenditure on long-term care is expected to be rather supply- than demand-driven. For that reason, GDP per worker (which reflects the wage evolution in all sectors, including in the care sector), rather than GDP per capita was chosen for *in-kind* benefits, the main driver of unit costs. Country-specific indexation assumptions are used for Member States with specific legislation on long-term care expenditure, i.e. Germany, France and Slovenia (see Section 3.2.3).

- *Elasticity of demand*: As countries become richer, they are likely to spend a larger proportion of their GDP on long-term care. This is modelled in the baseline by including the assumption that the income elasticity starts at 1.1 in base year 2022, falling to 1 by the end of the projection period for those countries that are below the first quartile in terms of expenditure on long-term care as a proportion of GDP. Based on current estimates this is expected for all countries except NL, SE, DK, BE, FI, DE, FR and NO.

3.3.2. No healthy ageing scenario

The 'no healthy ageing scenario' is identical to the baseline apart from its assumption on the dependency status. It assumes that the disability rates of the population of a given age will not improve despite increases in life expectancy. This means, for example, that even if life expectancy increases by two years by 2070, the proportion of 80-year-olds who are disabled in 2070 will be the same as it was in 2022.

Those constant proportions are then applied to the projected changes in the dependent population. Since the prevalence of dependency is kept constant over the projection period, the dependent population evolves precisely in line with the total elderly population. This implies that, in practice, none of the gains in life expectancy translate into an improvement of health.

3.3.3. Healthy ageing scenario

This scenario reflects an alternative assumption about the dependency ratio. Inspired by the so-called 'dynamic equilibrium hypothesis' ([65]), it is analogous to the healthy ageing scenario carried out in the framework of the health care expenditure projections. The age-gender specific dependency rates are shifted in line with changes in life expectancy (e.g. if life expectancy increases by 2 years by year 2070, then the dependency rate of 80-year-old men in 2070 will be that of 78-year-old men today). This results in a gradual decrease over time in the prevalence of disability for each age cohort that goes beyond the gradual decrease in the baseline. Lower dependency rates translate in lower demand for and therefore lower expenditure on long-term care services for each age group.

3.3.4. Coverage convergence scenario

This scenario makes a different assumption in terms of policy setting. The pressure for increased public provision and financing of long-term care services may grow substantially in the coming decades, especially in Member States where the bulk of long-term care is currently provided informally.

This scenario assumes that economic convergence across Member States, the exchange of best practices and growing expectations of the populations will drive an expansion of publicly financed formal care provision into the groups of the population that have not been covered by the public programmes so far (i.e. widening of the coverage). This is modelled as convergence in the provision of *in-kind* formal care. This scenario should be considered as a policy-change scenario, as it assumes a considerable shift in the current long-term care provision mix from informal care to formal in-kind care, while aiming to take into account the high diversity of the current country-specific care mix in terms of the balance between the two types of in-kind care (home care and institutional care).

3.3.5. Cost convergence scenario

This scenario makes a different assumption on the age-related expenditure profiles. It considers the impact of a convergence in the unit costs of care. Similar to the level of coverage, there is a great deal of variation in the unit costs of care across Member States, which is a proxy for the variations in the quantity and quality of care provided to recipients. Just like a convergence in coverage across EU Member States could be expected, an increase in the costs of care (as percentage of GDP per capita) towards the EU average is also a plausible hypothesis (i.e. an expansion in the depth of coverage). The 'cost convergence scenario' is meant to capture the possible effect of a convergence in real living standards (resulting from the macroeconomic assumptions) on long-term care spending.

3.3.6. Risk scenario

The risk scenario (previously named 'AWG risk scenario') differs from the baseline with regards to the assumptions on age-related expenditure profiles and the policy settings. It is intended to capture the impact of cost drivers additional to demography and health status, i.e. the likely effect of a convergence in real living standards on long-term care spending.

3.3.7. Other sensitivity tests

Several sensitivity tests modify the baseline by making alternative assumptions on factors such as migration, fertility, employment, productivity and life expectancy. The full list and description of the assumptions can be found in Part I, Chapter 5 of this report.

([65]) Rechel et al. (2020).

4. EDUCATION

4.1. INTRODUCTION

Government expenditure on education is included in age-related spending as it is largely affected by demographic developments, due to the pronounced age profile of enrolment rates. Education expenditure represented around 5% of GDP on average in the EU in 2004-2021 (around 10% of total general government spending), making it the third largest component of ageing costs. ([66]) Expenditure ratios vary considerably across Member States, from a minimum of 3.5% of GDP in Romania to a maximum of 6.6% in Denmark and Sweden (see Table 1).

The projection exercise mainly aims at assessing the impact of demographic changes per se on general government education expenditure. ([67]) Therefore, baseline projections are conducted under the assumption of 'no policy change'. However, an alternative scenario – assuming policies favouring higher enrolment rates – and additional stress tests aimed at capturing macroeconomic uncertainty, are also considered.

Table II.4.1: **Education expenditure, % of GDP**

	2004	2007	2016	2018	2020	2021	avg 2004-2021
BE	5.6	5.5	6.2	6.2	6.6	6.3	6.1
BG	4.0	3.6	3.4	3.5	3.9	4.3	3.8
CZ	4.8	4.3	3.9	4.6	5.1	5.1	4.6
DK	6.6	5.9	6.8	6.4	6.4	6.0	6.6
DE	4.1	3.9	4.2	4.3	4.6	4.5	4.2
EE	6.2	5.7	5.7	6.2	6.4	5.9	6.1
IE	4.1	4.3	3.4	3.2	3.2	3.0	4.1
EL	4.1	3.6	4.0	4.1	4.5	4.1	4.1
ES	4.1	4.0	4.1	4.0	4.7	4.6	4.2
FR	5.5	5.3	5.4	5.3	5.4	5.2	5.4
HR	5.6	5.0	4.9	4.8	5.6	5.2	5.1
IT	4.3	4.4	3.9	3.9	4.3	4.1	4.2
CY	5.8	5.6	5.5	5.0	5.8	5.5	5.7
LV	5.8	5.5	5.5	5.8	5.8	5.6	5.8
LT	6.5	5.0	4.8	4.5	5.2	4.8	5.3
LU	4.9	4.3	4.3	4.6	5.0	4.7	4.7
HU	5.9	5.5	5.0	5.0	4.8	5.0	5.2
MT	5.5	5.2	5.1	5.0	5.7	5.5	5.3
NL	5.1	5.1	5.3	5.1	5.2	5.1	5.3
AT	4.9	4.7	4.9	4.8	5.1	4.9	4.9
PL	5.6	5.7	5.0	5.0	5.1	4.9	5.4
PT	6.6	5.9	4.8	4.4	4.7	4.6	5.5
RO	3.6	3.9	3.4	3.1	3.7	3.2	3.5
SI	6.4	5.9	5.5	5.4	5.7	5.7	6.0
SK	3.8	3.7	3.9	3.9	4.4	4.3	4.1
FI	6.2	5.8	6.0	5.5	5.9	5.7	6.1
SE	6.6	6.3	6.6	6.9	7.0	6.7	6.6
NO	5.6	4.8	5.6	5.4	5.8	5.0	5.2
EA	5.3	4.9	4.9	4.8	5.2	5.0	5.1
EU	5.3	4.9	4.9	4.8	5.2	5.0	5.1

Only selected years over the period 2004-2021 are shown.
Source: European Commission, EPC – based on Eurostat, Classification of the functions of government (COFOG) data.

Long-term developments of public education expenditure are affected by two opposite trends. On the one hand, the projected decline in the number of young people is expected to reduce public spending (all else being equal). On the other hand, the increasing enrolment rates, longer periods spent in education, and persistently rising (unitary) costs of tertiary education are likely to put upward pressure on total education expenditure.

The methodology used in the Ageing Report is highly stylised and, as such, cannot fully reflect the complexities of Member States' education systems. It has been set out with a view to use harmonised datasets, secure equal treatment across countries, and be consistent with wide labour market developments, particularly on participation rates.

Projections of *total* expenditure on public education require consideration of a number of important methodological issues, namely (i) the definition (or perimeter) of education activities; (ii) that studying

([66]) Based on the classification of the functions of government (COFOG) data. In the same period, health expenditure represented 6.8% of GDP (and 14.2% of total general government expenditure), old-age (i.e. pension) expenditure represented 10% of GDP (and 21% of total general government expenditure), while 'social protection' (also including the 'old-age' (pensions) function) represented 19.1% of GDP (and 39.7% of total general government expenditure).

([67]) Many other factors also have an important bearing on government education expenditure, for example the involvement of the general government in the education system, the duration of mandatory education, progress in enrolment rates in upper secondary and tertiary education, relative wages in the education sector, the average size of classes, and discretionary saving measures to curb expenditure trends.

can take place on a part-time basis after compulsory education; and (iii) that there are various outlays for public spending on education. ([68])

4.2. METHODOLOGY TO PROJECT TOTAL EXPENDITURE ON PUBLIC EDUCATION

The methodology used in the Ageing Report is based on a 'quasi-demographic' approach, since it relies on both demographic and participation rate projections. The projections rely on the following elements:

– The use of the UOE ([69]) data collection, which covers enrolment rates, staff levels, the labour force status of students (i.e. part time versus full time) ([70]), and detailed data on total public expenditure. Data are disaggregated by single age and international standard classification of education (ISCED) levels. ([71]) As in the 2021 Ageing Report, projections are run separately for four ISCED groupings, representing primary education (ISCED 1), lower secondary education (ISCED 2), upper secondary education (ISCED 3 and 4), and tertiary education (ISCED 5 to 8).

– Simplified assumptions on enrolment rates, with enrolment in primary and lower secondary education levels assumed to be compulsory, while enrolment in upper secondary and tertiary education levels depends on labour market outcomes, as changes in participation rates affect enrolment rates (in the opposite direction).

– Projections of total expenditure on public education rely on two components: (1) the number of students (see Section 4.2.1); and (2) expenditure per student on public education (see Section 4.2.2).

4.2.1. Number of students

Compulsory levels

For the compulsory levels considered (ISCED 1 and 2), enrolment rates per single age are assumed to remain constant at the level observed in the base year of the projections. ([72]) The projected number of students enrolled in ISCED levels 1 and 2 is obtained by multiplying for each specific age group, the enrolment rate of the base year by the corresponding population projection.

Non-compulsory levels

Enrolment rates for ISCED groupings 3-4 and 5-8 consider labour market developments according to the following formula (see Annex 13 for a derivation):

([68]) Public spending on education includes direct expenditure on educational institutions as well as educational-related public subsidies given to households and administered by educational institutions. Direct expenditure on educational institutions takes two main forms: (i) direct purchases by the government of educational resources to be used by educational institutions (e.g. direct payments of teachers' wages by the education ministry); or (ii) payments by the government to educational institutions that have the responsibility for purchasing educational resources themselves (e.g. a block grant to a university) (OECD, 2022).
([69]) UNESCO-UIS/OECD/Eurostat Data Collection on Education Statistics. The current version of classification is ISCED 2011 which replaced ISCED 1997, used already in the 2021 Ageing Report. The correspondence table between the two classifications is reported in the annex.
([70]) Students are classified between full-time and part-time based on their intended study load within the reference school or academic year. A full-time student is one who is enrolled in an education programme whose intended study load amounts to at least 75% of the normal full-time annual study load. A part-time student is one who is enrolled in an education programme whose intended study load is less than 75% of the normal full-time annual study lead (UNESCO-UIS/OECD/EUROSTAT (UOE), 2019).
([71]) However, data are not disaggregated by sex.
([72]) In particular, the levels of enrolment rates for ISCED 1 and 2 observed in the base year of the projections are derived from historical information (i.e. using the most recent available data). For details, see Annex 13.

$$e_{i,t} = \frac{1 - p_{i,t} - i^*_{i,t}}{1 - \alpha_{i,t}} \tag{4.1}$$

where $e_{i,t}$ is the total enrolment rate (both full and part-time students) for single age cohort *i* in period *t*; $p_{i,t}$ is the participation rate; $\alpha_{i,t}$ is the fraction of part-time students in the total; and $i^*_{i,t}$ is the fraction of inactive individuals minus full-time students over the total population.

Equation (4.1) will be implemented in terms of differences to a base period (*b*):

$$e_{i,t} - e_{i,b} = -\frac{\overline{\kappa}_{i,b}}{1 - \overline{\alpha}_{i,b}} * \left(p_{i,t} - p_{i,b}\right) \tag{4.2}$$

where

$$0 \leq \overline{\kappa}_{i,b}, \overline{\alpha}_{i,b} \leq 1$$

where $\overline{\kappa}_{i,b}$ is the ratio between full-time students and total inactive individuals; $\overline{\alpha}_{i,b}$ is the fraction of part-time students over the total number of students. These two ratios are assumed to remain constant throughout the projection period.

According to Equation (4.2), an increase in the participation rate leads to a decrease in the enrolment rate. ([73]) Enrolment rates per age are then broken down into ISCED levels (3-4 and 5-8) values, based on student shares in the base year.

4.2.2. Expenditure per student and total expenditure on public education

Key data

Expenditure per student on public education, expressed in purchasing power standards (PPS), varies significantly across educational level and country (see Table II.4.2). Higher levels of expenditure are generally found for the ISCED 3-4 and 5-8 levels. However, in some countries, expenditure tends to be higher for primary and lower secondary education (ISCED 1 and 2 levels). This variability reflects a number of factors, such as wages of teachers and non-teaching staff, different class sizes, differences in capital expenditure, as well as particular national circumstances. ([74])

([73]) To the extent that individuals entering the labour force are likely to have been previously involved in education activities. The Labour Force Survey (LFS) variable MAINSTAT, which describes the main labour market status, was used to assess the distribution of inactive individuals by age, distinguishing between schooling and other forms of inactivity, such as retirement and domestic tasks.

([74]) For example, smaller EU Member States tend to send a higher fraction of their tertiary students abroad. Other things being equal, this tends to raise expenditure levels.

Table II.4.2: **Expenditure per student on public education in PPS - 2019**

	ISCED 1	ISCED 2	ISCED 3-4	ISCED 5-8
BE	7.896	10.189	10.620	14.767
BG	3.889	5.027	3.659	4.972
CZ	5.021	8.590	7.473	9.351
DK	8.231	9.559	8.879	18.954
DE	7.211	8.885	9.523	13.608
EE	6.253	6.529	5.134	8.578
IE	5.976	6.847	8.324	12.169
EL	4.683	4.662	3.397	2.196
ES	5.124	6.289	7.216	7.250
FR	6.206	7.755	10.021	10.345
HR	9.049	:	4.830	5.181
IT	6.810	7.178	7.195	7.267
CY	8.205	9.851	10.813	4.783
LV	4.530	4.611	6.050	5.176
LT	4.752	4.719	5.336	5.680
LU	14.618	16.784	16.038	35.026
HU	4.937	4.309	5.055	7.002
MT	6.349	10.157	10.361	16.490
NL	7.013	9.567	9.031	14.019
AT	8.738	11.262	10.706	13.209
PL	5.628	5.621	4.815	7.856
PT	5.848	7.652	7.037	5.642
RO	2.070	4.540	4.092	6.788
SI	6.269	7.884	6.618	10.264
SK	:	:	:	:
FI	7.307	11.655	6.798	12.541
SE	9.181	9.331	10.755	20.741
EA	6.991	8.471	8.160	10.747
EU	6.607	7.978	7.684	10.764

Purchasing Power Standards. Based on full-time equivalents (FTE) by educational level and programme orientation.
Source: European Commission, EPC - based on Eurostat (UOE 2019) data. Simple averages are shown for the EU and the euro area.

Methodology

The expenditure (per student) on public education can be broken down into four main components: (i) expenditure on staff compensation (i.e. gross wages and salaries of teaching and non-teaching staff); (ii) other current expenditure; (iii) capital expenditure; and (iv) transfers (e.g. scholarships and public subsidies to private education institutions).

On this basis, we can compute the total expenditure on public education (as percentage of GDP). This is done across all ISCED levels: ISCED 1, ISCED 2, ISCED 3-4, and ISCED 5-8. ([75])

$$\frac{\sum_i EDU_t^i}{GDP_t} = \frac{\sum_i \left[W_t^i + O_t^i + K_t^i + R_t^i\right]}{GDP_t} \qquad (4.3)$$

([75]) It should be stressed that no attempt is made to project total expenditure on education, as ISCED 0 level expenditure (pre-primary and not allocated by level) is not covered by the analysis.

where EDU_t^i is expenditure on education in ISCED level i and year t, W_t^i is expenditure on staff compensation, O_t^i is other current expenditure, K_t^i is capital expenditure, R_t^i is transfers; and i stands for the ISCED groups: 1, 2, 3-4, and 5-8.

In line with past Ageing Reports, the average expenditure of the last two years of available data is used as the starting point.

To project the expenditure-to-GDP ratio in the baseline, the main assumptions are the following:

– Expenditure per capita grows in line with labour productivity. Per capita values are defined either in terms of education staff or students. Specifically, the average compensation is defined per member of staff ($\frac{W_t^i}{T_t^i}$), while the other three expenditure variables are defined in terms of student ratios ($\frac{O_t^i}{S_t^i}$, $\frac{K_t^i}{S_t^i}$, $\frac{R_t^i}{S_t^i}$), where T_t^i and S_t^i are the number of workers in the education sector and students, respectively. ([76])

– The education staff-to-student ratio will remain constant over the projection period, which implies that staff adjusts instantaneously and fully to demographic changes.

Assuming that per capita variables grow in line with labour productivity is sufficient to derive the following compact general formula for the projection of the expenditure-to-GDP ratio:

$$\frac{\sum_i EDU_t^i}{GDP_t} = \left[\frac{\sum_i W_0^i}{GDP_0} * \overline{IT}_t + \frac{\sum_i \left[O_0^i + K_0^i + R_0^i \right]}{GDP_0} * \overline{IS}_t \right] * \frac{IP_t}{IG_t} + CE_t \qquad (4.4)$$

where IT_t^i, IS_t^i, IP_t^i, and IG_t^i are indices (assuming the value of 1 in the base period) of respectively, staff, students, labour productivity, and GDP. ([77]) A bar over an index represents one calculated over all ISCED levels considered. ([78]) CE_t is the composition effect, which is usually a small number compared with the total expenditure-to-GDP ratio. ([79])

Equation (4.4) expresses the expenditure-to-GDP ratio as a function of base period ratios, and indexes for staff, students, labour productivity and GDP.

In the baseline, which assumes a constant ratio of staff-to-students (i.e. $IT_t^i = IS_t^i$), equation (4.4) can be further simplified to:

([76]) These modelling assumptions involve considerable simplifications of the determinants of the unit costs of education. A key variable missing is class size. Research suggests that costs tend to change discontinuously with the creation/abolition of classes. Given the difficulty in obtaining data on the relationship between class size and costs, a reasonable approximation may be using student-to-staff ratios.

([77]) An index $IX_t = \frac{X_t}{X_0}$ measures the ratio between the values of variable X in the current period t and in the base period 0.

([78]) $\overline{IT}_t = \frac{\sum_i T_t^i}{\sum_i T_0^i}$ and $\overline{IS}_t = \frac{\sum_i S_t^i}{\sum_i S_0^i}$.

([79]) The composition effect is given by: $CE_t = \left[\frac{\sum_i W_0^i * \left\{ IT_t^i - \overline{IT}_t \right\}}{GDP_0} + \frac{\sum_i \left[O_0^i + K_0^i + R_0^i \right] * \left\{ IS_t^i - \overline{IS}_t \right\}}{GDP_0} \right] * \frac{IP_t}{IG_t}$

$$\frac{\sum_i EDU_t^i}{GDP_t} = \frac{\sum_i EDU_0^i}{GDP_0} * \frac{\overline{IS}_t * IP_t}{IG_t} + CE_t \quad (4.5)$$

Equivalently, equation (4.5) can also be written as:

$$\frac{\sum_i EDU_t^i}{GDP_t} = \frac{\sum_i EDU_0^i}{GDP_0} * \frac{\overline{IS}_t}{IE_t} + CE_t \approx \frac{\sum_i EDU_0^i}{GDP_0} * \frac{\overline{IS}_t}{IE_t} \quad (4.6)$$

where IE_t is the employment index. ([80])

In the baseline, equation (4.6) allows the following straightforward interpretation: projections for the expenditure-to-GDP ratio are obtained by 'inflating' base period values by a students and labour productivity index and by 'deflating' them by a GDP index. ([81]) There are two sources for the increase in expenditure (ratios): the (average) number of students and per capita costs that are assumed to grow in line with labour productivity, conversely GDP growth 'deflates' expenditure ratios.

4.3. SENSITIVITY ANALYSIS

In addition to the baseline described above, a set of sensitivity tests is run.

– *High enrolment rates* – as in the 2021 Ageing Report, a scenario is conducted, assuming a gradual upward convergence of enrolment rates (to be completed by 2045). In particular, enrolment rates in ISCED levels 3-4 and 5-8 are assumed to rise towards the average of the three best performers in the EU. Such a scenario implicitly assumes a policy change supporting such convergence.

– *Additional sensitivity tests:* as in the 2021 Ageing Report and as done for the other expenditure items, a range of uniform shocks to the baseline projection is applied across different scenarios (e.g. higher/lower productivity, higher/lower migration, lower fertility). ([82])

([80]) The approximation assumes that CE_t is a small number.
([81]) The discrepancy being given by the composition effect (CE_t).
([82]) A nascent literature also points to potential impacts of the COVID-19 pandemic on education, notably in terms of lower educational achievement. In turn, the latter might affect future job prospects, lower earnings, and even long-term economic growth (via lower productivity). However, the available studies are still quite heterogeneous and depend on the subject tested, previous performance, age and social background. Overall, preliminary results point to higher learning deficits in countries with lower income, at global level. The pandemic can be expected to have exacerbated the educational gap between children from different socioeconomic backgrounds (with more adverse effects on students from lower socio-economic backgrounds), but also between richer and poorer countries (Betthäuser et al., 2022; European Commission, 2022). Additional adverse impacts on growth (via lower productivity) may even stem from the impact of long COVID on children's educational outcomes (although severe COVID-19 is less common for children than for adults, and research on the topic is still quite scarce – Chua et al., 2021).

ANNEX 1

Projecting labour force developments using the Cohort Simulation Model

Overall approach

The Cohort Simulation Model (CSM) calculates entry rates to and exit rates from the labour market by gender and cohort. The methodology was initially developed by the OECD ([83]), but its use by the Commission for Ageing Report purposes is based on Carone (2005), with the particular feature of single ages instead of the average of 5-years age groups.

The dynamic cohort approach is based on the estimates of labour market exit and entry rates of a 'synthetic' generation/cohort. The cohort is 'synthetic' because, due to a lack of individual longitudinal data on labour market transitions, the same individual cannot be followed over time. Instead, it is assumed that those individuals aged x+1 at year t+1 are representative of the same generation observed in the previous year (aged x at time t). Due to the lack of specific information on each individual's behaviour, this assumption ignores inflows and outflows from the labour market that cancel out. ([84])

Participation rate projections are produced by applying the weighted average entry and exit rates observed over the period 2013-2022 by gender and single age to the period 2023-2070. Specifically, average entry rates observed for the period 2013-2022 are kept constant over the entire projection period. For example, average entry rates for persons aged x, calculated for the period 2013 to 2022 (with x varying between 15 and 74 years of age), are applied to persons aged x over the projection period of 2023 to 2070 to calculate future participation rates. This way, the CSM captures 'cohort effects', namely the one resulting from the stronger attachment of women of the youngest cohorts to the labour market.

The CSM is also able to incorporate a broad typology of pension reforms, such as increases in the statutory retirement age, the convergence of lower statutory retirement ages for women to those for men, the linking of the statutory retirement age to changes in life expectancy, the tightening of conditions for early retirement, and changes in incentives affecting the retirement decision. The likely impact of pension reforms is incorporated in the labour force projections by appropriately changing average labour market exit probabilities for people aged 51-74.

The calculation of entry rates

Entry rates into the labour market from inactivity are calculated as follows. The calculation of the number of people that enter the labour market (coming from inactivity) takes into account the size of each gender/age group. It can be expressed as:

$$NLF_x^{t+1} = (WAP_{max} - LF_x^t) - (WAP_{max} - LF_{x+1}^{t+1})$$

$$\text{with } LF_x^t + NLF_{x+1}^{t+1} \leq WAP_{max}$$

where *NLF* is the number of people expected to become active between ages x and x+1; WAP_{max} is the maximum working age population that can potentially enter the labour force, which is usually slightly lower than the overall civilian population at working age, due for example to illness or inability; and *LF* is the number of active people (thus in the labour force) aged x in year t and aged x+1 in year t+1.

By multiplying and dividing by the population aged x at time t, which is supposed to be the same as the population aged x+1 at time t+1, the following equation is obtained:

([83]) See Burniaux et al. (2003) and Scherer (2002), which developed a dynamic version of the methodology in Latulippe (1996).

([84]) For example, this means that if in year t there are 100 persons aged x in the labour force and in the following year, thus aged x+1, these same individuals leave the labour force (for whatever reason, e.g. discouragement, death or emigration), but they are replaced by 100 other individuals aged x+1, previously not part of the labour force, no change in the size of our 'synthetic' cohort is observed. As a consequence, the calculated net rates of exit and entry are equal to zero, while the actual (gross) values are 100%.

$$NLF_x^{t+1} = [(PR_{max} - PR_x^t) - (PR_{max} - PR_{x+1}^{t+1})] \times POP_x^t$$

where PR_{max} is the upper limit to the participation rate, assumed at 0.99 for both male and female. ([85]) Thus, the rate of entry R_{en} can be calculated by dividing the number of people expected to become active by the number of people outside the labour force at time t, that is:

$$R_{en} = \frac{NLF_x^{t+1}}{WAP_{max} - LF_x^t} = [(PR_{max} - PR_x^t) - (PR_{max} - PR_{x+1}^{t+1})] \times \frac{POP_x^t}{WAP_{max} - LF_x^t}$$

which, taking into account that $PR_x^t = \frac{LF_x^t}{POP_x^t}$ and $PR_{max} = \frac{WAP_{max}{}_x^t}{POP_x^t}$, can be reformulated as:

$$R_{en_{x+1}} = [(PR_{max} - PR_x^t) - (PR_{max} - PR_{x+1}^{t+1})] \times \frac{1}{PR_{max} - PR_x^t}$$

or $$R_{en_{x+1}} = \left[1 - \frac{(PR_{max} - PR_{x+1}^{t+1})}{PR_{max} - PR_x^t}\right] \geq 0$$

or $$R_{en_{x+1}} = \frac{(PR_{x+1}^{t+1} - PR_x^t)}{(1 - PR_x^t)} \geq 0 \; when \; PR_{max} = 1$$

After re-arranging, the analytical formulation used for projecting participation rates based on these entry rates is obtained:

$$PR_{x+1}^{t+1} = PR_x^t + R_{en_{x+1}} \times (PR_{max} - PR_x^t)$$

Thus, projections of participation rates for each single-year cohort x+1 can be calculated by applying the entry rates observed in a given year or period over the projection period (t = 2023-2070). In practice, the entry rates for each age are calculated on the basis of the average participation rates observed over the period 2013-2022.

The calculation of exit rates

In the same way, when participation rates for two adjacent single-year age groups are falling, an *exit rate from the labour market* (the net reduction in the labour force relative to the number of people who were initially in the labour force in the same cohort the year before) can be calculated as follows. The number of persons that leave the labour market at time t+1 is equivalent to:

$$OP_x^{t+1} = LF_x^t - LF_{x+1}^{t+1}$$

where *OP* is the number of people expected to be outside the labour force between age x and x+1, and *LF* is the number of active people (thus in the labour force) aged x in year t and aged x+1 in year t+1.

By multiplying and dividing by the population aged x at time t, which is supposed to remain the same as the population aged x+1 at time t+1, one gets:

$$OP_x^{t+1} = (PR_x^t - PR_{x+1}^{t+1}) \times POP_x^t$$

where *PR* are the participation rates.

([85]) Burniaux et al. (2003) use as maximum values for the male/female participation rates 0.99/0.95.

Thus, the (conditional) rate of exit, R_{ex}, can be calculated by dividing the number of people that leave the labour force at time t+1 by the number of people active at time t. That is,

$$R_{ex} = \frac{OP_x^{t+1}}{LF_x^t} = (PR_x^t - PR_{x+1}^{t+1}) \times \frac{POP_x^t}{LF_x^t} = 1 - \frac{PR_{x+1}^{t+1}}{PR_x^t}$$

As a consequence, R_{ex} can also be used to project participation rates of older workers as:

$$PR_{x+1}^{t+1} = \left(1 - R_{ex_{x+1}}\right) \times PR_x^t$$

or $$PR_{x+n}^{t+n} = (1 - R_{ex_{x+1}})(1 - R_{ex_{x+2}})(1 - R_{ex_{x+3}}) \ldots \left(1 - R_{ex_{x+n-1}}\right) \times PR_x^t$$

Projecting the labour force

Participation rates by single age and gender are projected in accordance with the above approach. Aggregate values for participation rates are a weighted average of participation rates by single age and gender using population shares as weights. For example, the average participation rate *PR* for age group $\underline{a}$ (lower age) to $\overline{a}$ (upper age) in period *t* is calculated as:

$$PR\left(\underline{a}, \overline{a}, t\right) = \sum_{a=\underline{a}}^{\overline{a}} \sum_{g=m,f} PR_{a,g}^t \times p_{a,g}^t$$

where *a* is the age index, *g* is the gender index, $PR_{a,g}^t$ is the participation rate for single age *a* and gender *g* in period *t*, *pop* is the population; and *p* is the structure of the population:

$$p_{a,g}^t = \frac{pop_{a,g}^t}{\sum_{a=\underline{a}}^{\overline{a}} \sum_{g=m,f} pop_{a,g}^t}$$

The labour force ($LF_{a,g}^t$) or labour supply (for each single age and gender combination) is then calculated by multiplying the age/gender labour force participation rate with the corresponding population projection:

$$LF_{a,g}^t = PR_{a,g}^t \times pop_{a,g}^t$$

The total labour supply for age group $\underline{a}$ (lower age) to $\overline{a}$ (upper age) in period *t* is then calculated as follows:

$$LF\left(\underline{a}, \overline{a}, t\right) = \sum_{a=\underline{a}}^{\overline{a}} \sum_{g=m,f} LF_{a,g}^t = \sum_{a=\underline{a}}^{\overline{a}} \sum_{g=m,f} PR_{a,g}^t \times pop_{a,g}^t$$

ANNEX 2
Estimating the average exit age from the labour market

The CSM allows estimating the 'average exit age' from the labour force, which can be used as an approximation for the effective retirement age. The methodology is based on the comparison of labour force participation rates over time (see Annex 1).

The conditional probability for each person to stay in the labour force at age *a* in year t (conditional on staying in the labour force in year t-1), can be calculated by using the observed activity rates *PR* as follows:

$$Probability\ to\ stay = cProb_{a,t}^{stay} = \frac{PR_a^t}{PR_{a-1}^{t-1}}\ with\ 0 \leq cProb_{a,t}^{stay} \leq 1$$

Thus, at time *t*, the conditional probability for each person to exit at age *a* ($cProb_{a,t}^{ex}$) is equal to:

$$Probability\ of\ exit = cProb_{a,t}^{ex} = 1 - \frac{PR_a^t}{PR_{a-1}^{t-1}} = 1 - cProb_{a,t}^{stay}\ with\ 0 \leq cProb_{a,t}^{ex} \leq 1$$

Assuming that nobody retires before minimum age *m* (e.g. *m* = 50), the (unconditional) probability that any person will still be in the labour force (that is the probability of not retiring before a given age *a*) can be calculated as the product of all the conditional probabilities to stay in the labour force from age *m* to age *a-1*:

$$Probability\ of\ not\ retiring\ before\ age\ a = Prob_{a,t}^{noret} = \prod_{i=m}^{a-1} cProb_i^{stay}$$

Thus, the probability of retiring at age *a* can be calculated as the product of the unconditional probability of not retiring from age *m* to *a* and the (conditional) probability of exit:

$$Probability\ of\ retiring\ at\ age\ a = Prob_{a,t}^{ret} = Prob_{a,t}^{noret} \times cProb_i^{ex}$$

By assuming that everybody will be retired at a given age *M* (e.g. *M* = 74), the sum of the probabilities of retiring between the minimum age *m* and the maximum age *M* is equal to 1:

$$\sum_{a=m}^{M} Prob_a^{ret} = 1$$

The average exit age from the labour market is then calculated as the weighted sum of the retirement ages (between the minimum and the maximum age of retirement, assumed 50 and 74 respectively), where the weights are the probabilities of retiring at each age *a*:

$$Average\ exit\ age = aea = \sum_{a=m}^{M} Prob_a^{ret} \times a$$

ANNEX 3
Methodology underpinning potential GDP growth projections

Description of the production function framework

The production function framework used is based on the standard specification of the Cobb-Douglas production with constant returns to scale, where GDP can be expressed formally as total output represented by a combination of factor inputs multiplied by total factor productivity (TFP), which embeds the technological level. ([86])

$$Y = TFP \cdot L^{\beta} \cdot K^{1-\beta}$$

where:

- Y is total output (GDP).
- L is the supply of labour (total hours worked).
- K is the stock of capital.
- β is the labour share, i.e. the share of labour costs in total value-added. It is set at 0.65. ([87])

As a result, labour productivity growth comes down to the following expression

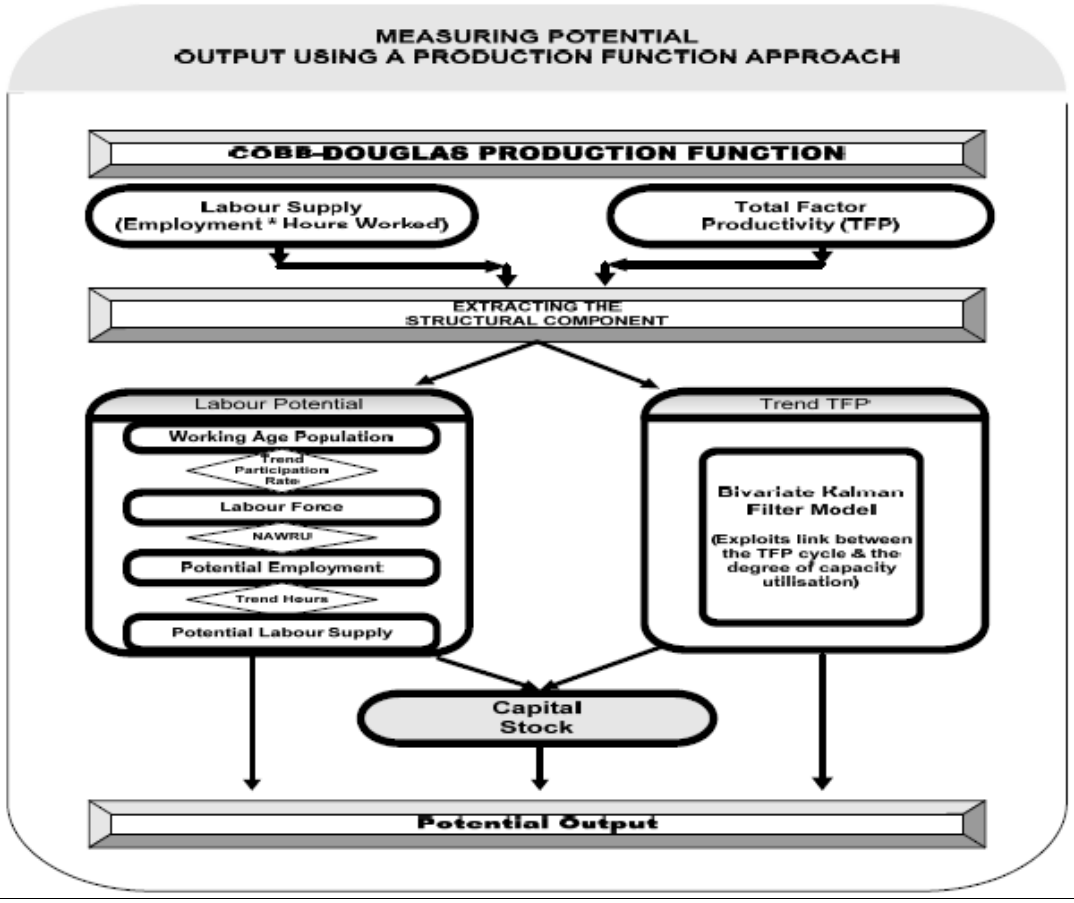
$$\left(\frac{\dot{Y}}{L}\right) = \dot{TFP} + (1-\beta) \cdot \left(\frac{\dot{K}}{L}\right)$$

Thus, the projection of TFP growth and the growth in capital per hour worked, so called *capital deepening*, are the key drivers of projected labour productivity over the medium run.

In the long run, according to the standard neo-classical growth model ([88]), the economy should reach its equilibrium, also called steady state or balanced growth path, where the ratio of capital stock to labour expressed in efficiency unit, $K/(L \cdot TFP^{\frac{1}{\beta}})$, remains constant over time. As a result, the capital stock per hour worked grows at the same pace as $TFP^{\frac{1}{\beta}}$. Therefore, labour productivity growth (i.e. output per hour worked growth) coincides with TFP growth divided by the labour share.

([86]) See Havik et al. (2014).
([87]) Although there is some debate about the recent and observed decline of the labour share, most economists assume that it will remain broadly constant in a long run perspective, while allowing for a variation in the short-term. This rule is uniformly applied in the projections to all Member States to allow for consistent cross-country comparisons of the results. The assumption is also well-founded in economic theory. If the real wage is equal to the marginal productivity of labour, it follows that under the standard features of the production function, real wage growth is equal to labour productivity growth and real unit labour costs remain constant.
([88]) Also known as the Solow growth model, see Solow (1956).

Graph II.A3.1: **Overview of the production function approach**



Source: Havik et al. (2014).

It should also be noted that, in the steady state, the contribution of capital deepening to output growth is a simple function of TFP ([89]), which becomes the single driver of labour productivity:

$$contrib\left(\frac{K}{L}\right) = (1-\beta)\cdot\left(\frac{\dot{K}}{L}\right) = \frac{(1-\beta)}{\beta}\cdot T\dot{F}P$$

As all these variables can be influenced by the business cycle in the short term, it is safer to project the potential output, i.e. the output adjusted for cyclical movements in the economy, than the actual output. This requires estimating the trend components for the individual production factors, except for the capital stock, which can only adjust in the long run.

Estimating potential output therefore amounts to removing the cyclical component from both TFP and labour. Trend TFP is obtained using a detrending technique. Potential labour input is the total labour obtained when the unemployment rate equals the structural unemployment rate (NAWRU). It equals *LF·(1-NAWRU)·Hours*, where *LF* stands for total labour force and *Hours* for average hours worked per worker. The potential output denoted *Yp* can be expressed in logarithm as the sum (in logarithm) of *trend*

([89]) With the assumption of a long-run TFP growth rate equivalent to 0.8% per annum in the baseline scenario (see Section 3.5), this implies a long-run contribution of capital deepening to labour productivity growth equal to 0.4% and hence a labour productivity growth rate of 1.2%.

TFP, potential labour input weighted by the labour share in total value-added and the total capital stock multiplied by one minus the labour share. More formally, we get:

$$Log(Yp)=Log(trendTFP)+\beta\cdot Log(LF\cdot(1-Nawru)\cdot Hours)+(1-\beta)\cdot LogK$$

Graph II.A3.1 illustrates the building blocks of the production function used in the medium-term potential growth projection and the T+10 methodology developed by the Commission and the EPC's Output Gap Working Group (OGWG).

Following the practice used for the 2021 Ageing Report, the AWG and EPC decided to use the OGWG methodology for potential growth and its components until T+10 (2032).

Potential GDP projections for the first ten years ('T+10' projections)

The T+10 methodology was first used for the 2015 Ageing Report for projecting potential GDP growth for the first ten years because it had several advantages compared to previous approaches:

More structural information: The T+10 approach marks an improvement with respect to the incorporation of additional information regarding the structural determinants of growth. This is explicitly the case with respect to the T+10 NAWRU anchor and is implicitly driving the rationale behind the capital formation and participation rate forecasts over the period T+6 to T+10. There are clear advantages from introducing more structural information into the T+10 methodology, including (i) it is easier to explain country differences; and (ii) it allows for a quantitative evaluation of structural reforms.

T+10 NAWRU anchor versus reversion to a pre-crisis NAWRU level: The T+10 NAWRU anchor represents a significant methodological improvement over the previous method by anchoring medium term NAWRU developments to a long run unemployment rate which is estimated from the main structural determinants of labour market trends. Alternative approaches that do not rely on economic information were discussed and eventually abandoned. In particular, approaches relying on the concept of a return to the pre-crisis level for the NAWRU appeared impractical.

'Structural' approach to investment: The debate in relation to the assumption to be used for the T+10 capital formation projections was initiated with a discussion on the relative merits of pursuing a structural model of investment. This option was not pursued however since there would be only limited gains relative to the 'capital rule' approach which was finally adopted. The latter approach effectively amounts to a structural model of investment since it links investment to its fundamental long run drivers, namely labour supply and TFP.

A more credible evolution for the path of participation rates: The approach adopted for projecting participation rates up to T+10 constitutes a balanced mixture of the information emanating from time series trends with the solid structural information derived from the cohort method. An important improvement is the introduction of a technical transition rule for smoothing the breaks in participation rates which occurred in the forecasts using the T+5 and the T+10 methodologies.

Internally consistent TFP projections up to T+10: The current T+6 to T+10 TFP projections are arguably superior to those used until the 2015 Ageing Report since the T+5 and T+10 estimates are now both produced with the same bivariate Kalman filter approach and are consequently internally consistent.

ANNEX 4
Overview of pension systems

Table II.A4.1: **Pension schemes in EU Member States and projection coverage**

	Public pensions[3]						Private pension scheme		
	Scheme type	Minimum Pension[4]	Old-age pensions	Early retirement pensions	Disability pensions	Survivors' pensions	Occupational pension scheme	Mandatory private individual	Voluntary private individual
BE	DB	MT - SA	ER	ER	ER priv FR self-emp	ER	M* priv[8] V* self-emp	X	yes*
BG	DB	MT - SA	ER	ER	ER	ER	V*	quasi M*	yes*
CZ	flat rate + DB	FR & ER	ER	ER	ER	ER	X	X	yes*
DK	flat rate + DB	FR & MT suppl.	FR & MT suppl.	V	FR	FR	quasi M	X	yes
DE	PS	MT - SA*	ER	ER	ER	ER	V*	X	yes*
EE	flat rate + PS	MT - SA	ER	ER	ER	ER	V*	quasi M	yes*
IE	flat rate + DB	MT - FR & SA	FR	X	FR - MT	FR - MT	M pub V* priv	X	yes*
EL[1]	flat rate + DB + NDC	MT - FR	FR - ER	FR - ER	FR - ER	FR - ER	V*	yes	yes*
ES	DB	MT	ER	ER	ER	ER	V	X	yes
FR[2]	DB + PS	MT - SA	ER	ER	ER	ER	V*	X	yes*
HR	PS	ER	ER	ER	ER	ER	X	yes	yes*
IT	NDC	MT - SA	ER	ER	ER	ER	V*	X	yes*
CY	PS	MT & ER	ER	ER	ER	ER	M* pub V* priv	X	yes*
LV	NDC	FR - SA	ER	ER	ER	ER	X	yes	yes*
LT	PS	SA	ER	ER	ER	ER	X	quasi M	yes*
LU	DB	FR[5]	ER	ER	ER	ER	V*	X	yes*
HU	DB	MT - SA[6]	ER	ER	ER	ER	V*	X	yes*
MT	flat rate + DB	MT - SA	FR & ER	FR & ER	FR & ER	FR & ER	V*	X	yes*
NL	flat rate + DB	SA	FR	X	ER	FR	M	X	yes*
AT	DB	MT - SA	ER	ER	ER	ER	V*	X	yes*
PL	NDC	ER	ER	ER	ER	ER	V*	yes*	yes*
PT	DB	MT - SA[7]	ER	ER	ER	ER	quasi M V[9]	X	yes*
RO	PS	SA	ER	ER	ER	ER	X	yes	yes
SI	DB	MT - SA*	ER	ER	ER	ER	V*	X	yes*
SK	PS	MT - SA	ER	ER	ER	ER	X	quasi M	yes*
FI	DB	MT	ER	ER	ER	ER	V*	X	yes*
SE	NDC	MT	ER	ER	ER	ER	quasi M	yes	yes
NO	NDC	FR	ER	X	ER	X	M*	X	yes*

(1) The public supplementary pension fund is NDC since 2015. From 2022 onwards, the supplementary pensions of new labour market entrants are covered by a funded DC scheme (treated as a mandatory private individual scheme in the projections). (2) Point system refers to the complementary ARRCO and AGIRC schemes. (3) Public pension expenditure includes all public expenditure on pensions and equivalent cash benefits granted for a long period, see Annex 5 for details on the coverage of the public pension expenditure projections. (4) Minimum pensions correspond to minimum pensions and other social allowances for older people not included elsewhere. (5) The minimum pension constitutes an integral part of the pension, guaranteed for members that have contributed at least 20 years. It is included in the projections. Elder people who do not qualify for a minimum pension can receive the means-tested social inclusion income, which is not included in the projections. (6) Aside from the old-age allowance, which is not included in the pension system, there is an earnings-related minimum pension under the state pension system. Both are included in the projections. (7) Includes all pensions of the non-earning-related scheme such as old-age, disability and survivor pensions and the social supplement. (8) Participation in an occupational scheme is mandatory for employees if their company is subject to a collective agreement that provides for a second pillar. (9) Occupational pension schemes established under collective bargaining agreements are mandatory for employers, with the possibility to opt-out for employees, others are voluntary.

DB defined benefit
PS point system
NDC notional defined contribution
MT Means-tested
FR Flat rate
ER Earnings-related
SA Social allowance/assistance
X Does not exist
V Voluntary participation in the scheme
M Mandatory participation in the scheme
* Not covered in the projections

Source: European Commission, EPC.

Table II.A4.2: **Statutory retirement ages, early retirement ages (in brackets) and incentives to postpone retirement**

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

BE – Bonus is expected to apply as of 2024.
BG – The latest pension reform included a provision to link retirement ages to life expectancy as from 2037. This provision has not been implemented, though.
CZ – Statutory retirement age depends on the number of children. Values for women with two children are reported.
DK – Increase in the retirement age is subject to a Parliamentary decision.
ES – People with at least 38.5 contributory years have a statutory retirement age of 65 and an early retirement age of 63.
IT – Retirement is allowed with at least 20 years of contribution and a minimum pension amount of 1.5 times the old-age allowance in 2012. In bracket the minimum age for early retirement under the NDC system is reported (a minimum pension amount of 2.8 times the old-age allowance is required in addition to the minimum of 20 years of contribution). Early retirement is also allowed regardless of age, with a contribution requirement of 42.8 years in 2022, indexed to changes in life expectancy (43.3 in 2030, 45.3 in 2050 and 46.9 in 2070). Workers who reached the age of 62 with a minimum contribution requirement of 38 years ('Quota 100') could have retired earlier in 2019-2021; workers who reached the age of 64 with a minimum contribution requirement of 38 years ('Quota 102') could retire earlier in 2022; workers who reach the age of 62 with a minimum contribution requirement of 41 years ('Quota 103') may retire earlier in 2023.
PT – Since 2015, early retirement is possible from the age of 60 with 40 contributory years. For each year the contributory career exceeds 40 years, the statutory retirement age is reduced by 4 months.
SK – The statutory retirement age depends on the number of children. Weighted average for women is reported. Since 2023 early retirement is possible after 40 years of contribution. Figures report the standard early retirement which is possible 2 years prior to the statutory retirement age.
SE – The retirement age is flexible as of 62 years without an upper limit and will increase in line with life expectancy at 65 years. Under the Employment Protection Act, an employee is entitled to stay in employment until the age of 67.
NO – Retirement is flexible as of the age of 62.

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

Source: European Commission, EPC.

Table II.A4.3: **Main indexation and valorisation parameters for old-age pensions**

	Pensionable earnings reference	General valorisation variable(s)	General indexation variable(s)
BE	Full career	Prices	Prices and living standard
BG	Full career	Wages	Prices and wages
CZ	Full career	Wages	Prices and wages
DK	Years of residence	Not applicable	Wages
DE	Full career	Wages	Wages
EE	Full career	Prices and social taxes	Prices and social taxes
IE	Flat rate	Not applicable	No fixed rule
EL	Full career	Prices and wages	Prices and GDP (max 100% prices)
ES	324 best months in last 348	Prices	Prices
FR	25 best years (CNAVTS)	Prices	Prices
HR	Full career	Prices and wages	Prices and wages
IT	Full career	GDP	Prices
CY	Full career	Wages	Prices and wages
LV	Full career	Contribution wage sum index	Prices and wage sum
LT	Full career	Wage sum	Wage sum
LU	Full career	Prices and wages	Prices and wages
HU	Full career	Wages	Prices
MT	10 best of last 41 years	Cost of living	Prices and wages
NL	Years of residence	Not applicable	Wages
AT	Full career	Wages	Prices
PL	Full career	NDC 1st: Wages, NDC 2nd: GDP	Prices and wages
PT	Full career up to a limit of 40 years	Prices and wages	Prices and GDP
RO	Full career	Prices and wages	Prices and wages
SI	Best consecutive 24 years	Wages	Prices and wages
SK	Full career	Wages	Prices
FI	Full career	Prices and wages	Prices and wages
SE	Full career	Wages	Wages
NO	Full career	Prices and wages	Prices and wages

BG – Pensionable earnings reference is full career back to 2000.
CZ – Pensionable earnings reference is full career back to 1986.
IE – A price and wage indexation rule has been assumed in the projections.
EL – Pensionable earnings reference is full career, considering wages/income from 2002 onwards.
ES – Pensionable earnings reference is last 25 years as of 2022.
FR – The pensionable earnings reference is full career in AGIRC and ARRCO; CNAVTS: Caisse nationale de l'assurance vieillesse des travailleurs salariés. Valorisation rule and indexation of 1% in both AGIRC and ARRCO.
LT – Pensionable earnings reference is full career back to 1994. Pensions are indexed to the seven-year average of the wage sum growth over the current, previous three and next three years. The index is applied in case of a balanced budget of the Pension Social Security System in two consecutive years and contingent on positive GDP or wage sum growth.
LU – Indexation rule is wages if sufficient financial resources are available, otherwise only cost of living indexation.
HU – Pensionable earnings reference is full career back to 1988.
MT – Pensionable earnings reference rule applies to people born as of 1969.
PT – Pensionable earnings reference is full career as of 2002. Price and wage valorisation applies to earnings recorded from 2002 onwards.
SK – Pensionable earnings reference is full career back to 1984.
SE – Indexation rule is wage growth minus 1.6 pps.

Source: European Commission, EPC.

Table II.A4.4: **Automatic adjustment mechanisms**

	Automatic balancing mechanism	Sustainability factor (benefit linked to life expectancy)[6]	Retirement age linked to life expectancy
CY			X
DE	X		
DK[1]			X
FR[2]		X	
FI		X	X
EL[3]			X
EE			X
IT		X	X
LV		X	
LT	X		
LU	X		
MT[4]			X
NL[5]			X
PL		X	
PT[5]		X	X
SK			X
SE[5]	X	X	X

(1) Subject to Parliamentary decision.
(2) Pension benefits evolve in line with life expectancy through the 'proratisation' coefficient; it has been legislated until 2028.
(3) An automatic balancing mechanism is applied in the auxiliary pension system.
(4) Subject to Parliamentary decision. The Government is obliged to provide Parliament, at least every five years, with recommendations to keep a stable proportion between the contribution period and life expectancy at retirement.
(5) The legal retirement age is linked to two thirds of the increase in life expectancy.
(6) In NDC systems, the benefit is linked to changes in life expectancy through the annuity factor.

Source: European Commission, EPC.

Table II.A4.5: **Contribution rates to the public pension system**

	Contribution rate: employer	Contribution rate: employee	State contributions		Contribution rate: self-employed
			Contribution rate	Other provisions	
BE	24.92% (for all Social Security schemes)	13.07% (for all Social Security schemes)	-	Social security spending is also funded by State subisidies (around 19% of total revenue) and alternative funding (around 16% of total revenue), mainly VAT revenues.	In 2023, 20.5% for revenues up to EUR 70.858 and 14,16% for revenues between EUR 70.858 and EUR 104.722.
BG	8.22% when born after 1959; 11.02% when born before 1960	6.58% when born after 1959; 8.78% when born before 1960	-	State commitment to cover the deficit on an annual basis.	Born before 1960: 19.8% of declared covered earnings in the preceding year; born after 1959: 14.8% of declared covered earnings.
CZ	21.5%	6.5%	-	Balance of pension system is part of general governement budget	28%
DK	-	-	-	-	-
DE	9.3%	9.3%	-	State subsidies with annual indexation. 'Sustainability fund' fluctuates between 20% and 150% of monthly pension expenditures. The contribution rate is set so that this requirement is met.	18.6%
EE	20% (if not participating to 2nd pillar); 16% (if participating to 2nd pillar)	-	-	-	20%
IE	Varies	Varies	-	Social Insurance Fund and Social Assistance Fund (to finance other, non-pension social benefits). Shortfalls are met by the Exchequer.	4% of covered income
EL	Main pensions 13.33%; auxiliary pensions 3%	Main pensions 6.67%; auxiliary pensions 3%	-	National budget/other sources	Contributions are based on insurance classes. Corresponding insurable base is derived taking into account contribution rate of 20%.
ES	Private sector: 23.6% + contribution to Intergenerational Equity Mechanism (0.5% in 2023, rising to 1% in 2029)	Private sector: 4.7% + contribution to Intergenerational Equity Mechanism (0.1% in 2023, rising to 0.2% in 2029)	-	Pension Reserve Fund. If needed, annual funding gaps are covered through central government transfers.	29.5% (including 1.2% to Intergenerational Equity Mechanism)
FR	Private sector (CNAV): 10.45% up to the Social Security Ceiling (SSC) and 1.9% above	Private sector (CNAV): 7.3% up to the social security ceiling (SSC) and 0.4% above.	-	Pensions Reserve Fund, Old-age solidarity fund, specific taxes and external transfers	17.75% up to the SSC and 0.6% above.
HR	4.86% to 17.58% for employees in arduous and hazardous occupations	20% (public PAYG scheme participants only); 15% (participants in both public PAYG scheme and mandatory fully-funded DC scheme)	-	Government is committed to cover deficits.	20% (public PAYG scheme participants only); 15% (participants in both public PAYG scheme and mandatory fully-funded DC scheme)
IT	23.81%	9.19%	-	Residual funding by the State (pension expenditure exceeding contributions)	24%
CY	8.3%	8.3%	4.9%	Reserve fund	15.6% of insurable income
LV	Total contribution rate for old-age pension capital (employer and employee): 20% (if no participant of 2nd tier) or 16% (if participant of 2nd tier), with 4% contribution to the 2nd tier	-	-	-	Contribution rate for old-age pension capital: 20% (if no participant of 2nd tier) or 16% (if participant of 2nd tier) with 4% contribution to the 2nd tier.
LT	0.0%	8.72%	-	State provides funds from the national budget to cover the general pension part of public pension scheme	8.72% - based on 50% of declared earnings (90% when engaged in an individual activity).
LU	8%	8%	8%	Buffer fund of at least 1.5 times the amount of annual pension expenditure	16%
HU	11.8% in 2020, 11.1% in 2021, 9.3% in 2022 (part of social contribution tax payed into Pension Insurance Fund)	10%	-	-	10% of declared monthly earnings and 9.3% of declared monthly earnings in the form of a social contribution tax.
MT	10%	10%	10%	-	15% of the annual income, subject to the same ceiling as for employees.
NL	-	17.9%	-	Government supplements shortfall between expenditure and funds raised by the 17.9% tax levy	17.9%
AT	12.55%	10.25%	For farmers, self employed and liberal professions, the difference with the standard contribution rate of 22.8% is borne by federal transfers	Federal budget covers the deficits in public pension schemes	17% for farmers, 18.5% for self-employed and 20% for liberal professions.
PL	9.76%	9.76%	-	Demographic Reserve Fund	19.52%
PT	23.75%	11%	-	Social Security Trust Fund	Employee: 21.4% or 25.2%; employer: 10%, if economic dependence is higher than 80%, or 7% if economic dependence is between 50% and 80%.
RO	Between 0% and 8%: 0% (normal working conditions); 4% (difficult working conditions) and 8% (special working conditions)	25%	-	State provides funds from the national budget to cover the public pension system deficit.	25%
SI	8.85%	15.5%	-	State provides funds from the national budget and other sources to cover shortfalls.	24.35%
SK	21.75% of gross wage (including disability insurance contribution) if one does not participate in the 2nd pillar; otherwise 5.50% is sent to the second pillar in 2023 (rising to 6 % by 2027)	7% of gross wage (including disability insurance contribution)	-	Government makes contributions for people insured by the state (e.g. maternity leave) and covers special benefits (e.g. 13. pension, minimum pension). Otherwise, social security system deficits are covered by state transfers.	28.75% (including disability insurance contribution) if only covered in the 1st pillar; otherwise 5.50% is sent to the second pillar in 2023 (rising to 6% by 2027).
FI	17.39% for private sector, including the 0.44% repayment installment of the employer's contribution reduction; 16.84% for local government (in 2023).	7.15% (17-52y and +63y); 8.65% (53-62y)	17.11% for State pensions	National and guarantee pensions are fully funded by the State. Part of farmers', self-employed persons' and seafarers' pensions are funded by the State. 25% of private sector pension is prefunded.	24.1% (17-52y and +63y); 25.6% (53-62y)
SE	10.21% (including Premium Pension)	7% (including Premium Pension)	Employer contribution for social insurance	Buffer funds	17.21%
NO	7.9%	14.1% in 2022 (temporary increase in 2023 by 5% for wages exceeding NOK 750.000)	-	State Pension Fund contributes to financing government expenditures (pension and other)	11.1%

When several schemes exist, the information refers to the main (general regime) pension scheme.

Source: European Commission, EPC.

ANNEX 5
Coverage and specification of pension schemes

Table II.A5.1: **Coverage and specification of pension schemes**

	Schemes covered in the projections	Schemes *not* covered
BE	***Public pensions: old-age and early pensions*** Means-tested minimum benefits: 65+; 66+ as of 2025; 67+ as of 2030. Wage earners: earnings-related old-age pensions (63+ and 41 career years in 2018 and 63+ and 42 career years as of 2019[(a)]), widows. Self-employed: earnings-related old-age pensions (63+ and 41 career years in 2018 and 63+ and 42 career years as of 2019[(a)]), widows. Civil servants: earnings-related old-age pensions (63+ and 42 career years as of 2019[(a)]), widow(er)s, disability. Unemployment with company allowance (wage earners): 62+ and 40 career years, until the age of 65 (66 as of 2025, 67 as of 2030). Unemployment with company allowance (wage earners) for companies undergoing restructuring or in difficulty: 60+ until the age of 65 (66 as of 2025, 67 as of 2030). ***Public pensions: disability*** Wage earners, disability pensions: -64; -65 as of 2025; -66 as of 2030. Self-employed, disability pensions: -64; -65 as of 2025; -66 as of 2030. [(a)]Some exceptions: 61 and 43 career years, 60 and 44 career years.	***Public pension scheme*** Unemployment with company allowance only includes the part paid through unemployment benefits, not the allowance paid by the employer. ***Private occupational pensions scheme*** Wage earners. Self-employed. ***Private individual voluntary pension scheme***
BG	***Public pensions: old-age and early pensions*** Earnings-related old-age pensions (including farmers and military officials). ***Public pensions: other*** Earnings-related disability pensions due to general disease (including farmers and military officials). Earnings-related disability pensions due to work injury and professional disease (including farmers and military officials). Earnings-related survivors' pensions according to relationship with the deceased – widows, children, parents. Pensions not related to employment – social pensions, special merits pensions, pensions by Decree.	***Supplementary mandatory pension schemes*** Supplementary life-long old-age pensions - Universal Pension Funds (UPF). Early retirement pensions for a limited period for people working in hazardous conditions - Professional Pension Funds (PPF). ***Supplementary voluntary pension schemes – individual private and occupational pensions.*** ***Teachers' Pension Fund.***

CZ	***Public pensions: old-age and early pensions*** Earnings-related old-age pensions (all sectors except armed forces, all ages). Early pensions with permanent reductions (all sectors except armed forces, all ages). ***Public pensions: other*** Disability pensions (all three types of disability, all sectors except armed forces, all ages). Widows and widower pensions (all ages). Orphan pensions (all ages).	***Individual private schemes*** Voluntary fully funded scheme.
DK	***Public pensions: old-age and early pensions*** Public flat-rate old-age pensions and means-tested supplements, all citizens 67+ (68+ as of 2030, 69+ as of 2035). Civil servants old-age pensions 67+, central and local government. Voluntary early retirement schemes, all wage earners. ***Public pensions: other*** Disability pensions, -66. ***Occupational pensions*** Labour market pensions. Individual, private pensions. Labour market supplementary pensions, ATP. Employees' capital fund (LD).	
DE	***Public pensions: old-age and early pensions*** Earnings-related old-age, widows and disability schemes, all ages. General scheme and civil servants. Early pensions for long-time workers. Early pensions for severely handicapped. ***Public pensions: other*** (covered above; not shown separately)	Means-tested minimum benefits to elderly (social assistance); 0.17% of GDP in 2022. Farmers' pensions; 0.07% of GDP in 2022. ***Occupational pensions*** Annual contributions. Pension expenditure of 1.1% of GDP in 2022. *Individual funded and state subsidised private pension (Riester-Rente)*, schemes at a building stage, only contributions to the schemes.

EE	***Public pensions: old-age and early pensions*** Minimum flat-rate pensions, all citizens. Earnings-related old-age pensions; 65+ for both sexes as of 2026, all sectors (Pension Insurance Fund). Early pensions (possible to retire 5 years before the statutory retirement age), all sectors. ***Public pensions: other*** Disability pensions (work ability benefits) and survivors' pensions, all ages, all sectors (Pension Insurance Fund). ***Private mandatory pensions*** Funded schemes, mandatory for people born as of 1983, with possibility to opt out since 2021.	***Occupational and voluntary private individual pensions***
IE	***Public pensions: old-age and early pensions*** Minimum flat-rate old-age non-contributory pensions, 66+ (also includes widow(er)s non-contributory pensions, deserted wives, 66+), all sectors. Carers, 66+, all sectors. Flat-rate contributory 66+, private sector, self-employed and some civil servants. Widow(er)s contributory pensions, 66+, all sectors. Carers and deserted wives (scheme winded down), 66+, private sector, self-employed and some civil servants. ***Public pensions: others*** Widow(er)s non-contributory pensions, 65-, all sectors. Blind people, carers, 65-, all sectors. Disability pensions, 65-, and invalidity pensions 65-, private sector, self-employed, some civil servants. Carers, contributory, 65-, private sector, self-employed, some civil servants. Widow(er) contributory pension, 65-, all sectors. ***Public sector occupational pensions*** Pensions, lump sums and spouses, civil service, defence, police, education, health and local authorities, non-commercial state bodies.	***Occupational pensions*** Private sector schemes and public sector commercial bodies.

EL	***Public pensions*** Main pension: private sector (employees, self-employed and farmers) and public sector. National pension (flat rate) and (earnings-related) proportionate amount based on the total period of insurance for all insured (statutory retirement age 67+) (including transitional period for old system regarding age thresholds and farmers). Means-tested flat rate pensions of uninsured individuals 67+. Disability pensions, 15-67y. Survivors' pensions, all ages. Early pensions 62+, transition period. Auxiliary pension (old-age, disability, survivor): NDC system (including transitional period for old DB system). ***Mandatory fully funded defined-contribution (DC) scheme*** Auxiliary pension for new entrants to the labour market from 2022 onwards.	Welfare benefits ***Occupational and voluntary private pension schemes.***
ES	***Public pensions: old-age and early pensions*** Earnings-related old-age and early retirement pensions for private sector employees, the self-employed, regional and local and central government and the military. Means-tested minimum pension supplements (contributory). Means-tested minimum pension scheme (non-contributory). War pensions. ***Public pensions: other*** Disability (-64) and survivors' pensions (all ages) for private sector employees, self-employed, regional, local and central government and the military. Means-tested minimum pension supplements (contributory). Means-tested minimum pension scheme (non-contributory). ***Private pensions*** Private (supplementary and voluntary) pension schemes: occupational and individual.	

FR	***Public pensions - earnings-related*** Basic old-age pension schemes for all types of workers: private and public sector employees, civil servants, self-employed, agricultural sector, regulated private-practice professionals (e.g. architects, lawyers, doctors) and other specific professions (e.g. railway workers). Mandatory complementary pension schemes for the above categories of workers except civil servants. Early pensions for long-time workers. Survivors' pensions. Non-contributory minimum pensions. ***Disability (earnings-related and non-earnings-related)*** pension benefits covered by the health insurance scheme.	***Public pensions - earnings-related*** Mandatory complementary pension scheme for civil servants (RAFP, introduced in 2005): < 0.02% of GDP in 2021. ***Occupational and other private pension schemes*** (PERP, PERCO, PERE, PREFON): <0.3% of GDP in 2021.
HR	***Public pensions*** Old-age and early retirement pensions. Disability pensions. Survivors' pensions. Minimum pensions (no means-tested). Pensions of people who could be granted benefits from the PAYG public pension scheme under more favourable conditions (e.g. military officers, police officers and authorized officials, war veterans from the Homeland War). ***Mandatory fully funded defined-contribution (DC) scheme based on individual savings accounts*** Mandatory for all people born as of 1962 and for people born between 1953 and 1962 who voluntarily joined the private second pillar scheme.	***Voluntary private individual pension schemes***.
IT	***Public pensions and social assistance benefits*** Old-age and early retirement pensions. Disability pensions. Survivors' pensions. Old-age allowances and social assistance additional lump sums (State budget).	***Occupational pensions*** They are not included in the definition of the 'Public pension system' (used for the analysis of the sustainability of public finances) insofar as: (i) they are never mandatory and (ii) they provide a pension supplement that corresponds to a minor fraction of the pension guaranteed by the public pension system and never replace it. No risk is taken by the State on investment returns.

CY	***Public pensions: old-age and early pensions*** General Social Insurance Scheme (GSIS), covering the following benefits: early, statutory, invalidity and survivors' pensions. Government Employees Pension Scheme (GEPS) covering old-age, widows' and disability pensions. Social pension scheme and special allowances to pensioners.	***Occupational pensions*** DB pension schemes for semi-state and private sector employees. DC provident funds for private sector employees.
LV	***Public pensions: old-age and early pensions*** Old-age minimum pension, 65+ (as of 2025). Earnings-related old-age DB pensions, granted before 1996. Earnings-related old-age NDC pensions, 65+ (as of 2025), granted as of 1996 (included early retirement). Disability pensions, granted before 1996 and not transformed to old-age pensions. Survivors' pensions. ***Public pensions: other*** Disability pensions -65 (as of 2025). Survivors' pensions -24. ***Private mandatory pensions*** Individual funded old-age, mandatory for people born after 1971. ***Social pension*** public benefit, insurance record <15 years (<20 years from 2025), paid from the state basic budget.	***Voluntary private funded pension scheme*** ***Specific public sector service pensions schemes*** (paid from State budget).

LT	***Public pensions: old-age and early pensions*** Social assistance pensions, women 63.7+, men 64.3+ (65+ as of 2026); (State budget). Earnings-related old-age pensions, women 63.7+, men 64.3+ (65+ as of 2026), all sectors (Social Insurance scheme). Early retirement pensions (possible to retire 5 years before the statutory retirement age), all sectors (Social Insurance scheme). ***Public pensions: disability pensions*** Social assistance disability pensions (State budget). Earnings-related disability pensions, all sectors (Social Insurance scheme). ***Public pensions: survivors' pensions*** Social assistance survivors' pensions (State budget). Survivors' pensions, all sectors (Social Insurance scheme). ***Public pensions: other*** Special public service (state) pensions for selected professions (scientists, judges) (State budget); state pensions of the first and second degree of the Republic of Lithuania (State budget); state pensions of deprived persons (State budget) women 63.7+, men 64.3+ (65+ as of 2026). Officials and military personnel pensions (for service, disability and survivors), public sector (State budget); length of service pensions, compensation for extraordinary working conditions (Social Insurance scheme). Pension supplement to small social insurance old-age and disability pensions – top-up to the ceiling of the basket of minimum consumption needs; depends on contribution period and the total amount of pension benefits received by the pensioner. ***Private mandatory pensions*** Individual funded old-age pension, quasi mandatory, all sectors.	***Voluntary private pension schemes***
LU	***Public pensions: old-age and early pensions*** Earnings-related old-age, early retirement, disability pensions (65+), private sector and self-employed (general pension scheme). Earnings-related old-age, early retirement, disability pensions (65+), public sector (special pension scheme), state budget. ***Public pensions: other*** Disability (-64 years) and survivors' pensions, all sectors.	Voluntary private pension schemes (occupational and individual), social assistance (REVIS)

HU	***Public pensions: old-age and early pensions*** Social allowances close to minimum pensions to people above retirement age. Earnings-related old-age and anticipatory old-age pensions, all sectors. Survivors' pensions, above retirement age, all sectors. Disability pensions, above retirement age, all sectors. ***Public pensions: other*** Disability benefits, below retirement age, all sectors. Survivors' pensions, below retirement age, all sectors. Pension-like regular social allowances, below retirement age. ***Private mandatory pensions*** Individual funded pensions. People who entered the labour market before 2010 and chose to remain in the scheme, can have some entitlements.	Support for disabled people, political compensation allowances. ***Voluntary private pension schemes (occupational and individual)***
MT	***Public pensions: old-age and early pensions*** Two-thirds pension scheme (incorporating two-thirds retirement pension, national minimum pension, increased national minimum pension, and decreased national minimum pension), 64y in 2023 and 65y as of 2027. ***Public pensions: other*** Pensions other than those listed above, notably disability and survivors' pensions and some pensions, including Treasury Pensions (a DB pension scheme open to Public Officers who joined the Public Service prior to 15/01/1979 and that is closed to new members) and increased retirement pension, which will be phased out over a transition period, to specific groups of pensioners. Public pensions: disability: decreased national invalidity pension, national minimum invalidity pension Public pensions: survivors: early survivorship pension, national minimum widows' pension, survivors' pension Non-contributory old-age pension	***Private pension schemes (occupational and individual)***
NL	***Public pensions: old-age and early pensions*** Public flat-rate old-age pensions, 66.6y in 2022 (67y in 2024, linked to life expectancy as of 2026), all citizens (AOW). Widow pensions, women 55+, all sectors (ANW). ***Public pensions: other*** Disability benefits, all sectors (WAO; being phased out), WIA, WaJong). ***Occupational pensions*** Occupational old-age pensions, legal retirement age, all sectors.	***Individual private pensions***

AT	***Public pensions: old-age and early pensions*** *Earnings-related regular old-age pensions:* **Private sector (including blue and white-collar workers, self-employed and farmers):** female 60y, male 65y (female retirement age will rise gradually to 65 years in 2024-2033). **Public sector:** female 65y, male 65y. *Earnings-related early retirement pensions (details concern private sector):* **Corridor pension scheme ('Korridorpension'):** female 62y, male 62y (for women this gets relevant only by 2028); required number of insurance years is 40; 5.1% deduction per year before the regular retirement age. **Early old-age pension for long-term contributors ('Hacklerregelung'):** female 62y (born as of 1966), male 62y (born as of 1954); required number of contribution years is 45; 4.2% deduction for each year below the regular retirement age. **Heavy worker regulation ('Schwerarbeitspension'):** female 60y, male 60y (for women this gets relevant only by 2024); required number of insurance years is 45, at least 10 years of 'hard labour' within 20 years before retirement; 1.8% deduction per year before the regular retirement age. **Early old-age pension for long-term contributors in combination with heavy worker regulation ('Hackler-Schwerarbeit'):** female 55y (born 1959-1963), male 60y (born 1954-1958); required number of insurance years is 40 for women, 45 for men; 1.8% deduction per year before the regular retirement age. ***Public pensions: other*** **Survivors' pensions (widow, widower and orphans):** all sectors. **Invalidity and occupational disability pensions:** only in case of permanent disability; the temporary invalidity pension was replaced by medical and job-related rehabilitation and was completely abolished for people born as of 1964 (therefore, the temporary invalidity pension will fade out); all sectors. ***Items not included in standard public pension expenditure but covered in the projections*** **Minimum guarantee pensions:** no legal minimum pension exists; if individual pension claims are lower than legally defined thresholds, the gap will be closed by federal budget contributions to guarantee a minimum income for pensioners (equalising allowance or 'Ausgleichszulage'); the Ausgleichszulage is considered a social benefit; all sectors. **Rehabilitationsgeld:** only in case of temporary invalidity; healthcare expenditure but paid out of the pension insurance pocket.	***Private occupational and individual pensions***

PL	***Public pensions: old-age and early pensions*** Earnings-related DB old-age, women 60+, men 65+, disability, widows, people born before 1949, private and public sector, self-employed (ZUS, Social Insurance Institution). Earnings-related NDC old-age, women 60+, men 65+, private and public sector, self-employed (ZUS). Earnings-related NDC bridging pensions (employment in special conditions or character) women 55+, men 60+. Earnings-related DB old-age, disability and widows' pensions, all ages, farmers (KRUS, Farmers social insurance scheme). Armed forces old-age pensions (State budget). ***Public pensions: other*** Disability and survivors' pensions, private and public sector, self-employed (ZUS). ***Private quasi mandatory pensions*** DC funded old-age pensions. Includes supplements to ensure minimum pensions.	***Private pensions*** Private individual (non-mandatory) pension schemes (including the remaining part of the former mandatory FDC pillar). Private (non-mandatory) occupational pension schemes.
PT	***Public pensions*** *Social Security System* - Contributory Welfare System (private sector employees and self-employed, public employees since 2006 and special pensions): old-age, disability and survivors' pensions. Includes supplements to ensure minimum pension value. - Social Solidarity protection System (non-contributory and means-tested): old-age, disability and survivors' pensions. - RESSAA (special social security scheme for agricultural workers): old-age, disability and survivors' pensions. *CGA* (Pension scheme of civil servants hired until 2005): old-age and early pensions, disability and survivors' pensions. Includes supplements to ensure minimum pensions values and special pensions. Non-contributory CGA pensions are reported under 'other pensions' in the questionnaire. Solidarity supplement for the elderly (non-contributory means-tested scheme designed to help pensioners with low incomes). ***Private occupational pensions*** Occupational DB and DC pension schemes financed by pension funds, all sectors.	***Private individual pensions*** Individual (non-mandatory) private pension schemes.

RO	***Public old-age pensions*** Women 60+/63y, men 65y, standard contribution period women 30+/35y, men 35y. No contribution period requirements for work accidents, professional diseases, people with neoplasms, suffering from schizophrenia or AIDS. For ordinary diseases and non-work-related accidents, a minimum contribution period is required. ***Early and partial early retirement*** 5 years before the statutory retirement age, provided the full contribution period is exceeded by at least 8 years (for early retirement) or by less than 8 (for partial early retirement, which is penalised). ***Public pensions: other*** Survivors' pensions: children and spouse. Disability pension: people who lost at least half of their capacity to work. Military, farmers, special pensions, special indemnities. Sine 2016, military pensions are paid by the State's Budget, instead of the State's Social Insurance Budget. ***Private mandatory pension*** Compulsory for eligible people under the age of 35; voluntary for age group 35-45.	***Private individual, voluntary pensions***
SI	***Public pensions: old-age and early pensions*** Old-age pension (60+ with 40 years of service; 65+ with minimum insurance period of 15 year). Early retirement (60+ with 40 year of insurance period, including purchased years). Special compulsory (occupational) pensions for workers in high-risk occupations, private and public sector. ***Public pensions: other*** Disability pensions Survivors' pensions Flat-rate pensions for farmers Pension supplements for the military personnel of the former Yugoslav army and retirees from other republics of former SFRY. Annual allowance for pensioners	National (state) pensions: excluded from Pension and Disability Act in 2012 (individuals can ask for social assistance). Mandatory collective supplementary pensions for public employees. Non-mandatory collective supplementary pensions (private sector) - based on collective agreements. Private non-mandatory individual supplementary pensions (private and public sector).

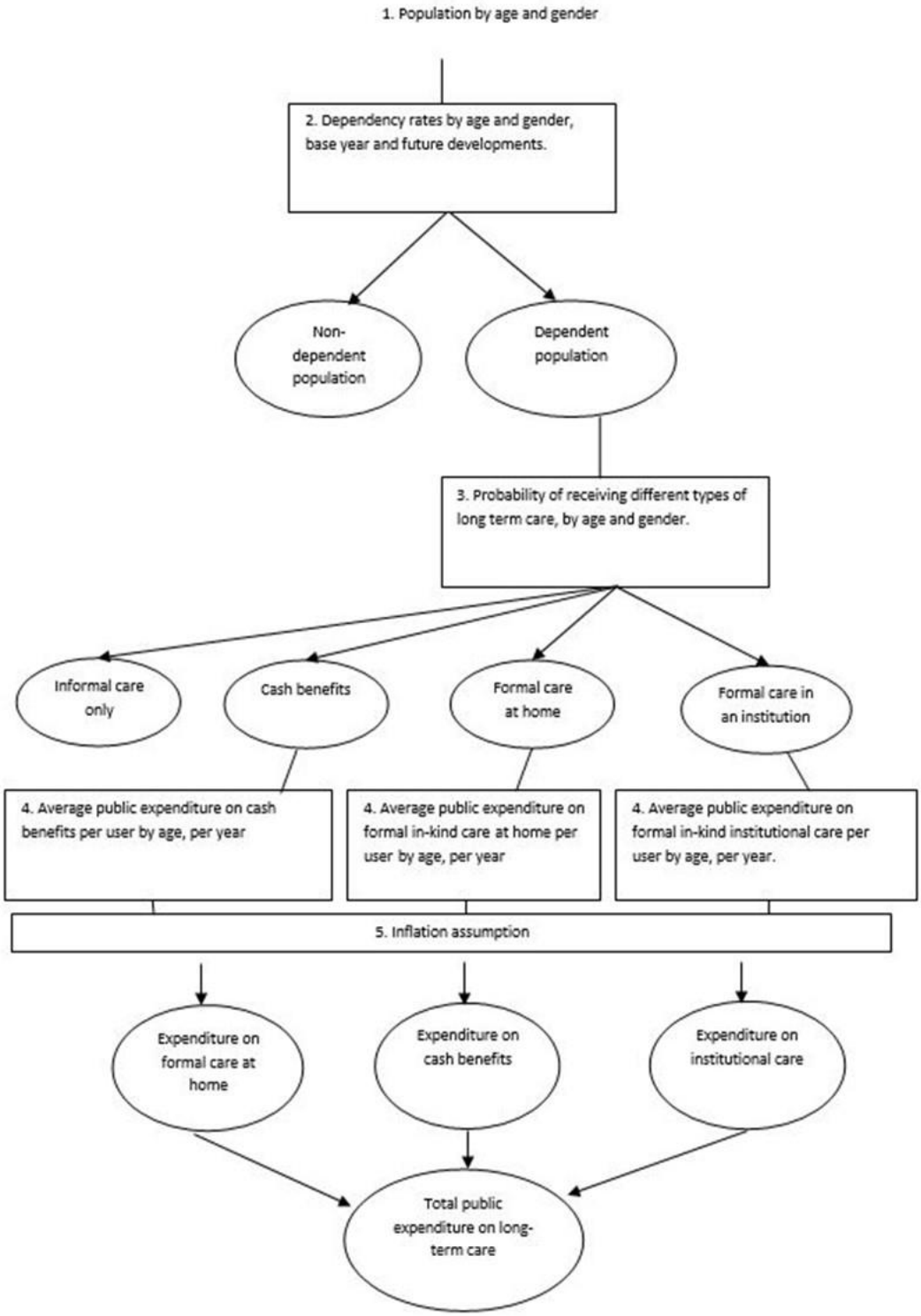
SK	***Public pensions: old-age and early pensions*** Earnings-related old-age pensions and early pensions, all ages. ***Public pensions: other*** Disability pensions, widow and widower pensions, orphan pensions, all ages. Minimum pensions, 13th pension, 14th pension (one-off disbursement in 2022), parental pension, means-tested minimum benefits to elderly (social assistance). ***Private mandatory pensions – partly covered*** Individual old-age pension: covers people that chose to take part in the scheme and those that had been included in the scheme when it was mandatory (prior to 2008) and did not exit during any of the openings (in 2008, 2009, 2012 and 2015). As of 2023, the scheme is mandatory again for people entering the labour market for the first time, though with the possibility to opt out. ***The special pension system of the armed forces and police.***	***Voluntary individual pension:*** funded DC scheme, introduced in 1996. ***Pension scheme of the municipal police:*** small DB scheme, introduced in 2020. Quasi early retirement scheme that provides 'pensions' to municipal police officers that leave the force until they reach the retirement age.
FI	***Public pensions: old-age and early pensions*** Earnings-related old-age pension. Minimum eligible age: 63 years for individuals born before 1954. For those born in 1955 or later, the minimum retirement age increases by 3 months for each birth cohort until reaching 65 years (+65 years from 2027 and linked to life expectancy from 2030). Applicable to private sector (TyEL), self-employed (YEL), farmers (MYEL) and the public sector (JuEL, covers central government, municipal sector and church employees). Earnings-related partial early old-age pension (50% or 25%). Minimum eligible age 61 years. Starting in 2026, minimum age increases to 62 years, and from 2027 onwards it will be linked to life-expectancy, set 3 years lower than old-age pension minimum age). National old-age pension (National pension insurance), +65 years. Early national pension, +63 years for individuals born in 1957 or before and +64 years for people born in 1958-1961. Old-age pension for long-term unemployed, +62 years for individuals born in 1957 or before and +64 years for individuals born in 1958-1961. ***Public pensions: other*** Guarantee pension (guaranteed minimum amount) for individuals over 65 years (16-64 years for disability pensioners). Disability pension, 16-64 years, national pension scheme. Disability pension, 17-62 years, earnings-related, all sectors. Survivors' pensions, no age limit for widow(er)s, 0-18y for orphans (both earnings-related and national pension schemes). Years-of-service pension, +63 years, earnings-related, all sectors.	***Occupational and voluntary individual pensions:*** collective and voluntary supplementary schemes.

SE	***Public pensions: old-age and early pensions*** Minimum pension, housing supplement for pensioners, maintenance support for the elderly (State budget), 66+ (increasing in line with life expectancy). Earnings-related NDC old-age pensions, flexible from 62 years (increasing in line with life expectancy), including old transitional DB system, all sectors (Social insurance scheme). ***Public pensions: other*** Disability pensions, from age 19 until old-age retirement. Survivor benefits, all ages (State budget). ***Occupational pensions*** Occupational (supplementary) DC and DB pensions, all sectors. ***Private mandatory pensions*** Individual mandatory fully funded old-age pension, flexible from 62 years (increasing in line with life expectancy), all sectors (Social insurance scheme). ***Private non-mandatory pensions*** Tax-deductible pension savings (since 2016 only deductible for self-employed).	
NO	***Public pensions: old-age and early pensions*** Earnings-related benefits. Minimum income guarantee. ***Public pensions: other*** Disability pensions.	***Public pensions*** Survivors' pensions (abolished in 2023 and replaced by a transitory arrangement). Central government occupational pension scheme: financed by employee contributions and transfers from State budget; supplement to public old-age pension. Local government occupational pension schemes: funded schemes; supplement to public old-age pension. ***Private pensions*** Mandatory private sector occupational schemes: funded defined contribution schemes; supplement to public old-age pension. Private non-mandatory defined benefits and defined contribution schemes.

Source: European Commission, EPC.

ANNEX 6
Long-term care model structure

Graph II.A6.1: **Long-term care model structure for the 2024 Ageing Report**



Source: European Commission, EPC.

ANNEX 7
Data sources for health care expenditure

Data sources health care

The data required to run long-term public expenditure projections in the field of health care ([90]) includes:

- Population by age and gender.
- Total public expenditure on health care.
- Per capita public expenditure on health care by age and gender cohorts (age/gender specific expenditure profiles). ([91])
- Fiscal impact of legislated policy measures in the health care area.
- Health sector-specific expenditure shares and their relative growth rates in the past 10 years (for the sector-specific indexation scenario).

The data collection procedure takes two steps. First, the Commission (DG ECFIN) pre-filles data based on existing databases managed by international organisations (Eurostat, OECD, AMECO). The questionnaire is then circulated to Member States and Norway, to endorse the pre-filled figures and complement these with data from national sources if no data was available from international sources. The completed data questionnaires are used for conducting the projections.

Note that age/gender-specific per capita public expenditure on health care are not available in any common international databases. Therefore, they are provided exclusively by the Member States and are based on national sources and methodologies.

Population by age and gender

Eurostat population projections (EUROPOP2023) by age and gender is used for the health care public expenditure projections. Given the universal coverage of health care public provision in the EU and Norway, the whole population is assumed to be covered over the projection horizon. The only exception is Germany, where no legal obligation exists for public provision of health care to the share of the population that is compulsory insured in private health insurance funds (approximately 10% of the German population). Consequently, solely the German population compulsory insured in social insurance funds is used in the health care projections. To that end, national data on projected participation rates by age and gender in the social insurance funds is applied to the EUROPOP2023 projections for Germany.

Computing total public expenditure on health care

To calculate total public health care expenditure, the sum of the following two components is used:

1. Public current expenditure on health care – computed as the sum of all "core" health care System of Health Accounts 2011 (SHA 2011) functions/expenditure categories HC.1 to HC.9, excluding HC.3 (defined as "Long-Term Care (health)" in SHA 2011). More specifically, for the current public expenditure on health care the following SHA 2011 categories are used: Curative care (HC.1); and Rehabilitative care (HC.2); Ancillary services (HC.4); Medical goods (HC.5); Preventive care (HC.6); Governance, and health system and financing administration (HC.7); Other health care services not elsewhere classified (HC.9).

([90]) As explained below, this definition of health care excludes SHA expenditure category HC.3, which is included in the long-term care expenditure category.

([91]) The age-gender cost profiles are accepted for use based on a plausible description of the underlying national methodology and data sources.

2. Public expenditure on gross capital formation in health from the COFOG GF07 "Health" function excluding the GF0705 "R&D Health" category. To smooth the volatility inherent to capital formation, the average value for the last four years is used.

SHA data by function/expenditure category and respective sub-functions is available on Eurostat, OECD Health Data, and WHO Data for All. At the time of compiling the questionnaire on health care, SHA data on current public health expenditure is available up to year 2020. In past Ageing Reports, the latest available SHA data point was used as a reference to the base year estimate. However, the COVID-19 pandemic increased the health care public current expenditure in all Member States, though to a varying degree. Given the difficulties to collect complete data on COVID-19 related expenditure in order to subtract the ones that can be considered as one-off or temporary spending, public current expenditure for year 2019 is used instead as a reference point for the 2022 (base) year estimate. The data in million euros have been extracted from Eurostat for all countries, except for Germany. For the purpose of the Ageing Report, data on health care expenditure of the German compulsory private health insurances is not considered. The public current health care expenditure for Germany is therefore comprised by the government and social health insurances shares, which are reported on the OECD database only. The figures in percentage of GDP for all countries are calculated on the basis of the GDP figures in million euros from the AMECO database (spring forecast 2023).

On top of these components, COFOG data on capital formation from Eurostat is added. Most recent data refer to year 2021. In past Ageing Reports, to smooth the volatility inherent to capital formation, the average value for the last four years available was normally used. For the purposes of the 2024 Ageing Report the years 2016 to 2019 are used for calculating the four-year average to align it with the 2019 values on current public expenditure on health care used from SHA and avoid over-estimating future capital formation by excluding the temporary and extraordinary increases of the COVID-19 pandemic years. COFOG data on capital formation in million euros has been extracted from Eurostat. The figures in percentage of GDP for all countries are calculated on the basis of the GDP figures in million euros from the AMECO database (spring forecast 2023). For Norway, GDP for *mainland Norway* is used as provided by Statistics Norway.

Per capita public expenditure on health care by age and gender cohorts

The submission of gender and age specific cost-profiles for public health care expenditure is important to track the impact of population ageing on future expenditure and essential for the health care projection model used for the Ageing Report. To avoid possible data distortions in the pandemic years (excess COVID-19 expenditure coupled with missing expenditure for postponed elective surgeries and other diagnostics and chronic diseases treatments), countries are invited to base the calculations of the age-gender cost profiles on the 2019 public expenditure data and health care consumption. Countries submit age-gender cost profiles by single age or 5-year age groups. As age-cost profiles are computed following national data sources and methodologies, they vary sometimes quite substantially, both over time and across countries. This requires the submission of a documentation of the methodology and data sources used to compute the age-gender cost profiles.

Fiscal impact of policy measures, including Resilience and Recovery Plans and COVID-19 measures

Fiscal and health care structural reforms may impact on the expenditure path, and the projections in the Ageing Report need to take this into account. This is useful information for correctly determining the situation in the base year and subsequent years of the projections.

Countries submit information and data on relevant or recently legislated or implemented policy measures and reforms that have a potential impact on the health care expenditure path as part of the data collection process. To this end, a description of the policy measures, the legal documents confirming the reforms

and the estimated fiscal impact on (if applicable) the components of expenditure is submitted to the Commission.

A distinction is made between one-off (temporary) and permanent fiscal effects of health care policy measures. One-off policy measures are typically capital investments or bonuses paid to health personnel such as those paid during the COVID-19 crisis. Policy measures with permanent fiscal effects are such as an increase/decrease of salaries in the health sector, change in the reimbursement volumes or basket of health goods and services, operational costs of new hospitals or other health care institutions. One-off (temporary) public expenditure only affects the projection results of the respective year(s), while policy measures with permanent fiscal effect also affect the projection results of the subsequent years.

Furthermore, fiscal spending linked to the national Resilience and Recovery Plan's (RRP) health care reforms and investments can be indicated for the base year and the following years if implementation has already started or reforms have been legislated. This includes both one-off national fiscal spending as well as recurrent costs stemming from RRP health-related measures. National expenditure related to RRP measures that have *not yet been legislated or implemented* is not included, as these are subject to uncertainty and potential renegotiations.

Finally, countries submit data on expenditure related to the COVID-19 crisis that affect year 2022 (e.g. permanent increase in salaries since year 2019 or long-lasting increase in prevention services such as vaccines or testing). More specifically, all countries are requested to provide information for the base year estimate on COVID-19 related public expenditure that were introduced from 2020 onwards and were not discontinued in 2022.

Data used for calculating the sector-specific composite indexation

In the '***sector-specific composite indexation scenario***' the importance and evolution of various components to health care provision is captured. The components are: (1) inpatient care, (2) outpatient care and ancillary services, (3) pharmaceuticals and therapeutic appliances, (4) preventive care, (5) governance and administration, and (6) capital investment. They broadly reflect the different sectors of the health system and correspond to the categories of the System of Health Accounts (SHA).

As shown in Table II.A7.1 the respective share in public expenditure on health care of each component is calculated with SHA data for the latest year available, except for the capital formation component, for which COFOG data on gross capital formation on health excluding R&D health is used. These shares are then applied to the age-specific per capita expenditure and by so doing each age-specific per capita expenditure is divided into six sub-items of expenditure.

Next, the past evolution of public expenditure on each of those components is calculated as average annual growth rate for the past 10 years for each country. Due to current data limitations for building 10-year time series from data based on the SHA 2011 classification, data from COFOG categories in correspondence to the SHA 2011 health care functions are used for the calculation of the average annual

Table II.A7.1: **Data sources for the sector-specific indexation components**

Inpatient care (curative and rehabilitative care)	Outpatient care (curative and rehabilitative care) + Ancillary services	Medical goods (pharmaceuticals and therapeutic appliances)	Preventive care	Governance and administration	Capital formation
HC.1.1 + HC.1.2 + HC.2.1 + HC.2.2	(HC.1.3 + HC.1.4 + HC.2.3 + HC.2.4) + HC.4	HC.5	HC.6	HC.7 + HC.9	GF07 "Health" function excluding GF0705 "R&D Health"
SHA	SHA	SHA	SHA	SHA	COFOG
Eurostat or OECD	Eurostat or OECD	Eurostat or OECD	Eurostat or OECD	Eurostat or OECD	Eurostat

Source: European Commission, EPC.

expenditure growth rate for each component.

Lastly, the ratio of each of these 10-year average growth rates to the 10-year average growth rate of GDP is built. Due to high volatility in the relative growth rates for prevention, capital formation and governance and administration, these items are excluded from the indexation. Moreover, the relative growth rates of the other three components (hospitals, outpatient care and medical goods) are capped at their respective 25^{th} and 75^{th} percentiles.

ANNEX 8
Data sources for long-term care expenditure

DATA SOURCES LONG-TERM CARE

As in past projection exercises, the 2024 Ageing Report will rely whenever possible on data following common methodologies and definitions (i.e. the System of Health Accounts - SHA) agreed by international institutions (Eurostat, OECD and WHO), gathered through the joint data collection exercise (i.e. the joint OECD-Eurostat-WHO questionnaire) and reported in Eurostat (Cronos) and OECD (Health Data) databases. ([92])

SHA 2011 expenditure data are available for all EU Member States for variable HC.3, but only for a limited number of Member States for the voluntary variable HC.R.1, which requires the use of the European System of integrated Social Protection Statistics (ESSPROS) database to construct a proxy for this missing variable in several countries.

SHA and ESSPROS data on current long-term public expenditure are available up to the year 2020. In past Ageing Reports, the latest available SHA data point was used as a reference to the base year estimate. However, the COVID-19 pandemic increased the current public health care expenditure in all Member States, though to a varying degree. Given the difficulties to collect complete data on COVID-19 related expenditure in order to subtract the ones that can be considered as one-off or temporary spending, public current expenditure for the year 2019 is used instead as a reference point for the 2022 (base) year estimate. Data in millions of euros have been extracted from Eurostat for all countries, except for Germany. For the Ageing Report, data on health care expenditure of the German compulsory private health insurances are not considered. Current public health care expenditure for Germany is therefore comprised by the government and social health insurance shares, which are only reported on the OECD database. The figures as a percentage of GDP for all countries are calculated based on the GDP figures in million euros from the AMECO database (spring forecast 2023).

When data are not available in the international databases, they have to be provided by each Member State individually. This is particularly the case for the number of recipients, age-cost profiles and the breakdown of expenditure by care setting.

The data collection procedure covers the same steps as for health care (see Chapter 2 on health care), with an equivalent questionnaire used to report the data required for the health and long-term care expenditure projections.

The detailed analysis of available data and classifications carried out led to the following agreement. For the Commission (DG ECFIN) to be able to calculate the proposed scenarios and run the relevant sensitivity tests, the Member States provide the following information in the framework of the long-term care expenditure projections:

- Total number of dependent people receiving long-term care a) in institutions b) at home and c) cash benefits, by sex and five-year cohorts.

- Possible overlaps between the recipients of cash benefits and the recipients of long-term care in-kind services (countries should provide information on whether this is legally possible in their long-term care system and also on the numbers of those affected).

- Public expenditure per user (patient) on long-term care, by sex and single age or five-year cohorts (so-called ‘age-related expenditure profiles’).

([92]) See the SHA 2011 Manual (OECD, Eurostat, WHO, 2011). The manual contains guidelines for reporting health expenditure according to an international standard. It proposes a common boundary of healthcare as well as a comprehensive and detailed structure for classifying the components of total expenditure on health.

- Public expenditure breakdown by care setting (institutional care, home care, cash benefits).
- Data on all policy measures implemented since 2019 that have a potential impact on the long-term care expenditure path as part of the data collection process.

In addition, the Commission (DG ECFIN) pre-filled (according to data availability) the following items, which the Member States had to verify/confirm:

- Total public spending on long-term care, disaggregated, into services of long-term nursing care (classified as HC.3 in the System of Health Accounts) and social services of long-term care (classified as HC.R.1).
- Breakdown of total public spending on long-term care into spending on institutional care, home care and long-term care-related cash benefits derived from ESSPROS and/or SHA.
- Disability rates by sex and five-year cohorts (based on EU-SILC data).

Public expenditure on long-term care

The data sources on long-term care are described on Table II.A8.1.

According to the System of Health Accounts classification, public expenditure on long-term care is defined as the sum of the following publicly financed items:

- Services of long-term nursing care (HC.3 in SHA 2011) (which is also called 'long-term healthcare' and includes both nursing care and medical care related to the cause of the dependency as well as assistance with ADL tasks).
- 'Social services' of long-term care (HC.R. 1 in SHA 2011), which represent the 'assistance services' part, relating primarily to assistance with IADL tasks.

Taken together these should represent the total benefits allocated to dependent people, although, as explained below, due to data availability issues, these data have to be supplemented to different degrees with ESSPROS data to fulfil the projection needs.

Long-term care (health) public expenditure

The health component of long-term care (HC.3) includes a range of services required by persons with a reduced degree of functional capacity, physical or cognitive, and who are consequently dependent on help with basic activities of daily living (ADL), such as bathing, dressing, eating, getting in and out of bed or chair, moving around and using the bathroom. The underlying physical or mental disability can be the consequence of chronic illness, frailty in old age, mental retardation or other limitations of mental functioning and/or cognitive capacity. It also includes any further medical treatment linked to the cause of the disability as well as basic medical services including help with wound dressing, pain management, medication, health monitoring, prevention, rehabilitation or services of palliative care.

Finally, HC.3 also includes any cash benefits spent on the services detailed above. However, these cash benefits cannot be identified in the data, since they are assigned to the category that they are spent on by the recipients.

Table II.A8.1: **Long-term care public expenditure base data requirements according to availability**

I. Preferred solution: SHA, when data are available (all countries except those listed below)

LTC (health)	LTC (social)	LTC (institutional care)	LTC (home care)	LTC (cash benefits)
SHA: HC.3	**SHA**: HCR.1	**SHA**: (HC.3+HCR.1). Institutional care share according to **ESSPROS**, **SHA**, **ESSPROS**+**SHA** or **national data**	**SHA**: (HC.3+HCR.1). Home care share according to **ESSPROS**, **SHA**, **ESSPROS**+**SHA** or **national data**	**SHA**: (HC.3+HCR.1). Cash benefits share according to **ESSPROS**, **SHA**, **ESSPROS**+**SHA** or **national data**

II. Alternative: When data on LTC (social) HCR.1 are not available from SHA for 2019, a proxy is constructed based on ESSPROS data (BG, DE, IE, HR, IT, HU, MT, AT, PL and SK)

LTC (health)	LTC (social)	LTC (institutional care)	LTC (home care)	LTC (cash benefits)
SHA: HC.3	**ESSPROS**: proxy based on cash and in-kind benefits according to Disability and Old age functions, inclunding "Accommodation", "Home help", "Periodic care allowance", and in the Disability function "Lump sum care allowance". Adjusted to reduce potential double-counting with expenditure already included within HC.3 in SHA.	**SHA**: (HC.3+HCR.1). Institutional care. Share according to **ESSPROS**, **SHA**, **ESSPROS**+**SHA** or **national data**	**SHA**: (HC.3+HCR.1). Home care share according to **ESSPROS**, **SHA**, **ESSPROS**+**SHA** or **national data**	**SHA**: (HC.3+HCR.1). Cash benefits share according to **ESSPROS**, **SHA**, **ESSPROS**+**SHA** or **national data**

Source: European Commission, EPC.

Long-term care (social) public expenditure

Long-term care recipients may also need help with instrumental activities of daily living (IADL) more generally, such as help with activities of housework, meals, shopping, using the telephone and managing one's finances. The need for this type of services does not stem from social causes, but from by medical conditions, old age or long-term disability that will often progress to more severe dependency. This type of care is classified in SHA as a 'social' long-term care category HC.R.1 As in HC.3, this category also includes cash benefit expenditure, although the data is not currently populated. A further shortcoming of these data is that the SHA classification does not currently include expenditure on those long-term care recipients that need help with IADL, but not with ADL.

As in the case of health care, the SHA figures on public expenditure on long-term care are available in two separate databases: EUROSTAT database available at NewCronos website and a parallel OECD database 'OECD Health Data'. SHA data on HC.3 are available for all Member States. Data on HC.R.1 is currently available for 15 Member States and Norway. For those not reporting HC.R.1, a proxy is calculated on the basis of the following ESSPROS data categories, adjusted in order to reduce the likelihood of double counting between HC.3 and the ESSPROS proxy:

In-kind benefits in ESSPROS:

- 'Disability' function – 'Accommodation' (institutional care), and 'Home help/assistance in carrying out daily tasks' (home care).

- 'Old age' function – 'Accommodation' (institutional care) and 'Home help/assistance in carrying daily tasks' (home care).

Benefits in cash in ESSPROS:

- 'Disability' function – 'Periodic care allowance', 'Lump sum care allowance'.

- 'Old age' function – 'Periodic care allowance'.

These proxies are then validated on the basis of national expertise in order to eliminate any possible double counting or under-counting in this area.

Public expenditure by care setting

The long-term care model projects public expenditure separately by care setting. The reason for this is that each care setting covers a different population with different characteristics and its unit costs are affected differently by the ageing of the population.

Institutional care refers to long-term care delivered in an institution in which the care recipient lives. It is most appropriate for cases with relatively high degrees of dependency who need a lot of care. Institutional care is provided to people with moderate to severe functional restrictions who live permanently or for an extended period of time (usually for six months or longer) in specially designed institutions, or in a hospital-like setting where the predominant service component is long-term care, although this may frequently be combined with other services (basic medical services, help with getting meals, social activities, etc.). In these cases, eligibility is often explicitly assessed and defined by the level (severity) of dependency and level of care needs.

Home care refers to long-term care delivered in the private home of the care recipient. It is most appropriate for cases with lower levels of dependency and can slow down the progression of dependency as recipients age. Services at home include services provided by external home care providers, both public and private, in a person's private home on a long-lasting basis. This includes living arrangements in specially designed or adapted flats for persons who require help on a regular basis, but where this living arrangement still guarantees a high degree of autonomy and self-control over other aspects of a person's private life. Also included are services received on a day-case basis or in the form of short-term stays in institutions, for example in the form of respite care. During these stays, persons are not considered as 'institutionalised,' but are receiving temporary services to support their continued stay at home. They also include tele-care where the care is provided in the home of the patient through IT.

In contrast to in-kind care like institutional care and home care, cash benefits are payments given to care recipients or their families so that they can purchase care directly themselves. Public spending on cash benefits includes social programmes offering care allowances. Care allowances were introduced in a number of countries in order to allow households for more choice over care decisions, and to support care provided at home or in institutions. They are mainly addressed to persons with long-term care needs who live in their own homes but can also include people who receive care in an institution. However, the design of these programmes varies widely across countries, which reduces the comparability between them. Illustrating this variety of systems, it is noteworthy that in the System of Health Accounts cash benefits can be included just as well in the HC.3 as well as in the HC.R.1 category.

At least three types of cash-benefit programmes and/or consumer-choice programmes can be distinguished: (1) personal budgets and consumer-directed employment of care assistants; (2) payments to the person needing care who can spend it as (s)he likes but has to acquire sufficient care; and (3) payments to informal caregivers.

This approach requires the identification of public expenditure on institutional care, home care, and cash benefits.

Splitting long-term care expenditure by care setting according to SHA

In the SHA classification system, we can use the sub-functions of HC.3 to identify institutional and home care, but with some limitations as explained below. For HC.R.1, although the classification allows for a breakdown between in-kind care and cash benefits, these variables are not currently submitted to ESTAT by any country.

The SHA function HC.3 (long-term care (health)) can be disaggregated into four sub-items as shown:

- Sub-function HC.3.1 comprises "long-term care (health) services provided in a health care facility (hospital, nursing home) and requiring an overnight stay with medical supervision. The package of services covers nursing and/or personal care, usually provided together, along with a range of other components such as accommodation and support services".

- Sub-function HC.3.2 comprises "planned long-term care (health) services in a health care facility but without an overnight stay. The services may be provided in a hospital or nursing home or in a dedicated or stand-alone day centre facility".

- Sub-function HC.3.3 comprises "long-term care (health) services that have the purpose of managing damaged health conditions and the associated clinical difficulties. Dependent patients with a chronic condition may require periodic verification of medication doses and of the evolution of their condition, and advice on how to handle symptoms that emerge as the disease evolves. These services may refer to regular outpatient visits or to the increasing provision of remote monitoring services for long-term care patients".

- Sub-function HC.3.4 comprises 'long-term care (health) services provided to persons within their own home, or in residential settings such as adapted housing that can be considered as their home, rather than in an 'institution'. Such residential facilities include community-based settings, such as adapted housing, which provide an individual housing environment in combination with certain services, such as health protection and surveillance, often for elderly people who are becoming more dependent. It can involve specialised health care at home and services to support informal (family or community) care. Note that long-term care services of a lower-level social care nature (such as home help) may be included as part of a package of home-based care. If such services cannot be separately accounted for and are not the dominant component of the package, they should be included under HC.3.4; if, however, they are the dominant feature, the complete package of care services should be included under HC.R.1 'Long-term care (social)'.

According to the above definitions, HC.3.1 and HC.3.2 are types of care that are provided in institutions or in community facilities (in any case not at beneficiary's home), while HC.3.4 is provided at home. This delimitation is used as a distinction between the 'medical' components of long-term care being provided in institutional and home care respectively. The case of HC.3.3 is different, as the SHA 2011 definition has a degree of ambiguity. However, as the cases described relate mostly to home care, it is considered as home care for the purposes of the Ageing Report.

However, the SHA classification does not provide a cash benefits breakdown for HC.3. Cash benefits are included in the different categories according to the services that they are used to purchase. A cash benefit used to purchase institutional care should is therefore classified in SHA as expenditure on institutional care.

The split by care setting of the 'social' component of long-term care of HC.R.1 in SHA 2011 across care settings is problematic as well, since, although the breakdown between cash and in-kind benefits theoretically exists but is not provided by any Member State.

As a result, SHA can be used to provide an estimated breakdown of expenditure by care settings in Member States that do not have cash benefits.

Splitting long-term care expenditure by care setting according to ESSPROS

An alternative is to use the ESSPROS classification to identify long-term care expenditure by care setting, deriving from the description of the ESSPROS functions - the share of spending that goes to cash benefits, home care and institutional care, as explained above.

The accommodation variables in the 'disability' and 'old age' functions can approximate institutional care expenditure.

The 'home help/assistance in carrying out daily tasks' variables in the 'disability' and 'old age' functions can be used to estimate home care expenditure.

Finally, the 'periodic care allowance' variable in the 'disability' and 'old age' functions as well as the 'lump sum care allowance' in the 'disability' function can be used to estimate cash benefit expenditure.

With these three elements it is possible to use ESSPROS data to calculate the breakdown of long-term care expenditure by care setting.

However, it should be noted that ESSPROS data also have limitations. Contrary to the SHA classification system, ESSPROS expenditure classification system does not have specific long-term care functions. Therefore, the definition of long-term care is not as clear-cut as in the case of SHA classification system. Additionally, it includes both public and private expenditure. Finally, ESSPROS categories are unlikely to contain all long-term care expenditure since they will not include the medical care component of HC.3.

2024 Ageing Report approach for splitting expenditure according to care setting

There is, therefore, no unambiguous solution to identifying the breakdown of long-term care expenditure by care setting using the available data sets. Neither SHA nor ESSPROS provide a fully satisfactory response.

The approach, as in the 2021 Ageing Report, uses ESSPROS proportions as a first approximation, supplemented with SHA data whenever the ESSPROS data collection seems incomplete or the breakdown seems to be of insufficient quality. In a second step, the long-term care expenditure proportions by care setting and type of benefit will be validated against the breakdown derived from national data provided by the Member States. Where available and of sufficient quality, national data will be preferentially used to split total long-term care expenditure by care setting.

Disability rates

Similarly to past Ageing Reports, disability rates are derived from EU-SILC data and more specifically data reported by the Global activity limitation indicator (GALI), on severe "limitations in activities

because of health problems [for at least the last 6 months]". ([93]) EU-SILC data, used to construct the GALI indicator, are available for all EU Member States and Norway by age-sex group and have a disability measure which allows us to identify severe (strongly limited) limitations.

This is considered an adequate measure of dependency with a high degree of data availability and comparability. Indeed, it is available for 27 EU Member States and Norway, by age-sex group for people aged 15+. ([94]) A moving average of the 5 most recent years of data available will be constructed and used for the projections, albeit excluding any data breaks.

In addition, it is proposed that the ad-hoc 2017 EU-SILC survey focusing on children is used to supplement this data for age-groups below 16 years. For those countries that were not covered by this survey (the Netherlands, Denmark, Slovenia, Finland, Sweden and Norway), the same methodology as in the 2021 Ageing Report will be followed, and the four-year average dependency rate for the 16-19 age group will be applied to this younger age group.

([93]) The person's self-assessment of whether they are hampered in their daily activity by any ongoing physical or mental health problem, illness or disability. An activity is defined as 'the performance of a task or action by an individual' and thus activity limitations are defined as 'the difficulties the individual experience in performing an activity'. Limitations should be due to a health condition. The activity limitations are assessed against a generally accepted population standard, relative to cultural and social expectations by referring only to activities people usually do. This is a self-perceived health question and gives no restrictions by culture, age, sex or the subject's own ambition. The purpose of the instrument is to measure the presence of long-standing limitations, as the consequences of these limitations (e.g. care, dependency) are more serious. A 6-month period is often used to define chronic or long-standing diseases in surveys.

([94]) For those aged 0-14, either national data are used if available or the rate is assumed to equal those aged 15-19. The required age breakdowns of the EU-SILC disability rates for the Ageing Report are calculated upon request of the AWG by Eurostat.

ANNEX 9
Mathematical illustration of the health care scenarios

The formal illustration of the scenarios to project public expenditure on health care are presented in the following sections. The scenarios are variations of the baseline.

I. Baseline

The baseline is the former 'AWG reference scenario' in the 2021 Ageing Report. It is based on the Eurostat 2023 baseline projections for population and life expectancy. Further, it assumes that costs profiles shift by half the change in age-specific life expectancy and that unit costs develop with GDP per capita. It further assumes an elasticity of demand of 1.1 in base year 2022 which converges linearly to 1 over the projection horizon.

To calculate future public expenditure on health care, the age/sex-specific per capita public expenditure profiles are multiplied by the respective age/sex population group in each projection year.

This scenario starts with calculating, for each projection year, the change in life expectancy in relation to the base year. The change in life expectancy of a person of sex *g* and age *a* in relation to the base year (say, 2022) for each year of the projections, using the Eurostat population projections 2023 is given by:

$$\Delta LE_{g,a,t,0} = LE_{g,a,t} - LE_{g,a,0} \qquad \text{II.A9.1}$$

where:

$\Delta LE_{g,a,t,0}$ is the additional life expectancy of a person of sex *g* and age *a* in year *t* compared to a person of sex *g* and age *a* in the base year 2022;

$LE_{g,a,t}$ is the life expectancy of a person of sex *g* and age *a* in year *t;* and

$LE_{g,a,0}$ is the life expectancy of a person of sex *g* and age *a* in the base year 2022.

The age/sex specific public expenditure profiles, showing the average public spending on health care per capita for each year of age (from 0 to 100, according to data availability), are assumed to grow over time in line with GDP per capita taking the income elasticity of demand into account, and considering the changing life expectancy. Therefore, the per capita cost (expenditure) in a projected year t is:

$$\begin{aligned} c_{g,a,0} &= c_{g,a,0} && \text{t=0} \\ c_{g,a,t} &= c_{g,a,t-1} \cdot (1 + \Delta Ypc_t \cdot \varepsilon_t + \Delta c_{g,0,a-0.5*\Delta LE_t}) && \text{t>0} \end{aligned} \qquad \text{II.A9.2}$$

where:

$c_{g,a,t}$ is the cost per capita of a person of a given sex *g* and age *a* in period *t*;

$\Delta c_{g,0,a-0.5*\Delta LEt}$ is the growth rate in costs per capita due to the change in life expectancy between year 0 and projection year t. Note that only half the change in life expectancy is considered for the shift.

$$\Delta c_{g,0,a-0.5*\Delta LE_t} = \frac{(c_{g,0,a-0.5*\Delta LE_{g,a,t,0}} - c_{g,0,a})}{c_{g,0,a}} \qquad \text{II.A9.3}$$

where:

$c_{g,0,a-\Delta LE_{g,a,t,0}}$ is the cost per capita assigned to a person of sex *g* and of age *a* in the base year 2022 minus half the years gained in life expectancy by a person of sex *g* and age *a* between year *t* and year 2022, specified with a precision to a decimal part of a year in the base year 2022. ([95]) This is done only for those sections of the age-profile where the cost per capita is growing. ([96])

ΔYpc_t is GDP per capita growth rate in year *t*.

$$\Delta Ypc_t = \left(\frac{Y_t}{P_t} - \frac{Y_{t-1}}{P_{t-1}}\right) \Big/ \left(\frac{Y_{t-1}}{P_{t-1}}\right) \qquad \text{II.A9.4}$$

with Y_t and P_t representing GDP and total population in projection year *t*;

ε_t is income elasticity of demand, assumed to converge from ε_{2022} to ε_{2070} in 2070 according to the following equation:

$$\varepsilon_t = \varepsilon_{2022} - (t - 2022) \cdot \frac{\varepsilon_{2022} - \varepsilon_{2070}}{2070 - 2022} \qquad \text{II.A9.5}$$

In the baseline where the income elasticity of demand converges from 1.1 in 2022 to 1 in 2070, the values will then be the following:

$$\varepsilon_t = 1.1 - (t - 2022) \cdot \frac{0.1}{48} \qquad \text{II.A9.6}$$

Hence, this 'adjusted' per capita unit cost, $c_{g,a,t}$, is the cost per capita of a person of sex *g* and age *a* in year *t* of the projection period, following the adjustment to GDP per capita growth multiplied with the income elasticity of demand at time t and shifted by half the change in age-specific life expectancy.

Next, in each year the respective unit cost is multiplied by the projected population of each age group (using the baseline population projections) to obtain the total public spending for each age/sex group:

$$S_{g,a,t} = c_{g,a,t} \cdot p_{g,a,t} \qquad \text{II.A9.7}$$

where:

$S_{g,a,t}$ is public spending on health care for all persons of sex *g* and age *a* in year *t*.

Last, the resulting total public spending on health care is divided by the projected GDP to obtain the public health care expenditure as a percentage of GDP:

$$T_t = \frac{\sum S_{g,a,t}}{Y_t} \qquad \text{II.A9.8}$$

([95]) Changes in life expectancy and therefore shifts in the age profile from one year to another are sometimes very small (in a range of a tenth part of a year). However, the data gathered by the Member States does not provide detailed information on costs per capita by single year of age (the most detailed item available is a 5-year average), so an additional calculation needs to be performed. To solve this problem, the intermediate values can be obtained by simple extrapolation/trend-smoothening method from the existing average figures. In this way it is possible to assign a concrete value of cost per capita to each tenth part of a year of age.

([96]) For the young and the oldest old the reference age remains the same over the whole projection period.

where:

T_t is the ratio of total public spending on health care to GDP in year *t*.

II. Demographic scenario

The aim of the 'demographic scenario' is to estimate the pure effect of an ageing population on future public expenditure on health care. In other words, the income elasticity of demand is assumed to be 1 over the whole projection period. The formula for the 'unit costs' changes to:

$$c_{g,a,0} = c_{g,a,0} \qquad t=0$$

$$c_{g,a,t} = c_{g,a,t-1} \cdot (1 + \Delta Ypc_t + \Delta c_{g,0,a-0.5*\Delta LE_t}) \qquad t>0 \quad \text{II.A9.9}$$

The other equations stay equal compared to the baseline.

III. No healthy ageing scenario

The 'no healthy ageing scenario' allows assessing the impact of the *expansion of morbidity* hypothesis on public health spending projections. It assumes that age-/gender-specific morbidity rates and the structure of health care provision do not change over time. This, in turn, means that age-/gender-specific per capita public expenditure (on health care) profiles, which can be considered as proxies for the morbidity rates ([97]), remain constant in real terms over the whole projection period. As in the baseline, the scenario relies on Eurostat population projections, assuming a gradual increase in life expectancy. This increase in life expectancy together with no change in health status, as compared to today's health status, mean that all the gains in life expectancy are assumed to be spent in poor health. The number of years spent in good health remains constant. Other assumptions are unchanged compared with the baseline.

The formula for the 'unit costs' changes to:

$$c_{g,a,0} = c_{g,a,0} \qquad t=0$$

$$c_{g,a,t} = c_{g,a,t-1} \cdot (1 + \Delta Ypc_t \cdot \varepsilon_t) \qquad t>0 \quad \text{II.A9.10}$$

IV. Healthy ageing scenario

The 'healthy ageing scenario' is based on the *relative compression of morbidity* hypothesis, meaning that health status is improving in line with declines in mortality rates and increasing life expectancy. It assumes that the number of years spent in bad health during a lifetime remains constant over the whole

([97]) Strictly speaking, age profiles of expenditure illustrate exclusively public health care spending per person of a given age cohort. As such it is not a measure of health status or morbidity. However, given the lack of a reliable and comparable data on the latter, one can plausibly assume that the shape of the profile follows the evolution of health status over the lifespan, i.e. over time, we assume that the same segments of the curve (early childhood, old age, and motherhood) follow the same pattern.

projection period. Consequently, the morbidity rate and therefore the age/sex-specific per capita public expenditure profiles are declining with the mortality rate.

$$c_{g,a,0} = c_{g,a,0} \qquad t=0$$

$$c_{g,a,t} = c_{g,a,t-1} \cdot (1 + \Delta Ypc_t \cdot \varepsilon_t + \Delta c_{g,0,a-\Delta LE_t}) \qquad t>0 \quad \text{II.A9.11}$$

Therefore, the scenario mirrors the 'no healthy ageing scenario'.

V. Labour intensity scenario

The 'labour intensity scenario' estimates the evolution of public expenditure on health care considering that health care is and will remain a highly labour-intensive sector. In practical terms, that means that unit costs are assumed to evolve in line with the evolution of *GDP per hours worked*. Therefore, the growth in GDP per capita is replaced by the growth in GDP per hours worked, so that the equation for unit costs becomes:

$$c_{g,a,0} = c_{g,a,0} \qquad t=0$$

$$c_{g,a,t} = c_{g,a,t-1} \cdot (1 + \Delta Yphw_t \cdot \varepsilon_t + \Delta c_{g,0,a-0.5*\Delta LE_t}) \qquad t>0 \quad \text{II.A9.12}$$

where:

$\Delta Yphw_t$ is the rate of growth of GDP per hours worked in year t

$$\Delta Yphw_t = \left(\frac{Y_t}{HW_t} - \frac{Y_{t-1}}{HW_{t-1}}\right) \Big/ \left(\frac{Y_{t-1}}{HW_{t-1}}\right) \qquad \text{II.A9.13}$$

where HW stands for total hours worked.

Corresponding equations II.A9.7 and II.A9.8 are then used to calculate total age/sex group expenditure and total public expenditure on health care in each projection year.

VI. Sector-specific composite indexation scenario

The 'sector-specific composite indexation scenario' presents the special character of the health care sector (e.g. high level of government regulation, investment in new technologies, high labour intensity, a shift of provision of some health care services from inpatient to outpatient care) and uses sector-specific elements as unit costs determinants in the model.

This scenario considers that expenditure on health care can be disaggregated in its different components, broadly reflecting the different sectors of the health system: 1) inpatient care, 2) outpatient care and ancillary services, 3) pharmaceuticals and therapeutic appliances, 4) preventive care, 5) governance and administration and 6) capital investment. The different components are treated separately and indexed in a separate/different way, creating a sort of composite indexation for 'unit cost development'.

Due to the high volatility of the relative growth rates for the sub-components on prevention, governance and administration, and capital formation, these items are excluded from the indexation. The other three sub-items of the age-specific per capita expenditure (hospitals, outpatient care and medical goods) are multiplied by their respective growth rate (capped at their respective 25th and 75th percentiles, as in previous Ageing Reports). It is then assumed that the growth ratio multiplying each sub-item of expenditure converges to 1 in a certain year in the future (i.e. grows at the same pace as productivity or GDP). ([98])

In mathematical terms, the different steps of this scenario are as follows: The share of each of the six components in total public expenditure on health care in each year *t* of available data, up to the baseline year of 2022 is calculated as follows:

$$s_{i,t} = \frac{PE_{i,t}}{\sum_{i=1}^{6} PE_{i,t}} \qquad \text{II.A9.14}$$

where $S_{i,t}$ is the share of public expenditure on component or input *i* at each time *t* to total public expenditure on health care,

$PE_{i,t}$ is total public expenditure on component *i* at each time *t* and

$\sum_{i=1}^{6} PE_{i,t}$ is total public expenditure on health care expressed as the sum of the public expenditure on each of the six components.

The average share of the ten past observations, up to the latest available data, $\bar{s}_i$ of each component is calculated as:

$$\bar{s}_i = \frac{\sum_{t=0}^{-9} s_{i,t}}{10} \qquad \text{II.A9.15}$$

These average shares are combined with the age/sex-specific per capita expenditure in 2022 so that this is the sum of the expenditure on the above six components:

$$c_{g,a,0} = \sum_{i=1}^{6} \bar{s}_i \cdot c_{g,a,0} \qquad \text{II.A9.16}$$

We can define the cost per capita in each subsector as

$$c_{g,a,i,0} = \bar{s}_i \cdot c_{g,a,0} \qquad \text{II.A9.17}$$

To calculate the annual growth rate of public expenditure for each of the six components, the growth rate of public expenditure for component *i* at time *t* of available data up to the baseline year of 2022 included is:

([98]) Assume that per capita public expenditure on health care for a 20-year-old man is EUR 2 000 in year t. Assume also that, in line with total public expenditure on health care, this is made up of 40% inpatient care, 30% outpatient care and ancillary services, 17% pharmaceuticals and therapeutic appliances, 3% preventive care, 5% governance and administration, and 5% capital investment. Therefore, the per capita public expenditure is divided into six sub-items: EUR 800 for inpatient care, EUR 600 for outpatient care and ancillary services, EUR 340 for pharmaceuticals and therapeutic appliances, EUR 60 for preventive care, EUR 100 for governance and administration, and EUR 100 for capital investment. Then, in year t+1, expenditure increases as follows: EUR 800 x 1.2 + EUR 600 x 1.1 + EUR 340 x 1.3 + EUR 60 x 1.0 + EUR 100 x 1.0 + EUR 100 x 1.0, where 1.2, 1.1, and 1.3 are the (illustrative) past growth ratios observed for the first three components, while the other items are not indexed by their past observed growth rates. As far as the pattern of convergence is concerned, we can use past observations to determine the convergence pattern of the growth ratios.

$$\Delta PE_{i,t} = \left(\frac{PE_{i,t} - PE_{i,t-1}}{PE_{i,t-1}}\right) \qquad \text{II.A9.18}$$

and the average annual growth rate of public expenditure for component *i* for the last past 10 years where available, which is:

$$\overline{\Delta PE_i} = \frac{\sum_{t=0}^{-9} \Delta PE_{i,t}}{10} \qquad \text{II.A9.19}$$

Note again that we assume no additional growth in three of the six categories, i.e. $\Delta PE_{i,t} = 1$, for prevention, governance and administration, and capital formation.

Next, we calculate the average annual growth rate of GDP (ΔY) for the past ten years of available data as:

$$\overline{\Delta Y} = \frac{1}{10} \cdot \sum_{t=0}^{-9} \Delta Y_t \qquad \text{II.A9.20}$$

The ratio of average annual grow rate of expenditure on each component to the average annual growth rate of GDP is calculated by dividing equation II.A9.19 by equation II.A9.20.

Following these calculations, the per capita cost is assumed to evolve in the following manner:

$$c_{g,a,t} = \frac{\overline{\Delta PE_i}}{\overline{\Delta Y_t}} \cdot \sum_{i=1}^{5} \left(\bar{s}_i \cdot c_{g,a,t-1}\right) \qquad \text{II.A9.21}$$

where:

ΔY_t is the GDP rate of growth in year *t* for each country.

Each of the six ratios of growth rates (the ratio of $\overline{\Delta PE_i}$ to ΔY) converges linearly to 1 by a specified date, 2070.

Again, corresponding Equations II.A9.7 and II.A9.8 are then used to calculate total age/sex group expenditure and total public expenditure on health care in each projection year.

VII. Risk scenario

The 'risk scenario' (former 'AWG risk scenario') aims at fully taking into account technological changes and institutional mechanisms, which have driven expenditure growth in recent decades.

This scenario uses panel regression techniques to estimate the country-specific non-demographic cost of health care. The non-demographic cost is defined as the excess of growth in real per-capita health care expenditure over the growth in real per-capita GDP after controlling for the demographic composition effects. Alternatively, the results can also be expressed in terms of country-specific average' income elasticities of health care expenditure. A proxy for the non-demographic costs with an estimated EU

average elasticity of 1.5, based on this Commission research (endorsed by the Ageing Working Group) and recalculated for the 2024 Ageing Report including latest data available, is used in 2022 and then converges linearly to 1 by the end of the projection period. The formula for the elasticity of demand changes to:

$$\varepsilon_t = 1.5 - (t - 2022) \cdot \frac{0.1}{48} \qquad \text{II.A9.22}$$

The other equations are the same as in the baseline.

ANNEX 10
Mathematical illustration of the long-term care scenarios

General definitions

Let us define $N_{g,a,t}$ as the population of a given sex *g* and age *a* in year *t*. Following the main steps of the general methodology process presented in Chapter 3 on long-term care, the following definitions are derived.

STEP 1: dependent/non-dependent population

The ratio of dependent (resp. non-dependent) persons in the base year *t=b* (e.g. 2022) is derived from the EU-SILC data, for each age – actually, 5-year age groups– and sex group: $d_{g,a,b}$ (resp. *1*- $d_{g,a,b}$). The average dependency rates for the last 5 years are being used, based on data availability. Therefore, the projected dependent population of a given sex *g* and age *a* in a projected year *t* is:

$$D_{g,a,t} = d_{g,a,b} \cdot N_{g,a,t} \qquad \text{II.A10.1}$$

STEP 2: split into types of care

To be able to differentiate the impact of different scenarios according to the respective behaviour of the different types of care, one needs to split the projected dependent population into four groups: those receiving formal in-kind care at home, those receiving formal in-kind care in institutions, those receiving cash benefits (which is also defined as a type of formal care) and those receiving only informal care.

Therefore, one defines $DFh_{g,a,t}$, $DFi_{g,a,t}$, $DI_{g,a,t}$ the projected dependent population of a given sex *g* and age *a* in a projected year *t* receiving respectively in-kind formal care at home (*DFh*), in-kind formal care in institutions (*DFi*), cash benefits and informal care (*DI*), as follows:

$$DFh_{g,a,t} = D_{g,a,t} \cdot p^{Fh}_{g,a,0} \qquad \text{II.A10.2}$$

$$DFi_{g,a,t} = D_{g,a,t} \cdot p^{Fi}_{g,a,0} \qquad \text{II.A10.3}$$

$$DI_{g,a,t} = D_{g,a,t} \cdot (1 - p^{Fh}_{g,a,0} - p^{Fi}_{g,a,0}) \qquad \text{II.A10.4}$$

Where $p^{Fh}{}_{g,a,0}$ is the probability for a dependent person of sex *g* and age *a* to receive in-kind formal care at home, in the base year *0* (e.g. 2022). Similarly, $p^{Fi}{}_{g,a,0}$ is the correspondent probability of being taken care of formally in institutions, while $p^{I}{}_{g,a,0}$ – the probability of being take care of informally – is defined as not receiving any formal care service.

STEP 3: age-sex profiles of expenditure

Average expenditure is calculated for a base year *0*, to define the long-run unit costs of services. If the data is available (through the SHA joint questionnaire and/or provided by Member States), unit costs for in-kind formal care at home and in-kind formal care in institutions are calculated separately ([99]):

$$c^{Fh}_{g,a,0} = \frac{S^{Fh}_{g,a,0}}{N^{Fh}_{g,a,0}} \qquad \text{II.A10.5}$$

([99]) Otherwise, an average of the age-cost profiles of other EU Member States is used.

where: $S^{Fh}_{g,a,0}$ is public spending on in-kind formal care at home in the base year (e.g. 2022); and $N^{Fh}_{g,a,0}$ is the number of recipients of a given sex *g* and age *a* of in-kind formal care at home, for the same year.

Similarly, the unit cost per beneficiary of a given sex *g* and age *a* of in-kind formal care in institutions is:

$$c^{Fi}_{g,a,0} = \frac{S^{Fi}_{g,a,0}}{N^{Fi}_{g,a,0}} \qquad \text{II.A10.6}$$

Note that two adjustments are made to the derived unit costs. The first one applies when age profiles are not provided separately for the two types of in-kind formal care. The age profiles provided by Member States for public expenditure on in-kind formal care services are then used to 're-calibrate' the unit costs. In other words, the relative size of the amounts provided for each sex/age group is applied to respective 'total' public expenditure aggregates of in-kind formal care at home (S^{Fh}_0) and in-kind formal care in institutions (S^{Fi}_0).

The unit costs evolve in time with the GDP growth, as will be explained in the next section of this annex.

STEP 4: total public expenditure on long-term care services

For a projected year *t*, public spending on both types of in-kind formal care is then computed as:

$$TS^{Fh}_{g,a,t} = c^{Fh}_{g,a,t} \cdot DFh_{g,a,t} \qquad \text{II.A10.7}$$

where: $TS^{Fh}_{g,a,t}$ (resp. $TS^{Fi}_{g,a,t}$) is public spending on formal in-kind care at home (resp. in institution) for all persons of sex *g* and age *a* in year *t*.

Hence, for all age and sex groups:

$$TS^{Fh}_t = \sum TS^{Fh}_{g,a,t} \qquad \text{II.A10.8}$$

and

$$TS^{Fi}_t = \sum TS^{Fi}_{g,a,t} \qquad \text{II.A10.9}$$

STEP 5: total public expenditure on long-term care (services and cash)

Therefore, total public expenditure on both types of formal long-term care services is added to long-term care related cash benefit expenditure, to obtain TS^{LTC}_t for a projected year *t*:

$$TS^{LTC}_t = TS^{Fh}_t + TS^{Fi}_t + TS^{C}_t \qquad \text{II.A10.10}$$

Where TS^{C}_t is projected in a similar manner to expenditure on in-kind benefits ([100]).

([100]) The projection of cash benefit expenditure is illustrated in less detail than that for in-kind benefits because the data on recipients is less readily available and therefore the profile is in some cases assumed to be the same as that for in-kind care.

These general definitions apply to the general, 'basic' model structure. To run more accurate scenarios, general and scenario-specific assumptions are being applied. These assumptions are illustrated in the following section.

Assumptions for the different scenarios

I. Baseline

The baseline of the 2024 Ageing Report is equivalent to the 2021 Ageing Report's 'AWG reference scenario'. It builds onto the general model described above by assuming that for the time horizon of the projection exercise, the age-sex specific public expenditure profiles (showing the average public spending on long-term care per beneficiary for each year of age – or 5-year age group – from 0 to 85+ or more, according to data availability) grow with either GDP per worker (for in-kind benefits) or GDP per capita (for cash benefits) . For $t > 0$, the projections of the unit costs profiles develop according to the following equations (subject to the relevant exceptions to reflect country-specific assumptions):

$$c^{F}_{g,a,t} = c^{F}_{g,a,t-1} \cdot (1 + \Delta Yphw_t) \qquad \text{II. A10.11}$$

$$c^{Fc}_{g,a,t} = c^{Fc}_{g,a,t-1} \cdot (1 + \Delta Ypc_t) \qquad \text{II. A10.12}$$

where:

- $c^{F}_{g,a,t}$ is the cost per beneficiary of a given sex *g* and age group *a* in period *t.* F can either be *Fh* for formal in-kind care at home or *Fi* for formal in-kind care in institution.
- $\Delta Yphw_t$ is the rate of growth of GDP per hours worked in year *t*:
- $\Delta Yphw_t = \left(\frac{Y_t}{HW_t} - \frac{Y_{t-1}}{HW_{t-1}}\right) / \left(\frac{Y_{t-1}}{HW_{t-1}}\right)$ II.A10.13
- $c^{Fc}_{g,a,t}$ is the cost per beneficiary of a given sex *g* and age group *a* in period *t* in for cash benefits (Fc).
- ΔYpc_t is GDP per capita growth rate in year *t*:
- $\Delta Ypc_t = \left(\frac{Y_t}{P_t} - \frac{Y_{t-1}}{P_{t-1}}\right) / \left(\frac{Y_{t-1}}{P_{t-1}}\right)$ II.A10.14

Further, the baseline takes the increase of life expectancy over the projection horizon into account.

It assumes that half of the projected longevity gains up to the end of the projection period will be spent in good health and free of disability/dependency. Accordingly, age-specific disability rates shift along the age profile by half of the projected increase in life expectancy.

In practice that means that one starts by calculating, for each projection year, the change in life expectancy in relation to the base year. For example, life expectancy for a 50-year-old man is expected to increase by, say, 4 years: from 30 years in year *t* to 34 years in year *t+20* in a specific Member State.

Then, the scenario assumes that in *t+20*, in that same Member State, a 50-year-old man will have a disability prevalence of a (50 – (4 x 0.5)) = 48-year-old man in year *t*.

Hence, the change in life expectancy of a person of sex *g* and age *a* in relation to the base year (2022) is first calculated for each year of the projections, using the Eurostat population projections:

$$\Delta LE_{g,a,t,0} = LE_{g,a,t} - LE_{g,a,0} \qquad \text{II.A10.15}$$

where:

- $\Delta LE_{g,a,t,0}$ is the additional life expectancy of a person of sex *g* and age *a* in year *t* compared to a person of sex *g* and age *a* in the base year.
- $LE_{g,a,t}$ is the life expectancy of a person of sex *g* and age *a* in year *t*.
- $LE_{g,a,0}$ is life expectancy of an average person of sex *g* and age *a* in the base year.

Then the probability for being a dependent person is adjusted accordingly:

$$p_{g,a-0.5\Delta\,\mathrm{LE}\,,t} = p_{g,a,0} \qquad \text{II.A10.16}$$

where Δ LE = $\Delta LE_{g,a,t,0}$

Lastly, for Member States in the highest quartile of long-term care expenditure as a proportion of GDP in the base year, income elasticity of long-term care expenditure is assumed to remain 1 over the projection period. For the rest, income elasticity is assumed to start at 1.1 in the base year of 2022, falling to 1 by the end of the projection period.

II. No healthy ageing scenario

The 'no healthy ageing scenario' is identical to the baseline except for its assumption on the dependency status. It assumes that the disability rates of the population of a given age will not improve despite increases in life expectancy. This means, for example, that even if life expectancy increases by two years by 2070, the proportion of 80-year-olds who are disabled in 2022 will be the same as in 2070.

For the probability being a dependent person that meant that it would stay constant over the projection horizon:

$$p_{g,a,t} = p_{g,a,0} \qquad \text{II.A10.17}$$

For all $t > 0$.

Those constant proportions are then applied to the projected changes in the dependent population. Since the prevalence of dependency is kept constant over the projection horizon, the dependent population evolves precisely in line with the total elderly population. This implies that, in practice, none of the gains in life expectancy translate into an improvement of health.

III. Healthy ageing scenario

This scenario reflects an alternative assumption about the dependency ratio. Inspired by the so-called 'dynamic equilibrium hypothesis' ([101]), it is analogous to the healthy ageing scenario carried out in the framework of health care expenditure projections. The profile of age-specific disability rates shifts in line with changes in life expectancy (disability rate in the future is equal to that of a younger - by the same number of years as the change in age-specific life expectancy - age cohort today), resulting in a gradual decrease over time in disability prevalence for each age cohort.

In practical terms, one starts by calculating, for each projection year, the change in life expectancy in relation to the base year. For example, life expectancy for a 50-year-old man is expected to increase by, say, 4 years: from 30 years in year *t* to 34 years in year *t+20* in a specific Member State. Then, the scenario assumes that in *t+20*, in that same Member State, a 50-year-old man will have a disability prevalence of a (50 - 4) = 46-year-old man in year *t*. Equation II.A10.16 is adapted accordingly:

$$p_{g,a-\Delta\,\mathrm{LE}\,,t} = p_{g,a,0} \qquad \text{II.A10.18}$$

IV. Coverage convergence scenario

This policy-change scenario assumes an expansion of publicly financed formal care provision into the groups of population that have not been covered by the public in-kind programmes so far. 'Formal coverage' covers any of the three types of formal long-term care: in-kind institutional care, in-kind formal home care, and cash benefits. This scenario assumes that coverage of in-kind formal care (institutional and home care) will be extended to cover a proportion of those dependent people who do not receive any type of care in the base year. The assumption is that all recipients of long-term care are dependent. It means that the equations II.A10.2 to II.A10.4 become four equations, with probabilities now changing over time, i.e. depending on *t*, but also country-specific (for a country *i*).

The scenario envisaged is a coverage convergence to the EU average for in-kind care. It is meant to consider the high diversity of country-specific current in-kind care-mix between home care and institutional care. The Member States where the in-kind formal coverage rate for a specific age-range is below the EU average in the starting year are assumed to converge to this average by 2070. For age ranges with coverage above the EU average, this scenario is the same as the base case scenario.

The baseline steps are used for the countries whose formal in-kind coverage for that age-group is the same or greater than the EU average in the base year (2022). For those countries whose in-kind formal coverage is below the EU average for that age-group, it is assumed to converge to the EU average. It therefore implies that each type of in-kind formal care converges at a different pace, making up for the respective relative gaps to the EU average. This scenario allows a country to grow faster the relatively less-developed type of in-kind formal care. ([102])

V. Cost convergence to EU average scenario

This policy-change scenario is run in parallel with the analogous scenario on healthcare expenditure projections. The 'cost convergence scenario' is meant to capture the possible effect of a convergence in real living standards on long-term care spending. It assumes an upward convergence of the relative age-

([101]) Rechel et al. (2020).
([102]) Note that the convergence to the EU average is done for each type of care and for each 5-year age group and sex separately.

sex specific per beneficiary expenditure profiles (as percent of GDP per capita or per hours worked) of all countries below the corresponding EU average to the EU average. This is done for each type of formal care coverage (i.e. formal care in institutions, formal care at home, cash benefits).

To run this scenario, one builds on the methodology used for the baseline. For those countries whose per beneficiary costs are equal to or above the EU average nothing changes.

For those countries below the EU average per beneficiary costs in the base year (2022) a further change in the way cost per beneficiary evolves over the projection period is assumed to reach the EU average of per beneficiary costs for each age-group. Building on the equations – for cash benefits – and – for in-kind benefits – the real convergence to EU average is assumed to follow the adjusted equations (for $t > 0$):

$$c^{Fc}_{a,t,i} = c^{Fc}_{a,t-1,i} \cdot \left(1 + \Delta Ypc_{t,i} + m_{a,i}\right) \quad \text{II.A10.19}$$

$$c^{F}_{a,t,i} = c^{F}_{a,t-1,i} \cdot \left(1 + \Delta Yphw_{t,i} + n_{a,i}\right) \text{II.A10.20}$$

where:

$c^{F}_{a,t,i}$ is the country *i*-specific cost of in-kind benefits per beneficiary of a given age *a* in period *t*. F is either *Fh* for formal care at home or *Fi* for formal care in institution – adjusted to the GDP per hours worked growth and a catch-up effect if country *i* is below the EU average;

$c^{Fc}_{a,t,i}$ is the country *i*-specific cost of cash benefits per beneficiary of a given age a in period t –adjusted to GDP per capita growth and a catch-up effect if country *i* is below the EU average;

$\Delta Ypc_{t,i}$ is the GDP per capita rate growth rate in year t, for country *i*;

$\Delta Yphw_{t,i}$ is GDP per hours worked growth rate in year *t*, for country *i*, and

$m_{a,i}$ and $n_{a,i}$ are hypothetical rates of growth of per beneficiary costs. They are higher than zero for countries whose per beneficiary costs are below the EU average, and equal to zero for those countries whose per beneficiary costs are equal or above the EU average. To close the gap, $m_{a,i}$ is assumed to be constant in time and equal to ([103]):

$$m_{a,i} = \left[\left(\frac{\overline{rc}_{a,EU,2011}}{rc_{a,i,2022}}\right)^{\frac{1}{2070-2022}}\right] - 1 \qquad \text{II.A10.21}$$

if $\overline{rc}_{a,EU,2022} \geq rc_{a,i,2022}$

where:

$\overline{rc}_{a,EU,2022}$ is the weighted EU average relative cost per beneficiary of age *a* calculated in the base year of 2022 and

$\overline{rc}_{a,i,2022}$ is the relative cost per beneficiary of age *a* for country *i* calculated in the base year of 2022 defined as:

([103]) Assumptions for different convergence paths according to the initial country-specific situation - comparing to the EU average age profile - could be explored further when data is made available.

$$rc_{a,i,2022} = \left(\frac{c_{a,i,2022}}{Yphw_{a,i,2022}}\right) \qquad \text{II.A10.22}$$

and

$$\overline{rc}_{a,EU,2022} = \left(\frac{\bar{c}_{a,EU,2022}}{\overline{Yphw}_{a,EU,2022}}\right) \qquad \text{II.A10.23}$$

where:

$\bar{c}_{a,EU,2022}$ is the weighted EU average cost per beneficiary of age *a* calculated in the base year (2022); and

$\overline{Yphw}_{a,EU,2022}$ is the average GDP per hours worked in the EU calculated in the base year (2022).

The same type of reasoning can be run with the corresponding equations for cash benefits, adjusted to GDP per capita growth instead of GDP per hours worked growth.

Then after country-specific per beneficiary cost has been calculated, subsequent corresponding equations are used to obtain total age-sex group expenditure and then total public expenditure on long-term care in each projection year.

VI. Risk scenario

The 'Risk scenario' keeps the assumption that half of the future gains in life expectancy are spent without care-demanding disability, as in the baseline. In addition, it combines is a combination of the 'cost convergence scenario' and the 'coverage convergence' scenario thereby being equal to the 'cost and coverage convergence scenario' from the 2021 Ageing Report. The scenario assumes convergence upwards of unit costs to the EU average as well as coverage convergence upwards to the EU average.

ANNEX 11
Organisational structure of secondary education

Three different organisational models can be distinguished: (i) a single structure; (ii) a compulsory integrated secondary education corresponding to a 'common core'; and (iii) distinct types of education. In some new Member States (Czechia, Latvia, Lithuania, Hungary and Slovakia), combinations of these three models coexist (European Commission, 2005).

In all countries where the single structure is the only type (Denmark, Estonia, Portugal, Slovenia, Finland, Sweden, Iceland, Norway and Bulgaria), the end of secondary education coincides with the end of compulsory education, except in Bulgaria where compulsory education ends one year later.

In almost half of all European countries, all pupils follow the same general curriculum 'common core' during lower secondary education. In seven of these countries, the end of lower secondary education coincides with the end of full-time compulsory education.

In Belgium, France, Ireland, Italy, Hungary, Austria, Slovakia and Bulgaria, the end of full-time compulsory education does not coincide with the end of lower secondary education. Instead, one or more final years of compulsory education are part of upper secondary education. Thus, pupils in these countries - with the exception of Ireland - have to choose between general, technical or vocational education of one or two years (or four in Hungary) before the end of full-time compulsory education.

In the French- and German-speaking Communities of Belgium, Germany, Latvia, Lithuania, Luxembourg, the Netherlands and Austria, pupils may select or be streamed into different types of provision or school from the beginning or before the end of lower secondary education. Even though pupils in Germany attend different schools, they follow entirely compatible curricula for the first two years so that selection of an appropriate study branch can be deferred. In the Netherlands, pupils follow a common core curriculum usually for the first two years at VMBO and three years at HAVO and VWO. While its level varies depending on the type of school concerned, it specifies minimum skills that should be acquired by all pupils.

ANNEX 12
Data sources for education expenditure

Data sources and information

To project total expenditure on public education, Eurostat will be the main provider of data, mainly through the UOE data collection. ([104]) Consistent with the 2021 Ageing Report, the average of the two last available years (i.e. 2019 and 2020 – or more recent data if available) should be used as the starting point of the projections. In addition, this average is then uprated until the base year of the 2024 Ageing Report projections (i.e. 2022) using COFOG data. ([105])

Specifically, by country, year, and ISCED groupings (1, 2, 3-4, 5-8), the following information from the UOE dataset will be used:

- Total number of students by single age
- Number of working students by single age
- Numbers of teachers and non-teaching staff
- Total expenditure in staff compensation ([106])
- Other current (excluding staff compensation) and capital expenditure
- Share of transfers over total public education expenditure
- Share of publicly funded education

Furthermore, and to secure full consistency of the long-term budgetary exercise, the common AWG macroeconomic assumptions for the following variables are used:

- Total population per single age
- Labour force per single age
- GDP per worker
- GDP

([104]) The objective of the UNESCO-UIS/OECD/EUROSTAT (UOE) data collection on education statistics is to provide internationally comparable data on key aspects of education systems, specifically on the participation and completion of education programmes, as well as the cost and type of resources dedicated to education.

([105]) Classification of the Functions of Government (COFOG) data. Because of recurrent lags in the availability of recent UOE data, uprating the starting point until the base year by using COFOG information has the advantage of taking into account the most recent outturns.

([106]) Current expenditure on staff compensation is obtained by deducting expenditure designated for capital, for ancillary services and for R&D from direct expenditure on educational institutions (UOE, 2019).

ANNEX 13
Estimating the education enrolment rate

Starting with the labour market identity:

$$E_{i,t} + U_{i,t} + I_{i,t} \equiv P_{i,t} \qquad \text{II.A13.1}$$

where $E_{i,t}$, $U_{i,t}$, $I_{i,t}$ and $P_{i,t}$ are, respectively, employment, unemployment, inactive and the population for age cohort *i* in period *t*.

After adding and subtracting the number of full-time students ($SF_{i,t}$), and of part-time students ($SP_{i,t}$):

$$SF_{i,t} + SP_{i,t} - SP_{i,t} + E_{i,t} + U_{i,t} + I_{i,t} - SF_{i,t} \equiv P_{i,t} \qquad \text{II.A13.2}$$

Let us use the definitions of total students ($ST_{i,t} \equiv SF_{i,t} + SP_{i,t}$), labour force ($LF_{i,t} \equiv E_{i,t} + U_{i,t}$), and inactive minus full-time students ($I^*_{i,t} \equiv I_{i,t} - SF_{i,t}$):

$$ST_{i,t} - SP_{i,t} + LF_{i,t} + I^*_{i,t} \equiv P_{i,t} \qquad \text{II.A13.3}$$

Dividing Equation II.A13.3 by the population ($P_{i,t}$), and defining $\alpha_{i,t} \equiv \frac{SP_{i,t}}{SF_{i,t}+SP_{i,t}} = \frac{SP_{i,t}}{ST_{i,t}}$ as the fraction of part-time students in the total number of students, the following identity is obtained:

$$\frac{ST_{i,t}}{P_{i,t}} - \frac{SP_{i,t}}{ST_{i,t}} * \frac{ST_{i,t}}{P_{i,t}} + \frac{LF_{i,t}}{P_{i,t}} + \frac{I^*_{i,t}}{P_{i,t}} = 1 \qquad \text{II.A13.4}$$

Equation II.A13.4 can be rearranged as:

$$e_{i,t} = \frac{1 - p_{i,t} - i^*_{i,t}}{1 - \alpha_{i,t}} \qquad \text{II.A13.5}$$

where $e_{i,t} = \frac{ST_{i,t}}{P_{i,t}}$ is the enrolment rate for total students; $p_{i,t} = \frac{LF_{i,t}}{P_{i,t}}$ is the participation rate; and $i^*_{i,t} \frac{I^*_{i,t}}{P_{i,t}}$ is the fraction of inactive minus full-time students over the population.

In Equation II.A13.5, enrolment rates are inversely related to the participation and the (adjusted) inactivity rates.

In most EU Member States, the LFS MAINSTAT variable can be used to assess the distribution of inactivity by age, distinguishing between schooling and other forms of inactivity. ([107])

Assume that the ratio between full-time students and the total inactive ($\overline{\kappa}_{i,b}$) is constant over time at the value observed in the base period (b):

([107]) However, the MAINSTAT variable, which describes the main labour market status, is an optional one.

$$\frac{SF_{i,t}}{I_{i,t}} = \frac{SF_{i,b}}{I_{i,b}} = \overline{\kappa}_{i,b} \Rightarrow \frac{I^*_{i,t}}{P_{i,t}} = \left(1 - \overline{\kappa}_{i,b}\right) * \frac{I_{i,t}}{P_{i,t}} \Rightarrow i^*_{i,t} - i^*_{i,b} = \left(1 - \overline{\kappa}_{i,b}\right) * \left(i_{i,t} - i_{i,b}\right) \quad \text{II.A13.6}$$

where $\overline{\kappa}_{i,b} \leq 1$; and, $i_{i,t} \equiv \frac{I_{i,t}}{P_{i,t}}$ and $i^*_{i,t} \equiv \frac{I^*_{i,t}}{P_{i,t}}$ are the inactivity and the adjusted inactivity rates, respectively.

A bar over a variable indicates that it is constant (i.e. time invariant).

How Equation II.A13.5 is used to project enrolment rates

Expressing Equation II.A13.5 in terms of differences to the base period, substituting Equation II.A13.6, and using the identity $\left(p_{i,t} - p_{i,b}\right) + \left(i_{i,t} - i_{i,b}\right) \equiv 0$:

$$e_{i,t} - e_{i,b} = -\frac{\overline{\kappa}_{i,b}}{1 - \overline{\alpha}_{i,b}} * \left(p_{i,t} - p_{i,b}\right) \quad \text{II.A13.7}$$

where $\overline{\kappa}_{i,b} = \frac{SF_{i,b}}{I_{i,b}}$; $\overline{\alpha}_{i,b} \equiv \frac{SP_{i,b}}{SF_{i,b}+SP_{i,b}} = \frac{SP_{i,b}}{ST_{i,b}}$, and $0 \leq \overline{\kappa}_{i,b}, \overline{\alpha}_{i,b} \leq 1$.

A value for $\overline{\kappa}_{i,b}$ lower than one means that changes in the labour force do not necessary reduce one by one enrolment rates, because some people coming from inactivity were not involved in education activities.

Part III

Statistical Annex

The full dataset with annual data for 2022-2070 is published online.

1. BELGIUM

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.53	1.55	1.58	1.60	1.62	1.64
Life expectancy at birth							
males	6.9	79.5	80.8	82.4	83.8	85.2	86.4
females	5.9	84.6	85.5	86.9	88.2	89.4	90.5
Life expectancy at 65 (years)							
males	4.9	18.7	19.7	20.7	21.7	22.7	23.6
females	4.6	22.3	23.0	24.1	25.1	26.0	26.9
Net migration (thousands)	-86.8	115.7	37.2	36.2	32.5	30.1	28.9
Net migration as % of population in t-1	-0.8	1.0	0.3	0.3	0.3	0.2	0.2
Population (million)	1.0	11.7	12.0	12.4	12.6	12.6	12.7
share of prime-age population (25-54y)	-4.0	39.0	38.1	38.2	37.1	36.2	35.0
share of working-age population (20-64y)	-5.1	58.1	56.8	55.7	54.7	53.8	53.0
share of elderly population (+65y)	8.5	19.6	22.1	24.2	25.3	26.8	28.1
share of very elderly population (+80y)	5.8	5.5	6.4	8.1	9.7	10.3	11.3
share of very elderly population (+80y) in elderly population (+65y)	12.1	28.1	28.7	33.4	38.2	38.4	40.2
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.3	1.8	1.1	1.7	1.3	1.2	1.1
Employment (15-74y; growth rate)	0.2	1.5	0.5	0.2	0.0	-0.1	-0.2
Labour input: hours worked (growth rate)	0.2	1.6	0.5	0.2	0.0	-0.1	-0.2
Labour productivity per hour (growth rate)	1.1	0.2	0.6	1.5	1.4	1.3	1.2
TFP (growth rate)	0.7	0.2	0.4	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.4	0.0	0.2	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.1	1.0	0.9	1.4	1.2	1.2	1.0
Potential GDP per worker (growth rate)	1.1	0.3	0.6	1.5	1.4	1.3	1.2
HICP (growth rate)	2.3	10.3	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.8	1.7	3.6	3.9	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-60	6,786	6,829	6,888	6,873	6,792	6,726
Working-age population (growth rate)	-0.6	0.4	0.0	0.1	0.0	-0.1	-0.2
Labour force (20-64y; thousands)	231	5,167	5,323	5,489	5,506	5,452	5,398
Participation rate (20-64y)	4.1	76.1	77.9	79.7	80.1	80.3	80.3
Participation rate (20-74y)	2.5	65.4	66.2	68.1	68.6	68.0	67.9
young (20-24y)	2.8	48.4	50.9	51.3	51.1	51.0	51.2
prime-age (25-54y)	2.1	86.1	87.2	87.8	88.2	88.1	88.2
older (55-64y)	11.5	59.1	63.2	67.2	68.3	69.8	70.6
oldest (65-74y)	5.2	5.4	8.2	10.0	10.6	10.6	10.6
Participation rate (20-64y) - female	5.6	71.9	74.6	76.7	77.4	77.6	77.6
Participation rate (20-74y) - female	4.3	61.1	63.0	65.4	66.0	65.4	65.3
young (20-24y)	1.7	45.6	47.0	47.5	47.2	47.1	47.3
prime-age (25-54y)	3.3	82.0	83.8	84.8	85.3	85.3	85.3
older (55-64y)	14.8	53.9	59.8	64.8	66.3	68.0	68.7
oldest (65-74y)	7.1	3.2	7.8	9.5	10.2	10.2	10.2
Participation rate (20-64y) - male	2.6	80.3	81.2	82.6	82.8	82.9	82.9
Participation rate (20-74y) - male	0.7	69.8	69.4	70.9	71.3	70.6	70.4
young (20-24y)	3.8	51.1	54.6	55.1	54.8	54.7	54.9
prime-age (25-54y)	0.8	90.2	90.5	90.8	91.0	90.9	91.0
older (55-64y)	8.3	64.2	66.4	69.6	70.4	71.6	72.5
oldest (65-74y)	3.2	7.9	8.5	10.4	10.9	11.0	11.0
Average labour market exit age (1)	1.7	62.8	64.1	64.2	64.3	64.4	64.5
male	2.0	62.5	64.0	64.2	64.3	64.4	64.5
female	1.4	63.0	64.1	64.2	64.3	64.4	64.4
Employment rate (20-64y)	3.7	72.1	73.7	75.2	75.6	75.8	75.8
Employment rate (20-74y)	2.2	62.0	62.7	64.4	64.8	64.3	64.2
Unemployment rate (20-64y)	0.3	5.3	5.4	5.6	5.6	5.6	5.6
Unemployment rate (20-74y)	0.2	5.3	5.4	5.5	5.5	5.5	5.5
Employment (20-64y; millions)	0.2	4.9	5.0	5.2	5.2	5.1	5.1
Employment (20-74y; millions)	0.3	5.0	5.1	5.3	5.3	5.3	5.2
share of young (20-24y)	-0.1	5.7	6.2	5.7	5.4	5.6	5.5
share of prime-age (25-54y)	-4.5	75.2	73.9	73.9	73.0	72.3	70.7
share of older (55-64y)	3.1	17.8	17.7	17.9	19.0	19.3	20.9
share of oldest (65-74y)	1.6	1.3	2.1	2.5	2.6	2.8	2.9
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.2	22.9	22.0	21.4	22.5	22.5	24.1
Old-age dependency ratio (3)	19.2	33.7	39.0	43.5	46.3	49.8	53.0
Total dependency ratio (4)	16.6	72.0	76.1	79.4	82.8	86.0	88.7
Total economic dependency ratio (5)	6.4	135.5	133.8	132.5	135.3	138.5	141.8
Economic old-age dependency ratio (20-64y) (6)	21.5	45.4	50.7	55.2	58.5	62.7	66.9
Economic old-age dependency ratio (20-74y) (7)	20.1	44.8	49.6	53.8	56.9	60.9	65.0

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

2. BULGARIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.56	1.60	1.64	1.66	1.68	1.69
Life expectancy at birth							
males	12.3	70.5	73.4	76.0	78.5	80.7	82.8
females	10.0	77.7	80.1	82.3	84.2	86.0	87.7
Life expectancy at 65 (years)							
males	7.8	13.5	15.4	17.0	18.5	19.9	21.3
females	7.1	17.5	19.1	20.6	22.0	23.3	24.6
Net migration (thousands)	-144.3	160.1	-2.9	11.5	12.9	12.4	15.8
Net migration as % of population in t-1	-2.0	2.3	0.0	0.2	0.2	0.2	0.3
Population (million)	-1.6	6.9	6.5	6.1	5.8	5.6	5.3
share of prime-age population (25-54y)	-8.1	41.2	37.8	34.8	32.8	33.5	33.1
share of working-age population (20-64y)	-7.8	59.0	57.8	55.6	51.6	49.4	51.2
share of elderly population (+65y)	9.2	21.6	23.2	26.5	30.2	32.4	30.8
share of very elderly population (+80y)	9.0	4.7	5.9	7.5	9.0	11.8	13.7
share of very elderly population (+80y) in elderly population (+65y)	22.5	21.9	25.6	28.2	29.7	36.4	44.5
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.4	2.2	1.7	1.4	1.1	1.3	1.0
Employment (15-74y; growth rate)	-0.7	0.0	-1.2	-1.0	-1.1	-0.4	-0.3
Labour input: hours worked (growth rate)	-0.7	-0.2	-1.2	-1.0	-1.1	-0.4	-0.3
Labour productivity per hour (growth rate)	2.2	2.4	2.9	2.4	2.2	1.7	1.2
TFP (growth rate)	1.4	2.0	1.5	1.5	1.4	1.1	0.8
capital deepening (contribution to labour productivity growth)	0.8	0.4	1.4	0.9	0.8	0.6	0.4
Potential GDP per capita (growth rate)	2.0	2.0	2.5	1.9	1.6	1.9	1.4
Potential GDP per worker (growth rate)	2.2	2.2	2.9	2.4	2.2	1.7	1.2
HICP (growth rate)	2.5	13.0	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.4	1.5	2.6	3.1	3.8	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-1,353	4,063	3,781	3,411	3,015	2,749	2,710
Working-age population (growth rate)	0.0	-0.2	-0.8	-1.3	-1.2	-0.3	-0.3
Labour force (20-64y; thousands)	-1,034	3,215	2,944	2,672	2,393	2,224	2,181
Participation rate (20-64y)	1.3	79.1	77.9	78.3	79.4	80.9	80.5
Participation rate (20-74y)	0.9	67.3	66.0	64.8	63.9	65.3	68.1
young (20-24y)	1.8	41.6	42.7	43.5	43.4	43.2	43.4
prime-age (25-54y)	3.0	85.9	87.3	88.1	88.9	89.1	88.9
older (55-64y)	2.5	71.0	66.3	68.5	69.4	72.8	73.5
oldest (65-74y)	0.2	11.2	10.0	10.5	10.4	10.1	11.4
Participation rate (20-64y) - female	1.7	75.0	74.0	74.7	75.7	77.1	76.7
Participation rate (20-74y) - female	2.3	61.8	61.2	60.5	59.9	61.2	64.2
young (20-24y)	2.3	33.9	35.6	36.3	36.2	36.0	36.2
prime-age (25-54y)	2.4	82.5	83.6	84.1	84.8	85.1	84.9
older (55-64y)	5.4	66.1	63.4	66.6	67.8	70.9	71.5
oldest (65-74y)	1.7	7.9	7.8	8.4	8.7	8.4	9.6
Participation rate (20-64y) - male	0.9	83.2	81.7	81.9	83.0	84.5	84.1
Participation rate (20-74y) - male	-1.0	72.9	70.9	69.1	68.0	69.4	72.0
young (20-24y)	1.1	48.9	49.4	50.2	50.0	49.8	50.0
prime-age (25-54y)	3.6	89.1	90.8	91.9	92.7	92.8	92.7
older (55-64y)	-0.9	76.4	69.4	70.3	71.1	74.8	75.5
oldest (65-74y)	-2.4	15.7	12.9	12.8	12.3	11.9	13.4
Average labour market exit age (1)	1.3	63.0	63.6	64.0	64.1	64.2	64.3
male	1.0	63.5	64.0	64.1	64.2	64.3	64.4
female	1.7	62.5	63.2	63.9	64.0	64.1	64.2
Employment rate (20-64y)	0.8	75.8	74.4	74.5	75.5	77.0	76.6
Employment rate (20-74y)	0.4	64.4	63.1	61.7	60.9	62.2	64.8
Unemployment rate (20-64y)	0.6	4.2	4.4	4.9	4.9	4.9	4.9
Unemployment rate (20-74y)	0.6	4.2	4.4	4.8	4.8	4.8	4.8
Employment (20-64y; millions)	-1.0	3.1	2.8	2.5	2.3	2.1	2.1
Employment (20-74y; millions)	-1.0	3.2	2.9	2.6	2.4	2.2	2.1
share of young (20-24y)	1.1	3.7	4.7	4.8	4.5	4.8	4.8
share of prime-age (25-54y)	-4.3	73.6	71.4	68.1	68.5	72.2	69.3
share of older (55-64y)	3.0	19.8	21.2	23.8	23.3	19.5	22.8
share of oldest (65-74y)	0.1	3.0	2.7	3.3	3.7	3.5	3.1
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	3.0	22.6	25.4	27.9	27.4	22.2	25.5
Old-age dependency ratio (3)	23.6	36.6	40.2	47.7	58.6	65.5	60.3
Total dependency ratio (4)	25.9	69.6	73.1	80.0	93.8	102.4	95.5
Total economic dependency ratio (5)	30.3	117.1	126.3	133.6	147.1	153.8	147.5
Economic old-age dependency ratio (20-64y) (6)	30.3	45.1	51.1	60.6	73.6	81.4	75.5
Economic old-age dependency ratio (20-74y) (7)	29.4	43.8	49.7	58.6	70.9	78.6	73.2

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

3. CZECHIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.0	1.72	1.73	1.74	1.75	1.75	1.75
Life expectancy at birth							
males	8.9	75.9	77.9	79.8	81.6	83.3	84.8
females	7.3	81.9	83.5	85.1	86.6	87.9	89.2
Life expectancy at 65 (years)							
males	6.5	15.9	17.4	18.8	20.0	21.3	22.4
females	6.0	19.7	21.0	22.3	23.5	24.6	25.7
Net migration (thousands)	-445.9	470.8	-1.8	29.7	26.2	23.8	24.8
Net migration as % of population in t-1	-4.2	4.4	0.0	0.3	0.2	0.2	0.2
Population (million)	-0.2	10.7	10.8	10.7	10.7	10.7	10.6
share of prime-age population (25-54y)	-6.6	41.8	38.4	35.9	35.1	35.7	35.2
share of working-age population (20-64y)	-5.3	58.4	57.8	56.1	52.9	51.4	53.2
share of elderly population (+65y)	7.0	20.4	21.5	24.3	27.3	28.6	27.4
share of very elderly population (+80y)	7.6	4.3	6.1	7.4	8.1	11.3	11.9
share of very elderly population (+80y) in elderly population (+65y)	22.5	21.0	28.5	30.6	29.7	39.4	43.5
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.5	2.1	1.3	1.6	1.6	1.6	1.2
Employment (15-74y; growth rate)	-0.2	1.5	-0.3	-0.7	-0.4	0.0	0.0
Labour input: hours worked (growth rate)	-0.2	1.6	-0.2	-0.7	-0.4	0.0	0.0
Labour productivity per hour (growth rate)	1.7	0.5	1.6	2.3	2.0	1.6	1.2
TFP (growth rate)	1.1	0.4	0.9	1.5	1.3	1.1	0.8
capital deepening (contribution to labour productivity growth)	0.6	0.1	0.6	0.8	0.7	0.6	0.4
Potential GDP per capita (growth rate)	1.5	0.9	1.6	1.6	1.6	1.8	1.3
Potential GDP per worker (growth rate)	1.7	0.6	1.6	2.3	2.0	1.6	1.2
HICP (growth rate)	2.5	14.8	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	4.3	4.3	4.7	4.4	4.1	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-659	6,275	6,268	6,016	5,684	5,505	5,616
Working-age population (growth rate)	-0.5	0.5	-0.4	-0.8	-0.4	0.0	0.1
Labour force (20-64y; thousands)	-635	5,214	5,133	4,870	4,627	4,521	4,579
Participation rate (20-64y)	-1.6	83.1	81.9	81.0	81.4	82.1	81.5
Participation rate (20-74y)	-0.9	70.9	70.3	68.1	66.8	68.3	70.0
young (20-24y)	2.0	50.7	52.2	52.7	52.9	52.5	52.7
prime-age (25-54y)	-0.8	89.1	88.9	88.1	88.0	88.5	88.3
older (55-64y)	0.3	74.7	74.5	74.2	74.5	75.2	75.0
oldest (65-74y)	-1.5	10.7	7.2	9.9	8.5	8.7	9.2
Participation rate (20-64y) - female	-1.0	75.8	75.4	74.3	74.3	75.3	74.8
Participation rate (20-74y) - female	0.5	63.5	63.9	61.9	60.4	62.2	64.0
young (20-24y)	1.3	42.3	43.2	43.6	43.7	43.4	43.6
prime-age (25-54y)	-1.3	81.6	81.7	80.0	79.6	80.6	80.3
older (55-64y)	4.2	68.8	71.4	72.5	72.2	73.0	73.0
oldest (65-74y)	0.3	8.6	5.9	9.5	8.2	8.4	8.9
Participation rate (20-64y) - male	-2.5	90.2	88.1	87.2	87.9	88.4	87.7
Participation rate (20-74y) - male	-2.9	78.4	76.7	74.1	72.8	74.1	75.4
young (20-24y)	2.4	58.9	60.8	61.3	61.5	61.0	61.3
prime-age (25-54y)	-0.7	96.2	95.7	95.6	95.7	95.6	95.6
older (55-64y)	-3.9	80.7	77.5	75.9	76.7	77.1	76.9
oldest (65-74y)	-3.7	13.2	8.6	10.3	8.8	9.1	9.4
Average labour market exit age (1)	1.8	62.2	63.8	64.0	64.0	64.0	64.0
male	1.3	62.6	63.9	63.9	63.9	63.9	63.9
female	2.2	61.7	63.7	64.0	64.0	64.0	64.0
Employment rate (20-64y)	-1.9	81.3	79.7	78.8	79.2	79.9	79.4
Employment rate (20-74y)	-1.3	69.4	68.5	66.4	65.0	66.5	68.1
Unemployment rate (20-64y)	0.5	2.2	2.6	2.7	2.7	2.6	2.6
Unemployment rate (20-74y)	0.5	2.1	2.6	2.6	2.6	2.6	2.6
Employment (20-64y; millions)	-0.6	5.1	5.0	4.7	4.5	4.4	4.5
Employment (20-74y; millions)	-0.7	5.2	5.1	4.9	4.6	4.5	4.6
share of young (20-24y)	1.6	4.6	6.0	6.1	5.8	6.0	6.2
share of prime-age (25-54y)	-4.5	74.8	71.2	67.9	69.9	73.0	70.3
share of older (55-64y)	3.3	18.1	21.3	23.3	21.6	18.5	21.4
share of oldest (65-74y)	-0.4	2.6	1.6	2.7	2.6	2.4	2.1
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	3.1	20.6	23.7	26.0	24.2	20.7	23.7
Old-age dependency ratio (3)	16.6	34.9	37.2	43.2	51.7	55.7	51.5
Total dependency ratio (4)	16.9	71.2	72.9	78.2	89.1	94.5	88.1
Total economic dependency ratio (5)	26.8	105.1	113.4	120.1	132.4	137.3	131.9
Economic old-age dependency ratio (20-64y) (6)	22.5	40.2	45.0	52.1	62.5	67.1	62.7
Economic old-age dependency ratio (20-74y) (7)	22.2	39.2	44.2	50.7	60.9	65.5	61.3

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

4. DENMARK

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.68	1.69	1.71	1.72	1.72	1.73
Life expectancy at birth							
males	6.5	79.9	80.9	82.4	83.8	85.1	86.4
females	6.5	83.6	84.9	86.3	87.7	88.9	90.1
Life expectancy at 65 (years)							
males	4.7	18.7	19.5	20.5	21.5	22.5	23.4
females	5.2	21.3	22.3	23.4	24.5	25.5	26.5
Net migration (thousands)	-41.8	55.1	12.4	12.5	12.4	14.4	13.3
Net migration as % of population in t-1	-0.7	0.9	0.2	0.2	0.2	0.2	0.2
Population (million)	0.3	5.9	6.1	6.1	6.2	6.2	6.2
share of prime-age population (25-54y)	-3.6	38.3	37.4	37.4	36.1	35.2	34.6
share of working-age population (20-64y)	-6.3	57.7	56.2	53.9	54.6	53.3	51.4
share of elderly population (+65y)	8.6	20.4	22.5	24.8	25.3	27.1	29.0
share of very elderly population (+80y)	5.8	5.1	7.0	8.0	9.7	10.4	10.9
share of very elderly population (+80y) in elderly population (+65y)	12.8	24.8	31.1	32.2	38.4	38.5	37.5
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.3	2.2	0.9	1.6	1.6	1.2	1.1
Employment (15-74y; growth rate)	0.1	1.2	-0.1	0.1	0.3	-0.1	-0.2
Labour input: hours worked (growth rate)	0.1	1.2	-0.1	0.1	0.3	-0.1	-0.2
Labour productivity per hour (growth rate)	1.3	1.0	1.1	1.5	1.4	1.3	1.2
TFP (growth rate)	0.8	0.2	0.7	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.5	0.7	0.4	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.2	1.4	0.7	1.6	1.6	1.2	1.1
Potential GDP per worker (growth rate)	1.3	0.9	1.1	1.5	1.4	1.3	1.2
HICP (growth rate)	2.2	8.5	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.4	1.5	2.6	3.2	3.9	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-224	3,402	3,406	3,313	3,358	3,287	3,178
Working-age population (growth rate)	-0.9	0.6	-0.3	-0.2	0.2	-0.5	-0.2
Labour force (20-64y; thousands)	-47	2,843	2,883	2,849	2,910	2,875	2,796
Participation rate (20-64y)	4.4	83.6	84.6	86.0	86.6	87.5	88.0
Participation rate (20-74y)	4.9	73.1	73.3	74.6	77.1	77.7	78.0
young (20-24y)	3.5	75.1	78.6	78.6	78.6	78.6	78.6
prime-age (25-54y)	2.1	87.7	88.3	89.1	89.7	89.8	89.8
older (55-64y)	11.1	75.5	76.7	79.1	81.8	84.9	86.6
oldest (65-74y)	19.6	16.3	16.1	22.2	27.0	34.5	35.9
Participation rate (20-64y) - female	5.7	80.8	82.4	83.9	84.9	86.1	86.5
Participation rate (20-74y) - female	7.1	69.3	70.8	72.4	74.9	75.9	76.4
young (20-24y)	3.9	73.4	77.3	77.3	77.3	77.3	77.3
prime-age (25-54y)	3.0	85.3	86.1	87.3	88.2	88.2	88.3
older (55-64y)	14.0	71.5	74.2	75.8	79.2	83.9	85.5
oldest (65-74y)	26.2	9.2	14.2	21.8	25.2	32.8	35.4
Participation rate (20-64y) - male	3.1	86.3	86.8	88.0	88.3	88.8	89.3
Participation rate (20-74y) - male	2.5	76.9	75.8	76.8	79.2	79.4	79.5
young (20-24y)	3.1	76.7	79.8	79.8	79.8	79.8	79.8
prime-age (25-54y)	1.1	90.1	90.5	90.8	91.0	91.2	91.3
older (55-64y)	8.2	79.6	79.2	82.4	84.3	85.9	87.8
oldest (65-74y)	12.5	24.0	18.0	22.7	28.9	36.1	36.4
Average labour market exit age (1)	4.1	64.9	65.6	66.8	67.7	68.5	69.0
male	3.7	65.3	65.8	66.9	67.8	68.6	69.0
female	4.4	64.5	65.4	66.6	67.5	68.4	69.0
Employment rate (20-64y)	4.6	80.2	81.5	82.9	83.5	84.3	84.8
Employment rate (20-74y)	5.0	70.1	70.6	71.9	74.4	74.9	75.2
Unemployment rate (20-64y)	-0.5	4.1	3.7	3.6	3.6	3.6	3.6
Unemployment rate (20-74y)	-0.5	4.1	3.7	3.6	3.6	3.6	3.6
Employment (20-64y; millions)	0.0	2.7	2.8	2.7	2.8	2.8	2.7
Employment (20-74y; millions)	0.1	2.8	2.9	2.9	3.0	3.0	3.0
share of young (20-24y)	-1.4	9.0	8.9	8.3	8.6	7.8	7.6
share of prime-age (25-54y)	-4.6	67.5	67.3	68.3	64.8	62.3	62.9
share of older (55-64y)	0.6	20.0	20.2	18.1	21.1	21.6	20.6
share of oldest (65-74y)	5.4	3.5	3.6	5.3	5.6	8.2	8.9
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	0.1	22.7	22.9	20.6	23.4	24.0	22.8
Old-age dependency ratio (3)	21.1	35.4	40.0	45.9	46.4	50.9	56.5
Total dependency ratio (4)	21.2	73.4	78.1	85.4	83.1	87.6	94.7
Total economic dependency ratio (5)	0.4	108.8	110.6	111.7	106.9	104.1	109.2
Economic old-age dependency ratio (20-64y) (6)	16.3	40.3	45.2	49.5	49.3	51.1	56.6
Economic old-age dependency ratio (20-74y) (7)	12.7	38.9	43.5	46.9	46.6	46.9	51.6

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

5. GERMANY

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.53	1.55	1.57	1.59	1.61	1.63
Life expectancy at birth							
males	7.0	79.0	80.1	81.8	83.3	84.7	86.0
females	6.2	83.8	84.7	86.2	87.6	88.8	90.0
Life expectancy at 65 (years)							
males	5.0	18.3	19.1	20.2	21.3	22.3	23.3
females	4.9	21.5	22.3	23.4	24.4	25.4	26.4
Net migration (thousands)	-1395.5	1631.3	249.6	263.0	266.2	253.6	235.7
Net migration as % of population in t-1	-1.7	2.0	0.3	0.3	0.3	0.3	0.3
Population (million)	0.3	83.9	85.3	85.2	84.8	84.3	84.2
share of prime-age population (25-54y)	-2.8	38.3	37.3	36.7	36.0	35.8	35.5
share of working-age population (20-64y)	-6.8	59.2	55.8	54.2	54.4	53.1	52.4
share of elderly population (+65y)	6.7	22.1	24.8	26.8	27.1	28.0	28.8
share of very elderly population (+80y)	4.4	7.3	6.9	8.6	11.2	10.5	11.7
share of very elderly population (+80y) in elderly population (+65y)	7.7	33.0	28.0	32.0	41.5	37.5	40.7
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.1	0.5	0.7	1.6	1.3	1.1	1.2
Employment (15-74y; growth rate)	-0.1	0.1	-0.5	0.1	-0.1	-0.2	0.0
Labour input: hours worked (growth rate)	-0.1	-0.4	-0.5	0.1	-0.1	-0.2	0.0
Labour productivity per hour (growth rate)	1.3	0.9	1.2	1.5	1.4	1.3	1.2
TFP (growth rate)	0.8	0.5	0.8	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.4	0.4	0.5	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.1	-0.3	0.7	1.6	1.3	1.2	1.2
Potential GDP per worker (growth rate)	1.2	0.5	1.2	1.5	1.4	1.3	1.2
HICP (growth rate)	2.3	8.7	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.3	1.1	2.5	3.1	3.9	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-5,511	49,652	47,586	46,174	46,089	44,767	44,141
Working-age population (growth rate)	-0.4	0.4	-0.9	0.2	-0.2	-0.2	0.0
Labour force (20-64y; thousands)	-3,742	41,343	39,644	39,013	38,945	38,036	37,601
Participation rate (20-64y)	1.9	83.3	83.3	84.5	84.5	85.0	85.2
Participation rate (20-74y)	0.2	72.4	69.9	71.4	72.7	71.8	72.6
young (20-24y)	0.3	73.6	73.9	73.9	74.0	73.9	73.9
prime-age (25-54y)	1.4	87.8	88.3	88.8	89.1	89.3	89.3
older (55-64y)	2.6	75.3	72.9	76.3	76.0	77.0	77.9
oldest (65-74y)	1.2	14.5	13.0	12.7	15.0	14.9	15.6
Participation rate (20-64y) - female	3.8	79.0	79.6	81.4	81.8	82.5	82.8
Participation rate (20-74y) - female	2.4	67.7	65.9	68.0	69.6	69.1	70.1
young (20-24y)	-0.1	70.8	70.8	70.8	70.8	70.8	70.7
prime-age (25-54y)	3.0	83.4	84.5	85.7	86.1	86.3	86.4
older (55-64y)	6.2	71.1	69.7	73.7	74.7	76.3	77.3
oldest (65-74y)	3.3	11.3	11.4	11.5	13.7	13.8	14.6
Participation rate (20-64y) - male	0.0	87.4	86.9	87.4	87.0	87.3	87.4
Participation rate (20-74y) - male	-2.2	77.1	73.7	74.7	75.7	74.5	75.0
young (20-24y)	0.6	76.1	76.8	76.8	76.8	76.8	76.7
prime-age (25-54y)	-0.2	92.2	91.9	91.6	91.9	92.1	92.0
older (55-64y)	-1.1	79.5	76.2	79.0	77.3	77.7	78.4
oldest (65-74y)	-1.4	18.0	14.7	14.0	16.5	16.1	16.6
Average labour market exit age (1)	1.2	64.2	64.9	65.1	65.2	65.4	65.5
male	1.1	64.4	65.1	65.2	65.3	65.4	65.5
female	1.4	64.0	64.8	65.1	65.2	65.3	65.5
Employment rate (20-64y)	1.2	80.7	80.4	81.3	81.2	81.7	81.9
Employment rate (20-74y)	-0.4	70.3	67.4	68.7	70.0	69.1	69.9
Unemployment rate (20-64y)	0.8	3.1	3.5	3.8	3.8	3.8	3.8
Unemployment rate (20-74y)	0.7	3.0	3.5	3.8	3.8	3.8	3.7
Employment (20-64y; millions)	-3.9	40.1	38.2	37.5	37.4	36.6	36.2
Employment (20-74y; millions)	-3.7	41.4	39.7	38.8	38.8	38.1	37.7
share of young (20-24y)	0.5	7.6	7.7	8.5	8.2	7.9	8.1
share of prime-age (25-54y)	2.1	66.2	68.5	68.9	67.4	68.1	68.2
share of older (55-64y)	-3.3	23.0	20.2	19.3	20.8	20.1	19.7
share of oldest (65-74y)	0.8	3.2	3.6	3.3	3.6	4.0	4.0
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	-3.8	26.1	23.9	22.0	23.9	23.0	22.3
Old-age dependency ratio (3)	17.6	37.4	44.4	49.5	49.9	52.7	55.0
Total dependency ratio (4)	21.9	69.0	79.2	84.5	84.0	88.3	90.8
Total economic dependency ratio (5)	21.1	102.6	114.9	119.5	118.3	121.4	123.7
Economic old-age dependency ratio (20-64y) (6)	20.0	42.9	51.4	57.4	57.6	60.3	62.9
Economic old-age dependency ratio (20-74y) (7)	18.9	41.5	49.5	55.5	55.5	57.9	60.4

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

6. ESTONIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.2	1.57	1.64	1.69	1.71	1.72	1.73
Life expectancy at birth							
males	9.8	74.3	76.0	78.3	80.4	82.3	84.1
females	6.8	83.0	84.3	85.8	87.2	88.5	89.8
Life expectancy at 65 (years)							
males	6.4	15.8	16.9	18.3	19.7	21.0	22.2
females	5.4	20.9	21.9	23.1	24.2	25.3	26.3
Net migration (thousands)	-41.5	45.4	1.0	3.8	4.1	3.6	3.9
Net migration as % of population in t-1	-3.1	3.4	0.1	0.3	0.3	0.3	0.3
Population (million)	0.0	1.4	1.4	1.3	1.3	1.3	1.3
share of prime-age population (25-54y)	-7.0	40.7	38.8	37.3	34.7	34.8	33.7
share of working-age population (20-64y)	-6.2	58.1	57.5	56.8	53.8	50.9	51.9
share of elderly population (+65y)	9.5	20.3	22.2	24.5	27.2	30.2	29.8
share of very elderly population (+80y)	7.3	6.0	6.2	8.0	9.1	10.7	13.3
share of very elderly population (+80y) in elderly population (+65y)	15.4	29.3	28.2	32.6	33.4	35.3	44.7
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.6	2.4	1.4	2.0	1.6	1.3	1.4
Employment (15-74y; growth rate)	-0.1	1.8	-0.4	0.0	-0.3	-0.2	0.2
Labour input: hours worked (growth rate)	0.0	2.4	-0.4	0.0	-0.3	-0.2	0.2
Labour productivity per hour (growth rate)	1.6	0.1	1.8	2.0	1.9	1.6	1.2
TFP (growth rate)	1.0	-0.2	1.0	1.3	1.2	1.0	0.8
capital deepening (contribution to labour productivity growth)	0.6	0.2	0.8	0.7	0.7	0.5	0.4
Potential GDP per capita (growth rate)	1.6	0.8	1.7	2.0	1.6	1.5	1.5
Potential GDP per worker (growth rate)	1.7	0.6	1.8	2.0	1.9	1.6	1.2
HICP (growth rate)	2.5	19.4	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.7	2.3	3.4	3.6	3.9	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-106	786	780	762	722	676	680
Working-age population (growth rate)	-1.4	1.3	-0.1	-0.3	-0.8	-0.1	-0.1
Labour force (20-64y; thousands)	-56	680	675	668	644	616	623
Participation rate (20-64y)	5.1	86.5	86.5	87.6	89.3	91.0	91.7
Participation rate (20-74y)	4.3	77.3	75.0	76.2	77.1	77.6	81.6
young (20-24y)	4.2	75.2	79.0	79.5	79.5	79.2	79.4
prime-age (25-54y)	3.5	90.8	92.1	93.4	94.3	94.3	94.3
older (55-64y)	12.6	77.1	73.1	75.1	80.2	86.2	89.7
oldest (65-74y)	4.6	28.7	17.3	20.5	26.0	27.2	33.3
Participation rate (20-64y) - female	7.1	84.5	84.9	86.3	88.9	91.0	91.7
Participation rate (20-74y) - female	7.4	74.0	72.2	73.9	75.9	77.2	81.4
young (20-24y)	3.3	78.2	81.2	81.5	81.6	81.4	81.6
prime-age (25-54y)	6.3	87.4	90.1	92.5	93.8	93.8	93.8
older (55-64y)	12.0	78.2	72.1	72.1	79.3	86.5	90.3
oldest (65-74y)	4.7	27.7	18.3	20.4	25.0	26.4	32.5
Participation rate (20-64y) - male	3.1	88.5	88.0	88.8	89.6	91.0	91.6
Participation rate (20-74y) - male	0.9	80.8	77.8	78.3	78.2	78.1	81.8
young (20-24y)	5.0	72.3	76.9	77.5	77.5	77.0	77.3
prime-age (25-54y)	0.8	93.9	93.9	94.3	94.8	94.7	94.8
older (55-64y)	13.5	75.7	74.2	78.0	80.9	85.9	89.2
oldest (65-74y)	4.0	30.0	16.0	20.7	27.2	28.1	34.0
Average labour market exit age (1)	4.6	63.8	64.6	65.8	67.0	67.7	68.4
male	4.8	63.6	64.6	65.8	67.0	67.7	68.4
female	4.5	63.9	64.7	65.9	67.1	67.7	68.4
Employment rate (20-64y)	4.3	81.8	81.5	82.3	83.8	85.6	86.1
Employment rate (20-74y)	3.6	73.3	70.8	71.7	72.6	73.2	76.9
Unemployment rate (20-64y)	0.6	5.4	5.8	6.1	6.1	6.0	6.0
Unemployment rate (20-74y)	0.5	5.2	5.6	5.9	5.8	5.7	5.7
Employment (20-64y; millions)	-0.1	0.6	0.6	0.6	0.6	0.6	0.6
Employment (20-74y; millions)	-0.1	0.7	0.7	0.7	0.6	0.6	0.6
share of young (20-24y)	1.2	5.9	8.1	7.6	6.6	7.0	7.1
share of prime-age (25-54y)	-7.0	69.5	69.7	67.4	64.2	66.1	62.5
share of older (55-64y)	4.7	18.4	18.2	20.1	22.4	19.2	23.1
share of oldest (65-74y)	1.2	6.1	4.0	4.8	6.8	7.7	7.3
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	3.4	21.8	22.2	24.4	26.5	21.8	25.2
Old-age dependency ratio (3)	22.4	34.9	38.6	43.2	50.6	59.3	57.3
Total dependency ratio (4)	20.5	72.0	74.0	76.1	85.7	96.5	92.5
Total economic dependency ratio (5)	9.8	97.4	105.0	103.7	106.5	112.0	107.2
Economic old-age dependency ratio (20-64y) (6)	22.6	35.9	43.1	47.4	52.9	60.8	58.5
Economic old-age dependency ratio (20-74y) (7)	20.5	33.7	41.4	45.1	49.3	56.2	54.2

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

7. IRELAND

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.60	1.62	1.64	1.66	1.67	1.69
Life expectancy at birth							
males	6.1	80.8	81.7	83.2	84.5	85.7	86.9
females	6.0	84.6	85.6	87.0	88.3	89.5	90.6
Life expectancy at 65 (years)							
males	4.5	19.4	20.1	21.1	22.1	23.0	23.9
females	4.9	22.1	22.9	24.0	25.0	26.0	27.0
Net migration (thousands)	-81.3	93.2	17.0	17.8	13.7	11.2	11.9
Net migration as % of population in t-1	-1.7	1.9	0.3	0.3	0.2	0.2	0.2
Population (million)	1.0	5.1	5.4	5.8	6.0	6.1	6.1
share of prime-age population (25-54y)	-7.5	41.2	40.1	38.6	37.5	35.5	33.6
share of working-age population (20-64y)	-6.2	58.7	59.3	58.1	53.8	53.1	52.5
share of elderly population (+65y)	14.0	15.1	17.8	21.5	25.6	27.3	29.2
share of very elderly population (+80y)	8.7	3.6	4.8	6.4	8.2	10.8	12.3
share of very elderly population (+80y) in elderly population (+65y)	18.2	23.9	26.7	29.6	31.9	39.6	42.1
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	2.1	7.3	3.3	1.7	1.2	1.3	0.9
Employment (15-74y; growth rate)	0.3	3.1	0.6	0.1	-0.1	0.0	-0.3
Labour input: hours worked (growth rate)	0.3	2.7	0.6	0.1	-0.1	0.0	-0.3
Labour productivity per hour (growth rate)	1.8	4.5	2.7	1.6	1.4	1.3	1.2
TFP (growth rate)	1.4	5.0	1.9	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.4	-0.5	0.8	0.6	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.7	5.6	2.7	1.1	1.0	1.3	0.9
Potential GDP per worker (growth rate)	1.8	4.2	2.7	1.6	1.4	1.3	1.2
HICP (growth rate)	2.2	8.1	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.7	1.7	3.5	3.8	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	183	3,006	3,224	3,348	3,235	3,232	3,189
Working-age population (growth rate)	-1.9	1.6	0.8	0.0	-0.3	0.1	-0.3
Labour force (20-64y; thousands)	285	2,452	2,688	2,841	2,791	2,792	2,737
Participation rate (20-64y)	4.3	81.6	83.4	84.9	86.3	86.4	85.8
Participation rate (20-74y)	0.1	72.9	73.9	74.0	73.0	74.4	73.0
young (20-24y)	3.2	74.4	77.3	77.7	77.5	77.4	77.6
prime-age (25-54y)	5.5	86.1	88.7	90.7	91.6	91.6	91.6
older (55-64y)	5.8	69.0	69.5	71.6	72.5	75.3	74.8
oldest (65-74y)	3.1	13.4	15.2	16.0	15.4	15.6	16.5
Participation rate (20-64y) - female	7.8	75.8	79.6	81.9	83.6	84.1	83.6
Participation rate (20-74y) - female	3.6	67.0	70.2	71.1	70.0	71.8	70.6
young (20-24y)	5.0	72.3	77.0	77.4	77.1	77.1	77.3
prime-age (25-54y)	8.2	80.4	84.4	87.2	88.5	88.6	88.6
older (55-64y)	13.1	60.8	65.1	69.1	70.5	74.3	73.8
oldest (65-74y)	9.0	6.3	13.1	14.2	13.9	14.1	15.3
Participation rate (20-64y) - male	0.6	87.5	87.3	88.0	89.0	88.7	88.1
Participation rate (20-74y) - male	-3.6	79.1	77.7	77.0	76.0	77.0	75.5
young (20-24y)	1.5	76.5	77.6	78.1	77.8	77.8	78.0
prime-age (25-54y)	2.6	92.0	93.2	94.2	94.8	94.6	94.6
older (55-64y)	-1.8	77.6	74.0	74.3	74.7	76.3	75.9
oldest (65-74y)	-3.0	20.9	17.4	17.8	17.1	17.2	17.9
Average labour market exit age (1)	0.7	64.2	64.8	64.8	64.8	64.8	64.8
male	0.6	64.3	64.8	64.8	64.8	64.8	64.8
female	0.8	64.1	64.8	64.8	64.8	64.8	64.8
Employment rate (20-64y)	3.1	78.2	79.4	80.3	81.7	81.8	81.3
Employment rate (20-74y)	-0.7	69.9	70.4	70.1	69.1	70.5	69.2
Unemployment rate (20-64y)	1.2	4.2	4.8	5.3	5.3	5.3	5.3
Unemployment rate (20-74y)	1.1	4.1	4.8	5.3	5.2	5.2	5.2
Employment (20-64y; millions)	0.2	2.3	2.6	2.7	2.6	2.6	2.6
Employment (20-74y; millions)	0.3	2.4	2.6	2.8	2.8	2.7	2.7
share of young (20-24y)	-0.9	9.1	10.0	8.4	7.3	8.2	8.2
share of prime-age (25-54y)	-6.8	72.5	70.1	68.8	71.3	68.6	65.6
share of older (55-64y)	5.8	16.0	17.0	19.4	17.3	19.6	21.9
share of oldest (65-74y)	1.9	2.4	2.9	3.5	4.1	3.6	4.3
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	6.7	19.2	20.8	23.5	21.3	23.2	25.9
Old-age dependency ratio (3)	29.8	25.7	30.1	37.0	47.7	51.5	55.6
Total dependency ratio (4)	20.3	70.2	68.5	72.1	86.0	88.4	90.5
Total economic dependency ratio (5)	11.7	112.7	106.1	106.8	118.5	121.9	124.4
Economic old-age dependency ratio (20-64y) (6)	33.3	30.4	34.8	42.3	54.0	59.0	63.8
Economic old-age dependency ratio (20-74y) (7)	31.3	29.7	33.8	40.9	51.8	56.9	61.0

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

8. GREECE

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.41	1.44	1.47	1.50	1.52	1.55
Life expectancy at birth							
males	7.7	78.8	80.5	82.2	83.7	85.2	86.5
females	6.2	84.2	85.5	86.8	88.1	89.3	90.4
Life expectancy at 65 (years)							
males	5.2	18.7	19.8	20.9	22.0	23.0	23.9
females	5.0	21.7	22.7	23.8	24.8	25.8	26.7
Net migration (thousands)	-2.0	21.5	-4.3	5.2	8.2	12.6	19.5
Net migration as % of population in t-1	0.0	0.2	0.0	0.1	0.1	0.2	0.2
Population (million)	-2.7	10.4	10.0	9.5	8.9	8.3	7.8
share of prime-age population (25-54y)	-7.1	39.7	35.7	32.1	31.9	32.4	32.5
share of working-age population (20-64y)	-8.5	58.5	56.6	52.0	47.7	48.3	50.0
share of elderly population (+65y)	10.2	22.8	26.1	31.5	35.5	34.9	33.0
share of very elderly population (+80y)	9.1	7.1	8.0	10.4	13.5	16.4	16.2
share of very elderly population (+80y) in elderly population (+65y)	17.7	31.3	30.6	32.9	37.9	47.0	49.0
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.1	0.4	0.6	1.1	1.1	1.3	1.0
Employment (15-74y; growth rate)	-0.5	-0.3	-0.8	-0.9	-0.8	-0.3	-0.2
Labour input: hours worked (growth rate)	-0.6	-0.5	-0.8	-0.9	-0.8	-0.3	-0.2
Labour productivity per hour (growth rate)	1.6	0.9	1.3	2.1	2.0	1.6	1.2
TFP (growth rate)	1.1	0.7	0.8	1.4	1.3	1.0	0.8
capital deepening (contribution to labour productivity growth)	0.5	0.2	0.5	0.7	0.7	0.6	0.4
Potential GDP per capita (growth rate)	1.7	1.6	1.1	1.7	1.8	2.1	1.6
Potential GDP per worker (growth rate)	1.6	0.7	1.3	2.1	2.0	1.6	1.2
HICP (growth rate)	2.2	9.3	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	4.2	3.5	4.5	4.3	4.1	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-2,215	6,106	5,667	4,925	4,266	4,019	3,891
Working-age population (growth rate)	0.6	-1.0	-1.0	-1.5	-1.1	-0.4	-0.4
Labour force (20-64y; thousands)	-1,495	4,606	4,321	3,823	3,375	3,198	3,111
Participation rate (20-64y)	4.5	75.4	76.3	77.6	79.1	79.6	79.9
Participation rate (20-74y)	4.9	64.7	63.9	63.4	64.3	68.1	69.7
young (20-24y)	3.4	46.6	49.5	50.0	49.9	49.8	50.0
prime-age (25-54y)	-0.1	85.3	85.1	85.0	85.2	85.2	85.2
older (55-64y)	20.8	57.4	65.5	70.9	74.0	76.5	78.2
oldest (65-74y)	15.0	9.3	9.9	13.9	16.8	19.9	24.3
Participation rate (20-64y) - female	7.3	66.6	69.4	71.3	73.0	73.5	73.9
Participation rate (20-74y) - female	7.3	56.4	57.1	57.3	58.4	62.1	63.7
young (20-24y)	3.3	43.3	46.0	46.5	46.5	46.3	46.6
prime-age (25-54y)	1.7	77.4	78.1	78.8	79.2	79.0	79.1
older (55-64y)	26.4	44.8	57.9	63.3	66.6	69.6	71.2
oldest (65-74y)	15.8	6.0	7.0	12.1	15.0	17.8	21.7
Participation rate (20-64y) - male	1.3	84.3	83.1	83.9	85.1	85.3	85.6
Participation rate (20-74y) - male	2.0	73.3	70.9	69.6	70.3	74.0	75.4
young (20-24y)	3.3	49.8	52.7	53.1	53.0	52.9	53.1
prime-age (25-54y)	-2.4	93.2	92.0	91.0	90.9	90.8	90.8
older (55-64y)	14.0	71.1	73.7	79.1	82.0	83.7	85.1
oldest (65-74y)	13.9	13.2	13.2	16.0	18.9	22.2	27.1
Average labour market exit age (1)	3.7	63.8	64.6	65.6	66.4	66.9	67.5
male	3.7	63.8	64.6	65.6	66.4	66.9	67.5
female	3.8	63.7	64.6	65.5	66.3	66.9	67.5
Employment rate (20-64y)	8.6	66.1	68.7	71.1	73.9	74.4	74.7
Employment rate (20-74y)	8.4	56.8	57.7	58.1	60.2	63.8	65.2
Unemployment rate (20-64y)	-5.8	12.4	9.9	8.5	6.6	6.5	6.5
Unemployment rate (20-74y)	-5.9	12.3	9.8	8.3	6.5	6.4	6.3
Employment (20-64y; millions)	-1.1	4.0	3.9	3.5	3.2	3.0	2.9
Employment (20-74y; millions)	-1.0	4.1	4.0	3.7	3.4	3.2	3.1
share of young (20-24y)	1.2	4.2	5.4	5.1	5.3	5.5	5.3
share of prime-age (25-54y)	-10.4	75.1	68.5	64.3	67.4	67.8	64.8
share of older (55-64y)	5.0	18.3	23.1	25.5	20.9	20.9	23.3
share of oldest (65-74y)	4.2	2.4	3.0	5.1	6.4	5.8	6.6
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.3	23.7	27.0	28.7	23.4	22.7	25.0
Old-age dependency ratio (3)	27.0	39.0	46.0	60.6	74.4	72.1	66.0
Total dependency ratio (4)	28.9	70.9	76.5	92.4	109.5	107.0	99.8
Total economic dependency ratio (5)	-2.6	152.2	149.2	157.0	165.4	162.1	149.7
Economic old-age dependency ratio (20-64y) (6)	24.7	56.2	63.7	79.6	93.6	90.6	80.9
Economic old-age dependency ratio (20-74y) (7)	20.8	54.8	61.8	75.6	87.6	85.4	75.6

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

9. SPAIN

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.2	1.19	1.23	1.29	1.33	1.38	1.42
Life expectancy at birth							
males	6.3	80.8	82.1	83.5	84.8	86.0	87.1
females	5.0	86.5	87.5	88.6	89.7	90.6	91.5
Life expectancy at 65 (years)							
males	4.6	19.5	20.5	21.5	22.4	23.3	24.1
females	4.1	23.6	24.5	25.4	26.2	26.9	27.7
Net migration (thousands)	-483.5	677.2	221.2	231.7	196.2	185.9	193.7
Net migration as % of population in t-1	-1.0	1.4	0.4	0.5	0.4	0.4	0.4
Population (million)	0.0	47.7	49.3	50.3	50.4	49.2	47.7
share of prime-age population (25-54y)	-8.5	41.5	38.4	36.1	35.3	34.1	33.0
share of working-age population (20-64y)	-9.3	60.6	59.5	55.4	51.3	51.4	51.4
share of elderly population (+65y)	12.9	20.2	23.7	29.1	32.7	32.9	33.1
share of very elderly population (+80y)	8.8	6.1	7.1	9.1	12.2	15.2	14.9
share of very elderly population (+80y) in elderly population (+65y)	14.9	30.0	29.9	31.3	37.4	46.3	45.0
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.2	1.1	0.8	1.6	1.3	1.3	0.8
Employment (15-74y; growth rate)	-0.1	1.1	0.0	-0.2	-0.4	-0.2	-0.4
Labour input: hours worked (growth rate)	-0.1	1.0	0.1	-0.2	-0.4	-0.2	-0.4
Labour productivity per hour (growth rate)	1.3	0.1	0.8	1.8	1.8	1.5	1.2
TFP (growth rate)	0.8	0.2	0.4	1.2	1.1	1.0	0.8
capital deepening (contribution to labour productivity growth)	0.5	0.0	0.4	0.6	0.6	0.5	0.4
Potential GDP per capita (growth rate)	1.2	0.5	0.6	1.5	1.4	1.6	1.1
Potential GDP per worker (growth rate)	1.3	0.0	0.8	1.8	1.8	1.5	1.2
HICP (growth rate)	2.2	8.3	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	4.0	2.2	4.2	4.3	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-4,432	28,933	29,332	27,853	25,848	25,295	24,501
Working-age population (growth rate)	-0.9	0.4	-0.2	-0.9	-0.4	-0.1	-0.5
Labour force (20-64y; thousands)	-3,028	23,032	23,654	22,821	21,260	20,716	20,005
Participation rate (20-64y)	2.0	79.6	80.6	81.9	82.2	81.9	81.6
Participation rate (20-74y)	0.5	69.1	69.2	69.0	68.8	70.5	69.6
young (20-24y)	1.2	55.3	56.4	57.1	56.3	56.3	56.5
prime-age (25-54y)	-0.5	87.4	87.4	86.9	87.0	86.9	86.9
older (55-64y)	12.1	65.4	72.9	77.8	77.4	77.9	77.5
oldest (65-74y)	14.1	6.4	13.8	18.9	18.8	19.6	20.5
Participation rate (20-64y) - female	3.7	75.0	77.1	79.0	79.3	79.0	78.7
Participation rate (20-74y) - female	1.9	64.5	65.4	65.9	65.6	67.2	66.4
young (20-24y)	1.4	52.6	53.8	54.5	53.8	53.7	54.0
prime-age (25-54y)	0.4	83.3	83.9	83.7	83.8	83.7	83.7
older (55-64y)	16.2	59.0	68.8	75.1	75.1	75.5	75.1
oldest (65-74y)	13.5	5.3	11.6	16.7	17.3	18.0	18.8
Participation rate (20-64y) - male	0.3	84.2	84.2	85.0	85.3	84.9	84.6
Participation rate (20-74y) - male	-1.0	73.8	73.1	72.3	72.1	73.9	72.8
young (20-24y)	1.1	57.9	58.8	59.5	58.8	58.7	59.0
prime-age (25-54y)	-1.4	91.6	91.0	90.1	90.3	90.1	90.2
older (55-64y)	7.9	72.1	77.3	80.7	79.9	80.5	80.0
oldest (65-74y)	14.8	7.6	16.3	21.3	20.4	21.5	22.3
Average labour market exit age (1)	2.4	64.0	65.6	66.4	66.4	66.4	66.4
male	2.5	64.0	65.6	66.4	66.4	66.4	66.4
female	2.3	64.0	65.6	66.4	66.4	66.4	66.4
Employment rate (20-64y)	6.8	69.6	72.0	74.5	76.8	76.6	76.4
Employment rate (20-74y)	4.8	60.4	62.0	63.0	64.4	66.0	65.2
Unemployment rate (20-64y)	-6.2	12.6	10.7	9.1	6.6	6.4	6.4
Unemployment rate (20-74y)	-6.3	12.5	10.5	8.8	6.4	6.2	6.2
Employment (20-64y; millions)	-1.4	20.1	21.1	20.7	19.9	19.4	18.7
Employment (20-74y; millions)	-0.5	20.4	21.9	22.0	21.1	20.5	19.9
share of young (20-24y)	0.6	5.0	5.8	5.2	5.0	5.5	5.5
share of prime-age (25-54y)	-10.2	74.8	68.0	65.5	68.8	67.0	64.6
share of older (55-64y)	5.0	18.8	22.6	23.4	20.2	22.1	23.9
share of oldest (65-74y)	4.6	1.4	3.6	5.9	6.0	5.3	6.0
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	3.6	23.1	25.7	26.0	22.8	24.5	26.6
Old-age dependency ratio (3)	31.2	33.3	39.9	52.6	63.9	64.0	64.5
Total dependency ratio (4)	29.8	64.9	68.1	80.5	95.1	94.6	94.6
Total economic dependency ratio (5)	5.9	133.6	124.9	128.1	138.7	140.4	139.5
Economic old-age dependency ratio (20-64y) (6)	31.5	46.3	51.4	64.1	76.5	77.7	77.8
Economic old-age dependency ratio (20-74y) (7)	27.5	45.7	49.5	60.3	72.0	73.5	73.1

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

10. FRANCE

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.0	1.82	1.81	1.80	1.80	1.79	1.79
Life expectancy at birth							
males	7.0	79.7	81.1	82.7	84.1	85.5	86.7
females	5.4	85.9	86.9	88.2	89.3	90.4	91.3
Life expectancy at 65 (years)							
males	4.4	19.7	20.6	21.5	22.4	23.3	24.1
females	3.9	23.8	24.5	25.4	26.2	27.0	27.7
Net migration (thousands)	-176.6	275.1	80.0	80.8	83.2	85.2	98.5
Net migration as % of population in t-1	-0.3	0.4	0.1	0.1	0.1	0.1	0.1
Population (million)	1.6	68.0	69.5	70.6	70.6	70.1	69.7
share of prime-age population (25-54y)	-3.5	36.7	35.6	35.3	34.6	34.0	33.2
share of working-age population (20-64y)	-4.5	55.3	54.1	52.3	51.4	51.3	50.7
share of elderly population (+65y)	8.2	21.1	23.7	26.2	27.4	28.3	29.3
share of very elderly population (+80y)	6.5	6.0	7.5	9.5	11.0	11.7	12.6
share of very elderly population (+80y) in elderly population (+65y)	14.3	28.5	31.6	36.3	40.0	41.6	42.8
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.1	1.1	0.6	1.5	1.3	1.3	0.9
Employment (15-74y; growth rate)	0.1	0.9	0.3	0.0	-0.1	0.0	-0.3
Labour input: hours worked (growth rate)	0.1	1.1	0.3	0.0	-0.1	0.0	-0.3
Labour productivity per hour (growth rate)	1.0	0.1	0.3	1.5	1.4	1.3	1.2
TFP (growth rate)	0.7	-0.1	0.1	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.4	0.2	0.1	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.1	0.7	0.4	1.4	1.4	1.3	1.0
Potential GDP per worker (growth rate)	1.0	0.2	0.3	1.5	1.4	1.3	1.2
HICP (growth rate)	2.2	5.9	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.7	1.7	3.5	3.8	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-2,270	37,604	37,578	36,915	36,321	35,981	35,333
Working-age population (growth rate)	-0.5	0.2	-0.1	-0.2	-0.2	0.0	-0.3
Labour force (20-64y; thousands)	-134	29,923	30,577	30,803	30,561	30,373	29,790
Participation rate (20-64y)	4.7	79.6	81.4	83.4	84.1	84.4	84.3
Participation rate (20-74y)	3.2	67.3	68.4	70.0	71.0	71.1	70.6
young (20-24y)	2.5	66.8	69.1	69.3	69.1	69.1	69.2
prime-age (25-54y)	1.5	88.2	88.5	89.1	89.7	89.7	89.8
older (55-64y)	15.5	60.4	67.0	72.7	74.4	76.2	75.9
oldest (65-74y)	3.6	6.8	6.9	8.9	10.0	9.8	10.4
Participation rate (20-64y) - female	6.3	76.3	78.5	81.1	82.3	82.8	82.6
Participation rate (20-74y) - female	5.0	63.9	65.6	67.6	68.9	69.1	68.8
young (20-24y)	2.2	64.3	66.4	66.7	66.4	66.5	66.6
prime-age (25-54y)	3.5	84.3	85.4	86.8	87.7	87.8	87.8
older (55-64y)	16.7	58.8	64.8	70.5	73.3	75.6	75.5
oldest (65-74y)	4.9	5.4	7.0	8.5	9.7	9.6	10.3
Participation rate (20-64y) - male	3.0	82.9	84.3	85.9	86.1	86.1	86.0
Participation rate (20-74y) - male	1.3	71.0	71.4	72.5	73.2	73.1	72.3
young (20-24y)	2.7	69.1	71.6	71.9	71.6	71.7	71.8
prime-age (25-54y)	-0.6	92.3	91.7	91.5	91.7	91.6	91.7
older (55-64y)	14.3	62.1	69.4	75.0	75.7	76.8	76.4
oldest (65-74y)	2.2	8.4	6.9	9.4	10.3	10.1	10.5
Average labour market exit age (1)	2.2	62.6	63.8	64.6	64.8	64.8	64.8
male	2.4	62.4	63.7	64.6	64.8	64.8	64.8
female	2.1	62.7	63.8	64.6	64.8	64.8	64.8
Employment rate (20-64y)	5.0	74.0	75.6	77.8	78.9	79.1	79.0
Employment rate (20-74y)	3.5	62.7	63.6	65.3	66.5	66.6	66.2
Unemployment rate (20-64y)	-0.7	7.0	7.1	6.7	6.3	6.3	6.3
Unemployment rate (20-74y)	-0.7	6.9	7.1	6.7	6.2	6.2	6.2
Employment (20-64y; millions)	0.1	27.8	28.4	28.7	28.6	28.5	27.9
Employment (20-74y; millions)	0.4	28.3	28.9	29.4	29.4	29.2	28.7
share of young (20-24y)	-0.5	7.9	8.4	7.4	7.5	7.7	7.4
share of prime-age (25-54y)	-4.8	73.0	70.8	70.9	70.3	69.1	68.2
share of older (55-64y)	4.2	17.4	19.0	19.3	19.7	20.7	21.5
share of oldest (65-74y)	1.1	1.7	1.8	2.4	2.6	2.5	2.8
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.4	23.0	23.2	22.4	22.6	23.3	24.4
Old-age dependency ratio (3)	19.7	38.2	43.8	50.1	53.2	55.0	57.8
Total dependency ratio (4)	16.2	81.0	84.8	91.1	94.4	94.8	97.2
Total economic dependency ratio (5)	2.3	140.2	140.1	139.8	140.3	139.9	142.5
Economic old-age dependency ratio (20-64y) (6)	20.5	49.7	55.9	61.9	64.8	66.8	70.2
Economic old-age dependency ratio (20-74y) (7)	19.4	48.8	54.9	60.4	63.1	65.1	68.2

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

11. CROATIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.49	1.51	1.53	1.55	1.57	1.59
Life expectancy at birth							
males	9.3	74.9	76.7	78.8	80.8	82.6	84.2
females	7.7	81.2	82.9	84.5	86.1	87.5	88.9
Life expectancy at 65 (years)							
males	6.4	15.6	16.9	18.2	19.5	20.8	22.0
females	6.0	19.3	20.5	21.8	23.0	24.2	25.3
Net migration (thousands)	-4.4	14.5	2.0	4.8	6.8	8.3	10.1
Net migration as % of population in t-1	0.0	0.4	0.1	0.1	0.2	0.3	0.3
Population (million)	-0.8	3.9	3.7	3.5	3.3	3.1	3.0
share of prime-age population (25-54y)	-4.5	38.3	37.4	36.0	35.7	34.8	33.8
share of working-age population (20-64y)	-6.3	58.2	56.3	55.2	53.4	52.6	51.9
share of elderly population (+65y)	9.7	22.6	25.6	27.8	30.0	31.1	32.3
share of very elderly population (+80y)	7.6	5.5	6.3	9.1	10.4	11.7	13.1
share of very elderly population (+80y) in elderly population (+65y)	16.2	24.3	24.7	32.7	34.6	37.5	40.5
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.5	3.2	1.5	1.7	1.4	1.1	0.7
Employment (15-74y; growth rate)	-0.4	1.3	-0.5	-0.6	-0.7	-0.6	-0.6
Labour input: hours worked (growth rate)	-0.4	1.5	-0.5	-0.6	-0.7	-0.6	-0.6
Labour productivity per hour (growth rate)	1.9	1.8	2.1	2.2	2.1	1.7	1.2
TFP (growth rate)	1.2	1.5	1.1	1.5	1.4	1.1	0.8
capital deepening (contribution to labour productivity growth)	0.7	0.2	0.9	0.8	0.8	0.6	0.4
Potential GDP per capita (growth rate)	2.0	5.7	2.1	1.9	1.9	1.8	1.5
Potential GDP per worker (growth rate)	1.9	1.9	2.0	1.9	2.1	2.0	1.7
HICP (growth rate)	2.3	10.7	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	4.2	2.7	4.5	4.4	4.1	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-682	2,244	2,072	1,923	1,764	1,653	1,562
Working-age population (growth rate)	3.0	-3.6	-0.8	-0.7	-0.9	-0.6	-0.5
Labour force (20-64y; thousands)	-413	1,681	1,628	1,548	1,436	1,345	1,268
Participation rate (20-64y)	6.2	74.9	78.6	80.5	81.4	81.3	81.2
Participation rate (20-74y)	4.8	62.0	64.7	67.0	66.7	67.3	66.7
young (20-24y)	6.4	55.5	61.6	61.7	61.9	61.8	61.9
prime-age (25-54y)	4.1	86.0	88.7	89.8	90.2	90.1	90.1
older (55-64y)	12.4	53.0	57.2	63.5	64.3	65.0	65.4
oldest (65-74y)	5.0	5.0	7.4	9.0	10.0	10.0	10.0
Participation rate (20-64y) - female	8.4	70.5	75.0	77.4	78.8	79.0	78.9
Participation rate (20-74y) - female	7.6	57.2	60.2	63.1	63.4	64.6	64.7
young (20-24y)	5.5	48.6	53.9	54.1	54.1	54.1	54.1
prime-age (25-54y)	5.7	82.6	86.1	87.8	88.3	88.3	88.3
older (55-64y)	16.2	47.7	53.9	60.5	62.4	63.3	63.9
oldest (65-74y)	6.9	3.3	6.3	8.8	10.0	10.1	10.3
Participation rate (20-64y) - male	3.7	79.4	82.0	83.3	83.7	83.3	83.1
Participation rate (20-74y) - male	1.4	67.0	69.1	70.6	69.7	69.5	68.4
young (20-24y)	7.0	61.9	68.8	68.8	68.9	68.9	68.9
prime-age (25-54y)	2.3	89.3	91.1	91.5	91.7	91.6	91.6
older (55-64y)	7.8	58.8	60.6	66.5	66.1	66.5	66.6
oldest (65-74y)	2.8	6.9	8.7	9.2	10.0	9.8	9.7
Average labour market exit age (1)	0.8	62.9	63.4	63.7	63.7	63.7	63.7
male	0.4	63.3	63.6	63.7	63.7	63.7	63.7
female	1.1	62.5	63.2	63.7	63.7	63.7	63.7
Employment rate (20-64y)	6.1	70.0	73.7	75.3	76.3	76.2	76.1
Employment rate (20-74y)	4.7	57.9	60.7	62.7	62.5	63.1	62.6
Unemployment rate (20-64y)	-0.3	6.6	6.2	6.5	6.3	6.3	6.3
Unemployment rate (20-74y)	-0.3	6.6	6.2	6.4	6.2	6.2	6.2
Employment (20-64y; millions)	-0.4	1.6	1.5	1.4	1.3	1.3	1.2
Employment (20-74y; millions)	-0.4	1.6	1.6	1.5	1.4	1.3	1.2
share of young (20-24y)	-0.1	6.0	6.7	6.0	5.8	5.8	5.9
share of prime-age (25-54y)	-4.4	74.7	73.6	71.1	72.0	71.3	70.3
share of older (55-64y)	2.9	17.8	17.4	20.2	19.1	19.9	20.7
share of oldest (65-74y)	1.6	1.5	2.3	2.6	3.2	3.0	3.1
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.0	25.1	24.0	25.8	24.5	25.2	26.1
Old-age dependency ratio (3)	23.3	38.9	45.6	50.5	56.2	59.1	62.2
Total dependency ratio (4)	20.9	72.0	77.7	81.2	87.1	90.0	92.8
Total economic dependency ratio (5)	3.6	142.0	135.7	134.5	137.6	141.8	145.6
Economic old-age dependency ratio (20-64y) (6)	24.6	53.9	59.4	64.3	70.3	74.3	78.5
Economic old-age dependency ratio (20-74y) (7)	23.0	53.0	58.0	62.6	68.1	72.1	76.0

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

12. ITALY

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.2	1.24	1.28	1.33	1.37	1.41	1.45
Life expectancy at birth							
males	6.0	81.1	82.4	83.7	85.0	86.1	87.1
females	5.5	85.5	86.8	87.9	89.0	90.1	91.0
Life expectancy at 65 (years)							
males	4.5	19.5	20.5	21.4	22.3	23.2	24.0
females	4.5	22.7	23.7	24.7	25.5	26.4	27.2
Net migration (thousands)	-108.3	348.5	270.2	270.8	239.8	233.8	240.1
Net migration as % of population in t-1	-0.1	0.6	0.5	0.5	0.4	0.4	0.4
Population (million)	-5.8	59.0	58.8	58.5	57.4	55.2	53.3
share of prime-age population (25-54y)	-5.5	38.6	35.7	35.3	34.9	34.0	33.1
share of working-age population (20-64y)	-7.2	58.6	57.0	53.1	51.1	51.7	51.4
share of elderly population (+65y)	9.8	23.9	27.4	32.3	33.7	33.4	33.7
share of very elderly population (+80y)	6.9	7.6	8.7	10.3	13.7	15.3	14.5
share of very elderly population (+80y) in elderly population (+65y)	11.1	32.0	31.9	32.1	40.7	45.9	43.1
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.1	0.9	0.6	1.4	1.4	1.3	1.1
Employment (15-74y; growth rate)	-0.1	0.3	-0.1	-0.2	-0.1	0.0	-0.2
Labour input: hours worked (growth rate)	-0.1	0.4	-0.1	-0.2	-0.1	0.0	-0.2
Labour productivity per hour (growth rate)	1.2	0.5	0.7	1.6	1.5	1.4	1.2
TFP (growth rate)	0.8	0.3	0.4	1.1	1.0	0.9	0.8
capital deepening (contribution to labour productivity growth)	0.4	0.2	0.2	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.3	1.1	0.6	1.4	1.7	1.8	1.4
Potential GDP per worker (growth rate)	1.2	0.6	0.7	1.6	1.5	1.4	1.2
HICP (growth rate)	2.3	8.7	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	4.2	3.2	4.5	4.4	4.1	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-7,209	34,605	33,519	31,034	29,354	28,539	27,396
Working-age population (growth rate)	-0.3	-0.3	-0.6	-0.9	-0.4	-0.2	-0.6
Labour force (20-64y; thousands)	-3,487	24,377	24,079	22,914	22,114	21,636	20,890
Participation rate (20-64y)	5.8	70.4	71.8	73.8	75.3	75.8	76.3
Participation rate (20-74y)	7.1	60.3	60.8	61.4	64.5	66.5	67.4
young (20-24y)	0.4	45.2	45.4	45.8	45.5	45.4	45.6
prime-age (25-54y)	1.8	78.6	79.1	79.8	80.6	80.5	80.4
older (55-64y)	18.4	57.9	64.5	67.5	70.3	74.2	76.3
oldest (65-74y)	23.7	9.4	14.7	18.5	21.5	27.0	33.0
Participation rate (20-64y) - female	7.4	60.5	63.2	65.5	67.0	67.6	68.0
Participation rate (20-74y) - female	9.1	51.0	52.7	53.9	56.8	59.0	60.1
young (20-24y)	0.5	37.5	37.9	38.2	37.9	37.9	38.0
prime-age (25-54y)	3.2	68.6	69.7	70.9	72.0	71.9	71.8
older (55-64y)	20.9	47.6	57.0	60.4	62.7	66.9	68.5
oldest (65-74y)	24.8	6.0	11.3	16.7	19.6	24.7	30.8
Participation rate (20-64y) - male	3.5	80.4	80.3	81.8	83.1	83.3	83.8
Participation rate (20-74y) - male	4.4	69.7	69.0	68.8	71.8	73.5	74.1
young (20-24y)	0.3	52.1	52.3	52.6	52.3	52.3	52.4
prime-age (25-54y)	-0.4	88.6	88.0	88.0	88.4	88.3	88.1
older (55-64y)	14.9	68.7	72.4	75.0	78.0	81.1	83.6
oldest (65-74y)	22.1	13.1	18.5	20.5	23.6	29.3	35.2
Average labour market exit age (1)	4.5	64.2	65.4	66.2	66.9	67.8	68.8
male	4.6	64.0	65.2	66.0	66.7	67.6	68.6
female	4.5	64.5	65.6	66.3	67.1	68.0	69.0
Employment rate (20-64y)	6.5	64.8	65.3	67.9	70.4	70.9	71.3
Employment rate (20-74y)	7.8	55.6	55.5	56.7	60.4	62.4	63.3
Unemployment rate (20-64y)	-1.5	8.0	9.1	8.1	6.5	6.4	6.4
Unemployment rate (20-74y)	-1.8	7.8	8.9	7.7	6.3	6.1	6.0
Employment (20-64y; millions)	-2.9	22.4	21.9	21.1	20.7	20.2	19.5
Employment (20-74y; millions)	-1.2	23.1	23.0	22.7	22.2	22.0	21.8
share of young (20-24y)	-0.4	4.5	4.7	4.2	4.0	4.3	4.1
share of prime-age (25-54y)	-11.0	71.5	65.4	66.8	67.8	64.2	60.6
share of older (55-64y)	3.7	21.2	25.0	21.9	21.1	23.5	24.9
share of oldest (65-74y)	7.7	2.7	4.9	7.1	7.0	8.1	10.4
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.4	25.7	28.2	25.0	23.7	25.4	27.0
Old-age dependency ratio (3)	24.7	40.8	48.0	60.8	66.0	64.7	65.5
Total dependency ratio (4)	23.8	70.6	75.3	88.5	95.7	93.6	94.4
Total economic dependency ratio (5)	-12.0	156.0	155.3	158.0	158.4	150.9	144.0
Economic old-age dependency ratio (20-64y) (6)	20.0	60.0	68.1	81.7	86.0	82.2	79.9
Economic old-age dependency ratio (20-74y) (7)	13.2	58.3	64.8	75.9	80.0	75.6	71.6

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

13. CYPRUS

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.37	1.40	1.43	1.46	1.49	1.51
Life expectancy at birth							
males	6.3	80.5	81.8	83.2	84.4	85.6	86.8
females	5.7	84.6	85.8	87.0	88.1	89.2	90.3
Life expectancy at 65 (years)							
males	4.6	19.1	19.9	20.9	21.9	22.8	23.7
females	4.6	21.8	22.6	23.6	24.6	25.5	26.4
Net migration (thousands)	-15.9	18.2	0.0	1.0	1.7	2.1	2.3
Net migration as % of population in t-1	-1.8	2.0	0.0	0.1	0.2	0.2	0.2
Population (million)	0.1	0.9	1.0	1.0	1.0	1.0	1.0
share of prime-age population (25-54y)	-7.8	43.7	42.5	40.4	37.5	36.8	35.9
share of working-age population (20-64y)	-9.4	62.1	59.6	58.4	57.3	53.9	52.6
share of elderly population (+65y)	12.6	16.6	19.1	21.5	24.1	27.8	29.2
share of very elderly population (+80y)	7.8	4.0	5.1	6.8	8.3	9.3	11.8
share of very elderly population (+80y) in elderly population (+65y)	16.5	23.9	26.5	31.7	34.3	33.4	40.4
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.6	3.5	1.6	1.9	1.5	1.1	1.3
Employment (15-74y; growth rate)	0.1	1.9	-0.2	0.2	0.0	-0.2	0.0
Labour input: hours worked (growth rate)	0.1	2.2	-0.2	0.2	0.0	-0.2	0.0
Labour productivity per hour (growth rate)	1.5	1.3	1.8	1.8	1.5	1.4	1.2
TFP (growth rate)	0.9	0.9	0.7	1.1	1.0	0.9	0.8
capital deepening (contribution to labour productivity growth)	0.6	0.4	1.1	0.6	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.4	1.8	1.3	1.8	1.4	1.0	1.3
Potential GDP per worker (growth rate)	1.5	1.6	1.8	1.8	1.5	1.4	1.2
HICP (growth rate)	2.2	8.1	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	4.2	3.0	4.6	4.4	4.1	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-43	568	572	569	563	535	525
Working-age population (growth rate)	-1.5	1.5	-0.1	0.1	-0.3	-0.5	0.0
Labour force (20-64y; thousands)	-21	473	480	480	474	457	452
Participation rate (20-64y)	3.0	83.2	84.0	84.3	84.2	85.4	86.1
Participation rate (20-74y)	0.6	74.4	73.6	74.0	73.3	72.8	75.0
young (20-24y)	3.3	68.8	71.8	72.1	72.3	72.3	72.1
prime-age (25-54y)	1.9	89.4	90.5	90.7	91.2	91.4	91.4
older (55-64y)	8.1	68.0	65.4	69.2	70.4	72.8	76.1
oldest (65-74y)	6.9	16.5	13.0	14.3	18.3	20.7	23.4
Participation rate (20-64y) - female	4.3	77.7	79.4	79.9	79.8	81.2	82.0
Participation rate (20-74y) - female	2.0	68.8	69.2	69.6	68.5	68.3	70.8
young (20-24y)	1.2	65.4	66.3	66.6	66.9	66.7	66.6
prime-age (25-54y)	2.5	85.0	86.4	86.7	87.3	87.5	87.5
older (55-64y)	15.3	56.8	59.3	64.2	65.6	68.5	72.1
oldest (65-74y)	11.5	9.5	9.5	12.1	16.0	18.2	21.0
Participation rate (20-64y) - male	1.1	89.0	88.9	89.1	88.6	89.6	90.2
Participation rate (20-74y) - male	-1.1	80.4	78.2	78.7	78.3	77.3	79.2
young (20-24y)	5.2	72.3	77.3	77.5	77.6	77.5	77.4
prime-age (25-54y)	0.8	94.3	94.9	94.7	95.0	95.1	95.1
older (55-64y)	0.7	79.6	72.0	75.0	75.7	77.4	80.3
oldest (65-74y)	2.1	24.0	16.6	16.8	21.1	23.5	26.1
Average labour market exit age (1)	3.0	63.7	64.0	64.6	65.2	65.9	66.7
male	2.7	64.0	64.3	64.8	65.4	66.0	66.7
female	3.2	63.5	63.8	64.4	65.1	65.9	66.7
Employment rate (20-64y)	3.3	77.5	77.4	78.2	78.9	80.1	80.8
Employment rate (20-74y)	1.1	69.4	67.9	68.8	68.8	68.4	70.5
Unemployment rate (20-64y)	-0.6	6.8	7.8	7.3	6.3	6.2	6.2
Unemployment rate (20-74y)	-0.7	6.7	7.7	7.1	6.1	6.0	6.0
Employment (20-64y; millions)	0.0	0.4	0.4	0.4	0.4	0.4	0.4
Employment (20-74y; millions)	0.0	0.5	0.5	0.5	0.5	0.5	0.4
share of young (20-24y)	-0.6	7.6	7.3	7.4	7.7	7.0	7.0
share of prime-age (25-54y)	-5.2	73.9	75.6	72.8	68.3	69.3	68.7
share of older (55-64y)	3.1	15.4	14.3	16.9	19.6	17.9	18.5
share of oldest (65-74y)	2.7	3.1	2.7	3.0	4.3	5.8	5.8
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	2.8	19.0	18.5	20.8	24.1	22.0	21.8
Old-age dependency ratio (3)	28.8	26.7	32.1	36.7	42.1	51.5	55.5
Total dependency ratio (4)	28.8	61.1	67.8	71.2	74.5	85.5	90.0
Total economic dependency ratio (5)	20.0	101.5	110.9	112.3	111.6	118.3	121.6
Economic old-age dependency ratio (20-64y) (6)	31.3	31.1	38.6	43.8	48.7	58.1	62.4
Economic old-age dependency ratio (20-74y) (7)	28.7	30.2	37.6	42.5	46.6	54.7	58.8

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

14. LATVIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.2	1.53	1.59	1.63	1.66	1.68	1.70
Life expectancy at birth							
males	12.2	70.3	72.6	75.4	78.0	80.4	82.5
females	8.6	79.8	81.5	83.4	85.2	86.9	88.4
Life expectancy at 65 (years)							
males	7.4	14.1	15.5	17.1	18.6	20.1	21.5
females	6.4	19.0	20.3	21.7	23.0	24.2	25.4
Net migration (thousands)	-31.0	32.9	-7.4	-2.4	-0.4	0.2	1.9
Net migration as % of population in t-1	-1.6	1.7	-0.4	-0.2	0.0	0.0	0.1
Population (million)	-0.6	1.9	1.7	1.6	1.5	1.4	1.3
share of prime-age population (25-54y)	-6.7	39.5	36.5	34.6	32.3	33.5	32.8
share of working-age population (20-64y)	-6.8	58.0	55.8	54.9	51.6	48.2	51.2
share of elderly population (+65y)	10.3	20.9	23.9	27.3	30.3	33.3	31.2
share of very elderly population (+80y)	8.9	6.0	6.3	8.5	10.5	12.0	15.0
share of very elderly population (+80y) in elderly population (+65y)	19.0	28.9	26.5	31.2	34.5	36.1	47.9
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.1	1.7	1.4	1.2	0.4	0.9	0.9
Employment (15-74y; growth rate)	-1.0	-0.4	-1.6	-1.0	-1.6	-0.7	-0.3
Labour input: hours worked (growth rate)	-1.0	-0.2	-1.7	-1.0	-1.6	-0.7	-0.3
Labour productivity per hour (growth rate)	2.1	1.9	3.1	2.2	2.0	1.6	1.2
TFP (growth rate)	1.3	1.0	1.8	1.4	1.3	1.0	0.8
capital deepening (contribution to labour productivity growth)	0.8	0.9	1.4	0.8	0.7	0.6	0.4
Potential GDP per capita (growth rate)	1.9	1.7	2.6	2.1	1.2	1.8	1.5
Potential GDP per worker (growth rate)	2.1	2.1	3.1	2.2	2.0	1.6	1.2
HICP (growth rate)	2.4	17.2	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.8	2.3	3.6	3.8	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-451	1,094	975	867	753	652	643
Working-age population (growth rate)	0.2	-0.4	-1.5	-1.2	-1.7	-0.5	-0.3
Labour force (20-64y; thousands)	-369	905	806	717	624	548	536
Participation rate (20-64y)	0.6	82.7	82.7	82.7	82.8	84.1	83.3
Participation rate (20-74y)	-1.6	73.0	69.1	68.9	67.7	66.9	71.4
young (20-24y)	3.2	67.4	70.1	71.3	70.7	70.0	70.5
prime-age (25-54y)	1.2	87.7	88.0	88.2	89.2	89.0	88.9
older (55-64y)	0.9	73.7	73.5	74.0	72.5	74.3	74.6
oldest (65-74y)	-11.7	22.8	10.8	11.0	11.1	9.8	11.1
Participation rate (20-64y) - female	0.1	79.9	79.4	79.0	79.4	80.8	80.0
Participation rate (20-74y) - female	-0.4	68.7	64.5	64.2	63.5	63.2	68.4
young (20-24y)	1.8	61.1	62.5	63.5	63.0	62.3	62.9
prime-age (25-54y)	1.3	84.4	84.4	84.9	85.9	85.8	85.7
older (55-64y)	-1.0	73.9	73.6	71.5	70.5	72.9	73.0
oldest (65-74y)	-9.7	20.5	10.7	10.8	10.6	9.4	10.8
Participation rate (20-64y) - male	0.7	85.6	86.0	86.2	86.0	87.1	86.3
Participation rate (20-74y) - male	-3.6	77.8	74.1	73.7	71.7	70.3	74.2
young (20-24y)	4.3	73.4	77.4	78.4	77.8	77.1	77.6
prime-age (25-54y)	0.9	90.9	91.5	91.3	92.2	91.9	91.8
older (55-64y)	2.6	73.4	73.3	76.5	74.4	75.7	76.0
oldest (65-74y)	-15.1	26.4	11.1	11.2	11.8	10.2	11.3
Average labour market exit age (1)	0.7	64.2	64.9	64.9	64.9	64.9	64.9
male	0.7	64.2	64.9	64.9	64.9	64.9	64.9
female	0.7	64.2	64.9	64.9	64.9	64.9	64.9
Employment rate (20-64y)	1.0	77.0	77.1	77.0	77.5	78.7	78.0
Employment rate (20-74y)	-1.2	68.2	64.6	64.3	63.4	62.7	66.9
Unemployment rate (20-64y)	-0.5	6.9	6.8	6.9	6.5	6.4	6.5
Unemployment rate (20-74y)	-0.3	6.7	6.6	6.7	6.3	6.3	6.3
Employment (20-64y; millions)	-0.3	0.8	0.8	0.7	0.6	0.5	0.5
Employment (20-74y; millions)	-0.4	0.9	0.8	0.7	0.6	0.5	0.5
share of young (20-24y)	2.4	5.5	7.7	8.5	6.8	7.5	7.9
share of prime-age (25-54y)	-1.8	68.5	67.8	65.4	65.3	71.2	66.7
share of older (55-64y)	2.0	20.7	21.4	22.8	24.3	17.8	22.7
share of oldest (65-74y)	-2.6	5.3	3.1	3.2	3.6	3.5	2.7
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.6	24.2	24.5	26.0	28.5	20.6	25.8
Old-age dependency ratio (3)	25.0	36.0	42.8	49.8	58.8	69.0	61.0
Total dependency ratio (4)	23.0	72.3	79.1	82.3	94.0	107.4	95.4
Total economic dependency ratio (5)	31.9	112.0	125.1	129.1	141.3	154.2	144.0
Economic old-age dependency ratio (20-64y) (6)	34.5	41.0	52.3	61.3	72.0	84.0	75.5
Economic old-age dependency ratio (20-74y) (7)	34.7	38.8	50.7	59.4	69.4	81.0	73.5

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

15. LITHUANIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.2	1.44	1.49	1.55	1.59	1.62	1.65
Life expectancy at birth							
males	12.0	70.8	73.3	76.0	78.5	80.8	82.8
females	8.4	80.5	82.4	84.2	85.9	87.5	88.9
Life expectancy at 65 (years)							
males	7.3	14.4	15.9	17.5	18.9	20.3	21.7
females	6.2	19.5	20.9	22.2	23.4	24.6	25.7
Net migration (thousands)	-76.2	81.8	-7.7	-0.5	2.8	4.3	5.5
Net migration as % of population in t-1	-2.6	2.9	-0.3	0.0	0.1	0.2	0.3
Population (million)	-0.8	2.8	2.7	2.5	2.3	2.2	2.0
share of prime-age population (25-54y)	-8.5	40.2	38.4	36.7	33.1	32.5	31.7
share of working-age population (20-64y)	-11.1	60.4	57.4	55.7	53.5	49.3	49.2
share of elderly population (+65y)	15.7	20.0	23.8	28.0	31.0	35.1	35.6
share of very elderly population (+80y)	9.6	5.6	6.0	8.5	11.3	12.5	15.2
share of very elderly population (+80y) in elderly population (+65y)	14.6	28.2	25.1	30.4	36.3	35.5	42.8
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.1	3.5	1.5	1.2	0.6	0.3	0.7
Employment (15-74y; growth rate)	-1.0	1.5	-1.5	-1.0	-1.3	-1.2	-0.6
Labour input: hours worked (growth rate)	-1.0	1.3	-1.5	-1.0	-1.3	-1.2	-0.6
Labour productivity per hour (growth rate)	2.1	2.1	3.0	2.2	1.9	1.6	1.2
TFP (growth rate)	1.2	0.9	1.5	1.4	1.2	1.0	0.8
capital deepening (contribution to labour productivity growth)	0.9	1.2	1.5	0.8	0.7	0.6	0.4
Potential GDP per capita (growth rate)	1.8	2.1	2.4	2.0	1.4	1.1	1.3
Potential GDP per worker (growth rate)	2.1	1.9	3.0	2.2	2.0	1.6	1.2
HICP (growth rate)	2.5	18.9	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.5	0.6	2.9	3.4	3.9	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-723	1,713	1,565	1,400	1,246	1,065	990
Working-age population (growth rate)	-1.6	1.1	-1.3	-1.1	-1.5	-1.2	-0.4
Labour force (20-64y; thousands)	-598	1,442	1,321	1,187	1,054	910	845
Participation rate (20-64y)	1.2	84.2	84.4	84.8	84.6	85.4	85.4
Participation rate (20-74y)	-4.4	74.6	70.8	70.9	70.2	67.6	70.2
young (20-24y)	1.7	64.1	64.6	66.5	66.1	65.5	65.8
prime-age (25-54y)	2.0	90.0	91.0	91.4	92.2	92.2	92.0
older (55-64y)	0.4	75.3	73.2	74.1	74.0	74.5	75.7
oldest (65-74y)	-8.1	20.6	13.4	12.9	13.7	12.7	12.5
Participation rate (20-64y) - female	0.8	83.4	83.2	83.1	83.0	84.2	84.2
Participation rate (20-74y) - female	-3.0	72.3	67.8	67.3	67.2	65.4	69.3
young (20-24y)	0.9	64.2	63.9	65.9	65.4	64.8	65.2
prime-age (25-54y)	1.5	88.9	89.0	89.5	90.5	90.5	90.4
older (55-64y)	0.1	75.6	75.3	73.7	73.2	74.2	75.7
oldest (65-74y)	-6.8	18.9	13.1	12.9	13.2	12.2	12.2
Participation rate (20-64y) - male	1.2	85.0	85.4	86.3	85.9	86.4	86.3
Participation rate (20-74y) - male	-6.3	77.3	74.0	74.3	72.7	69.4	71.0
young (20-24y)	2.4	64.0	65.2	67.1	66.7	66.1	66.4
prime-age (25-54y)	2.2	91.1	92.8	92.9	93.5	93.5	93.3
older (55-64y)	0.7	75.0	70.6	74.5	74.7	74.7	75.7
oldest (65-74y)	-10.3	23.1	13.9	12.9	14.3	13.2	12.8
Average labour market exit age (1)	0.7	64.1	64.8	64.9	64.9	64.9	64.9
male	0.7	64.1	64.8	64.9	64.9	64.9	64.9
female	0.8	64.1	64.8	64.9	64.9	64.9	64.9
Employment rate (20-64y)	0.8	79.1	79.1	79.2	79.1	79.9	79.8
Employment rate (20-74y)	-4.5	70.2	66.6	66.3	65.7	63.4	65.8
Unemployment rate (20-64y)	0.4	6.1	6.2	6.6	6.5	6.5	6.5
Unemployment rate (20-74y)	0.4	5.9	6.0	6.4	6.3	6.2	6.3
Employment (20-64y; millions)	-0.6	1.4	1.2	1.1	1.0	0.9	0.8
Employment (20-74y; millions)	-0.6	1.4	1.3	1.2	1.0	0.9	0.8
share of young (20-24y)	0.4	5.6	5.9	6.4	5.7	5.5	6.0
share of prime-age (25-54y)	-1.4	68.6	69.9	68.8	65.0	68.2	67.2
share of older (55-64y)	1.5	21.4	20.4	21.1	25.1	21.5	22.9
share of oldest (65-74y)	-0.5	4.4	3.8	3.7	4.2	4.9	3.9
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.8	25.3	24.6	25.3	30.2	26.1	27.0
Old-age dependency ratio (3)	39.3	33.1	41.5	50.3	57.9	71.2	72.4
Total dependency ratio (4)	37.5	65.7	74.3	79.4	86.9	102.8	103.1
Total economic dependency ratio (5)	44.2	100.4	112.0	118.2	126.3	141.5	144.5
Economic old-age dependency ratio (20-64y) (6)	49.4	37.2	48.5	59.6	68.8	84.0	86.6
Economic old-age dependency ratio (20-74y) (7)	47.6	35.5	46.7	57.4	65.9	79.9	83.2

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

16. LUXEMBOURG

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.2	1.38	1.42	1.47	1.51	1.54	1.56
Life expectancy at birth							
males	6.2	80.7	81.6	83.1	84.5	85.7	86.9
females	5.8	85.0	86.0	87.4	88.6	89.8	90.8
Life expectancy at 65 (years)							
males	4.5	19.4	20.2	21.1	22.1	23.0	23.9
females	4.6	22.5	23.3	24.3	25.3	26.2	27.1
Net migration (thousands)	-11.2	15.0	7.6	6.2	5.1	4.4	3.9
Net migration as % of population in t-1	-2.0	2.4	1.0	0.8	0.6	0.5	0.4
Population (million)	0.3	0.7	0.7	0.8	0.9	0.9	1.0
share of prime-age population (25-54y)	-10.0	45.5	44.4	42.3	39.0	36.9	35.5
share of working-age population (20-64y)	-11.4	64.1	62.4	60.0	58.1	55.2	52.7
share of elderly population (+65y)	14.4	14.8	17.0	20.0	22.9	26.5	29.2
share of very elderly population (+80y)	7.2	3.9	4.3	5.6	7.7	9.1	11.1
share of very elderly population (+80y) in elderly population (+65y)	11.4	26.6	25.3	27.9	33.5	34.3	37.9
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.8	2.2	1.6	2.2	1.8	1.4	1.2
Employment (15-74y; growth rate)	0.8	2.9	1.2	0.8	0.4	0.1	0.0
Labour input: hours worked (growth rate)	0.8	2.9	1.2	0.8	0.4	0.1	0.0
Labour productivity per hour (growth rate)	0.9	-0.7	0.4	1.5	1.4	1.3	1.2
TFP (growth rate)	0.6	-0.4	0.1	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.3	-0.3	0.3	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	0.9	0.0	0.2	1.3	1.2	1.0	1.0
Potential GDP per worker (growth rate)	1.0	-0.7	0.4	1.5	1.4	1.3	1.2
HICP (growth rate)	2.2	8.2	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.6	1.7	3.2	3.6	3.9	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	95	419	465	501	523	522	514
Working-age population (growth rate)	-2.1	2.0	0.9	0.6	0.3	-0.2	-0.1
Labour force (20-64y; thousands)	78	325	366	395	407	405	403
Participation rate (20-64y)	0.8	77.6	78.8	78.9	77.8	77.7	78.4
Participation rate (20-74y)	-5.1	69.4	68.9	67.9	66.2	64.2	64.3
young (20-24y)	7.0	46.9	54.1	54.1	54.0	54.0	53.9
prime-age (25-54y)	0.7	89.8	90.3	90.3	90.3	90.4	90.5
older (55-64y)	4.9	48.4	48.5	50.5	51.7	51.4	53.3
oldest (65-74y)	-1.3	5.6	4.3	4.0	4.2	4.3	4.3
Participation rate (20-64y) - female	4.3	74.1	77.9	78.8	78.1	77.9	78.4
Participation rate (20-74y) - female	-1.5	65.8	67.7	67.5	66.0	64.1	64.3
young (20-24y)	6.4	49.2	55.8	55.8	55.7	55.8	55.7
prime-age (25-54y)	3.5	86.8	89.3	90.3	90.2	90.3	90.3
older (55-64y)	13.3	40.1	46.8	50.2	52.2	51.5	53.3
oldest (65-74y)	0.7	3.8	3.1	3.6	3.9	4.3	4.5
Participation rate (20-64y) - male	-2.6	80.9	79.6	78.9	77.6	77.6	78.3
Participation rate (20-74y) - male	-8.6	73.0	70.1	68.2	66.3	64.3	64.4
young (20-24y)	7.5	44.8	52.4	52.5	52.3	52.4	52.3
prime-age (25-54y)	-2.0	92.7	91.3	90.4	90.3	90.5	90.6
older (55-64y)	-3.0	56.2	50.2	50.8	51.3	51.3	53.2
oldest (65-74y)	-3.3	7.5	5.5	4.5	4.5	4.4	4.2
Average labour market exit age (1)	0.8	60.7	60.8	61.0	61.2	61.3	61.5
male	1.0	60.6	60.7	61.0	61.2	61.3	61.5
female	0.6	60.9	61.0	61.0	61.1	61.3	61.5
Employment rate (20-64y)	0.0	74.5	74.9	74.9	73.9	73.8	74.5
Employment rate (20-74y)	-5.5	66.6	65.5	64.5	62.9	61.0	61.1
Unemployment rate (20-64y)	1.0	4.0	4.9	5.0	5.0	5.0	5.0
Unemployment rate (20-74y)	1.0	4.1	5.0	5.0	5.0	5.0	5.0
Employment (20-64y; millions)	0.1	0.3	0.3	0.4	0.4	0.4	0.4
Employment (20-74y; millions)	0.1	0.3	0.4	0.4	0.4	0.4	0.4
share of young (20-24y)	0.5	5.0	5.3	5.2	5.6	5.5	5.5
share of prime-age (25-54y)	-4.3	81.9	81.7	80.7	77.9	77.6	77.5
share of older (55-64y)	3.5	12.2	12.2	13.2	15.6	15.7	15.7
share of oldest (65-74y)	0.4	0.9	0.8	0.9	1.0	1.2	1.3
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	3.7	19.8	20.1	21.0	23.8	24.2	23.5
Old-age dependency ratio (3)	32.3	23.1	27.2	33.4	39.5	48.0	55.4
Total dependency ratio (4)	33.6	56.0	60.4	66.6	72.0	81.2	89.6
Total economic dependency ratio (5)	43.9	107.6	112.4	120.6	130.4	142.5	151.5
Economic old-age dependency ratio (20-64y) (6)	43.0	30.0	35.4	43.6	52.3	63.7	73.1
Economic old-age dependency ratio (20-74y) (7)	42.4	29.7	35.2	43.3	51.8	62.9	72.1

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

17. HUNGARY

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.62	1.67	1.70	1.71	1.72	1.72
Life expectancy at birth							
males	11.1	72.5	74.7	77.2	79.5	81.6	83.6
females	9.2	79.3	81.2	83.3	85.2	86.9	88.5
Life expectancy at 65 (years)							
males	7.3	14.5	16.0	17.5	19.0	20.5	21.8
females	7.0	18.4	19.8	21.3	22.7	24.1	25.4
Net migration (thousands)	-22.0	47.6	19.4	27.6	24.6	25.4	25.7
Net migration as % of population in t-1	-0.2	0.5	0.2	0.3	0.3	0.3	0.3
Population (million)	-0.7	9.7	9.5	9.3	9.2	9.1	9.0
share of prime-age population (25-54y)	-7.6	42.6	39.7	36.6	35.3	35.1	35.0
share of working-age population (20-64y)	-7.4	59.7	59.4	56.7	53.9	52.2	52.3
share of elderly population (+65y)	7.8	20.6	21.0	23.8	26.9	28.5	28.4
share of very elderly population (+80y)	6.8	4.7	5.6	7.2	7.9	10.9	11.5
share of very elderly population (+80y) in elderly population (+65y)	17.8	22.6	26.6	30.3	29.5	38.4	40.4
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.7	3.4	2.1	1.6	1.7	1.4	1.1
Employment (15-74y; growth rate)	-0.2	1.3	-0.3	-0.7	-0.4	-0.3	-0.1
Labour input: hours worked (growth rate)	-0.3	0.8	-0.4	-0.7	-0.4	-0.3	-0.1
Labour productivity per hour (growth rate)	2.0	2.6	2.5	2.3	2.1	1.7	1.2
TFP (growth rate)	1.3	1.5	1.4	1.5	1.4	1.1	0.8
capital deepening (contribution to labour productivity growth)	0.8	1.1	1.0	0.8	0.7	0.6	0.4
Potential GDP per capita (growth rate)	1.9	3.6	2.3	1.8	1.8	1.5	1.2
Potential GDP per worker (growth rate)	2.0	2.1	2.4	2.3	2.1	1.7	1.2
HICP (growth rate)	3.6	15.3	3.0	3.0	3.0	3.0	3.0
Nominal interest rate	6.0	7.6	7.3	6.2	5.2	5.0	5.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-1,065	5,786	5,649	5,294	4,972	4,773	4,721
Working-age population (growth rate)	0.5	-0.6	-0.3	-1.1	-0.3	-0.4	-0.1
Labour force (20-64y; thousands)	-727	4,817	4,797	4,515	4,299	4,139	4,089
Participation rate (20-64y)	3.4	83.2	84.9	85.3	86.5	86.7	86.6
Participation rate (20-74y)	2.5	70.8	73.6	71.9	71.5	72.4	73.3
young (20-24y)	2.2	54.5	56.9	56.7	56.9	56.7	56.7
prime-age (25-54y)	3.1	91.0	93.1	94.1	94.1	94.1	94.1
older (55-64y)	9.8	68.0	72.8	74.0	78.2	77.9	77.8
oldest (65-74y)	1.9	9.7	9.3	11.3	10.8	11.7	11.6
Participation rate (20-64y) - female	6.0	78.1	81.1	82.1	83.9	84.2	84.1
Participation rate (20-74y) - female	6.3	64.5	68.6	67.9	68.3	69.8	70.8
young (20-24y)	1.3	49.3	50.8	50.7	50.8	50.7	50.6
prime-age (25-54y)	4.9	87.7	91.0	92.5	92.4	92.5	92.6
older (55-64y)	16.5	57.8	65.7	68.5	74.7	74.4	74.3
oldest (65-74y)	4.3	7.3	7.8	10.3	10.5	11.7	11.6
Participation rate (20-64y) - male	0.6	88.4	88.7	88.4	88.9	89.1	89.0
Participation rate (20-74y) - male	-1.8	77.5	78.6	75.8	74.7	75.0	75.7
young (20-24y)	3.0	59.4	62.7	62.5	62.6	62.5	62.5
prime-age (25-54y)	1.3	94.3	95.1	95.5	95.6	95.6	95.6
older (55-64y)	1.6	79.6	80.5	79.7	81.5	81.2	81.2
oldest (65-74y)	-1.4	12.9	11.3	12.4	11.1	11.8	11.6
Average labour market exit age (1)	0.7	63.6	63.9	64.3	64.3	64.3	64.3
male	0.2	64.4	64.6	64.6	64.6	64.6	64.6
female	1.1	62.9	63.3	64.0	64.0	64.0	64.0
Employment rate (20-64y)	3.3	80.3	82.3	82.3	83.5	83.7	83.6
Employment rate (20-74y)	2.4	68.4	71.3	69.4	69.1	70.0	70.8
Unemployment rate (20-64y)	-0.1	3.5	3.1	3.5	3.5	3.5	3.5
Unemployment rate (20-74y)	-0.1	3.5	3.1	3.4	3.4	3.4	3.4
Employment (20-64y; millions)	-0.7	4.6	4.6	4.4	4.2	4.0	3.9
Employment (20-74y; millions)	-0.7	4.8	4.7	4.5	4.3	4.1	4.1
share of young (20-24y)	0.7	5.3	5.8	5.9	6.0	6.0	6.1
share of prime-age (25-54y)	-5.5	76.4	72.1	69.3	69.3	71.0	70.8
share of older (55-64y)	4.3	15.9	20.1	21.9	21.7	19.9	20.2
share of oldest (65-74y)	0.5	2.3	1.9	2.9	3.0	3.1	2.8
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	3.2	19.9	23.8	25.8	24.6	22.7	23.1
Old-age dependency ratio (3)	19.8	34.5	35.3	41.9	49.8	54.5	54.3
Total dependency ratio (4)	23.6	67.4	68.5	76.3	85.6	91.5	91.1
Total economic dependency ratio (5)	18.4	103.6	100.8	108.0	115.6	121.6	122.0
Economic old-age dependency ratio (20-64y) (6)	21.5	40.4	40.9	47.9	56.6	61.8	62.0
Economic old-age dependency ratio (20-74y) (7)	20.7	39.5	40.1	46.5	54.9	59.9	60.2

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

18. MALTA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.3	1.15	1.25	1.33	1.40	1.45	1.49
Life expectancy at birth							
males	6.1	80.9	81.9	83.4	84.7	85.9	87.0
females	6.2	84.6	85.6	87.1	88.5	89.7	90.8
Life expectancy at 65 (years)							
males	4.5	19.5	20.3	21.3	22.2	23.1	24.0
females	4.6	22.5	23.4	24.4	25.3	26.3	27.1
Net migration (thousands)	-7.5	11.5	9.4	7.5	6.0	5.1	4.0
Net migration as % of population in t-1	-1.7	2.2	1.6	1.1	0.8	0.6	0.5
Population (million)	0.3	0.5	0.6	0.7	0.7	0.8	0.8
share of prime-age population (25-54y)	-12.3	46.4	48.2	46.2	40.6	36.5	34.2
share of working-age population (20-64y)	-11.8	63.2	63.3	64.2	61.7	55.7	51.5
share of elderly population (+65y)	14.4	19.3	19.6	19.6	22.8	29.3	33.6
share of very elderly population (+80y)	8.1	4.3	6.0	6.9	7.0	8.7	12.4
share of very elderly population (+80y) in elderly population (+65y)	14.7	22.2	30.7	35.3	30.5	29.5	36.9
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	2.1	5.9	3.8	2.5	1.3	0.7	0.8
Employment (15-74y; growth rate)	0.6	4.4	1.9	0.9	-0.1	-0.6	-0.4
Labour input: hours worked (growth rate)	0.5	3.3	1.9	0.9	-0.1	-0.6	-0.4
Labour productivity per hour (growth rate)	1.6	2.6	1.9	1.6	1.4	1.3	1.2
TFP (growth rate)	1.0	1.1	1.2	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.6	1.5	0.6	0.6	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.2	4.2	2.1	1.5	0.6	0.3	0.7
Potential GDP per worker (growth rate)	1.5	1.5	1.8	1.6	1.4	1.3	1.2
HICP (growth rate)	2.2	6.1	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	4.0	2.4	4.2	4.2	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	84	333	386	442	461	440	417
Working-age population (growth rate)	-1.7	1.3	1.8	0.8	0.1	-0.7	-0.4
Labour force (20-64y; thousands)	86	277	338	390	402	381	363
Participation rate (20-64y)	3.8	83.3	87.7	88.2	87.2	86.6	87.0
Participation rate (20-74y)	-2.5	72.8	77.0	78.6	74.7	70.1	70.3
young (20-24y)	0.3	80.0	80.5	80.7	80.4	80.4	80.3
prime-age (25-54y)	3.2	90.6	93.1	93.7	93.8	93.8	93.7
older (55-64y)	16.5	55.3	66.1	71.8	73.0	70.9	71.8
oldest (65-74y)	-2.4	11.1	6.6	8.9	9.5	9.4	8.6
Participation rate (20-64y) - female	9.3	75.5	82.8	85.1	84.8	84.4	84.8
Participation rate (20-74y) - female	4.4	64.5	71.5	75.1	72.4	68.5	68.9
young (20-24y)	0.8	79.1	80.0	80.3	80.0	80.0	79.9
prime-age (25-54y)	6.7	83.7	88.4	90.2	90.4	90.4	90.4
older (55-64y)	28.4	43.0	59.4	69.3	72.2	70.5	71.4
oldest (65-74y)	2.9	5.4	5.0	7.9	8.9	9.0	8.4
Participation rate (20-64y) - male	-1.1	90.0	91.7	90.7	89.1	88.4	88.9
Participation rate (20-74y) - male	-8.8	80.1	81.6	81.3	76.5	71.4	71.4
young (20-24y)	0.0	80.7	81.0	81.1	80.8	80.8	80.7
prime-age (25-54y)	0.2	96.3	96.7	96.5	96.4	96.5	96.5
older (55-64y)	5.1	67.0	72.0	73.7	73.5	71.1	72.1
oldest (65-74y)	-8.0	16.9	8.3	9.7	9.9	9.7	8.9
Average labour market exit age (1)	0.6	63.0	63.5	63.6	63.6	63.6	63.6
male	0.7	62.9	63.4	63.6	63.6	63.6	63.6
female	0.5	63.1	63.6	63.6	63.6	63.6	63.6
Employment rate (20-64y)	2.5	81.0	84.5	84.6	83.6	83.1	83.5
Employment rate (20-74y)	-3.4	70.8	74.2	75.3	71.7	67.3	67.4
Unemployment rate (20-64y)	1.3	2.7	3.7	4.1	4.1	4.1	4.0
Unemployment rate (20-74y)	1.3	2.7	3.7	4.1	4.1	4.1	4.1
Employment (20-64y; millions)	0.1	0.3	0.3	0.4	0.4	0.4	0.3
Employment (20-74y; millions)	0.1	0.3	0.3	0.4	0.4	0.4	0.4
share of young (20-24y)	-1.0	7.7	6.2	6.0	6.2	6.3	6.7
share of prime-age (25-54y)	-8.4	78.2	80.2	75.7	69.4	69.2	69.8
share of older (55-64y)	9.0	11.8	12.5	16.9	22.4	21.6	20.8
share of oldest (65-74y)	0.4	2.2	1.1	1.4	2.0	2.8	2.6
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	7.5	18.0	16.5	20.7	26.9	26.8	25.5
Old-age dependency ratio (3)	34.9	30.5	31.0	30.5	37.0	52.6	65.4
Total dependency ratio (4)	36.1	58.2	58.0	55.9	62.0	79.6	94.3
Total economic dependency ratio (5)	35.7	90.9	84.9	81.7	89.8	110.0	126.6
Economic old-age dependency ratio (20-64y) (6)	40.3	35.2	35.5	34.6	42.1	60.3	75.5
Economic old-age dependency ratio (20-74y) (7)	39.1	34.4	35.1	34.1	41.2	58.6	73.5

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

19. THE NETHERLANDS

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.53	1.55	1.58	1.60	1.61	1.63
Life expectancy at birth							
males	6.4	80.3	81.6	83.0	84.3	85.5	86.7
females	6.4	83.6	84.8	86.2	87.6	88.8	90.0
Life expectancy at 65 (years)							
males	4.8	18.8	19.8	20.8	21.7	22.7	23.6
females	5.1	21.3	22.3	23.4	24.4	25.4	26.4
Net migration (thousands)	-192.7	234.9	45.3	44.3	42.4	44.3	42.1
Net migration as % of population in t-1	-1.1	1.3	0.2	0.2	0.2	0.2	0.2
Population (million)	1.0	17.7	18.4	18.7	18.7	18.7	18.7
share of prime-age population (25-54y)	-3.6	38.4	38.0	38.2	36.9	35.6	34.9
share of working-age population (20-64y)	-6.7	58.7	56.8	54.5	55.0	54.3	52.0
share of elderly population (+65y)	9.1	20.1	22.9	25.3	25.5	26.9	29.3
share of very elderly population (+80y)	6.1	4.9	6.5	8.2	10.2	10.2	10.9
share of very elderly population (+80y) in elderly population (+65y)	13.2	24.2	28.5	32.4	39.8	37.8	37.4
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.3	2.2	0.8	1.6	1.6	1.2	1.0
Employment (15-74y; growth rate)	0.2	2.1	0.0	0.1	0.2	-0.1	-0.2
Labour input: hours worked (growth rate)	0.2	2.0	0.0	0.1	0.2	-0.1	-0.2
Labour productivity per hour (growth rate)	1.1	0.1	0.8	1.5	1.4	1.3	1.2
TFP (growth rate)	0.7	0.2	0.4	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.4	-0.1	0.4	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.2	1.2	0.5	1.5	1.6	1.2	1.0
Potential GDP per worker (growth rate)	1.1	0.1	0.8	1.5	1.4	1.3	1.2
HICP (growth rate)	2.3	11.6	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.4	1.4	2.7	3.3	3.9	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-650	10,396	10,440	10,206	10,301	10,144	9,747
Working-age population (growth rate)	-1.3	0.9	-0.3	0.0	0.0	-0.3	-0.4
Labour force (20-64y; thousands)	-69	8,881	9,004	8,992	9,152	9,104	8,812
Participation rate (20-64y)	5.0	85.4	86.2	88.1	88.8	89.7	90.4
Participation rate (20-74y)	4.0	74.6	74.2	75.5	78.3	78.3	78.6
young (20-24y)	3.7	85.4	89.0	89.1	89.1	89.1	89.1
prime-age (25-54y)	3.7	89.1	90.5	91.6	92.4	92.7	92.8
older (55-64y)	8.9	75.3	72.5	75.6	78.4	82.0	84.2
oldest (65-74y)	13.0	17.0	16.8	17.3	22.2	26.4	30.0
Participation rate (20-64y) - female	7.1	81.5	83.0	85.6	86.8	88.0	88.6
Participation rate (20-74y) - female	6.6	70.2	71.3	73.2	76.2	76.5	76.8
young (20-24y)	2.3	85.9	88.2	88.2	88.2	88.2	88.2
prime-age (25-54y)	5.3	85.5	87.6	89.2	90.5	90.8	90.8
older (55-64y)	13.9	68.5	67.2	71.8	75.5	80.3	82.4
oldest (65-74y)	18.3	11.6	17.0	17.6	21.9	25.6	29.9
Participation rate (20-64y) - male	2.9	89.3	89.5	90.6	90.9	91.5	92.2
Participation rate (20-74y) - male	1.4	78.9	77.1	77.9	80.4	80.2	80.4
young (20-24y)	5.1	84.8	89.9	89.9	89.9	89.9	89.9
prime-age (25-54y)	2.0	92.6	93.4	93.8	94.3	94.6	94.6
older (55-64y)	3.8	82.1	77.9	79.6	81.4	83.7	85.9
oldest (65-74y)	7.6	22.6	16.6	17.0	22.6	27.2	30.2
Average labour market exit age (1)	2.9	64.9	65.3	65.9	66.6	67.2	67.8
male	2.8	65.0	65.4	65.9	66.6	67.3	67.8
female	3.0	64.8	65.2	65.9	66.6	67.2	67.8
Employment rate (20-64y)	4.8	82.9	83.6	85.5	86.2	87.0	87.7
Employment rate (20-74y)	3.7	72.4	71.9	73.2	75.9	75.9	76.1
Unemployment rate (20-64y)	0.1	2.9	3.0	3.0	3.0	3.0	3.0
Unemployment rate (20-74y)	0.2	3.0	3.1	3.1	3.1	3.1	3.2
Employment (20-64y; millions)	-0.1	8.6	8.7	8.7	8.9	8.8	8.5
Employment (20-74y; millions)	0.3	8.9	9.1	9.1	9.3	9.4	9.2
share of young (20-24y)	-1.7	10.4	9.9	9.2	9.4	9.1	8.6
share of prime-age (25-54y)	-2.1	66.1	67.8	70.2	67.0	64.0	64.1
share of older (55-64y)	0.0	20.0	18.5	16.7	19.3	21.0	20.0
share of oldest (65-74y)	3.8	3.6	3.8	4.0	4.4	5.9	7.3
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	-0.3	23.5	22.8	20.2	22.8	24.4	23.2
Old-age dependency ratio (3)	22.0	34.3	40.3	46.4	46.4	49.6	56.3
Total dependency ratio (4)	22.0	70.3	75.9	83.4	81.9	84.2	92.4
Total economic dependency ratio (5)	5.2	98.1	102.3	106.0	101.8	99.1	103.3
Economic old-age dependency ratio (20-64y) (6)	18.6	37.3	44.0	49.9	49.0	50.4	55.9
Economic old-age dependency ratio (20-74y) (7)	15.8	36.0	42.4	48.0	46.8	47.4	51.8

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

20. AUSTRIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.44	1.46	1.49	1.52	1.55	1.57
Life expectancy at birth							
males	6.8	79.5	80.8	82.4	83.8	85.1	86.3
females	6.0	84.2	85.3	86.7	88.0	89.1	90.2
Life expectancy at 65 (years)							
males	4.9	18.6	19.5	20.6	21.6	22.6	23.5
females	4.8	21.8	22.6	23.7	24.7	25.6	26.6
Net migration (thousands)	-69.0	103.7	36.1	37.3	37.0	35.9	34.7
Net migration as % of population in t-1	-0.8	1.2	0.4	0.4	0.4	0.4	0.4
Population (million)	0.5	9.0	9.2	9.4	9.5	9.5	9.5
share of prime-age population (25-54y)	-5.9	40.9	38.6	37.6	36.1	35.6	35.0
share of working-age population (20-64y)	-8.7	61.1	57.9	55.5	54.6	53.0	52.4
share of elderly population (+65y)	10.3	19.5	22.9	26.2	27.6	29.1	29.9
share of very elderly population (+80y)	6.3	5.9	6.4	7.9	10.8	11.0	12.1
share of very elderly population (+80y) in elderly population (+65y)	10.6	30.1	28.0	30.2	39.2	37.7	40.7
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.3	1.4	1.3	1.6	1.2	1.1	1.1
Employment (15-74y; growth rate)	0.1	1.1	0.3	0.1	-0.2	-0.2	-0.1
Labour input: hours worked (growth rate)	0.0	0.6	0.2	0.1	-0.2	-0.2	-0.1
Labour productivity per hour (growth rate)	1.2	0.8	1.0	1.5	1.4	1.3	1.2
TFP (growth rate)	0.8	0.4	0.6	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.4	0.4	0.4	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.1	0.6	1.0	1.4	1.2	1.1	1.1
Potential GDP per worker (growth rate)	1.2	0.3	1.0	1.5	1.4	1.3	1.2
HICP (growth rate)	2.3	8.6	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.6	1.7	3.1	3.5	3.9	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-516	5,514	5,343	5,231	5,200	5,057	4,999
Working-age population (growth rate)	-0.4	0.3	-0.5	0.0	-0.2	-0.2	-0.1
Labour force (20-64y; thousands)	-210	4,463	4,403	4,428	4,410	4,301	4,253
Participation rate (20-64y)	4.1	80.9	82.4	84.6	84.8	85.0	85.1
Participation rate (20-74y)	0.4	70.7	69.2	70.5	71.6	70.6	71.1
young (20-24y)	2.0	75.9	77.9	78.0	78.0	77.9	77.9
prime-age (25-54y)	2.0	89.6	90.8	91.3	91.6	91.6	91.6
older (55-64y)	10.7	58.6	60.9	67.5	68.9	69.0	69.4
oldest (65-74y)	1.0	8.3	7.7	8.1	9.4	9.4	9.3
Participation rate (20-64y) - female	7.3	76.6	79.9	83.0	83.5	83.8	83.9
Participation rate (20-74y) - female	3.5	66.0	66.1	68.2	69.7	68.9	69.5
young (20-24y)	4.2	72.9	77.1	77.1	77.1	77.0	77.0
prime-age (25-54y)	3.1	86.6	88.4	89.3	89.7	89.8	89.8
older (55-64y)	19.7	50.4	58.1	66.9	69.2	69.8	70.1
oldest (65-74y)	1.9	6.0	4.8	6.5	7.8	7.9	7.9
Participation rate (20-64y) - male	1.0	85.3	84.9	86.3	86.1	86.2	86.3
Participation rate (20-74y) - male	-2.8	75.5	72.4	72.9	73.5	72.2	72.7
young (20-24y)	-0.1	78.8	78.8	78.8	78.8	78.8	78.7
prime-age (25-54y)	0.8	92.6	93.2	93.2	93.4	93.5	93.4
older (55-64y)	1.6	67.1	63.9	68.2	68.5	68.2	68.7
oldest (65-74y)	-0.2	11.0	10.9	9.9	11.0	10.9	10.8
Average labour market exit age (1)	1.3	62.2	63.0	63.4	63.5	63.5	63.5
male	0.5	63.0	63.2	63.4	63.6	63.6	63.6
female	2.1	61.4	62.8	63.4	63.5	63.5	63.5
Employment rate (20-64y)	4.2	77.3	78.7	81.0	81.1	81.4	81.4
Employment rate (20-74y)	0.6	67.5	66.1	67.6	68.6	67.6	68.1
Unemployment rate (20-64y)	-0.2	4.5	4.5	4.3	4.3	4.3	4.3
Unemployment rate (20-74y)	-0.3	4.5	4.4	4.2	4.2	4.2	4.2
Employment (20-64y; millions)	-0.2	4.3	4.2	4.2	4.2	4.1	4.1
Employment (20-74y; millions)	-0.2	4.3	4.3	4.3	4.3	4.2	4.2
share of young (20-24y)	0.3	8.0	8.2	8.5	8.1	8.1	8.3
share of prime-age (25-54y)	-2.7	73.0	72.1	71.5	70.0	70.6	70.3
share of older (55-64y)	1.6	17.3	17.6	17.8	19.5	18.7	18.9
share of oldest (65-74y)	0.8	1.7	2.0	2.2	2.4	2.6	2.5
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	-0.6	24.1	24.1	22.5	24.4	23.4	23.5
Old-age dependency ratio (3)	25.0	32.0	39.5	47.2	50.6	54.8	57.0
Total dependency ratio (4)	27.3	63.7	72.7	80.1	83.3	88.7	90.9
Total economic dependency ratio (5)	20.4	108.2	114.9	117.4	120.5	125.7	128.6
Economic old-age dependency ratio (20-64y) (6)	27.9	39.5	48.1	56.0	59.9	64.6	67.4
Economic old-age dependency ratio (20-74y) (7)	26.9	38.9	47.1	54.8	58.5	62.9	65.7

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

21. POLAND

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.2	1.39	1.45	1.51	1.56	1.59	1.61
Life expectancy at birth							
males	10.9	73.2	75.7	78.1	80.3	82.3	84.1
females	8.2	81.3	83.2	85.0	86.6	88.1	89.5
Life expectancy at 65 (years)							
males	7.0	15.4	17.1	18.5	19.9	21.2	22.4
females	6.3	19.8	21.3	22.7	23.9	25.0	26.1
Net migration (thousands)	-931.4	1000.9	-44.5	43.5	62.5	57.5	69.5
Net migration as % of population in t-1	-2.4	2.7	-0.1	0.1	0.2	0.2	0.2
Population (million)	-6.2	38.1	37.3	35.8	34.6	33.3	31.8
share of prime-age population (25-54y)	-9.9	42.8	40.7	36.5	33.9	33.7	32.9
share of working-age population (20-64y)	-9.8	60.3	58.5	57.9	52.9	49.5	50.5
share of elderly population (+65y)	13.0	19.2	22.0	24.5	29.3	32.7	32.2
share of very elderly population (+80y)	10.7	4.3	5.4	8.7	9.1	11.8	15.0
share of very elderly population (+80y) in elderly population (+65y)	24.4	22.4	24.7	35.3	30.9	36.0	46.7
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.5	3.4	2.2	1.4	0.9	1.0	0.8
Employment (15-74y; growth rate)	-0.7	0.5	-0.9	-0.9	-1.2	-0.6	-0.4
Labour input: hours worked (growth rate)	-0.7	0.8	-0.9	-0.9	-1.2	-0.6	-0.4
Labour productivity per hour (growth rate)	2.2	2.6	3.2	2.3	2.0	1.6	1.2
TFP (growth rate)	1.4	1.6	1.8	1.4	1.3	1.1	0.8
capital deepening (contribution to labour productivity growth)	0.8	0.9	1.3	0.9	0.7	0.6	0.4
Potential GDP per capita (growth rate)	1.8	2.5	2.8	1.8	1.2	1.5	1.3
Potential GDP per worker (growth rate)	2.2	2.9	3.2	2.3	2.1	1.6	1.2
HICP (growth rate)	3.0	13.2	2.5	2.5	2.5	2.5	2.5
Nominal interest rate	5.3	6.1	6.4	5.7	4.7	4.5	4.5
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-6,868	22,946	21,821	20,711	18,301	16,491	16,078
Working-age population (growth rate)	-0.1	-0.1	-0.4	-0.8	-1.4	-0.6	-0.2
Labour force (20-64y; thousands)	-5,401	18,156	17,466	16,259	14,396	13,198	12,755
Participation rate (20-64y)	0.2	79.1	80.0	78.5	78.7	80.0	79.3
Participation rate (20-74y)	-0.6	67.6	68.4	67.5	63.7	64.7	67.0
young (20-24y)	1.1	57.9	58.2	59.0	59.2	58.8	59.0
prime-age (25-54y)	1.3	87.8	88.7	88.8	89.2	89.3	89.1
older (55-64y)	4.1	57.8	61.2	61.6	60.1	61.0	61.9
oldest (65-74y)	0.8	9.2	9.2	10.5	10.3	9.6	10.0
Participation rate (20-64y) - female	1.3	72.5	74.6	72.7	72.8	74.7	73.9
Participation rate (20-74y) - female	1.0	60.5	62.2	61.2	57.4	59.1	61.5
young (20-24y)	1.8	50.1	51.2	51.9	52.0	51.6	51.9
prime-age (25-54y)	2.2	83.4	85.0	85.3	85.6	85.8	85.6
older (55-64y)	6.5	45.8	51.8	52.0	50.4	51.2	52.3
oldest (65-74y)	0.4	6.0	5.6	6.7	6.6	6.2	6.4
Participation rate (20-64y) - male	-1.3	85.8	85.4	84.2	84.3	85.0	84.5
Participation rate (20-74y) - male	-2.9	75.1	74.8	73.8	69.9	70.1	72.2
young (20-24y)	0.4	65.4	65.1	65.9	66.1	65.6	65.9
prime-age (25-54y)	0.2	92.2	92.3	92.2	92.7	92.5	92.4
older (55-64y)	-0.1	71.1	71.2	71.5	69.9	70.4	71.0
oldest (65-74y)	0.2	13.4	13.7	15.0	14.5	13.4	13.6
Average labour market exit age (1)	0.0	63.0	63.0	63.0	63.0	63.0	63.0
male	0.0	64.5	64.5	64.5	64.5	64.5	64.5
female	0.0	61.6	61.6	61.6	61.6	61.6	61.6
Employment rate (20-64y)	0.1	76.9	78.0	76.1	76.3	77.6	76.9
Employment rate (20-74y)	-0.7	65.7	66.6	65.5	61.8	62.8	65.0
Unemployment rate (20-64y)	0.1	2.9	2.6	3.0	3.0	3.0	3.0
Unemployment rate (20-74y)	0.1	2.8	2.5	3.0	2.9	2.9	3.0
Employment (20-64y; millions)	-5.3	17.6	17.0	15.8	14.0	12.8	12.4
Employment (20-74y; millions)	-5.3	18.1	17.4	16.2	14.5	13.2	12.7
share of young (20-24y)	1.1	5.5	6.3	6.5	5.9	6.2	6.6
share of prime-age (25-54y)	-5.8	77.3	75.7	69.8	70.2	73.7	71.4
share of older (55-64y)	4.3	15.0	15.8	21.2	20.3	16.7	19.3
share of oldest (65-74y)	0.4	2.3	2.3	2.6	3.6	3.3	2.7
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	4.4	20.7	20.9	27.4	27.2	22.5	25.1
Old-age dependency ratio (3)	31.9	31.9	37.6	42.3	55.4	66.0	63.7
Total dependency ratio (4)	32.2	65.9	71.0	72.8	88.9	102.0	98.1
Total economic dependency ratio (5)	39.5	110.9	114.4	121.0	138.6	151.5	150.4
Economic old-age dependency ratio (20-64y) (6)	41.0	39.0	45.8	52.9	68.8	81.5	80.0
Economic old-age dependency ratio (20-74y) (7)	39.7	38.1	44.8	51.5	66.3	78.8	77.8

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

22. PORTUGAL

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.41	1.44	1.47	1.50	1.52	1.55
Life expectancy at birth							
males	7.3	79.6	81.9	83.3	84.6	85.8	86.9
females	5.4	85.0	86.0	87.2	88.3	89.4	90.4
Life expectancy at 65 (years)							
males	5.1	18.9	20.5	21.5	22.4	23.2	24.0
females	4.4	22.3	23.0	24.0	24.9	25.8	26.7
Net migration (thousands)	-43.1	81.6	16.2	25.9	27.3	32.7	38.5
Net migration as % of population in t-1	-0.4	0.8	0.2	0.3	0.3	0.4	0.4
Population (million)	-1.4	10.4	10.2	10.0	9.6	9.3	9.0
share of prime-age population (25-54y)	-6.0	38.9	36.5	33.5	32.9	32.4	32.9
share of working-age population (20-64y)	-8.8	58.4	56.2	52.1	49.5	49.8	49.6
share of elderly population (+65y)	9.8	23.8	27.0	31.2	34.0	33.8	33.6
share of very elderly population (+80y)	7.8	6.9	8.4	10.6	12.9	15.2	14.8
share of very elderly population (+80y) in elderly population (+65y)	14.8	29.2	30.9	34.1	38.0	45.1	44.0
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.2	1.8	0.7	1.2	1.4	1.4	1.1
Employment (15-74y; growth rate)	-0.4	0.7	-0.9	-0.8	-0.5	-0.2	-0.2
Labour input: hours worked (growth rate)	-0.4	0.3	-0.8	-0.8	-0.5	-0.2	-0.2
Labour productivity per hour (growth rate)	1.7	1.5	1.5	2.0	2.0	1.6	1.2
TFP (growth rate)	1.1	1.5	0.9	1.3	1.3	1.0	0.8
capital deepening (contribution to labour productivity growth)	0.5	0.0	0.6	0.7	0.7	0.6	0.4
Potential GDP per capita (growth rate)	1.5	1.3	0.9	1.5	1.9	1.8	1.3
Potential GDP per worker (growth rate)	1.7	1.0	1.5	2.0	2.0	1.6	1.2
HICP (growth rate)	2.2	8.1	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.9	2.2	3.9	4.1	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-1,616	6,055	5,748	5,200	4,766	4,609	4,438
Working-age population (growth rate)	-0.2	-0.1	-0.8	-1.2	-0.5	-0.3	-0.3
Labour force (20-64y; thousands)	-1,172	4,994	4,787	4,374	4,056	3,940	3,822
Participation rate (20-64y)	3.6	82.5	83.3	84.1	85.1	85.5	86.1
Participation rate (20-74y)	2.8	70.7	70.5	70.0	70.5	73.1	73.5
young (20-24y)	0.8	53.6	54.4	54.5	54.2	54.4	54.4
prime-age (25-54y)	1.3	91.3	92.1	92.3	92.5	92.5	92.6
older (55-64y)	11.3	69.3	71.1	74.1	76.5	79.0	80.6
oldest (65-74y)	10.8	14.3	16.1	18.4	19.3	22.5	25.1
Participation rate (20-64y) - female	5.3	79.9	81.3	82.6	84.0	84.5	85.2
Participation rate (20-74y) - female	5.0	67.2	68.0	68.0	68.7	71.8	72.3
young (20-24y)	1.5	49.7	51.3	51.4	51.1	51.2	51.2
prime-age (25-54y)	2.9	89.5	91.2	91.9	92.3	92.3	92.4
older (55-64y)	13.4	64.9	67.4	71.0	73.6	76.8	78.3
oldest (65-74y)	14.4	9.6	15.0	17.7	18.4	21.4	24.0
Participation rate (20-64y) - male	1.8	85.3	85.3	85.6	86.2	86.4	87.1
Participation rate (20-74y) - male	0.3	74.5	73.1	72.1	72.3	74.5	74.8
young (20-24y)	0.2	57.3	57.4	57.5	57.3	57.4	57.4
prime-age (25-54y)	-0.5	93.2	93.1	92.8	92.7	92.7	92.7
older (55-64y)	8.8	74.3	75.3	77.5	79.5	81.4	83.0
oldest (65-74y)	6.3	20.0	17.5	19.3	20.3	23.7	26.3
Average labour market exit age (1)	2.3	64.4	64.8	65.2	65.7	66.2	66.7
male	2.3	64.6	64.9	65.4	65.8	66.4	66.9
female	2.3	64.2	64.7	65.1	65.5	66.0	66.4
Employment rate (20-64y)	3.1	77.6	78.5	78.9	79.8	80.1	80.7
Employment rate (20-74y)	2.5	66.7	66.5	65.8	66.3	68.8	69.2
Unemployment rate (20-64y)	0.3	5.9	5.8	6.2	6.2	6.2	6.2
Unemployment rate (20-74y)	0.2	5.8	5.6	6.0	6.0	6.0	5.9
Employment (20-64y; millions)	-1.1	4.7	4.5	4.1	3.8	3.7	3.6
Employment (20-74y; millions)	-1.0	4.9	4.7	4.4	4.1	3.9	3.9
share of young (20-24y)	-0.3	5.2	4.9	4.6	4.9	5.0	4.8
share of prime-age (25-54y)	-5.0	71.5	69.0	66.7	68.2	66.4	66.5
share of older (55-64y)	1.7	19.7	21.5	22.8	20.6	22.4	21.4
share of oldest (65-74y)	3.7	3.6	4.5	5.9	6.3	6.3	7.4
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	0.3	24.1	26.2	27.2	24.2	25.5	24.4
Old-age dependency ratio (3)	27.0	40.7	48.2	59.8	68.6	67.8	67.8
Total dependency ratio (4)	30.5	71.3	78.1	91.8	102.1	100.7	101.8
Total economic dependency ratio (5)	18.8	112.7	116.7	128.9	137.2	134.7	131.5
Economic old-age dependency ratio (20-64y) (6)	27.2	48.6	56.5	69.4	79.1	77.7	75.8
Economic old-age dependency ratio (20-74y) (7)	23.4	46.9	54.0	65.3	74.1	72.8	70.3

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

23. ROMANIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.0	1.81	1.80	1.79	1.78	1.78	1.77
Life expectancy at birth							
males	12.4	70.9	73.7	76.4	79.0	81.3	83.3
females	9.9	78.6	80.9	83.0	85.0	86.8	88.5
Life expectancy at 65 (years)							
males	7.8	14.2	16.0	17.6	19.2	20.6	22.0
females	7.3	18.1	19.7	21.3	22.7	24.1	25.4
Net migration (thousands)	-50.6	78.7	-37.5	-4.8	5.7	13.1	28.2
Net migration as % of population in t-1	-0.2	0.4	-0.2	0.0	0.0	0.1	0.2
Population (million)	-4.0	19.0	18.2	17.2	16.4	15.7	15.0
share of prime-age population (25-54y)	-7.7	41.8	37.4	34.9	33.8	34.5	34.1
share of working-age population (20-64y)	-6.5	58.6	58.3	54.9	51.8	50.8	52.1
share of elderly population (+65y)	9.5	19.6	21.0	25.5	28.7	30.0	29.1
share of very elderly population (+80y)	8.6	4.4	5.3	7.7	9.3	11.9	13.1
share of very elderly population (+80y) in elderly population (+65y)	22.3	22.7	25.1	30.0	32.5	39.7	45.0
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.7	2.9	2.3	1.3	1.3	1.4	0.9
Employment (15-74y; growth rate)	-0.7	-0.2	-1.2	-1.1	-0.9	-0.3	-0.3
Labour input: hours worked (growth rate)	-0.7	0.0	-1.3	-1.1	-0.9	-0.3	-0.3
Labour productivity per hour (growth rate)	2.4	2.9	3.6	2.4	2.2	1.7	1.2
TFP (growth rate)	1.4	1.3	2.1	1.5	1.4	1.1	0.8
capital deepening (contribution to labour productivity growth)	1.0	1.6	1.5	0.9	0.8	0.6	0.4
Potential GDP per capita (growth rate)	2.2	3.3	3.0	1.8	1.8	1.9	1.3
Potential GDP per worker (growth rate)	2.4	3.1	3.6	2.4	2.2	1.7	1.2
HICP (growth rate)	2.9	12.0	2.5	2.5	2.5	2.5	2.5
Nominal interest rate	6.2	7.5	8.7	7.3	5.0	4.5	4.5
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-3,337	11,163	10,580	9,441	8,489	7,945	7,826
Working-age population (growth rate)	1.1	-1.4	-0.4	-1.2	-0.9	-0.2	-0.3
Labour force (20-64y; thousands)	-2,374	8,044	7,592	6,749	6,115	5,810	5,670
Participation rate (20-64y)	0.4	72.1	71.8	71.5	72.0	73.1	72.5
Participation rate (20-74y)	1.1	60.5	61.5	59.0	59.0	60.4	61.6
young (20-24y)	0.9	44.6	45.0	45.4	45.4	45.3	45.5
prime-age (25-54y)	-0.2	82.0	82.0	81.5	81.9	81.8	81.8
older (55-64y)	9.9	48.6	56.8	57.4	56.5	59.0	58.5
oldest (65-74y)	6.1	3.4	6.8	9.1	8.9	8.6	9.6
Participation rate (20-64y) - female	-0.3	61.7	62.0	61.0	61.0	62.0	61.5
Participation rate (20-74y) - female	1.3	50.5	51.8	49.2	49.1	50.5	51.7
young (20-24y)	0.8	34.0	34.3	34.8	34.7	34.6	34.8
prime-age (25-54y)	-2.5	72.4	71.4	69.8	70.0	70.0	69.9
older (55-64y)	12.2	37.6	50.0	50.0	47.7	50.2	49.8
oldest (65-74y)	4.4	2.3	4.4	6.8	6.4	6.0	6.7
Participation rate (20-64y) - male	0.3	82.3	81.2	81.5	82.4	83.4	82.6
Participation rate (20-74y) - male	-0.1	70.9	71.4	68.6	68.6	69.8	70.8
young (20-24y)	0.8	54.6	54.9	55.4	55.3	55.2	55.4
prime-age (25-54y)	1.4	91.3	91.9	92.4	92.9	92.7	92.7
older (55-64y)	5.8	60.8	63.9	64.7	65.0	67.2	66.6
oldest (65-74y)	7.4	5.0	10.0	11.7	11.5	11.2	12.4
Average labour market exit age (1)	0.7	62.8	63.2	63.4	63.5	63.5	63.5
male	0.5	63.2	63.4	63.6	63.6	63.6	63.6
female	0.8	62.5	63.0	63.2	63.3	63.3	63.3
Employment rate (20-64y)	0.0	68.3	67.9	67.4	67.9	68.9	68.3
Employment rate (20-74y)	0.8	57.3	58.3	55.6	55.7	57.0	58.1
Unemployment rate (20-64y)	0.6	5.2	5.3	5.8	5.8	5.8	5.8
Unemployment rate (20-74y)	0.5	5.2	5.3	5.7	5.7	5.7	5.7
Employment (20-64y; millions)	-2.3	7.6	7.2	6.4	5.8	5.5	5.3
Employment (20-74y; millions)	-2.2	7.7	7.3	6.6	6.0	5.6	5.5
share of young (20-24y)	0.6	4.5	5.2	5.3	5.0	5.2	5.1
share of prime-age (25-54y)	-8.5	80.8	72.4	70.6	72.4	74.4	72.3
share of older (55-64y)	6.1	13.8	20.6	20.8	19.4	17.5	19.8
share of oldest (65-74y)	1.8	1.0	1.8	3.2	3.2	2.9	2.8
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	4.5	20.3	26.0	26.2	25.0	21.9	24.8
Old-age dependency ratio (3)	22.3	33.5	36.0	46.5	55.4	59.1	55.8
Total dependency ratio (4)	21.3	70.5	71.6	82.1	93.2	97.0	91.9
Total economic dependency ratio (5)	26.1	147.2	148.1	161.7	175.5	177.6	173.3
Economic old-age dependency ratio (20-64y) (6)	30.9	47.9	51.2	65.6	78.2	82.7	78.8
Economic old-age dependency ratio (20-74y) (7)	29.2	47.5	50.2	63.5	75.7	80.4	76.6

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

24. SLOVENIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.59	1.62	1.65	1.67	1.68	1.69
Life expectancy at birth							
males	7.5	78.5	80.0	81.7	83.2	84.6	86.0
females	6.1	84.4	85.7	87.0	88.2	89.4	90.5
Life expectancy at 65 (years)							
males	5.5	17.8	18.9	20.1	21.2	22.3	23.3
females	5.0	21.7	22.8	23.9	24.9	25.8	26.7
Net migration (thousands)	-8.6	14.6	6.1	6.7	6.4	5.8	6.0
Net migration as % of population in t-1	-0.4	0.7	0.3	0.3	0.3	0.3	0.3
Population (million)	-0.1	2.1	2.1	2.1	2.1	2.0	2.0
share of prime-age population (25-54y)	-6.2	40.2	37.5	35.4	34.8	34.8	34.0
share of working-age population (20-64y)	-6.7	59.1	56.8	55.3	51.8	51.2	52.4
share of elderly population (+65y)	8.8	21.3	24.5	27.5	30.3	30.9	30.1
share of very elderly population (+80y)	8.1	5.6	6.7	9.3	10.9	12.7	13.8
share of very elderly population (+80y) in elderly population (+65y)	19.2	26.5	27.3	33.8	36.1	41.1	45.7
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.6	3.1	2.2	1.5	1.0	1.3	1.1
Employment (15-74y; growth rate)	-0.2	1.1	-0.1	-0.3	-0.6	-0.1	-0.2
Labour input: hours worked (growth rate)	-0.1	1.2	-0.1	-0.3	-0.6	-0.1	-0.2
Labour productivity per hour (growth rate)	1.7	1.9	2.3	1.8	1.6	1.4	1.2
TFP (growth rate)	1.2	1.6	1.6	1.2	1.0	0.9	0.8
capital deepening (contribution to labour productivity growth)	0.6	0.3	0.7	0.6	0.6	0.5	0.4
Potential GDP per capita (growth rate)	1.7	2.9	2.2	1.6	1.1	1.5	1.3
Potential GDP per worker (growth rate)	1.8	2.0	2.3	1.8	1.6	1.4	1.2
HICP (growth rate)	2.3	9.3	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	4.0	1.9	4.0	4.1	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-199	1,247	1,204	1,166	1,083	1,048	1,048
Working-age population (growth rate)	0.6	-0.6	-0.3	-0.5	-0.7	-0.1	-0.1
Labour force (20-64y; thousands)	-121	1,015	993	981	927	899	895
Participation rate (20-64y)	4.0	81.4	82.5	84.2	85.6	85.8	85.4
Participation rate (20-74y)	2.7	68.9	68.7	69.6	69.1	70.8	71.7
young (20-24y)	2.7	56.6	58.5	59.4	59.2	58.9	59.2
prime-age (25-54y)	-0.1	92.9	92.3	92.5	93.0	92.8	92.8
older (55-64y)	19.4	57.3	65.1	73.2	74.8	76.2	76.6
oldest (65-74y)	-0.8	7.4	6.5	6.0	6.4	6.3	6.6
Participation rate (20-64y) - female	4.5	77.9	79.2	81.2	82.6	82.9	82.4
Participation rate (20-74y) - female	4.5	64.7	64.8	66.0	65.8	67.9	69.2
young (20-24y)	2.5	51.2	53.1	53.9	53.7	53.5	53.7
prime-age (25-54y)	-0.4	90.4	90.0	89.7	90.2	90.1	90.0
older (55-64y)	21.7	52.9	61.9	71.4	72.6	74.1	74.5
oldest (65-74y)	1.4	5.1	6.0	5.6	6.2	6.0	6.4
Participation rate (20-64y) - male	3.3	84.6	85.3	86.8	88.2	88.3	87.9
Participation rate (20-74y) - male	0.9	72.9	72.3	72.9	72.0	73.3	73.8
young (20-24y)	2.9	61.3	63.4	64.4	64.2	63.9	64.2
prime-age (25-54y)	0.1	95.0	94.4	94.8	95.3	95.1	95.1
older (55-64y)	16.8	61.7	68.3	74.8	76.7	77.9	78.4
oldest (65-74y)	-3.2	9.9	7.1	6.4	6.6	6.5	6.8
Average labour market exit age (1)	1.7	62.3	63.0	64.0	64.0	64.0	64.0
male	1.6	62.4	63.0	64.0	64.0	64.0	64.0
female	1.8	62.2	62.9	64.0	64.0	64.0	64.0
Employment rate (20-64y)	2.3	78.3	77.8	79.4	80.8	81.0	80.6
Employment rate (20-74y)	1.3	66.2	64.8	65.7	65.1	66.8	67.6
Unemployment rate (20-64y)	1.8	3.9	5.6	5.7	5.7	5.6	5.7
Unemployment rate (20-74y)	1.8	3.9	5.6	5.7	5.7	5.7	5.7
Employment (20-64y; millions)	-0.1	1.0	0.9	0.9	0.9	0.8	0.8
Employment (20-74y; millions)	-0.1	1.0	1.0	0.9	0.9	0.9	0.9
share of young (20-24y)	1.0	5.3	6.2	6.2	5.6	6.1	6.2
share of prime-age (25-54y)	-6.6	76.5	73.2	69.6	71.9	72.9	69.9
share of older (55-64y)	5.8	16.5	18.9	22.6	20.5	19.4	22.3
share of oldest (65-74y)	-0.2	1.8	1.7	1.6	1.9	1.6	1.6
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.4	23.8	24.2	26.4	24.0	22.2	25.3
Old-age dependency ratio (3)	21.5	36.1	43.1	49.8	58.5	60.3	57.5
Total dependency ratio (4)	21.6	69.3	76.0	81.0	93.1	95.4	90.9
Total economic dependency ratio (5)	20.7	112.5	122.3	124.3	134.7	137.3	133.2
Economic old-age dependency ratio (20-64y) (6)	25.6	44.1	53.5	61.0	70.4	72.6	69.7
Economic old-age dependency ratio (20-74y) (7)	25.3	43.3	52.6	60.1	69.1	71.5	68.6

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

25. SLOVAKIA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.60	1.61	1.62	1.63	1.65	1.66
Life expectancy at birth							
males	10.7	73.4	75.8	78.1	80.3	82.3	84.1
females	8.7	80.4	82.4	84.3	86.0	87.7	89.1
Life expectancy at 65 (years)							
males	7.1	15.1	16.7	18.2	19.6	21.0	22.2
females	6.8	19.0	20.6	22.0	23.4	24.6	25.8
Net migration (thousands)	-88.5	96.2	-0.7	7.6	8.5	6.8	7.7
Net migration as % of population in t-1	-1.6	1.8	0.0	0.1	0.2	0.1	0.2
Population (million)	-0.7	5.5	5.4	5.3	5.2	5.0	4.8
share of prime-age population (25-54y)	-10.2	43.7	40.3	35.5	33.4	33.6	33.5
share of working-age population (20-64y)	-10.9	61.5	58.6	56.9	52.3	49.1	50.6
share of elderly population (+65y)	12.7	17.5	20.6	23.9	28.6	31.3	30.2
share of very elderly population (+80y)	10.5	3.4	4.7	7.3	8.5	11.6	13.9
share of very elderly population (+80y) in elderly population (+65y)	26.6	19.5	22.6	30.4	29.7	36.9	46.0
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.4	1.9	1.6	1.5	1.3	1.2	1.3
Employment (15-74y; growth rate)	-0.5	0.8	-0.8	-0.7	-0.8	-0.4	0.1
Labour input: hours worked (growth rate)	-0.5	0.3	-0.9	-0.7	-0.8	-0.4	0.1
Labour productivity per hour (growth rate)	2.0	1.6	2.5	2.2	2.0	1.6	1.2
TFP (growth rate)	1.2	1.1	1.5	1.4	1.3	1.1	0.8
capital deepening (contribution to labour productivity growth)	0.7	0.5	1.0	0.8	0.7	0.6	0.4
Potential GDP per capita (growth rate)	1.7	1.3	1.9	1.7	1.5	1.6	1.7
Potential GDP per worker (growth rate)	1.9	1.1	2.5	2.2	2.0	1.6	1.2
HICP (growth rate)	2.5	12.1	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.9	2.1	3.9	4.0	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-931	3,367	3,191	3,014	2,706	2,467	2,436
Working-age population (growth rate)	0.2	-0.3	-0.6	-0.9	-1.2	-0.5	-0.1
Labour force (20-64y; thousands)	-684	2,751	2,613	2,437	2,233	2,079	2,066
Participation rate (20-64y)	3.1	81.7	81.9	80.9	82.5	84.3	84.8
Participation rate (20-74y)	3.5	70.3	69.9	68.7	67.4	69.7	73.8
young (20-24y)	1.6	47.6	48.9	49.2	49.4	49.0	49.1
prime-age (25-54y)	1.3	89.9	91.2	91.0	91.2	91.4	91.2
older (55-64y)	15.7	67.1	66.5	69.4	73.7	78.4	82.8
oldest (65-74y)	12.9	7.0	8.1	10.3	12.6	15.5	19.9
Participation rate (20-64y) - female	6.0	77.5	79.0	78.4	80.9	83.0	83.6
Participation rate (20-74y) - female	6.7	65.4	66.2	65.6	65.0	67.7	72.1
young (20-24y)	1.8	35.9	37.3	37.7	37.9	37.6	37.7
prime-age (25-54y)	4.6	86.3	89.4	90.4	90.7	91.2	90.9
older (55-64y)	19.2	64.4	64.2	66.2	73.1	78.7	83.6
oldest (65-74y)	12.0	5.9	6.9	8.9	10.7	13.8	18.0
Participation rate (20-64y) - male	0.2	85.8	84.7	83.2	84.1	85.5	86.0
Participation rate (20-74y) - male	0.1	75.3	73.7	71.7	69.7	71.6	75.4
young (20-24y)	1.4	58.8	59.9	60.2	60.4	60.1	60.2
prime-age (25-54y)	-1.8	93.3	92.9	91.6	91.6	91.6	91.5
older (55-64y)	12.0	69.9	68.8	72.5	74.3	78.0	82.0
oldest (65-74y)	13.5	8.3	9.6	11.8	14.6	17.3	21.8
Average labour market exit age (1)	4.0	62.4	63.2	63.8	64.8	65.6	66.4
male	4.0	62.8	63.6	64.2	65.2	65.9	66.8
female	4.0	62.1	62.8	63.5	64.5	65.3	66.1
Employment rate (20-64y)	2.9	76.8	77.3	76.0	77.5	79.2	79.7
Employment rate (20-74y)	3.3	66.1	66.1	64.6	63.4	65.6	69.5
Unemployment rate (20-64y)	0.1	6.0	5.6	6.0	6.1	6.0	6.0
Unemployment rate (20-74y)	-0.1	5.9	5.5	5.9	5.9	5.8	5.8
Employment (20-64y; millions)	-0.6	2.6	2.5	2.3	2.1	2.0	1.9
Employment (20-74y; millions)	-0.6	2.6	2.5	2.4	2.2	2.1	2.0
share of young (20-24y)	1.0	4.2	4.7	5.3	4.9	5.0	5.2
share of prime-age (25-54y)	-9.2	77.2	75.3	68.7	67.7	70.7	68.0
share of older (55-64y)	5.0	17.1	18.0	23.3	23.2	19.4	22.1
share of oldest (65-74y)	3.2	1.6	2.0	2.7	4.2	4.9	4.8
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	2.5	20.8	22.4	27.4	26.6	21.6	23.3
Old-age dependency ratio (3)	31.2	28.5	35.1	42.0	54.7	63.7	59.7
Total dependency ratio (4)	35.0	62.7	70.6	75.7	91.2	103.5	97.7
Total economic dependency ratio (5)	27.8	108.5	116.3	125.0	136.2	144.2	136.2
Economic old-age dependency ratio (20-64y) (6)	34.3	35.4	43.3	52.4	66.1	75.1	69.7
Economic old-age dependency ratio (20-74y) (7)	31.5	34.9	42.5	51.0	63.3	71.4	66.4

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

26. FINLAND

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.39	1.42	1.45	1.48	1.51	1.53
Life expectancy at birth							
males	7.1	79.0	80.5	82.0	83.5	84.9	86.1
females	6.3	84.1	85.7	87.0	88.2	89.4	90.4
Life expectancy at 65 (years)							
males	5.1	18.3	19.5	20.5	21.6	22.5	23.4
females	5.2	21.6	23.0	24.0	25.0	25.9	26.8
Net migration (thousands)	-64.0	77.3	10.7	13.3	13.6	13.6	13.4
Net migration as % of population in t-1	-1.1	1.4	0.2	0.2	0.2	0.3	0.3
Population (million)	-0.3	5.6	5.6	5.6	5.5	5.3	5.2
share of prime-age population (25-54y)	-4.4	37.7	38.2	38.4	36.4	35.1	33.3
share of working-age population (20-64y)	-4.7	56.1	55.6	56.1	54.8	52.8	51.5
share of elderly population (+65y)	9.0	23.1	25.2	26.1	27.5	30.2	32.1
share of very elderly population (+80y)	7.3	5.9	8.1	9.9	10.7	11.2	13.2
share of very elderly population (+80y) in elderly population (+65y)	15.4	25.6	32.1	37.9	38.7	37.0	41.0
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.1	1.6	1.0	1.5	1.1	0.9	0.9
Employment (15-74y; growth rate)	-0.1	1.6	-0.3	0.0	-0.3	-0.4	-0.3
Labour input: hours worked (growth rate)	-0.2	1.0	-0.3	0.0	-0.3	-0.4	-0.3
Labour productivity per hour (growth rate)	1.3	0.6	1.3	1.5	1.4	1.3	1.2
TFP (growth rate)	0.8	0.3	0.7	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.5	0.3	0.6	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.2	1.0	1.1	1.7	1.3	1.1	1.1
Potential GDP per worker (growth rate)	1.3	0.0	1.3	1.5	1.4	1.3	1.2
HICP (growth rate)	2.2	7.2	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.6	1.7	3.1	3.5	3.9	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-438	3,131	3,131	3,115	2,988	2,822	2,693
Working-age population (growth rate)	-1.0	0.5	-0.1	-0.3	-0.5	-0.6	-0.5
Labour force (20-64y; thousands)	-315	2,619	2,584	2,608	2,525	2,398	2,304
Participation rate (20-64y)	1.9	83.7	82.5	83.7	84.5	85.0	85.6
Participation rate (20-74y)	2.8	70.9	70.2	72.2	72.4	72.3	73.7
young (20-24y)	3.0	68.9	71.7	71.9	71.8	71.8	71.8
prime-age (25-54y)	0.4	88.1	88.3	88.4	88.6	88.6	88.5
older (55-64y)	6.0	77.0	69.0	74.0	78.0	80.2	83.1
oldest (65-74y)	11.4	13.8	12.2	12.8	17.8	21.3	25.2
Participation rate (20-64y) - female	3.9	82.6	82.2	83.9	85.2	85.9	86.5
Participation rate (20-74y) - female	5.5	68.7	68.5	71.4	72.1	72.4	74.3
young (20-24y)	2.9	66.9	69.7	70.0	69.8	69.8	69.9
prime-age (25-54y)	2.3	86.8	87.8	88.8	89.2	89.3	89.0
older (55-64y)	8.9	77.1	70.2	74.5	80.1	82.8	86.0
oldest (65-74y)	14.6	11.0	8.9	10.3	15.3	20.2	25.6
Participation rate (20-64y) - male	0.0	84.7	82.9	83.6	83.8	84.2	84.7
Participation rate (20-74y) - male	0.1	73.1	71.8	73.0	72.7	72.2	73.2
young (20-24y)	2.9	70.7	73.5	73.8	73.6	73.6	73.6
prime-age (25-54y)	-1.3	89.4	88.8	88.1	88.0	88.0	88.0
older (55-64y)	3.3	77.0	67.7	73.6	76.0	77.8	80.3
oldest (65-74y)	7.8	17.0	15.9	15.5	20.3	22.5	24.8
Average labour market exit age (1)	4.0	63.4	63.9	65.2	65.8	66.6	67.4
male	3.8	63.7	64.2	65.6	66.2	66.8	67.4
female	4.2	63.2	63.7	64.8	65.5	66.4	67.4
Employment rate (20-64y)	2.0	78.3	77.7	78.6	79.3	79.8	80.3
Employment rate (20-74y)	2.8	66.5	66.2	67.8	68.1	68.0	69.3
Unemployment rate (20-64y)	-0.2	6.4	5.8	6.1	6.1	6.1	6.2
Unemployment rate (20-74y)	-0.3	6.2	5.7	6.1	6.0	5.9	5.9
Employment (20-64y; millions)	-0.3	2.5	2.4	2.4	2.4	2.3	2.2
Employment (20-74y; millions)	-0.2	2.5	2.5	2.5	2.5	2.4	2.3
share of young (20-24y)	-0.6	7.4	8.4	7.0	6.8	6.9	6.8
share of prime-age (25-54y)	-5.8	68.7	71.7	70.8	67.0	65.6	62.9
share of older (55-64y)	3.2	20.3	16.7	19.2	21.6	21.4	23.5
share of oldest (65-74y)	3.2	3.7	3.2	3.0	4.6	6.1	6.9
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	3.1	23.1	20.9	22.6	24.8	24.4	26.2
Old-age dependency ratio (3)	21.3	41.2	45.4	46.5	50.3	57.1	62.4
Total dependency ratio (4)	16.1	78.2	79.8	78.4	82.5	89.2	94.3
Total economic dependency ratio (5)	6.1	119.0	124.0	120.2	119.6	122.7	125.2
Economic old-age dependency ratio (20-64y) (6)	21.7	48.4	55.0	56.1	58.4	64.9	70.1
Economic old-age dependency ratio (20-74y) (7)	18.6	46.6	53.3	54.4	55.8	61.0	65.2

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

27. SWEDEN

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.68	1.73	1.75	1.76	1.76	1.76
Life expectancy at birth							
males	5.5	81.5	82.4	83.6	84.8	86.0	87.0
females	5.3	85.4	86.2	87.4	88.6	89.7	90.7
Life expectancy at 65 (years)							
males	4.2	19.7	20.4	21.3	22.2	23.0	23.9
females	4.4	22.5	23.2	24.2	25.2	26.1	26.9
Net migration (thousands)	-66.6	98.8	49.9	47.5	42.0	36.9	32.2
Net migration as % of population in t-1	-0.7	0.9	0.5	0.4	0.3	0.3	0.3
Population (million)	2.4	10.5	11.0	11.6	12.2	12.6	12.9
share of prime-age population (25-54y)	-3.7	39.0	37.9	38.5	36.8	36.4	35.3
share of working-age population (20-64y)	-3.4	56.4	56.0	55.8	55.3	53.2	53.1
share of elderly population (+65y)	6.4	20.3	21.4	22.7	23.4	25.9	26.7
share of very elderly population (+80y)	5.3	5.4	7.1	7.6	8.7	9.4	10.7
share of very elderly population (+80y) in elderly population (+65y)	13.3	26.8	33.5	33.4	36.9	36.2	40.1
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.6	1.8	1.5	2.0	1.6	1.4	1.5
Employment (15-74y; growth rate)	0.4	0.8	0.6	0.5	0.2	0.1	0.3
Labour input: hours worked (growth rate)	0.4	0.8	0.6	0.5	0.2	0.1	0.3
Labour productivity per hour (growth rate)	1.2	1.0	0.9	1.5	1.4	1.3	1.2
TFP (growth rate)	0.8	0.4	0.6	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.4	0.6	0.3	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.2	0.9	1.0	1.5	1.2	1.1	1.3
Potential GDP per worker (growth rate)	1.2	1.0	0.9	1.5	1.4	1.3	1.2
HICP (growth rate)	2.2	8.1	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.3	1.5	2.4	3.0	3.8	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	918	5,930	6,190	6,481	6,718	6,689	6,848
Working-age population (growth rate)	-0.6	0.7	0.4	0.4	0.2	0.1	0.1
Labour force (20-64y; thousands)	898	5,205	5,436	5,740	5,945	5,957	6,103
Participation rate (20-64y)	1.3	87.8	87.8	88.6	88.5	89.1	89.1
Participation rate (20-74y)	1.9	77.4	77.3	77.9	78.5	78.0	79.3
young (20-24y)	2.0	73.2	75.1	75.2	75.1	75.1	75.1
prime-age (25-54y)	0.7	91.6	92.0	92.1	92.3	92.3	92.3
older (55-64y)	4.3	82.2	81.0	83.6	83.5	85.4	86.5
oldest (65-74y)	9.4	20.3	18.9	21.9	23.8	28.4	29.7
Participation rate (20-64y) - female	1.9	85.0	85.0	85.9	85.9	86.7	86.8
Participation rate (20-74y) - female	3.1	74.1	74.7	75.3	76.0	75.7	77.1
young (20-24y)	1.8	69.0	70.8	70.8	70.8	70.8	70.8
prime-age (25-54y)	1.3	88.9	89.6	89.9	90.1	90.2	90.1
older (55-64y)	5.2	79.4	77.9	80.3	80.4	83.0	84.6
oldest (65-74y)	12.6	16.2	19.6	22.2	24.2	28.2	28.7
Participation rate (20-64y) - male	0.8	90.5	90.5	91.1	90.9	91.3	91.2
Participation rate (20-74y) - male	0.6	80.7	79.8	80.3	80.7	80.1	81.3
young (20-24y)	2.3	76.8	79.0	79.1	79.1	79.1	79.1
prime-age (25-54y)	0.1	94.1	94.4	94.2	94.3	94.3	94.2
older (55-64y)	3.3	84.9	84.1	86.8	86.6	87.6	88.2
oldest (65-74y)	6.0	24.5	18.1	21.5	23.4	28.5	30.6
Average labour market exit age (1)	2.9	65.0	65.8	66.4	66.4	67.1	67.9
male	2.9	65.0	65.8	66.4	66.4	67.2	67.9
female	2.9	65.0	65.7	66.4	66.4	67.1	67.9
Employment rate (20-64y)	1.9	82.3	83.0	83.6	83.6	84.1	84.2
Employment rate (20-74y)	2.4	72.6	73.1	73.6	74.2	73.8	75.0
Unemployment rate (20-64y)	-0.8	6.3	5.5	5.6	5.6	5.5	5.5
Unemployment rate (20-74y)	-0.8	6.2	5.4	5.5	5.5	5.4	5.4
Employment (20-64y; millions)	0.9	4.9	5.1	5.4	5.6	5.6	5.8
Employment (20-74y; millions)	1.1	5.1	5.3	5.7	5.9	6.0	6.2
share of young (20-24y)	0.5	7.2	8.4	8.1	7.6	7.6	7.7
share of prime-age (25-54y)	-4.7	69.6	68.7	69.0	66.5	66.6	64.9
share of older (55-64y)	2.0	19.1	19.1	18.3	21.1	19.0	21.1
share of oldest (65-74y)	2.2	4.1	3.8	4.6	4.8	6.7	6.3
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	2.0	21.0	21.3	20.1	23.3	21.1	23.0
Old-age dependency ratio (3)	14.4	36.0	38.1	40.7	42.4	48.7	50.4
Total dependency ratio (4)	11.2	77.2	78.5	79.1	80.9	88.1	88.4
Total economic dependency ratio (5)	3.1	106.6	106.9	104.4	106.1	108.4	109.7
Economic old-age dependency ratio (20-64y) (6)	13.7	39.1	41.8	43.7	45.5	50.3	52.9
Economic old-age dependency ratio (20-74y) (7)	12.0	37.5	40.2	41.7	43.3	46.9	49.5

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

28. NORWAY

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.47	1.49	1.52	1.55	1.57	1.60
Life expectancy at birth							
males	5.2	82.1	82.8	84.1	85.2	86.3	87.3
females	5.6	85.1	86.1	87.3	88.5	89.6	90.7
Life expectancy at 65 (years)							
males	4.0	20.2	20.8	21.7	22.5	23.4	24.2
females	4.6	22.3	23.1	24.1	25.1	26.0	26.9
Net migration (thousands)	-9.1	35.5	27.4	28.2	27.2	26.5	26.4
Net migration as % of population in t-1	-0.2	0.7	0.5	0.5	0.4	0.4	0.4
Population (million)	1.1	5.4	5.7	6.0	6.2	6.4	6.5
share of prime-age population (25-54y)	-5.4	40.6	39.4	39.7	38.1	36.6	35.2
share of working-age population (20-64y)	-5.8	58.9	58.4	56.8	55.9	54.5	53.2
share of elderly population (+65y)	10.6	18.4	20.9	23.7	25.0	27.1	28.9
share of very elderly population (+80y)	6.9	4.5	6.2	7.7	9.3	10.2	11.3
share of very elderly population (+80y) in elderly population (+65y)	14.9	24.4	29.9	32.4	37.1	37.8	39.2
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.5	1.6	1.5	1.8	1.6	1.4	1.2
Employment (15-74y; growth rate)	0.3	3.9	0.6	0.3	0.2	0.1	-0.1
Labour input: hours worked (growth rate)	0.3	3.9	0.6	0.3	0.2	0.1	-0.1
Labour productivity per hour (growth rate)	1.2	-0.1	0.9	1.5	1.4	1.3	1.2
TFP (growth rate)	0.8	0.5	0.7	1.0	0.9	0.8	0.8
capital deepening (contribution to labour productivity growth)	0.4	-0.6	0.2	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.1	0.9	0.9	1.3	1.3	1.1	0.9
Potential GDP per worker (growth rate)	1.2	-2.2	0.9	1.5	1.4	1.3	1.2
HICP (growth rate)	2.2	6.2	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	:	n.a	n.a	n.a	n.a	n.a	n.a
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	256	3,210	3,315	3,404	3,479	3,478	3,466
Working-age population (growth rate)	-0.6	0.5	0.5	0.2	0.1	0.0	-0.1
Labour force (20-64y; thousands)	266	2,663	2,750	2,862	2,936	2,942	2,929
Participation rate (20-64y)	1.5	83.0	82.9	84.1	84.4	84.6	84.5
Participation rate (20-74y)	-1.5	74.2	73.0	72.8	73.7	72.8	72.7
young (20-24y)	2.7	74.2	76.8	77.0	76.9	76.9	76.9
prime-age (25-54y)	3.2	86.6	88.1	89.1	89.8	89.7	89.8
older (55-64y)	-2.3	75.5	70.2	70.2	71.3	72.9	73.2
oldest (65-74y)	-2.0	22.2	17.5	16.8	17.9	19.1	20.2
Participation rate (20-64y) - female	3.6	79.8	80.6	82.4	83.0	83.5	83.5
Participation rate (20-74y) - female	0.8	70.5	70.4	70.8	72.0	71.3	71.3
young (20-24y)	2.1	73.1	75.1	75.3	75.2	75.2	75.2
prime-age (25-54y)	4.8	83.8	86.1	87.6	88.6	88.6	88.6
older (55-64y)	2.8	70.0	66.8	68.2	69.7	72.4	72.8
oldest (65-74y)	1.1	17.0	15.3	14.9	16.0	16.9	18.1
Participation rate (20-64y) - male	-0.5	86.0	85.2	85.7	85.7	85.6	85.5
Participation rate (20-74y) - male	-3.8	77.8	75.4	74.8	75.4	74.3	74.0
young (20-24y)	3.3	75.3	78.4	78.6	78.5	78.5	78.5
prime-age (25-54y)	1.7	89.2	90.0	90.6	90.9	90.8	90.9
older (55-64y)	-7.3	80.7	73.6	72.2	72.8	73.4	73.5
oldest (65-74y)	-5.3	27.6	19.8	18.8	19.7	21.2	22.3
Average labour market exit age (1)	0.6	65.0	65.1	65.2	65.3	65.5	65.6
male	0.6	65.0	65.1	65.2	65.3	65.5	65.6
female	0.7	65.0	65.1	65.2	65.3	65.5	65.6
Employment rate (20-64y)	1.3	80.8	80.4	81.6	81.9	82.1	82.0
Employment rate (20-74y)	-1.7	72.3	70.8	70.7	71.6	70.7	70.6
Unemployment rate (20-64y)	0.3	2.7	3.0	3.0	3.0	2.9	3.0
Unemployment rate (20-74y)	0.3	2.6	3.0	2.9	2.9	2.9	2.9
Employment (20-64y; millions)	0.2	2.6	2.7	2.8	2.8	2.9	2.8
Employment (20-74y; millions)	0.3	2.7	2.8	2.9	3.0	3.0	3.0
share of young (20-24y)	-0.8	8.5	8.9	7.9	7.5	7.7	7.6
share of prime-age (25-54y)	-2.1	68.9	69.1	71.3	69.7	68.0	66.7
share of older (55-64y)	2.2	18.3	18.3	16.8	18.8	19.4	20.4
share of oldest (65-74y)	0.8	4.4	3.7	3.9	4.0	4.8	5.2
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	3.8	20.7	22.0	20.6	22.9	23.3	24.5
Old-age dependency ratio (3)	23.2	31.2	35.8	41.7	44.7	49.7	54.4
Total dependency ratio (4)	18.4	69.7	71.3	75.9	79.0	83.5	88.0
Total economic dependency ratio (5)	16.5	100.9	105.1	107.1	109.8	112.9	117.3
Economic old-age dependency ratio (20-64y) (6)	26.9	33.8	40.6	47.0	50.4	55.5	60.7
Economic old-age dependency ratio (20-74y) (7)	25.2	32.4	39.1	45.1	48.4	52.8	57.6

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

29. EUROPEAN UNION

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.50	1.53	1.56	1.58	1.60	1.62
Life expectancy at birth							
males	7.7	78.4	80.0	81.7	83.3	84.8	86.1
females	6.4	84.0	85.3	86.7	88.0	89.3	90.4
Life expectancy at 65 (years)							
males	5.3	18.2	19.3	20.4	21.5	22.5	23.5
females	5.0	21.8	22.8	23.9	24.9	25.9	26.8
Net migration (thousands)	-4690.0	5901.8	984.6	1228.6	1187.5	1162.9	1211.8
Net migration as % of population in t-1	-1.0	1.3	0.2	0.3	0.3	0.3	0.3
Population (million)	-17.2	449.1	452.6	451.5	447.6	439.6	431.9
share of prime-age population (25-54y)	-5.5	39.5	37.5	36.2	35.1	34.7	34.0
share of working-age population (20-64y)	-7.0	58.6	56.8	54.5	52.6	51.8	51.6
share of elderly population (+65y)	9.3	21.2	23.9	27.1	29.0	30.0	30.5
share of very elderly population (+80y)	7.0	6.1	7.0	8.9	11.0	12.2	13.0
share of very elderly population (+80y) in elderly population (+65y)	14.2	28.6	29.2	32.8	37.8	40.8	42.7
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.3	1.5	1.0	1.5	1.3	1.2	1.1
Employment (15-74y; growth rate)	-0.1	0.7	-0.3	-0.2	-0.3	-0.2	-0.2
Labour input: hours worked (growth rate)	-0.2	0.6	-0.3	-0.2	-0.3	-0.2	-0.2
Labour productivity per hour (growth rate)	1.4	0.9	1.3	1.8	1.6	1.4	1.3
TFP (growth rate)	0.9	0.6	0.8	1.2	1.1	0.9	0.8
capital deepening (contribution to labour productivity growth)	0.5	0.3	0.5	0.6	0.6	0.5	0.4
Potential GDP per capita (growth rate)	1.3	1.0	1.1	1.6	1.5	1.4	1.2
Potential GDP per worker (growth rate)	1.4	0.8	1.3	1.7	1.6	1.4	1.2
HICP (growth rate)	2.3	9.2	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.8	2.2	3.6	3.9	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-40,279	263,125	257,303	246,200	235,600	227,753	222,846
Working-age population (growth rate)	-0.3	0.1	-0.4	-0.5	-0.4	-0.2	-0.3
Labour force (20-64y; thousands)	-24,556	208,903	206,534	200,563	193,580	188,310	184,347
Participation rate (20-64y)	3.3	79.4	80.3	81.5	82.2	82.7	82.7
Participation rate (20-74y)	2.4	68.3	68.2	68.7	69.4	70.1	70.7
young (20-24y)	2.1	61.6	62.5	63.4	63.8	63.5	63.7
prime-age (25-54y)	1.5	86.7	87.3	87.7	88.1	88.2	88.2
older (55-64y)	10.1	65.4	68.3	71.6	72.7	74.9	75.5
oldest (65-74y)	8.2	10.2	11.6	13.9	15.1	16.4	18.4
Participation rate (20-64y) - female	5.2	74.0	75.8	77.4	78.4	79.1	79.1
Participation rate (20-74y) - female	4.6	62.6	63.5	64.5	65.4	66.4	67.2
young (20-24y)	2.1	57.4	58.2	59.1	59.6	59.3	59.4
prime-age (25-54y)	3.0	81.5	82.9	83.7	84.3	84.5	84.5
older (55-64y)	13.5	59.1	63.7	67.5	69.3	72.0	72.6
oldest (65-74y)	9.6	7.5	9.8	12.4	13.6	15.0	17.1
Participation rate (20-64y) - male	1.3	84.8	84.7	85.5	85.8	86.1	86.1
Participation rate (20-74y) - male	0.0	74.1	72.9	72.9	73.3	73.7	74.1
young (20-24y)	2.0	65.6	66.6	67.5	67.8	67.5	67.6
prime-age (25-54y)	0.0	91.8	91.6	91.4	91.7	91.7	91.7
older (55-64y)	6.3	72.1	73.2	75.9	76.3	77.8	78.4
oldest (65-74y)	6.3	13.4	13.7	15.5	16.6	17.8	19.8
Average labour market exit age (1)	-0.2	65.4	64.4	64.9	64.9	64.9	65.2
male	-0.2	65.7	64.7	65.1	65.1	65.1	65.5
female	-0.2	65.2	64.1	64.8	64.7	64.6	64.9
Employment rate (20-64y)	3.8	74.7	75.5	76.8	78.0	78.5	78.5
Employment rate (20-74y)	2.9	64.3	64.2	64.8	65.9	66.6	67.2
Unemployment rate (20-64y)	-0.9	5.9	5.9	5.7	5.1	5.1	5.1
Unemployment rate (20-74y)	-0.9	5.9	5.8	5.6	5.0	5.0	5.0
Employment (20-64y; millions)	-21.5	196.5	194.3	189.1	183.7	178.7	175.0
Employment (20-74y; millions)	-17.4	201.5	200.5	196.9	191.8	187.2	184.1
share of young (20-24y)	0.2	6.4	6.9	6.7	6.5	6.6	6.6
share of prime-age (25-54y)	-5.1	72.0	69.8	68.8	68.8	68.4	66.9
share of older (55-64y)	2.3	19.1	20.2	20.5	20.4	20.5	21.4
share of oldest (65-74y)	2.5	2.5	3.1	3.9	4.2	4.5	5.0
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	1.0	23.5	24.2	24.0	23.9	23.4	24.5
Old-age dependency ratio (3)	23.0	36.1	42.0	49.7	55.2	58.0	59.1
Total dependency ratio (4)	23.1	70.7	75.9	83.4	90.0	93.0	93.8
Total economic dependency ratio (5)	11.7	122.9	125.7	129.3	133.4	134.8	134.5
Economic old-age dependency ratio (20-64y) (6)	24.2	45.7	52.3	60.5	66.2	69.0	69.9
Economic old-age dependency ratio (20-74y) (7)	21.8	44.6	50.7	58.1	63.4	65.9	66.4

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

30. EURO AREA

Main demographic and macroeconomic assumptions

Demographic projections - EUROPOP2023 (Eurostat)	Ch 22-70	2022	2030	2040	2050	2060	2070
Fertility rate	0.1	1.48	1.50	1.53	1.55	1.58	1.60
Life expectancy at birth							
males	6.9	79.6	81.0	82.6	84.0	85.3	86.5
females	5.8	84.8	85.9	87.3	88.5	89.6	90.7
Life expectancy at 65 (years)							
males	4.8	18.9	19.9	20.9	21.9	22.8	23.7
females	4.6	22.4	23.3	24.3	25.2	26.1	27.0
Net migration (thousands)	-2987.5	3989.9	989.5	1061.1	1001.2	979.4	1002.4
Net migration as % of population in t-1	-0.9	1.2	0.3	0.3	0.3	0.3	0.3
Population (million)	-7.2	348.2	353.1	354.6	352.5	346.5	341.1
share of prime-age population (25-54y)	-4.9	38.8	37.0	36.1	35.3	34.7	33.9
share of working-age population (20-64y)	-6.9	58.5	56.5	54.0	52.5	52.0	51.6
share of elderly population (+65y)	9.2	21.6	24.5	27.8	29.4	30.0	30.7
share of very elderly population (+80y)	6.5	6.5	7.3	9.1	11.6	12.5	13.0
share of very elderly population (+80y) in elderly population (+65y)	12.3	30.1	29.8	32.9	39.4	41.6	42.4
Macroeconomic assumptions	AVG 22-70	2022	2030	2040	2050	2060	2070
Potential GDP (growth rate)	1.2	1.3	0.9	1.5	1.3	1.2	1.0
Employment (15-74y; growth rate)	-0.1	0.7	-0.2	-0.1	-0.2	-0.1	-0.2
Labour input: hours worked (growth rate)	-0.1	0.6	-0.2	-0.1	-0.2	-0.1	-0.2
Labour productivity per hour (growth rate)	1.3	0.7	1.0	1.6	1.5	1.4	1.2
TFP (growth rate)	0.9	0.5	0.6	1.1	1.0	0.9	0.8
capital deepening (contribution to labour productivity growth)	0.4	0.2	0.4	0.5	0.5	0.5	0.4
Potential GDP per capita (growth rate)	1.2	0.8	0.8	1.5	1.4	1.4	1.2
Potential GDP per worker (growth rate)	1.3	0.6	1.0	1.6	1.5	1.4	1.2
HICP (growth rate)	2.2	8.4	2.0	2.0	2.0	2.0	2.0
Nominal interest rate	3.7	1.8	3.4	3.7	4.0	4.0	4.0
Labour force assumptions	Ch 22-70	2022	2030	2040	2050	2060	2070
Working-age population (20-64y; thousands)	-27,690	203,560	199,607	191,533	185,063	180,313	175,870
Working-age population (growth rate)	-0.5	0.2	-0.5	-0.4	-0.3	-0.2	-0.3
Labour force (20-64y; thousands)	-15,234	161,408	160,283	156,910	152,894	149,586	146,173
Participation rate (20-64y)	3.8	79.3	80.3	81.9	82.6	83.0	83.1
Participation rate (20-74y)	2.7	68.3	67.9	68.9	70.1	70.7	71.0
young (20-24y)	2.0	63.0	64.0	65.0	65.2	64.9	65.1
prime-age (25-54y)	1.6	86.4	87.0	87.5	87.9	88.0	88.1
older (55-64y)	11.0	65.9	68.9	73.1	74.3	76.2	77.0
oldest (65-74y)	9.0	10.4	12.1	14.3	16.0	17.2	19.3
Participation rate (20-64y) - female	5.8	74.2	76.1	78.3	79.3	79.8	80.0
Participation rate (20-74y) - female	6.2	62.7	64.5	67.2	68.1	68.6	68.9
young (20-24y)	5.4	57.9	62.4	64.7	61.9	62.0	63.3
prime-age (25-54y)	2.2	83.8	84.4	85.7	86.3	86.7	85.9
older (55-64y)	18.2	59.4	68.5	71.5	73.7	73.4	77.6
oldest (65-74y)	10.9	7.0	9.9	13.7	15.1	16.4	18.0
Participation rate (20-64y) - male	2.7	85.1	86.5	87.1	87.1	87.1	87.8
Participation rate (20-74y) - male	1.8	73.0	72.9	74.4	74.6	74.6	74.9
young (20-24y)	5.9	64.2	69.6	71.3	68.5	68.7	70.1
prime-age (25-54y)	-1.3	93.6	92.0	92.3	93.1	93.4	92.4
older (55-64y)	11.7	70.6	77.8	78.1	77.3	77.3	82.3
oldest (65-74y)	8.0	12.1	13.1	16.5	17.4	18.4	20.1
Average labour market exit age (1)	1.0	64.6	64.9	65.4	65.3	65.2	65.6
male	3.2	63.2	64.5	65.4	66.1	66.3	66.3
female	3.4	63.4	64.5	65.4	66.3	66.7	66.7
Employment rate (20-64y)	4.6	74.1	75.0	76.9	78.1	78.5	78.6
Employment rate (20-74y)	3.4	63.9	63.5	64.7	66.4	67.0	67.3
Unemployment rate (20-64y)	-1.2	6.6	6.6	6.2	5.4	5.4	5.4
Unemployment rate (20-74y)	-1.2	6.5	6.5	6.1	5.3	5.3	5.2
Employment (20-64y; millions)	-12.5	150.8	149.7	147.2	144.6	141.5	138.3
Employment (20-74y; millions)	-8.6	154.7	154.8	153.5	151.2	148.4	146.1
share of young (20-24y)	0.0	6.7	7.0	6.8	6.6	6.7	6.7
share of prime-age (25-54y)	-4.6	70.9	69.0	68.7	68.6	67.6	66.2
share of older (55-64y)	1.8	19.9	20.7	20.4	20.4	21.0	21.7
share of oldest (65-74y)	2.8	2.5	3.3	4.1	4.4	4.7	5.3
Dependency ratios	Ch 22-70	2022	2030	2040	2050	2060	2070
Share of older population in working-age population (2)	0.3	24.3	24.6	23.6	23.4	23.8	24.6
Old-age dependency ratio (3)	22.7	36.9	43.3	51.5	55.9	57.7	59.6
Total dependency ratio (4)	22.9	71.1	76.9	85.1	90.5	92.2	93.9
Total economic dependency ratio (5)	8.4	125.1	128.0	130.9	133.1	133.4	133.5
Economic old-age dependency ratio (20-64y) (6)	22.9	47.1	54.2	62.6	66.9	68.5	70.0
Economic old-age dependency ratio (20-74y) (7)	20.4	45.9	52.4	60.0	64.0	65.3	66.3

(1) Based on the average probabilities of labour force entry and exit. The table reports 2023 instead of 2022.
(2) Share of older population = Population aged 55 to 64 as a % of the population aged 20-64.
(3) Old-age dependency ratio = Population aged 65 and over as a % of the population aged 20-64.
(4) Total dependency ratio = Population under 20 and over 64 as a % of the population aged 20-64.
(5) Total economic dependency ratio = Total population less employed as a % of the employed population 20-74.
(6) Economic old-age dependency ratio (20-64) = Inactive population aged 65+ as a % of the employed population 20-64.
(7) Economic old-age dependency ratio (20-74) = Inactive population aged 65+ as a % of the employed population 20-74.

Part IV

Resources

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