

01

Demographic trends and the future of growth

In emerging Europe, low fertility rates, ageing populations and shrinking workforces are increasingly weighing on economic growth. A combination of greater labour-force participation by older adults and women, increased migration, and the use of technology to boost productivity growth could offset some of these pressures. Parts of Central Asia and the southern and eastern Mediterranean (SEMED) region currently benefit from younger populations that can support near-term growth, but they will soon experience similar ageing-related headwinds. In sub-Saharan Africa (SSA), fertility rates are also declining rapidly, but the region's young populations position it well to capture a demographic dividend over the next generation – provided the economies can effectively absorb a rapidly growing labour force.



AT A GLANCE

Over
two-thirds
of the world's population lives in
countries where fertility is below the
long-run replacement rate

Between 2024 and 2050, demographic
decline is projected to lower annual GDP
per capita growth by

0.36
percentage
point

in EBRD economies in the EU, the
Western Balkans, and eastern Europe
and the Caucasus

To offset demographic decline, many
EBRD economies would need annual
net immigration to exceed

1%

of their current total
population through 2050

INTRODUCTION

Demographic change has long been a source of concern, but the nature of that concern has shifted profoundly. In the 1960s and 1970s, fears centred on overpopulation – the so-called “population bomb” – driven by worry that rapid population growth would outpace the growth of food supplies and infrastructure, and deplete natural resources.¹ Today, while some economies are still experiencing pressures from high population growth, fertility rates are falling in much of the world. As a result, policymakers’ attention has turned to shrinking workforces, ageing societies, slower growth and mounting fiscal pressures.²

This shift in perspective reflects a fundamental change in global demographic trends. For most of human history, population growth has been low and stable. Between 1800 and 1900, annual growth rates remained around 0.5 per cent.³ This changed in the early 20th century, when falling mortality and sustained high fertility rates led to a sharp acceleration in population growth, which peaked at more than 2 per cent per year in the 1960s.⁴ Since then, global population growth has slowed steadily and the decline is expected to continue. According to United Nations projections, the global population will peak in the 2080s before entering a period of sustained decline.⁵

Population growth occurs when the number of children born exceeds the number of people dying. Recently, fertility rates have been falling fast in both high- and low-income countries, while life expectancy has continued to rise. Between 1960 and 2023, global life expectancy increased by more than 25 years, from 47.8 to 73.2 years. This increase was more pronounced in low- and middle-income countries (which saw life expectancy rise from 40.5 to 64.9 years and from 43.4 to 72.4 years, respectively), while life expectancy

¹ See Ehrlich (1968).

² See Bricker and Ibbitson (2019) and Spears and Geruso (2025).

³ See Gapminder (2024a).

⁴ See UNDESA (2024).

⁵ See UNDESA (2024). Alternative modelling approaches may yield different estimates. For instance, Fernández-Villaverde (2025) projects peak population in 2055.



in advanced economies rose from 68.1 to 81.4 years.⁶ On balance, global population growth is slowing, and the population decline has already begun in many advanced economies, some emerging markets and several economies in the EBRD regions. The fact that global growth is slowing despite gains in life expectancy points to decreasing fertility rates as the dominant force behind today's demographic decline.

As fertility rates fall and life expectancy rises, populations age rapidly. This chapter focuses on the economic consequences of a shrinking and ageing population, while subsequent chapters look at the drivers of fertility trends, the implications of ageing for the labour markets, and the political economy of demographic change.

The economic headwinds from ageing can be substantial. The analysis in this chapter estimates that, in the EBRD economies in the European Union (EU), the Western Balkans, and the eastern Europe and the Caucasus (EEC) region, declining working-age populations as a share of total population will reduce average annual per capita gross domestic product (GDP) growth by 0.36 percentage point between 2024 and 2050, and by 0.18 percentage point between 2050 and 2100. A combination of greater labour-force participation by older adults and women, increased migration, and the use of technology to boost productivity growth could offset some of the ageing-related pressures, though no single policy tool is likely to be sufficient on its own.

Younger economies in Central Asia and the SEMED region will, on average, benefit from a small growth premium in the near term, but are expected to face a comparable demographic drag – averaging 0.15 percentage point annually – over the second half of the century.

In contrast, median ages in the EBRD economies in sub-Saharan Africa are significantly below the global average, and these economies are positioned to experience a substantial demographic dividend over the next generation. A demographic dividend occurs when a country's age structure shifts in economically favourable ways: large cohorts of young people enter their prime working years, while birth rates simultaneously decline, creating a temporary period where the working-age population grows faster than the dependent population of children and elderly people.⁷ These demographic changes in SSA are projected to boost annual GDP per capita growth by approximately 0.37 percentage point between 2024 and 2050, provided these economies are able to seize this window of opportunity and effectively absorb a rapidly growing labour force.

This chapter documents long-term demographic trends, with a focus on recent shifts in the EBRD regions. It then quantifies the macroeconomic effects of ageing. Lastly, it evaluates the potential of commonly proposed policy responses – incentivising higher fertility rates, increasing labour-force participation, increasing immigration and boosting productivity – to mitigate the demographic drag.

⁶ See UNDESA (2024). "Advanced economies" are those classified as high income by the World Bank as at 8 May 2024.

⁷ See Lee and Mason (2006).

SETTING THE STAGE: DEMOGRAPHIC TRENDS

A WORLD IN TRANSITION

Around the world, countries are experiencing a profound demographic transition. Fertility rates have been falling, life expectancy has been rising and population growth has been slowing. In 2023, the global total fertility rate (the average number of children born per woman) stood at 2.25, only marginally above the long-run replacement rate – the fertility rate that would keep the size of the population constant – of roughly 2.1 births per woman (see Chapter 2 for a detailed discussion).⁸

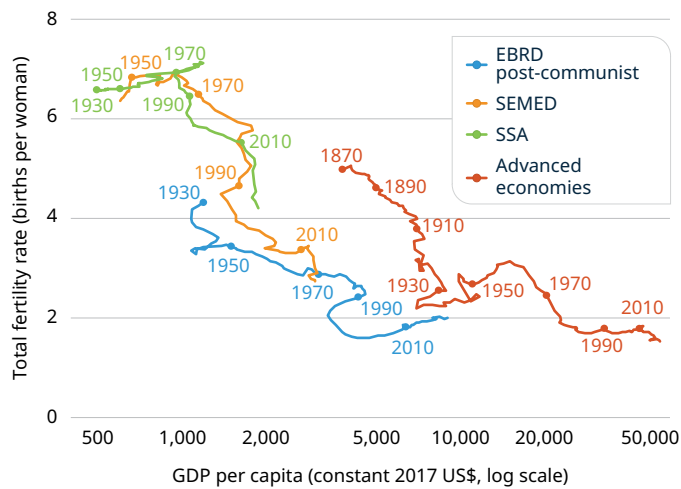
Alternative calculations based on vital registries suggest that the global fertility rate may have slipped even lower, implying that birth rates could already be below replacement level.⁹ More than two-thirds of humanity lives in countries where fertility is below the 2.1-children-per-woman threshold and birth rates are projected to decline. The expansion of the world population over the next few decades will, therefore, be largely driven by demographic momentum – in other words, by the fact that the large cohorts born when birth rates were higher are now entering their child-bearing years. United Nations World Population Prospects (UN WPP) data, for instance, suggest that momentum will account for more than 80 per cent of global population growth between 2024 and 2050.¹⁰

This trend is also visible across the EBRD regions, where economies are experiencing fertility decline at much earlier stages of economic development than advanced economies. As shown in Chart 1.1, fertility rates in post-communist economies have dropped below replacement levels, while GDP per capita has remained relatively low. In contrast, advanced economies have experienced similar fertility transitions at significantly higher income levels. Chapter 2 discusses how fertility rates have converged rapidly across countries, but how income growth has not always followed the same path.

⁸ The actual replacement rate varies across populations, as it depends on the sex ratio at birth and the probability that females will survive their reproductive age window. For instance, Fernández-Villaverde (2025) estimates a worldwide replacement rate of around 2.21.

⁹ For example, Fernández-Villaverde (2025) estimates the world’s total fertility rate to be around 2.17.

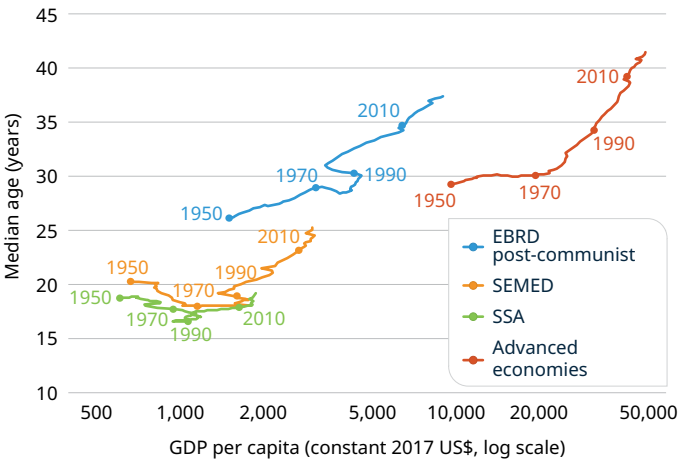
CHART 1.1. Fertility rates are falling earlier in the development paths of EBRD economies than in advanced economies



Source: Gapminder (2024a, 2024b and 2024c), World Bank (n.d.a) and authors’ calculations.

Note: Lines represent population-weighted averages. “Advanced economies” are those classified as high income by the World Bank’s income classification in 1990 with data available for 1870–2023. The “EBRD post-communist” grouping comprises 26 post-communist economies in the EBRD regions. SEMED comprises Egypt, Iraq, Jordan, Lebanon, Morocco and Tunisia. SSA comprises Benin, Côte d’Ivoire, Ghana, Kenya, Nigeria and Senegal.

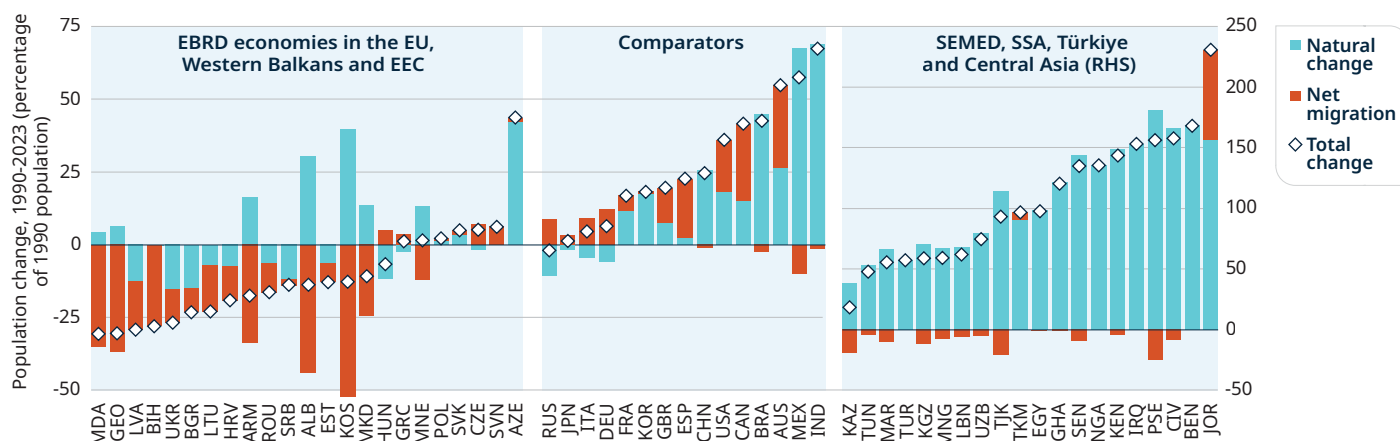
CHART 1.2. Many EBRD economies are getting old before they get rich



Source: Gapminder (2024b), UNDESA (2024), World Bank (n.d.a) and authors’ calculations.

Note: Lines represent population-weighted average GDP per capita in the region and median age of the combined regional population. See the notes on Chart 1.1 for definitions of the various regions.

CHART 1.3. Since 1990, populations have shrunk in most post-communist EBRD economies and surged in SEMED, SSA, Türkiye and Central Asia



Source: UNDESA (2024) and authors' calculations.

Note: Natural change refers to births minus deaths.

While the post-communist economies in the EBRD regions have, on average, seen fertility rates fall short of replacement rates since the early 1990s, amid rapidly ageing populations, the SEMED and SSA regions continue to have higher fertility rates and younger populations. Together with Central Asia and other economies in the Middle East and North Africa, these are among the few areas globally where fertility remains above the replacement rate. However, fertility rates in the EBRD's SEMED and SSA regions have been declining far more rapidly than during the demographic transitions experienced by advanced economies, suggesting that population growth in these regions may also be reversed in a matter of decades. For instance, according to the UN medium variant scenario, population growth in Morocco and Tunisia is expected to turn negative in the 2050s.¹¹

Population decline is preceded by rapid ageing: when fewer children are born and people live longer, the average age rises. Only once larger young cohorts move beyond reproductive age and are replaced by smaller cohorts do populations start to fall.

The shape of “population pyramids” changes with ageing. Lower fertility shrinks the base of the population pyramid, while longer life expectancy expands the top. The result is a rising median age, a smaller working-age population as a share of the total population, and a growing number of elderly dependants.

The median age in post-communist EBRD economies has increased sharply, now nearing that of advanced economies (see Chart 1.2). These countries are getting old before they get rich. While improvements in life expectancy have contributed to this trend, the primary driver of ageing in these countries has been the sustained decline in birth rates.¹² In some cases, this trend has been exacerbated by emigration, as discussed later on. In contrast, populations in SEMED and SSA remain much younger – with median ages of less than 26 and 20 years, respectively.

As ageing progresses and fertility rates remain low, at some point the number of deaths begins to exceed the number of births and, in the absence of immigration, populations start to decline. In several post-communist EBRD economies, this turning point has already occurred (see Chart 1.3). Countries such as Bulgaria, Hungary, Latvia, Serbia and Ukraine have recorded negative natural population change, with deaths exceeding births.

¹¹ Ibid.

¹² See Bussolo, Koettl and Sinnott (2015).

In most post-communist EBRD economies, emigration has played a central role in accelerating population decline. In some economies in the Caucasus and the Western Balkans, natural population change has remained positive, but large migration outflows have caused populations to shrink. For instance, Bosnia and Herzegovina, Georgia and Moldova have lost around 30 per cent of their respective populations since 1990, almost entirely due to emigration.¹³ In a number of advanced economies, including Italy and Germany, in contrast, inward migration has more than offset natural population decline.

Countries in SEMED, SSA and Central Asia, as well as Türkiye, saw rapid population increases over the 1990-2023 period, often exceeding 100 per cent. This growth was driven almost entirely by births far exceeding deaths. Chapter 2 quantifies the contributions of falling fertility and other demographic forces to the population decline across the EBRD economies.

THE URBAN-RURAL DEMOGRAPHIC DIVIDE

Demographic decline is not uniformly distributed within economies. Population declines tend to be most pronounced in rural and less densely populated areas. Major urban centres, in contrast, often continue to grow, supported by both internal migration from smaller municipalities and international migration. For instance, the predominantly rural regions of the EBRD economies saw an average decline of around 11 per cent in their working-age populations in 2014-22, compared with a decline of just 1.3 per cent in the predominantly urban areas. The magnitude of rural demographic decline in the EBRD economies substantially exceeded that observed in advanced European economies, where rural areas saw a more modest average decrease of 0.9 per cent over the same period.¹⁴

Across the Organisation for Economic Co-operation and Development (OECD) economies, population growth over the last five years has been greater in areas with larger initial populations (see Chart 1.4), owing to the migration of younger, working-age residents from rural areas to cities.¹⁵ Such outflows accelerate ageing and depopulation in less populated areas, leaving behind fewer individuals of childbearing age and a diminished tax base to sustain local services.

Accelerated urbanisation can create agglomeration economies, such as better matching between individuals' skills and jobs, and increased innovation, contributing to economic growth and development.¹⁶ However, the growing spatial concentration of populations, combined with accelerated ageing in depopulating areas, poses significant policy challenges. As rural populations shrink and age, providing infrastructure and public services becomes more costly. At the same time, rural depopulation and the abandonment of land can exacerbate environmental risks, with a heightened risk of wildfires due to the accumulation of flammable vegetation.¹⁷ Box 1.2 analyses the implications of demographic changes for regional convergence within countries. Chapter 2 discusses intra-country differences in fertility rates across the EBRD regions and comparators.

THE FISCAL CHALLENGE OF AGEING

Individual income and consumption follow a common pattern over the lifecycle. In early life, people consume more than they produce, relying on family and society for support. People of working age, typically between their mid-20s and late 50s or early 60s, tend to earn more than they consume. This surplus supports the consumption of both children and older people. In later life, labour income declines or stops altogether, while consumption remains stable or increases on account of greater demand for healthcare. This deficit is financed through a mix of private savings and public pensions and transfers.

¹³ Amplifying these effects, emigration from central and eastern Europe has generally been permanent and return migration has remained limited. See Atoyan et al. (2016).

¹⁴ Authors' calculations based on Eurostat data. "EBRD economies" comprise Albania, Bulgaria, Croatia, Czechia, Greece, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Türkiye. "Advanced

European economies" comprise the EU-15 (excluding Greece, Luxembourg and the United Kingdom) plus Iceland, Norway and Switzerland.

¹⁵ See OECD (n.d.a).

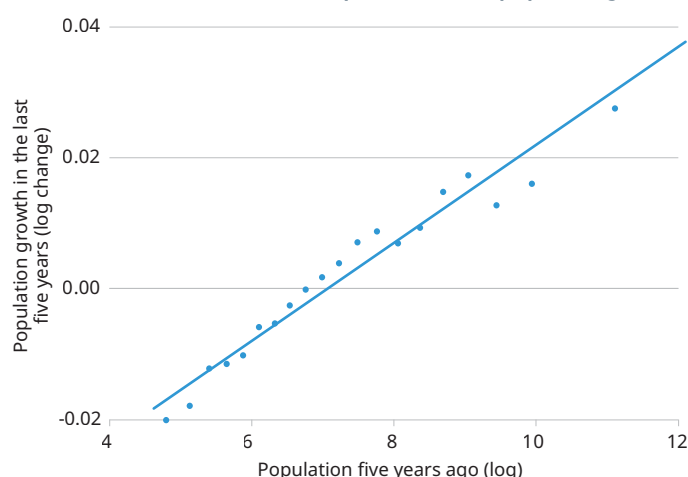
¹⁶ See Duranton and Puga (2004) and Glaeser (2011).

¹⁷ See OECD (2023).

This way of funding old age relies on an implicit intergenerational contract. The taxes and contributions of today's workers support the consumption of today's retirees and, when today's workers reach retirement, they will rely on the support of future workers. In ageing societies, this balance becomes harder to sustain, as the number of elderly people relative to working-age individuals grows. This puts pressure on public finances, necessitating more debt, tax increases or cuts to pensions and social welfare.

A forward-looking simulation illustrates this challenge (see Chart 1.5). It holds age-specific profiles of per capita labour income and consumption constant over time and uses age-specific population projections to estimate changes in the income-consumption balance.

CHART 1.4. Smaller municipalities are depopulating faster



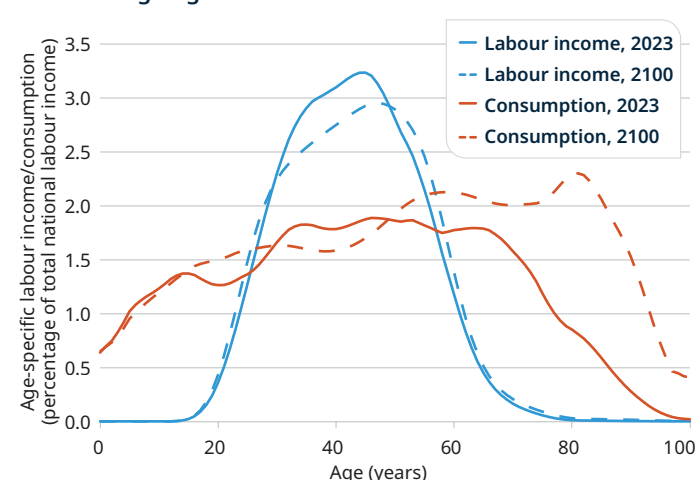
Source: OECD (n.d.a) and authors' calculations.

Note: This chart is a binned scatter plot based on an ordinary least squares (OLS) regression of the change in the logarithm of population between 2019 and 2024 (or the most recently available five-year period) on the logarithm of initial population, controlling for country fixed effects. The sample includes municipality-level data for eight economies in the EBRD regions, 16 advanced economies and three emerging markets, and it only includes municipalities with a population size of more than 100 at baseline. Municipalities and local areas are defined as administrative units corresponding to local governments at the lowest tier of administration within each country for which OECD data are available.

In the EBRD economies in the EU, individuals currently generate a surplus between the ages of 26 and 57 – a narrower range than the 25 to 59 observed in advanced European economies. This is down to earlier labour-market exits and shorter working lives. As the population ages, the proportion of individuals in this surplus-generating bracket declines, while the share with lifecycle deficits grows.

In response to these pressures, many EBRD economies in the EU have implemented pension reforms to improve long-term fiscal sustainability. These measures have helped reduce pension spending as a share of GDP in recent years. Nonetheless, ageing will continue to present challenges for public finances and will require further adjustments to the design of tax, transfer and social protection systems. These issues are explored in more detail in Box 1.3.

CHART 1.5. Old-age consumption will outpace labour income in ageing societies



Source: Istenič et al. (2016), UNDESA (2024), Eurostat data and authors' calculations.

Note: This chart shows age-specific labour income and consumption profiles as a percentage of total national labour income for 2023 and 2100 for the average EBRD economy in the EU. The sample of countries includes Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia. Baseline per capita age profiles are drawn from Istenič et al. (2016), re-weighted to the 2023 population structure and re-scaled to match 2023 aggregates from national accounts. Forward-looking projections impose the age distribution under the UN medium variant scenario (see UNDESA, 2024). Profiles are smoothed using a five-point moving average with partial windows at the edges.

POPULATION STRUCTURE AND ECONOMIC GROWTH

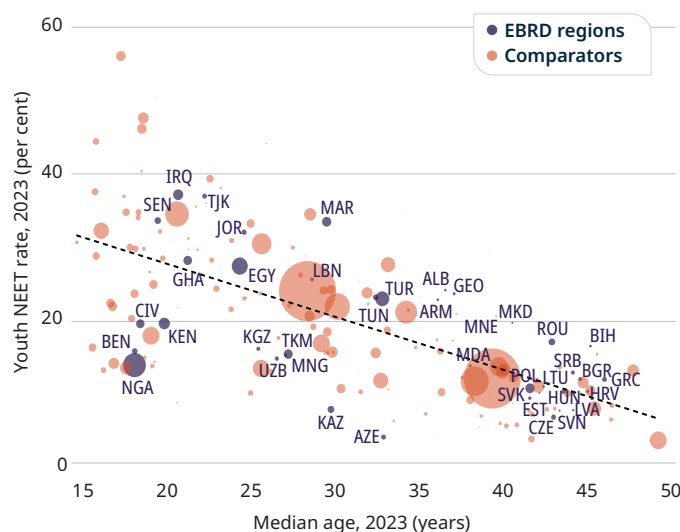
DEMOGRAPHIC DIVIDEND

In contrast to emerging Europe, the demographic profile of economies in the SEMED region, SSA and Central Asia offers a potential demographic dividend, as the working-age population is large and its share is increasing relative to the share of dependants.

At the same time, effectively absorbing a rapidly growing workforce is a challenge. Countries with younger populations often have significantly higher youth NEET rates (the share of 15- to 24-year-olds not in employment, education or training; see Chart 1.6). For instance, in Iraq, Jordan and Morocco, more than one-third of the population aged 15-24 are jobless and not engaged in formal education. In the Middle East and North Africa, youth employment tends to be constrained by rigid labour-market regulations and skill mismatches,¹⁸ while in SSA, young entrants to the labour market often find themselves in low-productivity jobs in the informal sector.¹⁹

Realising the demographic dividend, therefore, requires various country-specific constraints to be addressed, including the expansion of high-quality education and health systems to build human capital, the promotion of flexible labour markets that absorb a growing workforce, and the mobilisation of domestic savings to build deeper financial systems that effectively allocate capital to young entrepreneurs (see Chapter 3 on the role of entrepreneurship and tech-enabled startups in fostering employment growth in countries with young populations).²⁰ The window of opportunity to reap the demographic dividend may be relatively short before ageing exerts the same fiscal pressures as in higher-income economies that are rapidly ageing today. For instance, based on the UN WPP medium variant scenario,²¹ the working-age share of the population in Egypt, Morocco and Jordan can be expected to peak in the mid-2030s.

CHART 1.6. Countries with younger populations tend to have higher youth NEET rates



Source: ILOSTAT data, UNDESA (2024) and authors' calculations.

Note: Bubble size reflects population size in 2023.

DECOMPOSING GDP PER CAPITA GROWTH

More generally, demographic shifts affect GDP and GDP per capita growth. GDP per capita growth can be decomposed into three components: productivity (output per worker), employment rate (total employment relative to the working-age population) and the share of the working-age population. Demographic change affects growth mechanically by changing the share of the working-age population. It can also influence productivity growth, which relies on the generation and diffusion of new ideas.

Productivity growth has been the dominant source of increases in income per capita in the EBRD regions, while increases in employment rates have also played an important role (see Chart 1.7). In contrast, changes in the working-age share of the population have accounted for a relatively small part of average income growth and, in some EBRD economies in the EU and parts of the Western Balkans, this contribution has been negative.

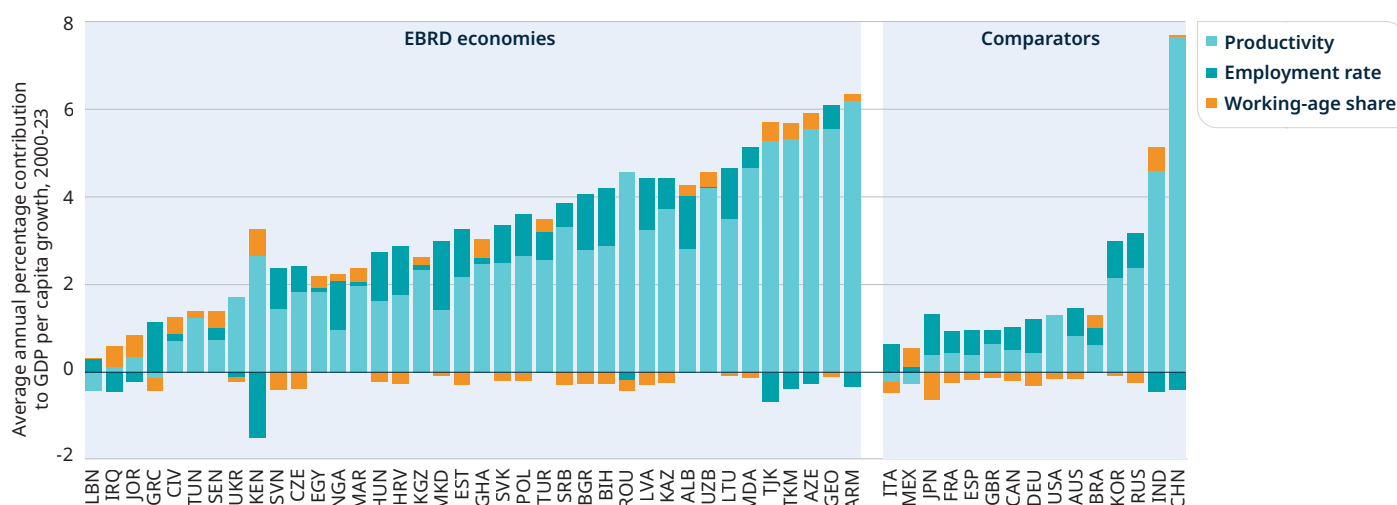
¹⁸ See IMF (2012).

¹⁹ See Canning, Jobanputra and Yazbeck (2015).

²⁰ See Bloom, Canning and Sevilla (2003).

²¹ See UNDESA (2024).

CHART 1.7. Historically, working-age population changes have been a minor growth driver in the EBRD economies relative to improvements in productivity and employment rates



DEMOGRAPHICS AND INNOVATION: WHY PEOPLE MATTER FOR PROGRESS

Beyond the number of workers, economic growth is largely driven by people discovering new ideas. More researchers generate more ideas, and more ideas translate into higher living standards. This insight, formalised in models of endogenous growth, implies that larger populations can sustain economic growth by expanding the supply of inventors and innovators.²²

As fertility rates decline, the reduction in the potential researcher base is threatening to weaken the rate at which new ideas are generated.²³ At the same time, ideas are becoming harder to generate, as research productivity has been falling: more researchers are now required to achieve the same pace of innovation as in the past, as innovation appears to exhibit diminishing returns to scale.²⁴ In economies further away from the frontier of innovation, including many economies in the EBRD regions, productivity growth is also closely tied to global technological progress, as these economies adopt innovations developed elsewhere (according to data from the World Intellectual Property Organization, no economy in the EBRD regions was ranked among the top 20 globally for patent applications in 2023).²⁵

Source: UNDESA (2024), World Bank (n.d.a), The Conference Board data and authors' calculations.

Note: The average annual growth in real GDP per capita in 2000-23 is decomposed into (i) changes in labour productivity growth (GDP per employed person), (ii) changes in the employment rate (employed persons per working-age population) and (iii) changes in the working-age share of the population.

In some SEMED economies,
**more than
 one-third**
 of the population aged
 15-24 are not in employment,
 education or training

²² See Romer (1990), Aghion and Howitt (1992), Grossman and Helpman (1991), Kremer (1993) and Peters (2022).

²³ See Hopenhayn, Neira and Singhania (2022) and Peters and Walsh (2021).

²⁴ See Bloom et al. (2020) and Jones (2022b).

²⁵ See WIPO (2024).

Consequently, in an “empty planet” scenario, living standards may stagnate not because of resource constraints, but due to insufficient populations of innovators to sustain idea generation.²⁶

Slower population growth may come with environmental benefits, including lower emissions and reduced pressure on natural resources, but falling birth rates will have a negligible impact on global temperatures because their effects will come far too late to affect current climate goals.²⁷ At the same time, as discussed, a world that stabilises at a higher global population is likely to be richer in per capita terms than one that stabilises at a lower level, reflecting the larger pool of innovators and idea producers.²⁸ The economic and environmental implications of demographic trends should, therefore, be considered together,²⁹ with environmental challenges addressed through appropriate policies.

CAN THE INNOVATION SLOWDOWN BE OFFSET?

There are reasons for optimism, however. Large segments of the global population, sometimes referred to as the “missing Einsteins”, remain under-represented in the innovation process – not because of a lack of ability, but due to systemic barriers. These include people who grow up in countries or areas without access to top education; women, who continue to be under-represented in science, technology, engineering and mathematics (STEM) fields and patenting activity;³⁰ and individuals from disadvantaged backgrounds.³¹ Currently, around 16 million people in technological frontier economies are engaged in research and development (R&D) – around 0.2 per cent of the world population.³² This share could rise as populations decline, if the barriers to entry for talented researchers can be lowered.

Technological advances in artificial intelligence (AI) and beyond could also make researchers more productive, reversing the long-term trend of declining productivity in research and development.³³

THE ECONOMIC COST OF AGEING

The following subsections quantify the impact of population ageing on per capita income growth and assess the effectiveness of potential policy responses aimed at offsetting the cost of ageing. The analysis builds on a standard neoclassical growth model³⁴ calibrated for the EBRD regions and compares two scenarios: one in which the working-age share of the population evolves according to the medium variant of the UN WPP demographic projections³⁵ and another in which it is held constant at its initial level. The difference in GDP per capita growth between these two scenarios captures the economic cost of ageing. This arises from two sources: a direct effect, as having fewer working-age individuals reduces labour input; and an indirect effect, due to lower incentives to accumulate capital, as capital and labour are used as complementary inputs to produce output (see Box 1.1).

This analysis means that in the EBRD economies in the EU, the Western Balkans and the EEC region, annual GDP per capita growth is projected to decrease by an average of 0.36 percentage point between 2024 and 2050 compared with a no-ageing scenario. This reflects the fact that, in many of these economies, the population is already relatively old. For instance, the average EBRD economy in the EU has a median age of 43 years, similar to other European economies such as Austria, Finland and Spain. As a result, the sharpest demographic headwinds are projected to occur over the next two decades. However, as current older cohorts exit the population over the second half of the century, the working-age ratio will stabilise and the impact of ageing on economic growth will ease to an average of 0.18 percentage point per year between 2050 and 2100 (see Chart 1.8).

²⁶ See Jones (2022a).

²⁷ See, for instance, Budolfson et al. (2025) on the climate implications of larger populations.

²⁸ See Eden and Kuruc (2023).

²⁹ See, for instance, Eden and Kuruc (2023) and Budolfson et al. (2025).

³⁰ See Jones (2022a).

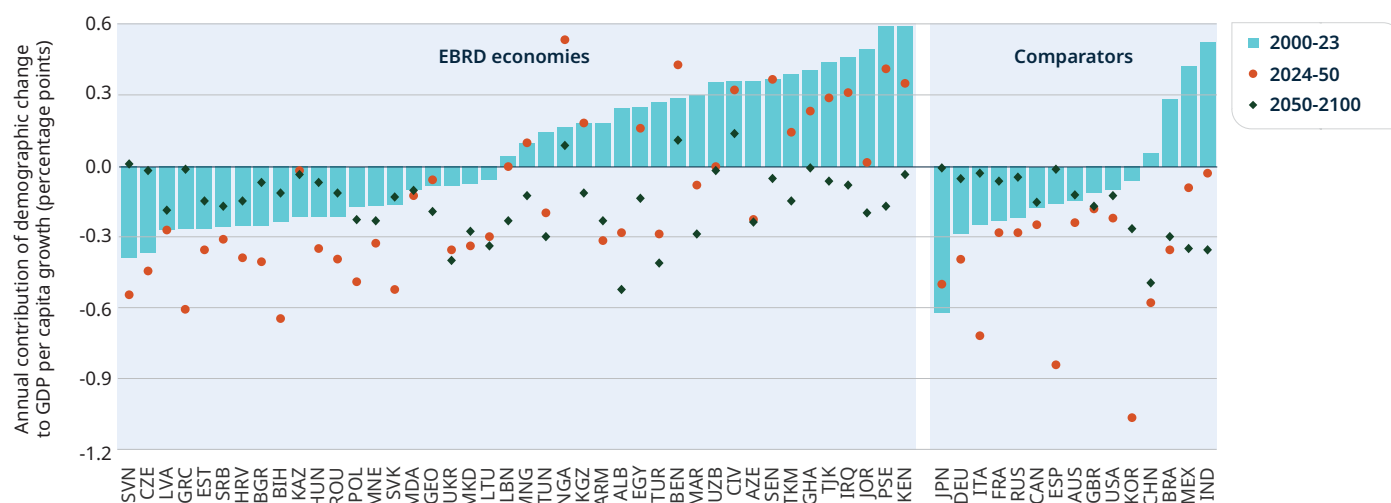
³¹ See Bell et al. (2019).

³² Authors' calculations based on OECD Research and Development Statistics data (see OECD, n.d.b). “Technological frontier economies” comprise the OECD economies and China.

³³ See Jones (2022a).

³⁴ See Fernández-Villaverde, Ventura and Yao (2025).

³⁵ See UNDESA (2024).

CHART 1.8. Demographic headwinds will increasingly weigh on GDP per capita growth in EBRD economies

In contrast, economies in the SEMED region and Central Asia will benefit from a modest demographic dividend averaging 0.1 percentage point per year between 2024 and 2050. However, this window of opportunity may narrow rapidly, as fertility rates in some of these economies are falling at a much faster pace than the trajectory previously experienced by advanced economies (see Chart 1.1). As a result, the expected decrease in the relative size of the working-age population will lead to an average drag on GDP per capita growth of about 0.15 percentage point per year between 2050 and 2100.

EBRD economies in SSA are positioned to experience a substantial demographic dividend driven by favourable dependency ratios as large cohorts of young people enter the workforce while birth rates decline. This demographic premium is projected to boost annual GDP per capita growth by an average of 0.37 percentage point between 2024 and 2050.

These figures evaluate the cost of ageing relative to a hypothetical scenario in which the working-age ratio remains constant, rather than relative to the historical contribution of demographics to GDP per capita growth.

Source: UNDESA (2024), World Bank (n.d.a), Feenstra, Inklaar and Timmer (2015) and authors' calculations based on Fernández-Villaverde, Ventura and Yao (2025).

Note: This chart reports the annual contribution of changes in the share of the working-age population to the growth of GDP per capita in real terms. The projections are calculated under the UN medium variant scenario (see UNDESA, 2024). Estimates are generated using a calibrated neoclassical growth model with endogenous capital accumulation, where declining working-age ratios affect growth both directly through reduced labour input and indirectly through lower incentives for capital investment (see Box 1.1). No policy changes beyond the shift in population structure are assumed.

For example, for Albania, which benefited from a rising working-age share until 2023, the cost of ageing is estimated at 0.28 percentage point, which corresponds to a decline of 0.53 percentage point compared with the average demographic dividend enjoyed in 2000-23.

Ageing and a shrinking working-age population may also have broader economic consequences beyond GDP growth. For example, while weaker aggregate demand could generate deflationary pressure, labour shortages caused by a declining workforce could push wages and prices up.³⁶

³⁶ See Yoon, Kim and Lee (2014).

POLICY LEVERS TO COUNTERACT THE ECONOMIC IMPACT OF DEMOGRAPHIC DECLINE

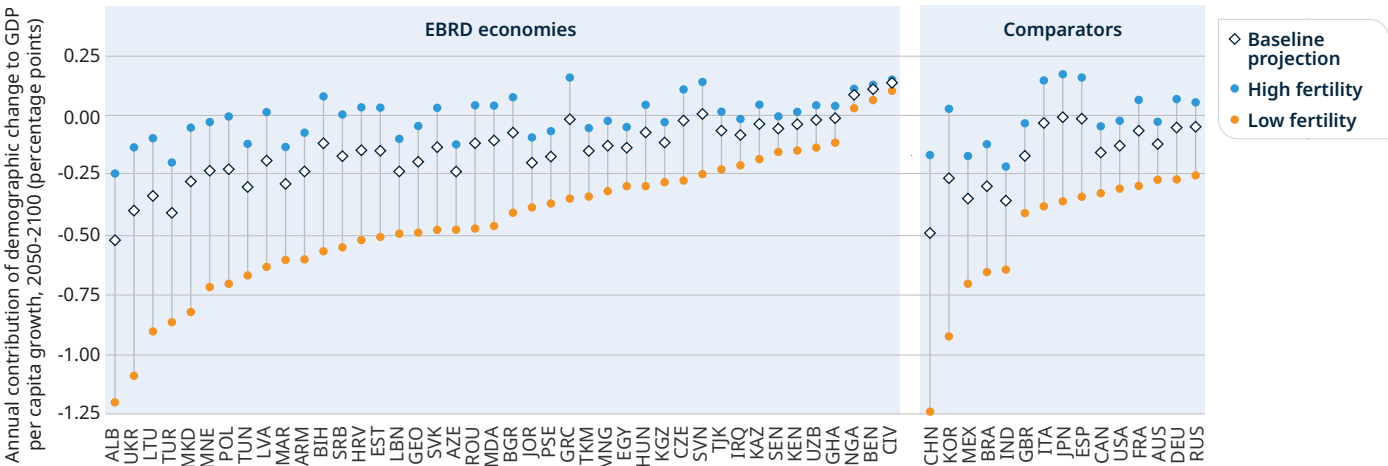
INCREASED FERTILITY

Changes in fertility trajectories can ease pressures from demographic decline, but their effects materialise with a delay. Even if fertility rates rebound, there will be a delay of around 20 years before newly born individuals enter the labour force and raise the ratio of workers to total population. In the intervening period, higher fertility will further increase the number of dependants per worker, intensifying demographic headwinds. Fertility paths are highly uncertain and the projected growth paths in the longer term differ under alternative fertility projections.

Chart 1.9 depicts a medium variant used as a baseline throughout the chapter, as well as a low-fertility variant from the UN WPP (where fertility is consistently lower by 0.5 children per woman relative to the baseline scenario) and a high-fertility variant (where fertility is higher by 0.5 children per woman).³⁷

For most economies in the EBRD regions, an increase in the fertility rate of 0.5 births per woman relative to the baseline scenario is sufficient for the demographic contribution to growth to be neutral by 2050-2100. In the low-fertility scenario, the longer-term impact of demographic change on economic growth is greater than in the medium variant scenario. An increase of 0.5 births per woman is large relative to prevailing fertility levels in central Europe (currently around 1.3 to 1.6 births). Chapter 2 discusses policies aimed at boosting fertility and their limited effectiveness to date.

CHART 1.9. The impact of demographic change on economic growth in the second half of the century (2050-2100) depends on fertility trajectories

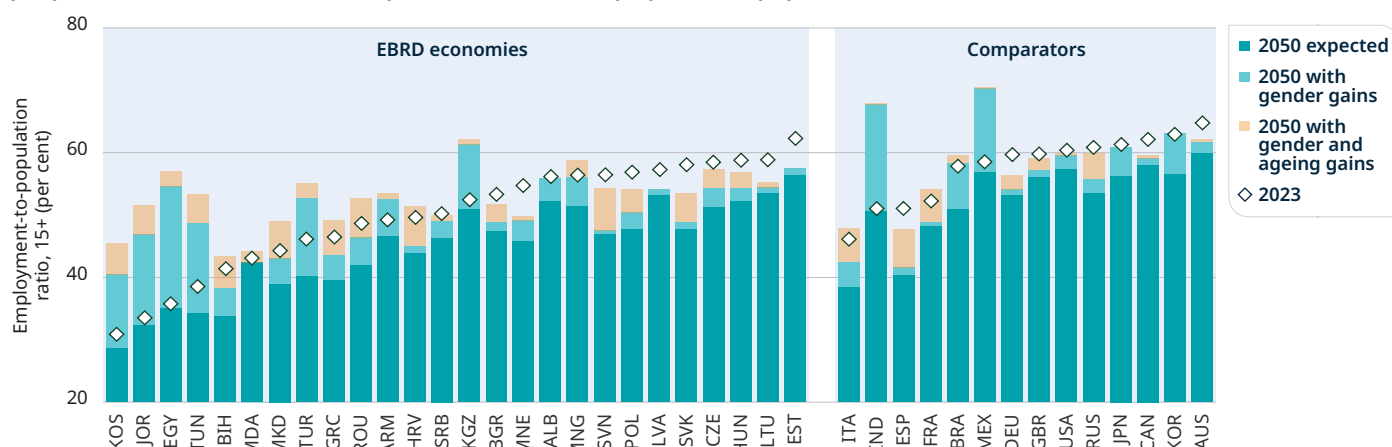


Source: UNDESA (2024), World Bank (n.d.a), Feenstra, Inklaar and Timmer (2015) and authors’ calculations based on Fernández-Villaverde, Ventura and Yao (2025).

Note: Estimates under alternative UN WPP fertility scenarios are generated using a calibrated neoclassical growth model with endogenous capital accumulation, where declining working-age ratios affect growth through reduced labour input and lower incentives for capital accumulation (see Box 1.1).

³⁷ See UNDESA (2024).

CHART 1.10. A combination of reductions in gender employment gaps and increases in participation of older people could offset most of the expected decline in employment-to-population ratios between 2023 and 2050



INCREASED LABOUR-FORCE PARTICIPATION

Increases in employment rates among working-age adults can offset some of the decrease in the ratio of the working-age population to total population. With age-specific employment rates remaining at 2023 levels, employment-to-population ratios are projected to fall in many economies in the EBRD regions, including in parts of SEMED (see Chart 1.10). Indeed, even where populations aged 15-64 are projected to increase as a share of the total population over this period, employment ratios may still fall as individuals move into older age brackets with historically low employment rates.

Employment rates could be raised by increasing the labour-force participation of women and older workers – groups with significantly lower labour-force participation rates. The “gender gains” scenario depicted in Chart 1.10 assumes that gender employment gaps fall to the 25th percentile of the cross-country distribution of gender employment gaps currently observed in OECD economies within age groups (for instance, this corresponds to a gap of 6.9 percentage points in Belgium for the 30-34 age group). Under these assumptions, Egypt, Jordan and Tunisia, where female

Source: ILOSTAT data, UNDESA (2024) and authors’ calculations.

Note: This chart shows employment-to-population ratios for the population aged 15+ across three scenarios for 2050 compared with historical levels in 2000 and 2023. The baseline scenario applies current 2023 age-specific employment rates by five-year age group to projected 2050 demographic structures using UN WPP medium variant projections. The “gender gains” scenario builds on the baseline by reducing gender employment gaps within each age group to the lower of the current gap and the 25th percentile of the age-specific cross-country distribution of gender employment gaps in OECD countries for 2023. The “gender and ageing gains” scenario combines the gender gap adjustment with rising employment rates for workers aged 60-64 and 65+, which increase to the higher of current rates and the 75th percentile of the age-specific cross-country distribution of employment rates in OECD countries for 2023. Employment-to-population ratios are standardised to the 19th International Conference of Labour Statisticians (ICLS) definition by applying country-specific scaling factors derived from the ratio of 19th to 13th ICLS employment rates for the 15+ age group in 2023. For countries where 19th ICLS data are unavailable, continental average scaling factors are applied (see ILO, 2013).

In the SEMED region, closing gender gaps could increase some national employment-to-population ratios by up to

19
percentage
points

labour-force participation remains low relative to that of men, experience large increases in employment-to-population ratios of up to 19 percentage points. Some economies in Europe show more modest but meaningful increases. For instance, narrower gender gaps in Albania, Montenegro and North Macedonia may be sufficient to maintain present employment-to-population ratios. In other economies, such as Slovenia, Latvia or Lithuania, gender gaps are already relatively small.

The “gender and ageing gains” scenario assumes that, in addition, the participation of older workers increases to the 75th percentile currently observed across the OECD economies. For instance, for 60- to 64-year-olds, this corresponds to an employment rate of 65.8 per cent (as observed in Denmark), compared with the current average of 45.2 per cent across the EBRD regions. Continued gains in healthy ageing – improvements in cognitive and physical ability at older ages – can support increased participation for older workers. Historically, such gains have been associated with higher earnings, increased hours per worker and higher productivity.³⁸

These increases in employment rates among older workers would enable Croatia or Romania to prevent their employment-to-population ratios from falling below current levels. In other economies, including Bulgaria, Czechia, Hungary and Poland, higher employment rates among women and older workers could mitigate the impact of demographic change on the labour supply. In contrast, in economies where labour-force participation rates are already high, such as Estonia and Latvia, the gains from increased employment among older workers would be marginal.

Labour-force participation among older workers could be boosted (i) by raising the age at which individuals are eligible for pensions, (ii) through schemes that offer phased or flexible retirement, where savings from later retirement are partially shared with the individuals in question, (iii) by expanding access to re-skilling programmes and (iv) by fostering age-friendly work environments.³⁹ Higher female labour-force participation could be facilitated by (i) policies that expand affordable childcare, (ii) parental leave schemes that nudge fathers as well as mothers to take time off, (iii) the removal of tax and benefit disincentives for second earners in households, (iv) the enforcement of pay-transparency rules that expose unjustified wage gaps, (v) better access to flexible schedules, (vi) the provision of lifelong learning opportunities over individual careers⁴⁰ and (vii) measures to address traditional gender norms and cultural expectations around women’s and men’s roles in the household and workplace.⁴¹

³⁸ See IMF (2025a).

³⁹ See Eurofound (2025).

⁴⁰ See OECD (2025).

⁴¹ See Jayachandran (2021) and Matavelli et al. (2025).

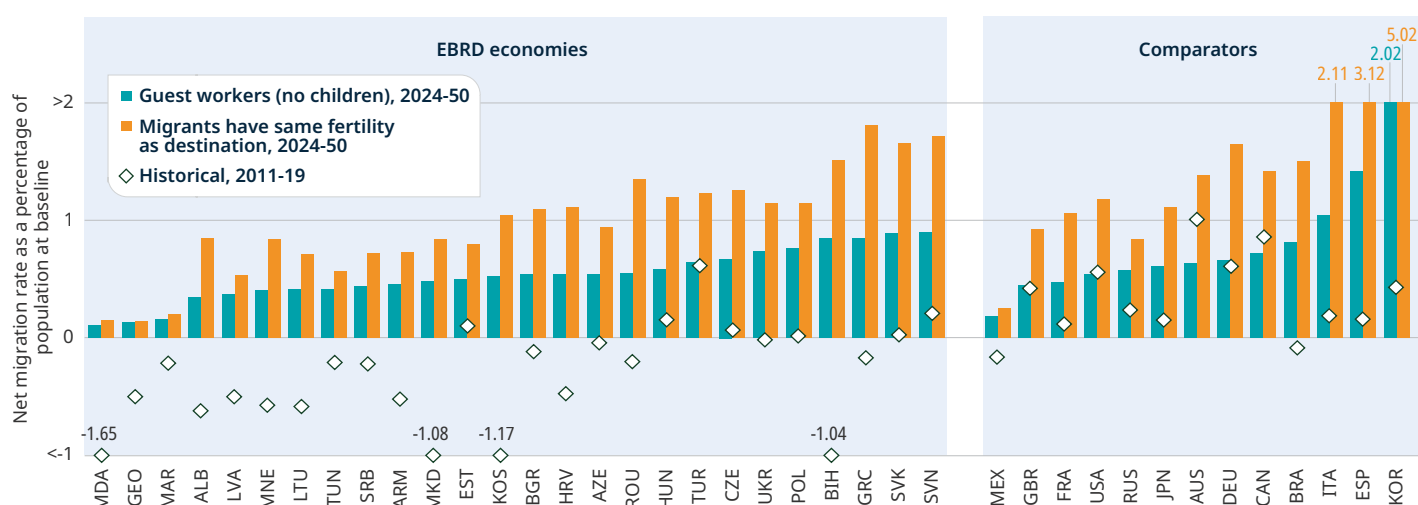
MIGRATION

Inward migration can offset population decline. Its economic effects are typically estimated to be broadly positive, but unevenly distributed. In countries of origin, emigration can foster “brain gain” by raising expected returns to schooling, provide channels for knowledge transfer through diaspora networks and return migration, and yield economic benefit in the form of increased remittance inflows.⁴² These channels, however, may not always compensate for the loss of skilled workers; sustained emigration can reduce the domestic tax base and result in “brain drain”, whereby the exit of higher-skilled workers depletes human capital and negatively affects productivity. These effects can be particularly large in smaller or poorer countries with very high emigration rates.⁴³

In destination economies, inflows of migrants can alleviate labour shortages and help to close skills gaps, boosting innovation and productivity. They often make a positive contribution to fiscal balances, as migrants tend to be of working age. At the same time, migrant arrivals can be concentrated in certain areas, putting pressure on local infrastructure, housing and the provision of public services such as education and healthcare (see Chapter 3).⁴⁴

The scale of migration needed to offset the ageing of locally born populations is large. To maintain their current working-age population ratios through 2050, many economies in the EBRD regions would require annual net immigration to exceed 1 per cent of their current total population (see Chart 1.11). Such levels are far higher than those historically observed in these economies (which have recently tended to experience net emigration). In fact, they surpass the net migration flows observed in Australia, Canada and Germany in

CHART 1.11. Offsetting population ageing through migration alone would require unprecedented migration inflows in EBRD economies



Source: UNDESA (2024) and authors' calculations.

Note: This chart shows the annualised net migration rates required to maintain constant ratios of working-age population (aged 15-64) to total population at 2023 levels, expressed as a percentage of mid-year 2023 population. Historical flows represent the average annual net migration flow between 2011 and 2019 as a percentage of mid-year 2010 population. The sample includes countries in which the working-age ratio is projected to decrease by more than 1 percentage point between 2023 and 2050 under the UN zero-migration variant.⁴⁵

⁴² See Batista et al. (2025).

⁴³ See Docquier and Rapoport (2012) and Atoyán et al. (2016).

⁴⁴ See IMF (2025b).

⁴⁵ See UNDESA (2024).

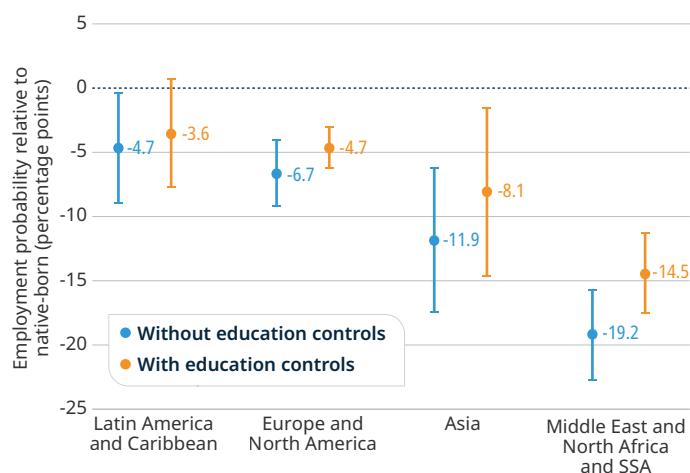
2011-19 (which averaged 1.0 per cent, 0.6 per cent and 0.86 per cent of their 2010 population annually, respectively) – some of the highest net migration inflows among OECD countries during that period.

The “guest workers” scenario in Chart 1.11 assumes a steady inflow of temporary foreign workers of working age who experience zero mortality, have no children and leave the country before retiring. These hypothetical migrants contribute labour without adding any dependants of their own. Even under these assumptions, many economies in the EBRD regions would need to maintain annual migrant inflows of between 0.5 and 0.9 per cent of their population.

The “same fertility” scenario treats migrants as permanent settlers who arrive at age 30, adopt the destination country’s fertility patterns and are subject to local mortality rates. In this scenario, each additional migrant worker adds dependants, necessitating further immigration to offset these additional increases in the number of children. As a result, the required rates of net migration exceed 1 per cent in almost half of all EBRD economies where the working-age ratio is projected to decline. In the case of Slovenia, for instance, the annual estimate stands at 1.7 per cent of its population in 2023 – roughly 8.5 times the annual inflow recorded in the 2010s. In a handful of fast-ageing comparator economies such as Italy, Spain and South Korea, the required annual migration inflows exceed 2 per cent of the population.

The extent to which immigration can offset the adverse impact of demographics on economic growth also depends on how new arrivals are integrated into the labour market. The regression analysis that follows, based on individual-level EU Labour Force Survey (EU LFS) data for 31 European destinations, compares the probability of employment for immigrants with that of individuals with similar characteristics born in the country of residence (see Chart 1.12).⁴⁶ On average, foreign-born individuals are around 10 percentage points less likely to be employed than working-age adults born in the country. This gap narrows to 7.4 percentage points after taking into account differences in

CHART 1.12. Employment probabilities of migrants in destination countries are generally lower than those of native-born workers



Source: Eurostat (2024) and authors’ calculations.

Note: The chart shows employment gaps relative to individuals born in the destination countries for different regions of birth based on a linear probability model in which a dummy for whether the respondent is employed is regressed on region of birth dummies, sex and age dummies, and country-year fixed effects. The sample includes respondents aged 15-64 in 31 European economies over the 2019-23 period. Ninety-five per cent confidence intervals are based on standard errors clustered at country level.

In Europe, foreign-born individuals are, on average, around

10 percentage points

less likely to be employed than native-born individuals

⁴⁶ See Eurostat (2024).

educational attainment. These employment differentials vary significantly by region of origin, with migrants from regions with the highest capacity for future working-age emigration (Asia, the Middle East and North Africa, and SSA) facing the largest employment gaps.

These different probabilities of being employed reflect differences in skills and their transferability (depending on the recognition of foreign credentials, for instance), language barriers and policies that govern labour-market access. Discrimination in the labour market may also play a role.⁴⁷ Migration, therefore, could yield lower contributions to the effective labour supply than is assumed in the scenarios considered above (see Chapter 3 for a discussion of policies that can strengthen the integration of immigrants into the labour market).

In addition, the supply of potential working-age migrants is constrained by global demographic trends, as every worker drawn into one labour market is removed from another. To maintain their ratios of working-age population to total population, countries experiencing demographic decline would collectively require an extra 655 million working-age adults by 2050, based on the “guest workers” scenario outlined above. This is around 20 per cent more than countries with growing working-age populations could provide without a decline in their own working-age population shares (in these calculations, it is assumed that recipient countries’ working-age population shares remain constant or decline to two-thirds, whichever is lower; potential donor countries are assumed to hold their working-age share constant at 2023 levels).

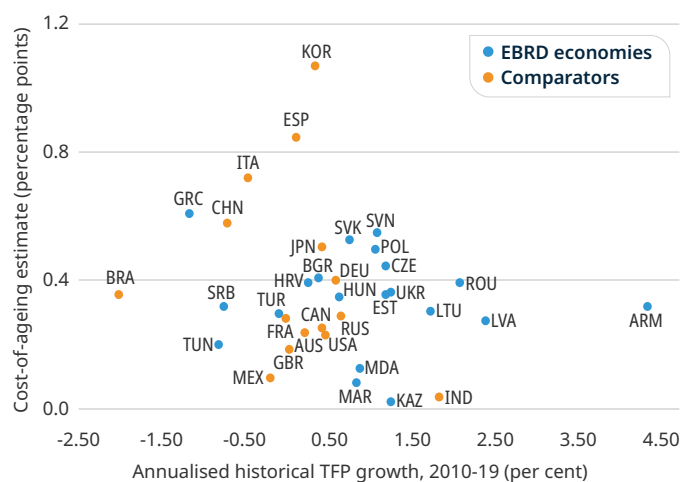
As a result, countries in the EBRD regions that may rely on migration to mitigate the economic impact of ageing will find themselves competing for immigrant talent (as well as their domestic talent) with other ageing economies where incomes may be substantially higher. While migration can partly mitigate the economic impact of demographic decline, policy responses will need to incorporate other measures that extend working lives and boost productivity if they are to be effective.

HIGHER PRODUCTIVITY

Another way to offset the economic impact of ageing is to boost the productivity of the increasingly scarce labour available by raising the efficiency with which labour and capital are combined, referred to as total factor productivity (TFP).

With the projected supply of labour unchanged, the acceleration of TFP growth that is required to offset the impact of labour scarcity on per capita income averages around 0.36 percentage point per year (see Chart 1.13, vertical axis). This compares with average TFP growth of 0.55 per cent per year in 2010-19 (horizontal axis). Both the required accelerations and recent experiences vary considerably across economies. Greece, Serbia, Tunisia and Türkiye recorded negative TFP growth between 2010 and 2019, so the required TFP increases are substantial.

CHART 1.13. The increases in productivity growth required to offset the impact of demographic change on per capita incomes are sizeable relative to historical performance

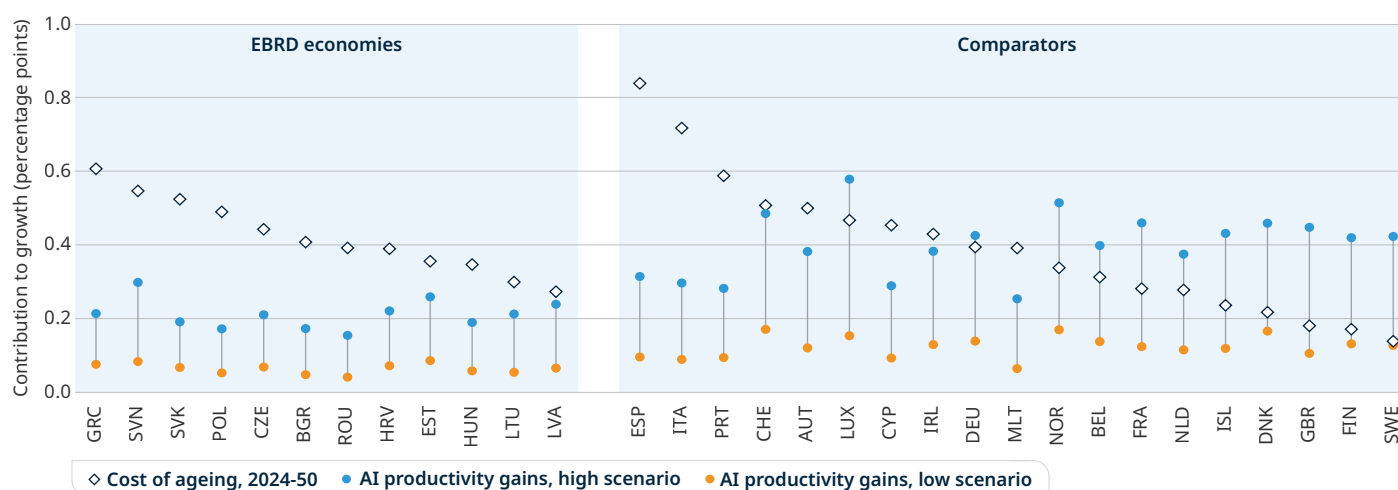


Source: UNDESA (2024), World Bank (n.d.a), Feenstra, Inklaar and Timmer (2015) and authors’ calculations based on Fernández-Villaverde, Ventura and Yao (2025).

Note: Historical TFP growth is calculated as annualised growth in the total factor productivity index at constant national prices in the Penn World Tables between 2010 and 2019. Cost-of-ageing estimates represent the average negative contribution of shrinking working-age populations to GDP per capita growth in 2024-50 (see notes accompanying Chart 1.8).

⁴⁷ See OECD (2024a).

CHART 1.14. Potential productivity gains from AI may partially offset the demographic burden



Source: UNDESA (2024), World Bank (n.d.a), Feenstra, Inklaar and Timmer (2015), Misch et al. (2025) and authors' calculations based on Fernández-Villaverde, Ventura and Yao (2025).

Note: The estimated cost of ageing represents the average negative contribution of the relative decline in the working-age population to GDP per capita growth in 2024-50 (see notes accompanying Chart 1.8). AI productivity gains are extracted from Misch et al. (2025), where the high and low scenarios represent the 75th and 25th percentiles, respectively, of the estimated cumulative medium-term productivity gains across different combinations of AI exposure measures and adoption rates.

In Bulgaria and Croatia, TFP growth would need to more than double relative to historical performance. In Latvia and Romania, by contrast, the required increases in TFP growth are 11 and 19 per cent of their historical average TFP growth rates, respectively.

Recent advances in AI have sparked a growing debate about its potential to enhance productivity in ageing societies. While there is concern about labour displacement and short-term adjustment costs,⁴⁸ AI is increasingly characterised as an emerging general-purpose technology.⁴⁹

A growing body of literature provides estimates of AI's potential contribution to TFP growth.⁵⁰ While these potential AI productivity gains could be substantial, they are unlikely to fully offset the impact of demographic pressures on growth in the EBRD regions (see Chart 1.14). Under high-impact scenarios, AI could provide on average around half of the required productivity growth across the EBRD economies in the EU. Under lower-impact assumptions, AI's potential

contribution becomes marginal relative to the projected demographic headwinds.

Realising productivity gains from AI also requires its broad adoption by firms. In 2024, an average of 9 per cent of firms across the EBRD regions reported using AI, compared with an average of 18 per cent in Germany, France and the Netherlands.⁵¹ Within the EBRD regions, adoption rates vary considerably: in Slovenia, more than 20 per cent of firms reported using AI, compared with 3 per cent in Romania. Chapter 3 discusses AI adoption by firms in more depth.

In addition, digital skills – critical to the effective use of AI technologies – decline significantly with age and across nearly all age groups. Chart 1.15 illustrates this trend using data from the fourth round of the Life in Transition Survey (LiTS), a representative household survey conducted by the EBRD in partnership with the World Bank in 2022-24, covering at least 1,000 individuals in 44 economies in the EBRD regions and beyond, including Algeria and Germany.⁵² As part of the survey, participants

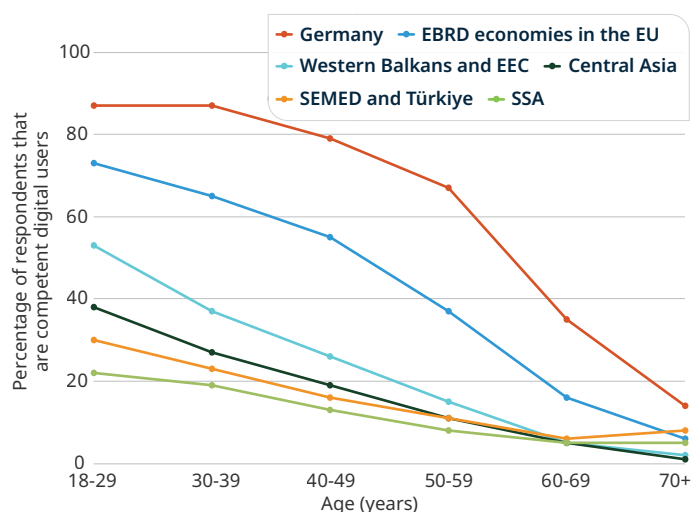
⁴⁸ See Acemoglu and Restrepo (2019).

⁴⁹ See Eloundou et al. (2024) and Calvino, Haerle and Liu (2025).

⁵⁰ See, for instance, Acemoglu (2025), Gmyrek, Berg and Bescond (2023), Filippucci, Gal and Schief (2024), Aghion and Bunel (2024) and Misch et al. (2025).

⁵¹ See Eurostat (2025).

⁵² See EBRD (2024a).

CHART 1.15. Basic digital skills drop fast with age

Source: EBRD (2024a) and authors' calculations.

Note: A competent digital user is a respondent who is able to (i) send emails with attachments, (ii) copy or move files and (iii) install software. Unweighted averages across economies. The "EBRD economies in the EU" grouping comprises Bulgaria, Croatia, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia. "Western Balkans and EEC" comprises Albania, Bosnia and Herzegovina, Georgia, Kosovo, Moldova, Montenegro, North Macedonia and Serbia. "Central Asia" comprises Kazakhstan, the Kyrgyz Republic, Mongolia, Tajikistan and Uzbekistan. "SEMED" comprises Iraq, Jordan, Lebanon, Morocco, Tunisia and the West Bank and Gaza. "SSA" comprises Benin, Côte d'Ivoire, Ghana, Kenya and Senegal.

were asked whether they could send emails with attachments, copy or move files, install software or code.

Basic digital proficiency (ability to work with attachments and install software) is lower in the EBRD regions than in Germany. Moreover, significant skill gaps persist among young cohorts in EBRD economies outside the EU, with digital literacy rates below 40 per cent, suggesting that generational change alone may not be sufficient to deliver near-universal digital literacy. Efforts to strengthen digital capabilities, particularly among older and mid-career workers, could help unlock additional productivity gains and improve resilience in ageing economies, complemented by measures to facilitate widespread technology adoption.

In EBRD economies in the EU, productivity gains from AI could offset on average

half

of GDP per capita losses from shrinking workforces under high-impact scenarios

Digital literacy rates among young cohorts are below

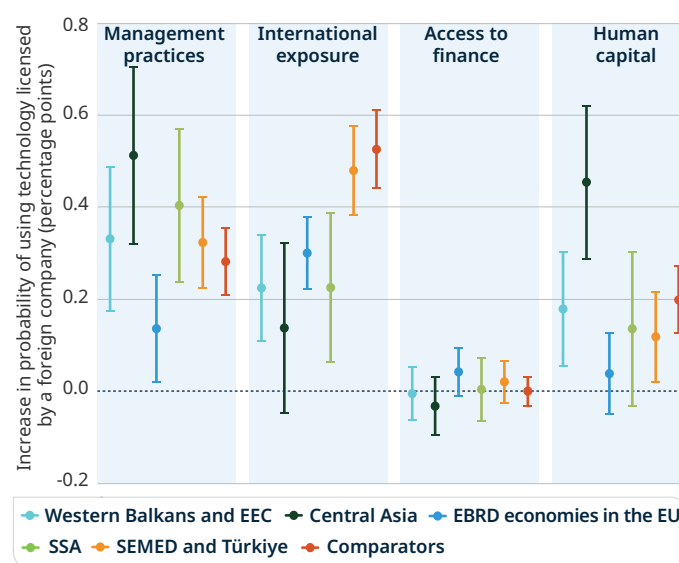
40%

in certain EBRD regions

Technology diffusion, particularly through the adoption of foreign innovations, is an important determinant of productivity growth in economies distant from the innovation frontier.⁵³ Data from the World Bank Enterprise Surveys, a representative global survey of firms with at least five employees, indicate that the use of technology licensed from foreign firms is more common in the EBRD regions than in other middle-income countries.⁵⁴ Adoption is highest in the Western Balkans and EEC (20 per cent), followed by Central Asia and the EBRD economies in the EU (both 17 per cent), while 12 per cent of firms in SSA report using licensed foreign technology, against 7 per cent in comparator countries. Although adoption rates are higher in the EBRD economies than in comparators, the ability to adopt foreign technology is associated with firm-level capabilities. Firms with better management practices, higher levels of human capital and greater international exposure through exports, imports or foreign ownership are more likely to report using licensed foreign technology (see Chart 1.16). Channels of technology adoption from international exposure include technology transfers from multinational corporations and imports of technology embodied in capital goods.⁵⁵

Cross-border payments for the use of intellectual property – patents, trademarks and the licensing of technology – provide further insight into the extent to which economies access and utilise foreign technology. Intellectual property payments have increased steadily over time across economies in the EBRD regions, especially in the EU, Western Balkans and Türkiye, signalling greater access to global knowledge. In contrast, payment levels in SEMED, Central Asia and SSA have remained relatively low (see Chart 1.17). Enhancing firms' capacity to access and adopt foreign technology will be essential to achieving higher productivity growth in these regions. Other levers, such as investment in human capital and improving the business environment, can also contribute to higher productivity growth.

CHART 1.16. Firms with better management practices, higher levels of human capital and more international exposure are more likely to use foreign technology



Source: World Bank (n.d.b) (latest year by economy) and authors' calculations.

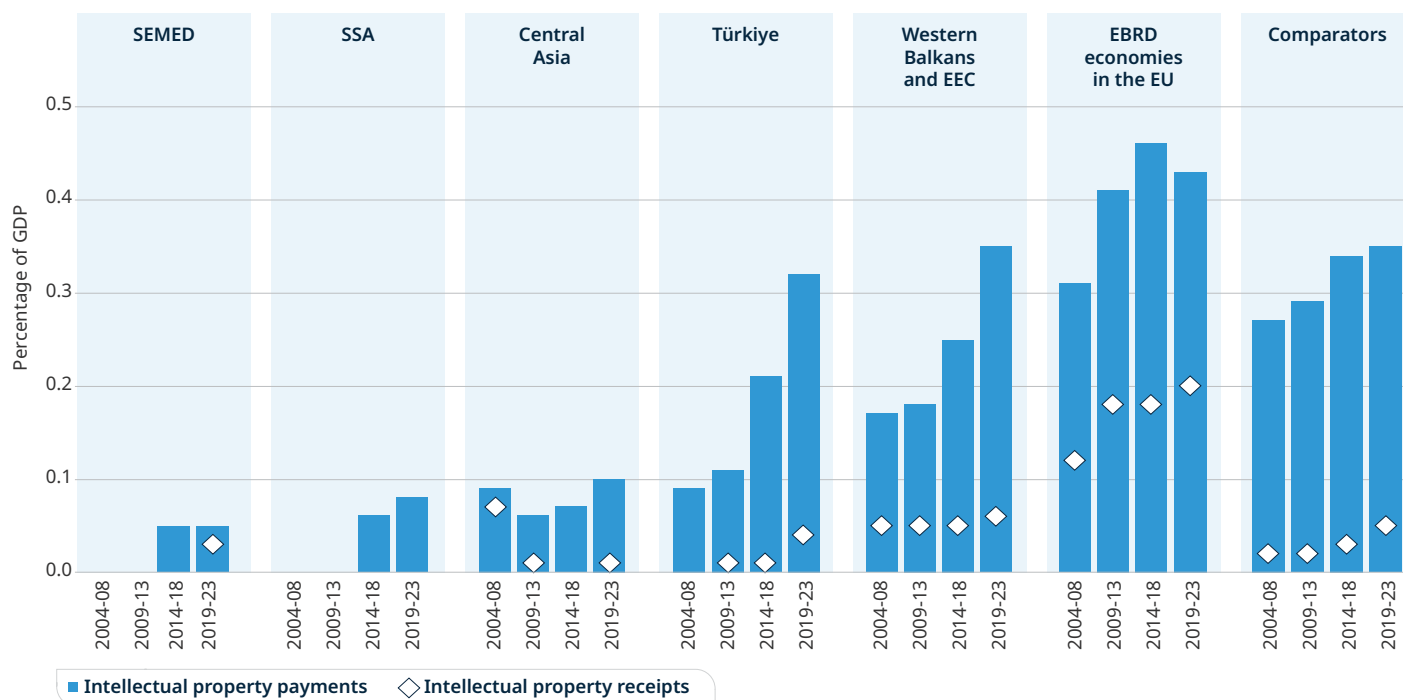
Note: This chart shows the estimated percentage point increase in the probability of a firm using technology licensed by a foreign company that is associated with a 1 percentage point increase in the indicator shown. Regressions include economy and firm-size fixed effects and various firm characteristics. "Access to finance" indicates that a firm is not credit constrained. "Human capital" is an average of the firm offering formal training, the proportion of permanent workers that completed secondary school, the firm identifying an inadequately educated workforce as a major or very severe obstacle to doing business and the proportion of permanent workers that are skilled. "International exposure" is an average of the proportion of total sales that are exported, the proportion of total inputs that are of foreign origin and the proportion of private foreign ownership in the firm. "Management practices" is a World Bank composite indicator that combines information from eight management practice indicators. The "EBRD economies in the EU" are Bulgaria, Croatia, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia. "Western Balkans and EEC" comprises Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Kosovo, Moldova, Montenegro, North Macedonia, Serbia and Ukraine. "Central Asia" comprises Kazakhstan, the Kyrgyz Republic, Mongolia, Tajikistan, Turkmenistan and Uzbekistan. "SEMED" comprises Egypt, Iraq, Jordan, Lebanon, Morocco, Tunisia and the West Bank and Gaza. "SSA" comprises Benin, Côte d'Ivoire, Ghana, Kenya, Nigeria and Senegal. "Comparators" comprises Bangladesh, Belarus, Brazil, China, India, Indonesia, Mexico, Russia, South Africa and Thailand.

⁵³ See Eaton and Kortum (1999), Keller (2004) and Choi and Shim (2022).

⁵⁴ See World Bank (n.d.b).

⁵⁵ See Javorcik (2004).

CHART 1.17. Payments for intellectual property rights have increased steadily in EBRD economies in the EU, the Western Balkans and Türkiye



Source: World Bank (n.d.a) and authors' calculations.

Note: Unweighted averages across economies using five-year average values in US dollars in constant prices. See the notes on Chart 1.16 for definitions of the various regions. Complete data are unavailable for intellectual property payments in SEMED and SSA in 2004-08 and 2009-13, and for intellectual property receipts in SSA in all periods, in SEMED in 2004-08, 2009-13 and 2014-18, in Central Asia in 2014-18, and in Türkiye in 2004-08.

Between

12%

and

20%

of firms in EBRD regions report using technology licensed by foreign companies

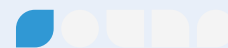
CONCLUSIONS AND POLICY IMPLICATIONS

Demographic change will reshape economies over the coming decades. In EBRD economies in the EU, the Western Balkans and the EEC region, ageing and shrinking workforces are projected to reduce annual GDP per capita growth by 0.36 percentage point in the next two decades. Younger economies in Central Asia and SEMED may see a modest, short-term demographic boost, but will face similar ageing-related drags by the second half of the century. SSA stands apart, with favourable age structures projected to raise growth by 0.37 percentage point annually over the next generation, provided that new entrants can be effectively integrated into national labour markets. A fertility rebound, should one occur, could reduce the projected burden from ageing over the second half of the century, but could also further reduce the ratio of workers to dependants in the near term. Alternatively, fertility could fall below the level projected under the current baseline scenario, a possibility that policymakers also need to consider.

The economic impact of ageing could be mitigated by a combination of greater labour-force participation by women and older workers, increased migration, and productivity growth, though no single policy is likely to be sufficient to counteract the economic impact of demographic change in most economies. The choice of policy responses will depend on local economic circumstances and policy preferences in ageing societies, as discussed in subsequent chapters of this report.

The effectiveness of migration depends crucially on how well migrants are matched to skill gaps in the economy and integrated into labour markets. Efforts to accelerate technology adoption need to focus on investment in skills upgrades, including digital skills, especially among elderly and young workers, as well as policies to foster technology adoption within firms. Targeted measures, such as promoting phased retirement, investing in re-skilling, fostering age-friendly workplaces or providing affordable childcare, can help to increase employment rates among women and older workers – groups with traditionally lower rates of labour-force participation.

Meanwhile, policymakers in economies with younger populations where demographic dividends are expected to arise should capitalise on this temporary window of opportunity by ensuring that labour markets can productively absorb a rapidly growing labour force.



BOX 1.1.

A NEOCLASSICAL GROWTH MODEL WITH DEMOGRAPHICS

The estimates of the economic cost of ageing are based on a model⁵⁶ where output Y in an economy with population N is produced according to the equation below in any time period t . In this production function, K_t is the stock of physical capital, A_t is the level of labour-augmenting technology, which grows at the exogenous rate g , and L_t is the population aged 15-64:

$$Y_t = K_t^\theta (A_t L_t)^{1-\theta}$$

In this economy, the growth of per capita income is given by the following equation and represents the weighted sum of the speed of technological change, capital deepening (where $\tilde{k}$ represents capital normalised by the product of technology and total population) and growth in the working-age share:

$$g_{Y/N} = g_A + \theta g_{\tilde{k}} + (1 - \theta) g_{L/N}$$

Capital deepening is, in turn, governed by the resource constraint (whereby the output in any period is the sum of consumption and investment) and the depreciation of the existing capital stock at a constant rate. A representative household with logarithmic utility chooses investment in each period to optimise the discounted value of the present and future consumption path. The marginal product of capital declines if labour input is lower, and this reduces households' incentives to accumulate capital as societies age.

The model is calibrated on an annual frequency. The discount factor, the capital share of income (the parameter θ in the production function) and the speed of depreciation are set to match the annual rate of return on capital observed in the United States of America between 2000 and 2019 based on data from Penn World Table 10.01.⁵⁷ Country-specific values of g are chosen so that, conditional on these structural parameters, they match GDP growth per working-age adult between 2000 and 2023. Real GDP growth is taken from the World Bank World Development Indicators,⁵⁸ while population numbers come from the UN World Population Prospects 2024 revision.⁵⁹

To quantify the impact of demographics on GDP per capita growth, a counterfactual path is generated in which the working-age ratio is held fixed at its baseline level. The annual "cost of ageing" is defined as the difference in growth rates of output per capita between the baseline and the counterfactual scenario, which combines the direct demographic effects of a falling working-age ratio with the endogenous slowdown in capital deepening. For instance, in the EBRD regions, approximately two-thirds of the estimated contribution of demographics to growth over the 2024-50 period comes from direct effects, with the remaining one-third stemming from indirect effects.

⁵⁶ See Fernández-Villaverde, Ventura and Yao (2025).

⁵⁷ See Feenstra, Inklaar and Timmer (2015).

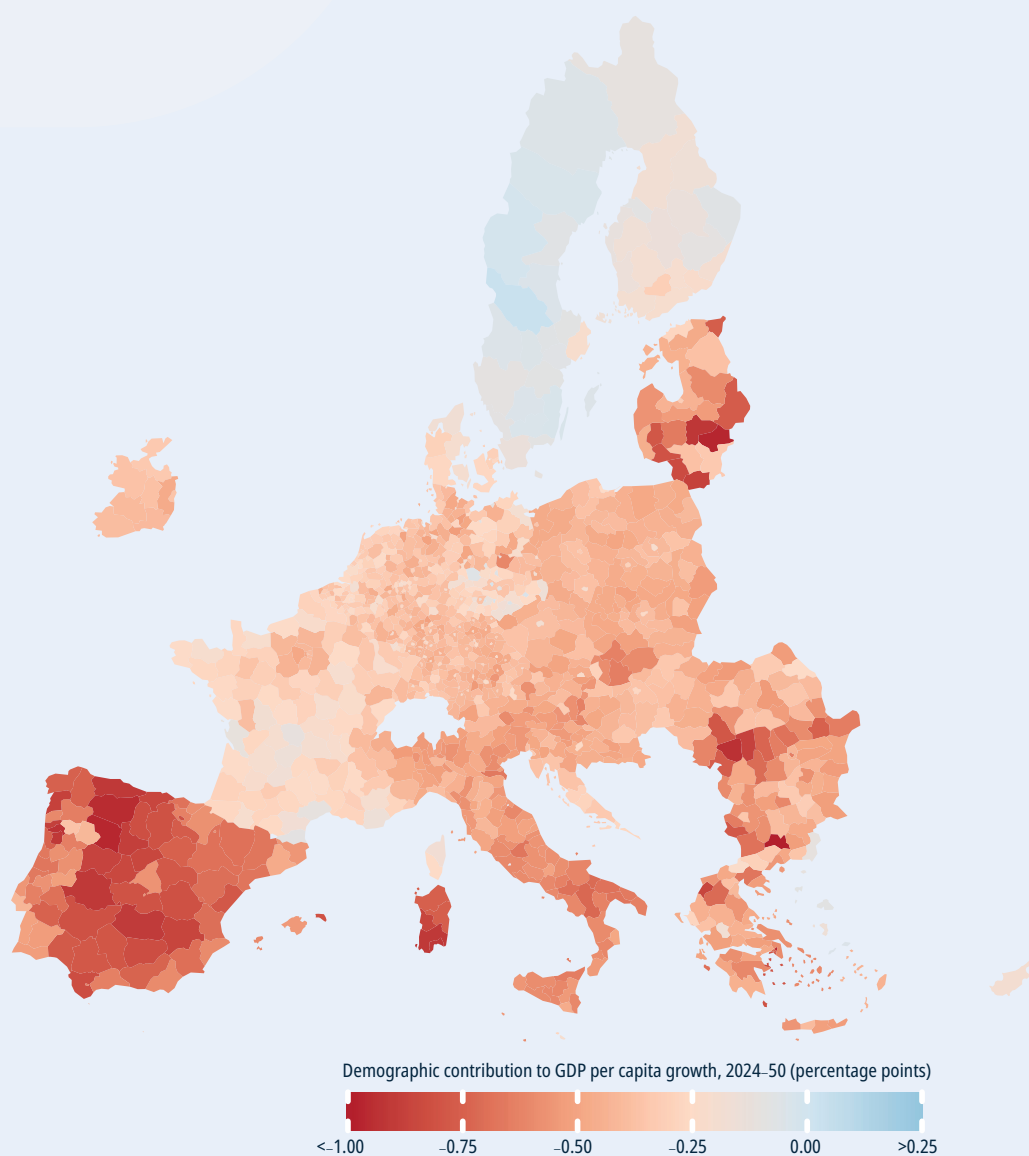
⁵⁸ See World Bank (n.d.a).

⁵⁹ See UNDESA (2024).

BOX 1.2.

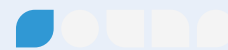
THE WEALTH OF WORKING REGIONS

CHART 1.2.1. The geography of demographic change varies within European economies



Source: European Commission (2025), Eurostat (2021) and authors' calculations based on Fernández-Villaverde, Ventura and Yao (2025).

Note: This map shows the contribution of demographic change to average annual real GDP per capita growth in 2024-50 at the NUTS-3 level. Estimates are generated using a calibrated neoclassical growth model with endogenous capital accumulation (see Box 1.1).



Public discussion of population ageing typically highlights differences between countries, but some of the most striking contrasts in demographic trends are to be found within national boundaries. Consider the population structure of the EU at the NUTS-3 level in 2023 (a granular level typically corresponding to counties, districts or provinces, such as *Kreise* in Germany or *oblasti* in Bulgaria).⁶⁰ Only 29 per cent of the cross-sectional variation in the working-age population ratio is explained by differences between country averages, with the remaining 71 per cent of variation arising from differences within countries.

To quantify what this heterogeneity means for future growth, we extend the neoclassical growth model described in Box 1.1 to the regional level. This analysis incorporates data from the Annual Regional Database of the European Commission (ARDECO) on population structure⁶¹ and real GDP for more than 1,100 NUTS-3 entities across the EU's 27 member states from 2000 to 2023. Region-specific labour-augmenting technology growth rates are calibrated to replicate the observed growth trajectories of real GDP per working-age adult in each region over this period. Common structural parameters (discount factor, capital share and depreciation rate) remain those identified at national level in Box 1.1. Lastly, working-age ratios for the 2024-50 period are derived from Eurostat's EUROPOP2019 regional population projections.⁶²

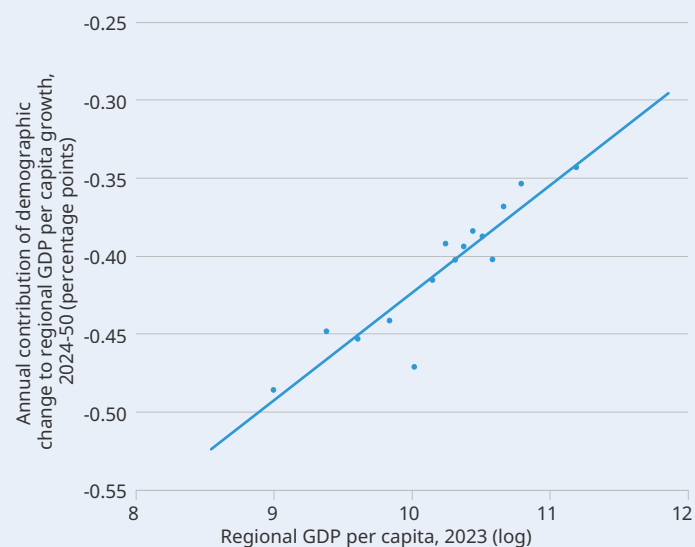
The estimated impact of changing working-age ratios on GDP per capita growth ranges from negligible in most of the Nordic region to negative effects approaching 1 percentage point per year in parts of southern Europe, Latvia, Lithuania and Romania.

These demographic differentials may further amplify regional disparities within economies, although this effect is relatively modest (see Chart 1.2.2). The regression analysis underpinning this chart links the projected demographic contribution to GDP per capita growth over 2024-50 to initial GDP per capita levels, while controlling for country fixed effects. It reveals that poorer regions within economies will face

a higher economic cost of ageing over the next two decades. Comparing regions at the 10th percentile of the intra-country income distribution with those at the 90th percentile in 2023 (for example, Badajoz and Barcelona, respectively, in Spain), the poorest regions will experience an additional demographic headwind of around 0.05 percentage point per year through 2050, adding up to a cumulative 1.26 percentage points.

The estimated demographic effects on regional convergence, while statistically significant, are economically small. They could be offset by policies aimed at addressing rising regional inequalities, including targeted upgrades of transport and digital infrastructure, sustained investment in skills, and reforms that improve the quality of governance in lower-income municipalities and regions.⁶³

CHART 1.2.2. Poorer regions within countries will experience somewhat stronger demographic headwinds



Source: European Commission (2025), Eurostat (2021) and authors' calculations based on Fernández-Villaverde, Ventura and Yao (2025).

Note: This chart shows a binned scatter plot based on an OLS regression of demographic contributions to regional GDP per capita growth (2024-50) on the logarithm of regional GDP per capita in 2023, controlling for country fixed effects. Demographic contributions are estimated using a calibrated neoclassical growth model with endogenous capital accumulation (see Box 1.1). Sample comprises the 27 member states of the EU.

⁶⁰ NUTS = Nomenclature of Territorial Units for Statistics.

⁶¹ See European Commission (2025).

⁶² See Eurostat (2021).

⁶³ See EBRD (2024b).

BOX 1.3.

DEMOGRAPHIC CHANGE AND PUBLIC PENSIONS

Public pensions are an essential element of the social contract in many countries and a vital source of income security for older adults. Policymakers, therefore, must balance the fiscal pressures arising from ageing populations with the need to provide adequate income in retirement. In some OECD countries, accumulated pension assets are substantial, reaching 180 per cent of GDP in Iceland and 160 per cent in Switzerland, for instance.⁶⁴ In EBRD economies in central Europe, EEC and Central Asia where funded pension schemes have been introduced, pension assets are accumulating steadily, albeit at varying paces, ranging from 5 per cent of GDP in Hungary to 30 per cent of GDP in Croatia. However, in many countries, pension systems continue to be financed by tax revenues and social security contributions.

Public pension systems have three main objectives: to reduce old-age poverty, smooth consumption over citizens' lifetimes and provide longevity insurance (namely, a steady income regardless of an individual's lifespan). A rapidly ageing workforce calls for an additional objective: ensuring sustainable pension debt. In emerging Europe and Central Asia, pension systems largely provide protection against poverty. Most countries offer a basic or defined-benefit pension, ensuring lifelong income and benefits for surviving spouses, where applicable. In a few cases, these schemes are complemented by mandatory defined-contribution pillars, where individuals' contributions are invested by pension funds and retirement benefits are determined by the accumulated return on investment, providing a strong link between contributions and benefits.⁶⁵ Nevertheless, concerns remain around the pension liabilities owed to future generations and the adequacy of pensions, due to the changing nature of work and rising life expectancy.

At present, in most EBRD economies in emerging Europe and Central Asia, more than 90 per cent of adults above retirement age receive a pension,⁶⁶ with poverty rates among the elderly lower than among working-age adults.⁶⁷ However, increasing self-employment and informal work are reducing contributor coverage, with future pension eligibility at risk for these groups. In general, the sustainability of pension liabilities is a growing concern in countries with increasing old-age dependency ratios and stable or rising benefit levels. So far, growth in pension spending in economies in the EBRD regions with older populations has slowed owing to a decline in average benefits, increases in retirement age and fewer adults meeting eligibility requirements based on their contribution history.⁶⁸ Unless the low coverage of the current population is addressed, pension spending on universal or basic pensions, and consequently public debt, may rise in the future.

RETIREMENT AGES, REPLACEMENT RATIOS AND SPENDING

Statutory retirement ages across the EBRD economies have been increasing in recent years and range from 55 to 67, with most countries moving towards equal ages for men and women (see Chart 1.3.1). However, the average effective retirement age remains lower, indicating that higher statutory ages do not always result in longer working lives, unless early retirement is restricted, as in North Macedonia. This gap may reflect various provisions for early retirement in certain occupations or retirement schemes, individual preferences or labour-market barriers for older adults.

Public pension expenditure in the EBRD regions ranges from 3 per cent to 11 per cent of GDP, based on World Bank Atlas of Social Protection Indicators of Resilience and Equity (ASPIRE) data.⁶⁹ Payroll social security contributions often fall short, creating pension-system deficits financed from government general expenditure. In some countries, such as Armenia, Georgia and Kazakhstan, pay-as-you-go pensions are financed directly from the state budget.

⁶⁴ See OECD (2024b).

⁶⁵ See Kaskarelis et al. (2025).

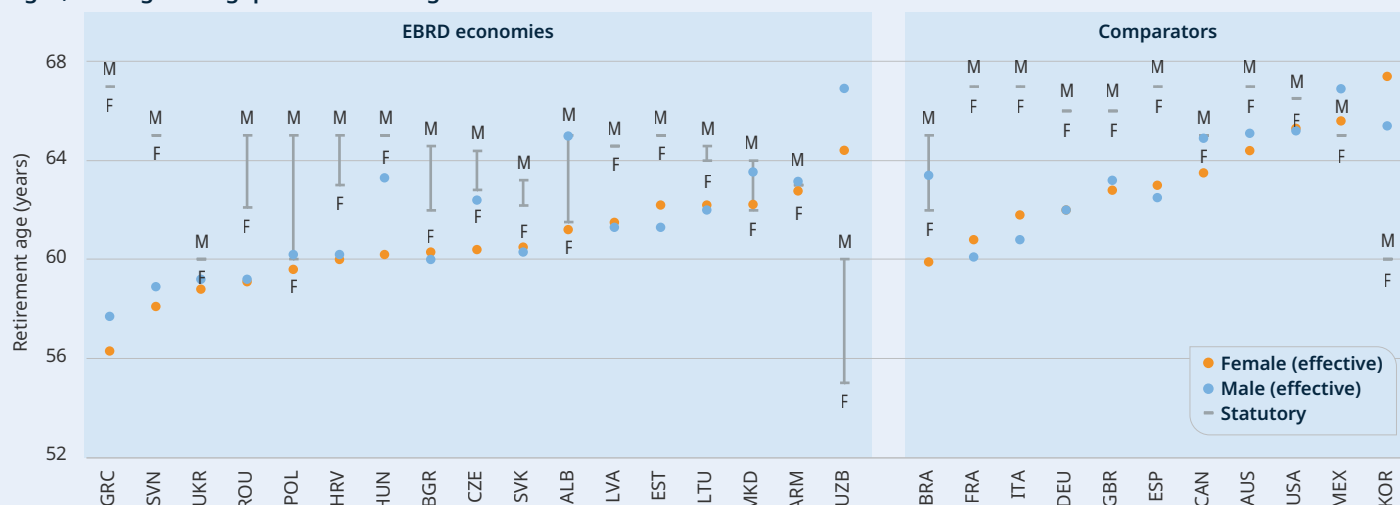
⁶⁶ Based on ILOSTAT data.

⁶⁷ Based on World Bank Poverty and Inequality Platform data.

⁶⁸ See European Commission (2024).

⁶⁹ See World Bank (n.d.c).

CHART 1.3.1. Effective retirement ages are generally below statutory retirement ages, while gender gaps are narrowing



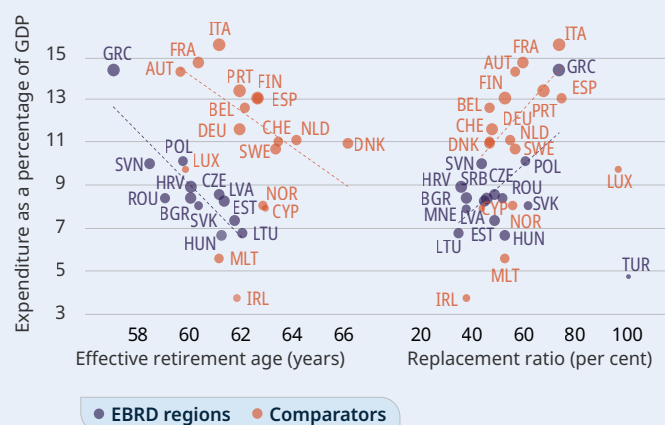
Source: Eurostat data, OECD data, World Bank data and authors' calculations.

Note: Data are for 2023 or the latest year available. The statutory retirement age is the age at which an individual can receive an old-age pension with full benefits. Effective retirement age is based on Eurostat data for all economies except for Australia, Canada, Mexico, South Korea, the United Kingdom and the United States, where OECD data on the average age of exit from the labour force for workers aged 40 and over are used, and Albania, Armenia, North Macedonia, Ukraine and Uzbekistan, where World Bank data on the average age of retirement for new pensioners are used.

Replacement ratios in EBRD economies covered by Eurostat ranged between 35 per cent and 101 per cent of pre-retirement salary in 2022 (see Chart 1.3.2), similar to or lower than those in advanced European economies. Effective retirement ages were also comparable. However, total pension expenditure as a percentage of GDP was generally lower in the EBRD economies, with their pension systems typically having less generous benefits. For pension systems to remain sustainable and provide adequate benefits, incentives for workforce participation among older adults need to be strengthened, including through further increases in the statutory retirement age.

Continued on page 40

CHART 1.3.2. Pension expenditure falls as the effective retirement age rises, and it increases as the replacement ratio rises



Source: Eurostat data, World Bank data and authors' own calculations.

Note: Data are for 2022. Trend lines are linear fits estimated separately for EBRD and other European countries, excluding Ireland, Luxembourg, Malta and Türkiye. Circle size reflects the proportion of individuals aged 65 and over relative to the population aged 15-64. Pension expenditure is defined according to the European System of Integrated Social Protection Statistics (ESSPROS) framework and includes both private and public pensions. Effective retirement age refers to the average age at which individuals begin to receive an old-age pension. The replacement ratio is calculated as the median gross individual pension income of people aged 65-74 relative to the median gross individual earnings of those aged 50-59, excluding other social benefits.

BOX 1.3.

DEMOGRAPHIC CHANGE AND PUBLIC PENSIONS

Continued from page 39

REFORM PRIORITIES

Experience of pension reforms points to several common reform priorities going forward:

- To acknowledge explicitly that public pension systems financed through general revenues must focus on the prevention of old-age poverty,⁷⁰ while schemes financed through payroll must be actuarially fair with a strong link between pension contributions and pension payouts.
- To manage expectations around pension adequacy, with a focus on issues related to inter- and intra-generational fairness.
- To improve incentives to make social-security contributions and encourage sufficient private savings and investments by the new generation in order to cover informal-sector workers.
- To engage the public, including children and young people, with transparent communication about how pension benefits are determined, underscoring the need for reforms due to ageing pressures and measures to be put in place to support longer, healthier lives. Public engagement should also aim to strengthen financial literacy on savings and investment.

Country-specific reform strategies will also be dictated by the pace of ageing and national fiscal capacity. Countries with young populations and high fertility rates, such as those in Central Asia, should focus on expanding the coverage of public pension systems and improving incentives to contribute while increasing women's labour-force participation, including through the provision of affordable childcare and the establishment of systems for private savings and investment.

Economies with relatively young populations that are expected to age significantly in the coming decades, including Türkiye and those in the Caucasus, should begin to undertake gradual reforms, strengthen compliance by linking social-security contributions and tax systems, and raise public awareness of the fiscal challenges associated with ageing.

In emerging Europe, rapidly ageing economies with high dependency ratios need to stay the course on measures that have been adopted but have yet to be implemented, consider additional measures to raise labour-force participation rates for older adults, and channel the accumulated capital pools of funded pensions towards productive investments.

⁷⁰ See Packard et al. (2019).



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