



Staff memo

Supply and demand effects of an ageing population

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Staff memos

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Summary

Large parts of the world are facing demographic challenges with low birth rates and an ageing population. In general, demographic change is slow, for example, today's birth rates will not affect labour supply for about 20 years. But the aging population is not a challenge that will arise in a few years; it is already here. In Sweden, the working-age population is however expected to continue growing in the coming decade, although at a slower pace. In countries like Germany, Italy, Poland and China, the development will likely be more dramatic. Already in the short term, the working-age population in these countries is expected to decline.

The change in the age composition of the population affects the economy in several ways. In general, an ageing population has a negative impact on GDP growth, and likely also on GDP per capita growth. This happens partly directly through lower labour force growth, but there are strong indications that this also happens through lower productivity growth. An ageing population also affects the composition of demand as consumption patterns change and the need for housing decreases. Furthermore, it means an increased need for staff in care services. The age composition of the population also has an impact on the neutral interest rate, as it can be assumed to affect the balance between saving and investment.

Overall, the ageing population will hold back growth in many countries in the coming decade compared to the previous decade. A declining working-age population among our trading partners may also, all else being equal, dampen Swedish growth through lower demand for Swedish exports. Population projections are uncertain and the outlook may change slightly, not least as a result of changing migration patterns. But given that fertility rates have been low in many countries for a long time, population ageing is more or less a fact of life in many countries. The Riksbank always takes demographics into account in its forecasting work, but in light of the major changes that are now expected in the relatively short term, this analysis argues in favour of placing even more focus on it. Not least given the negative effects on productivity growth.

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1 Introduction

In recent decades, global population growth has slowed down. Demographic trends in many high-income countries, including Sweden, are characterised by low fertility rates, i.e. the average number of children per woman, and an ageing population.² When Statistics Sweden published its latest population forecast in May 2024, a relatively large downward revision of the forecast was made both in the short and longer term. This was a result of lower migration and a decline in the fertility rate to just under 1.5 children per woman, the lowest level since Statistics Sweden began keeping population statistics.

According to Statistics Sweden's forecast, the growth of the working-age population in Sweden is expected to more than halve in the coming decade compared with the previous decade. This is a result of an ongoing trend of declining fertility rates and of lower expected migration due to, for example, higher income requirements for labour immigration. At the same time, we are living longer. This means that the population is ageing.

The trend in Sweden is not unique, but is a global phenomenon, with different countries' populations at different stages of ageing. In Germany, for example, the working-age population is expected to decline de facto over the next decade and the dependency ratio, a measure of the proportion of the population that needs to be supported by those of working age, is expected to rise by more than 10 percentage points.

Besides that low fertility rates and an ageing population affect the supply side of the economy and economic growth, it can also affect the composition of demand and thereby relative prices. However, demographic change is a slow process, not least in terms of supply-side changes. Nevertheless, it plays an important role in central banks' assessment of potential GDP and thus, among other things, of resource utilisation in the economy and inflationary pressures. Some demand effects, particularly in terms of public consumption and housing investment, can also be assumed to occur in the relatively short term, and are thus important in central banks' economic analyses. In particular, the demographic trend of ageing populations poses a challenge to the sustainability of public finances and pension systems in many countries.

The first part of this staff memo provides an international comparison of various demographic variables since the 1960s up to and including the coming decade, a period of relatively large demographic changes in many countries. In the second part, we describe a number of macroeconomic effects that an ageing population can be expected to have.

² In this staff memo, "fertility rate" is used synonymously with Total Fertility Rate, which relates the number of children born to the number of women of childbearing age (in Sweden 15-49 years). The calculation is made for each age, so-called age-specific fertility rates. The total fertility rate is obtained by adding together all age-specific fertility rates. See Statistics Sweden (2024).

2 International comparison of demographic variables

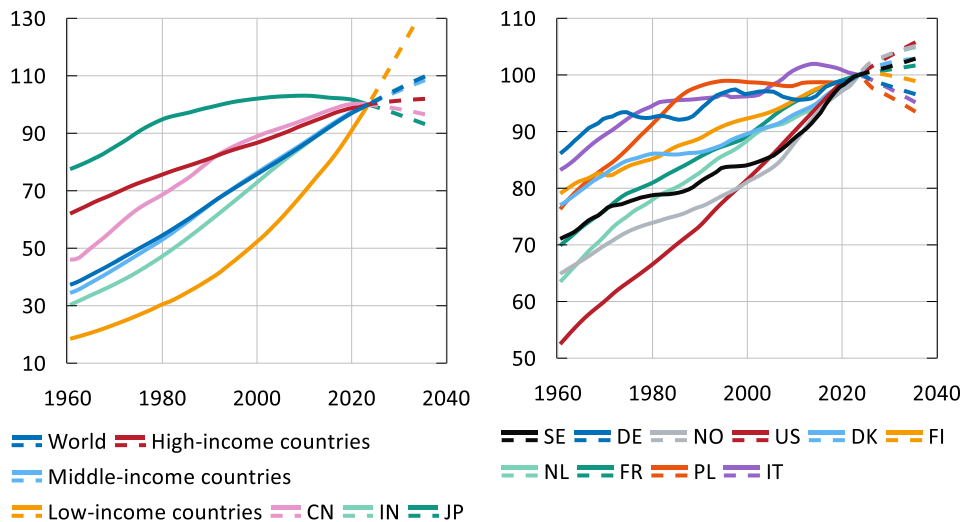
This chapter presents an international comparison of demographic trends to date and forecasts for the coming decade. The comparison focuses in particular on the countries that are major recipients of Swedish exports.

2.1 Global population growth has slowed down

At the global level, the change in population depends on the fertility rate and on the evolution of life expectancy. For individual countries, migration can also affect the development. In recent decades, population growth has slowed down (see figure 1). The global development has been driven by high-income and middle-income countries.³ In high-income countries, the slowdown has been relatively broad-based, while developments in middle-income countries have been weighed down by China but sustained by India. In low-income countries, the population is still growing relatively fast, especially in sub-Saharan Africa.

Figure 1. Population development

Index 2023 = 100



Note. SE=Sweden, DE=Germany, NO=Norway, US=United States, DK=Denmark, FI=Finland, NL=Netherlands, FR=France, PL=Poland, IT=Italy, CN=China, IN=India, JP=Japan. Outcome data up to end of 2023.

Sources: UN DESA and Statistics Sweden.

³ See Appendix 2 for a country breakdown.

Among high-income countries, population growth has declined from an average of around 1 per cent per year in the 1960s and 1970s to an average of 0.6 per cent over the period 2000-2023. Among Sweden's major trading partners (right-hand panel in figure 1), developments in Poland and Germany were particularly weak during 2000-2023.⁴ However, Finland, Denmark, France, the Netherlands and Italy have also been relatively weak. Sweden, the United States and Norway, on the other hand, have seen slightly higher growth than the average for high-income countries, which in part is explained by immigration. Between 2024 and 2035, population growth in high-income countries is expected to average only 0.2 per cent per year.⁵ In both China and especially Italy, the population has been declining for some years and is expected to continue to do so. The populations of Poland, Germany and Finland are also expected to decline over the coming decade.

2.2 Fewer children are being born, but we are living longer

The decline in fertility rates is a widespread global phenomenon. To maintain stable population growth, the fertility rate in the developed world should be around 2.1 (the so-called replacement level).⁶ If the fertility rate is lower than this, it means that over time the next generation, all else being equal, will be smaller than the previous one. Among high-income countries, fertility rates have been below 2.1 since the mid-1970s (see figure 2). In the OECD, the fertility rate averages 1.5 children per woman.⁷ Among middle-income countries, the ratio has been trending downwards in recent decades and is very close to 2.1. Even in low-income countries where fertility rates are still relatively high, there has been a decline that accelerated in the 2000s. In all of our comparison countries, the fertility rate is well below 2.1. In the United States and France, the fertility rate is around 1.7–1.8, while Finland, Italy and Poland have a much lower rate, around 1.3. The other countries in the comparison, including Sweden, are close to 1.5 children per woman. In all of these countries, this means that the population (without immigration) will decrease. The lower the fertility rate, the faster the population ages. As an illustrative calculation, a fertility rate of 1.5 means that a cohort of 100,000 births, from one generation to the next, will contain about 73,000 children. And in the generation after that, around 53,000 children. In the case of Poland and Finland, the corresponding figures are around 63,000 and 40,000 children respectively.

⁴ The selection of countries we look at more closely is based on the trade weights used by the Riksbank. The individual countries with the highest weights are Germany, China, the United States, the Netherlands, Norway, France, Italy, Poland, Denmark and Finland.

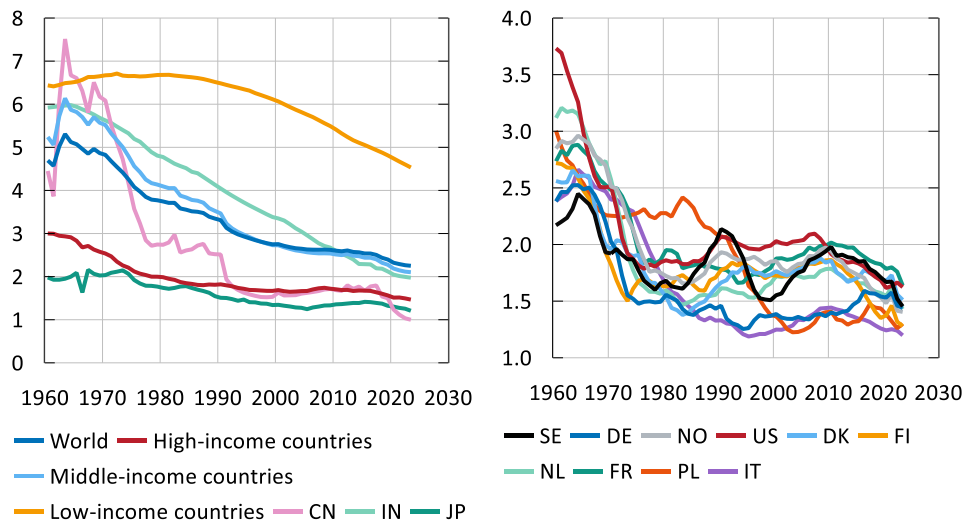
⁵ The projections we show for Sweden come from Statistics Sweden. Other projections come from the UN "medium scenario" which is based on probabilistic methods. The methodology takes into account past experience in each country, while reflecting uncertainty about future changes based on past experience in other countries under similar conditions. The medium scenario assumes some continued changes in fertility and life expectancy, and some migration. For more detailed information, see UN (2024).

⁶ The number is greater than 2 because there are always slightly more boys than girls born and because not all girls born survive to childbearing age.

⁷ For the individual OECD countries, Israel is highest with 2.9 children per woman and South Korea lowest with 0.7 children per woman, see OECD (2024).

Figure 2. Fertility rate

Number of children born per woman



Note. SE=Sweden, DE=Germany, NO=Norway, US=United States, DK=Denmark, FI=Finland, NL=Netherlands, FR=France, PL=Poland, IT=Italy, CN=China, IN=India, JP=Japan. Outcome data up to end of 2023.

Sources: UN DESA and Statistics Sweden.

The reasons for lower fertility rates have been much debated and are complex, and the explanations are many.⁸ The decline in fertility rates goes hand in hand with the rise in the age of first-time mothers and the fact that more and more women, mainly by choice, are not giving birth at all. The choice to have children depends, among other things, on various economic factors, but also on medical factors such as infertility, access to contraceptives and fertility treatments, as well as on factors such as social norms and gender equality. Historically, there has been a strong negative correlation between GDP per capita and fertility rates, and between female educational attainment and labour force participation and fertility rates. This is in line with the fact that the opportunity cost of raising children, where women on average take on more responsibility, becomes higher as more women are educated and working. In modern times, however, it seems that this relationship has changed. In some high-income countries, including Sweden, highly educated women are now more likely to give birth than low-educated women, and women's employment rates are positively correlated with fertility rates.⁹ One economic factor that has been shown to explain lower fertility rates is the direct cost of (larger) housing and childcare.¹⁰ However, the fertility rate in the Nordic countries with more extensive and generous systems of, for example, parental benefits and tax-funded childcare is roughly in line with the OECD average. This means that the absence of such systems is not a sufficient explanation for the decline. Furthermore, there is evidence that fertility rates are pro-cyclical, i.e.

⁸ See OECD (2024) for a more complete review of different drivers and more references.

⁹ See, for example, Jalovaara et al. (2019), Doepke et al. (2022) and the OECD (2024).

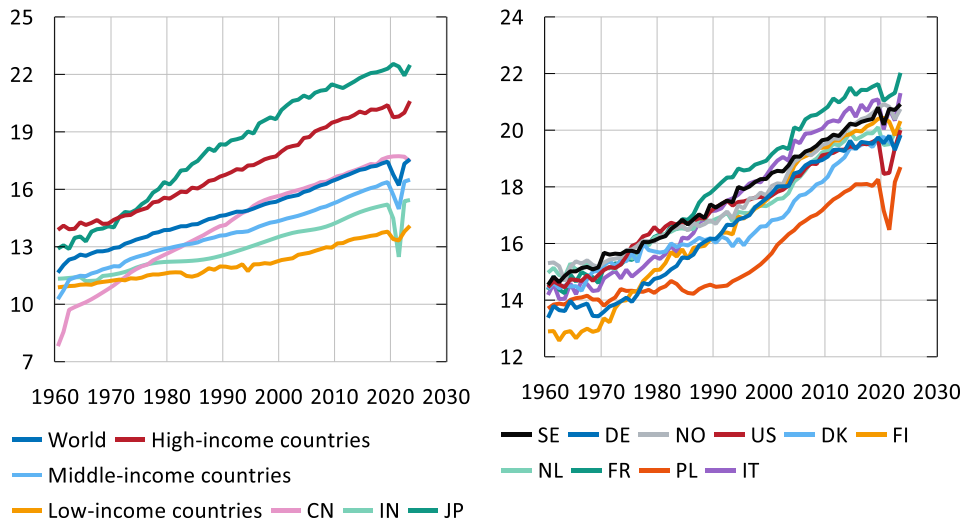
¹⁰ See, for example, Fluchtmann et al. (2023).

move in the same direction as the business cycle, in many countries.¹¹ This may help to explain the relatively large decline in many countries in recent years.¹² In terms of social norms, there is some evidence, mainly qualitative, that attitudes to parenthood among both young men and women have changed and that more are choosing not to have children. At the same time, normative demands around parenting have increased and parents are spending more time with their children (so-called "time intensive parenting").¹³ The decline in the proportion of relationships among young adults (25-34 years) has also been put forward as an explanation.¹⁴

While fertility rates have trended downwards, life expectancy has trended upwards in low-, middle- and high-income countries, except during the COVID-19 pandemic (see figure 3). The trend is similar for all of Sweden's major trading partners, where the remaining life expectancy at the age of 65 is between about 20 and 22 years. In China and Poland it is lower.

Figure 3. Life expectancy at age 65

Number of years



Note. SE=Sweden, DE=Germany, NO=Norway, US=United States, DK=Denmark, FI=Finland, NL=Netherlands, FR=France, PL=Poland, IT=Italy, CN=China, IN=India, JP=Japan. Outcome data up to end of 2023.

Source: UN DESA.

¹¹ The fertility rate is negatively correlated with various measures of unemployment and with (inverted) consumer confidence in Europe and in the United States, see Comolli (2017). There is also evidence for Sweden that the fertility rate is procyclical and that women's income is positively correlated with childbearing, see Andersson (2000). In Sweden, the fertility rate rose temporarily in the 1980s when the "speed premium" was introduced, i.e. people were allowed to keep their sickness benefit-qualifying income if they had children in quick succession, see Andersson (2002).

¹² Against this background, the fertility rate rises slightly in Statistics Sweden's forecast for Sweden in the coming years before levelling out at around 1.7, see Statistics Sweden (2024).

¹³ See, for example, Rotkirch (2020) and Ellingsæter et al. (2022).

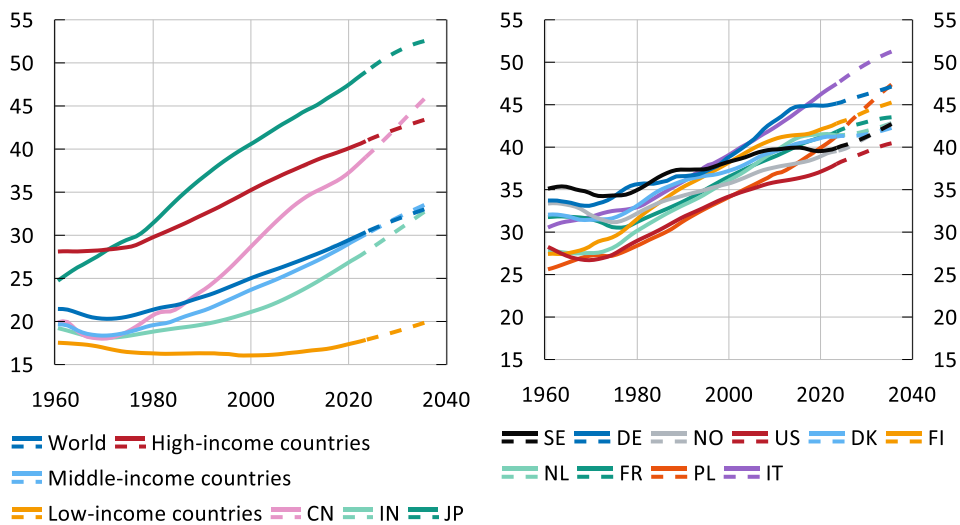
¹⁴ See Financial Times (2025).

2.3 Dependency ratio rises

The combined effect of lower fertility rates and longer life expectancy is an ageing population (see figure 4). This in turn means an increased dependency ratio for the working-age population. A commonly used way to illustrate this is through the so-called demographic dependency ratio.¹⁵ The demographic dependency ratio is affected by both the number of children under 15 and the number of people aged 65 and over. Therefore, low fertility rates hold back the ratio in the short term (15 years), while more elderly people put immediate upward pressure on the ratio.

Figure 4. Median age

Number of years



Note. SE=Sweden, DE=Germany, NO=Norway, US=United States, DK=Denmark, FI=Finland, NL=Netherlands, FR=France, PL=Poland, IT=Italy, CN=China, IN=India, JP=Japan. Outcome data up to end of 2023.

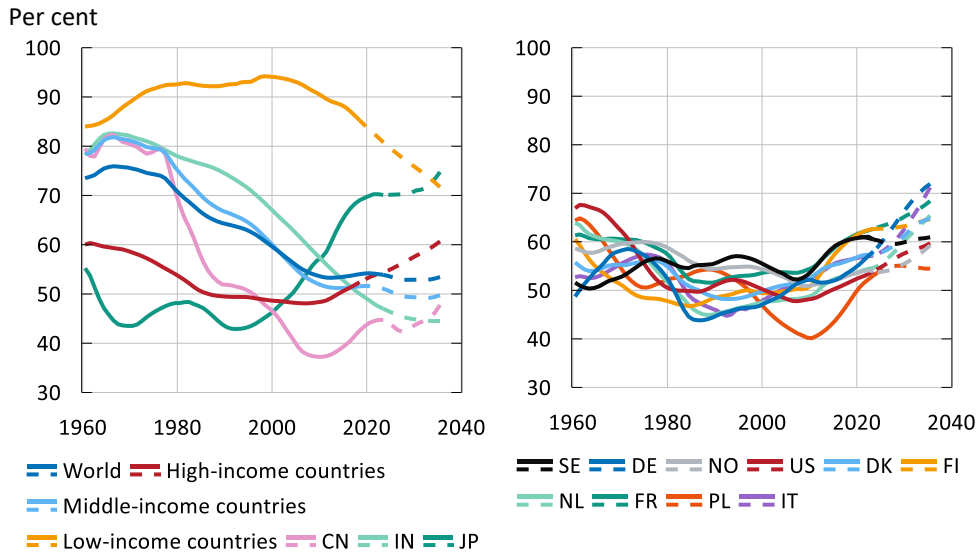
Source: UN DESA.

In high-income countries, the demographic dependency ratio started to rise in the mid-2010s and, despite low fertility rates, it is expected to rise rapidly in the coming years (see figure 5). An important difference from the 1960s, when the ratio was about the same as in the projection for the next decade, is that in the 1960s it was high because of the large number of children born in many high-income countries after the Second World War. The rise in the ratio is now instead driven by the ageing of these relatively large cohorts, while life expectancy has increased over time. Among our comparison countries, the demographic dependency ratio is currently highest in France and Finland, but it is expected to rise rapidly over the next decade, particularly in Italy, Germany and the Netherlands. In China, the dependency ratio is relatively low and is not expected to rise to a particularly high level over the horizon shown in figure 5. However, it is expected to rise very sharply in the slightly longer term as a result of

¹⁵ The UN definition of the demographic dependency ratio is used here, i.e. the number of people aged 0-14 years and older than 64 years in relation to the number of people of working age (15-64 years). A ratio of 100 means that each person of working age supports one person of non-working age.

the one-child policy pursued between 1979 and 2015. In Sweden, the proportion of older people is rising relatively rapidly, but over the horizon shown here the demographic dependency ratio is balanced by the low birth rate (see also section 3.2).

Figure 5. Demographic dependency ratio



Note. SE=Sweden, DE=Germany, NO=Norway, US=United States, DK=Denmark, FI=Finland, NL=Netherlands, FR=France, PL=Poland, IT=Italy, CN=China, IN=India, JP=Japan. The UN has outcome data through 2018 and 2023, Statistics Sweden has outcome data through 2023.

Sources: UN DESA and Statistics Sweden.

It should be mentioned that the demographic dependency ratio is only a demographic measure and not a perfect measure of economic activity and the actual 'burden' on those who work.¹⁶ In practice, many people aged 65 and over and people aged under 15 are working. In many low-income countries with a high proportion of young people, work among people under 15 is relatively widespread. At the same time, in Sweden, for example, many people aged 65 and older are working, and the number is increasing.¹⁷ However, there are also countries such as France and China that still have a retirement age lower than 65 years, while in many countries entry into the labour market is normally later than 15 years. Furthermore, it should be emphasised that projections of the evolution of the demographic dependency ratio are sensitive to the assumptions made. This is particularly true of immigration, which can have a relatively large impact on the development (see also Appendix 1).

¹⁶ The economic dependency ratio is the number of economically inactive (i.e. not employed) people in the population relative to the number of employed people in the population. In fact, this is the one that matters for economic development. For example, an ageing population can be met to some extent by increasing labour force participation among groups outside the labour market. However, this Staff memo does not make any assumptions about a change in the functioning of the labour market in the future.

¹⁷ As an example, labour force participation among people aged 65–69 has increased from around 18 per cent in 2008 to around 31 per cent in 2024.

3 Effects on supply and demand of an ageing population

Low fertility rates and an ageing population affect the supply side of the economy and imply lower growth prospects. Furthermore, they also affect the composition of consumption, and thus relative prices may be affected. There are also implications for construction, public finances and the neutral interest rate. This chapter describes a number of effects that an ageing population can be expected to have on the macroeconomy.

3.1 An ageing population negatively affects growth

A country's prosperity, often measured in terms of GDP per capita, depends on the share of the population that works and on productivity. Research suggests that an ageing population slows both labour supply growth and productivity growth.

The previous trend increase in the working-age population has slowed down in several countries and is expected to continue to level off, or even decline, over the next decade (see figure 6). The most dramatic developments are in Italy and Germany, where the working-age population is expected to fall by 10 and 9 percentage points respectively between 2024 and 2033. A significant slowdown is also expected in Denmark and the Netherlands. In Sweden, labour force growth is expected to slow markedly compared with the previous decade but remain positive.¹⁸ At the municipal level, however, the conditions are very different.¹⁹

All else being equal, lower population growth means lower labour force growth.²⁰ This in turn affects the amount of goods and services that can be produced. Furthermore, it may imply a change in the composition of the labour force as the average age of the labour force increases (see figure 6). Older people have, on average, a lower labour force participation rate than people in mid-life, and on average they work fewer hours per week. This may mean that the development of labour supply and the number of hours worked in the economy also slows down as the population ages.

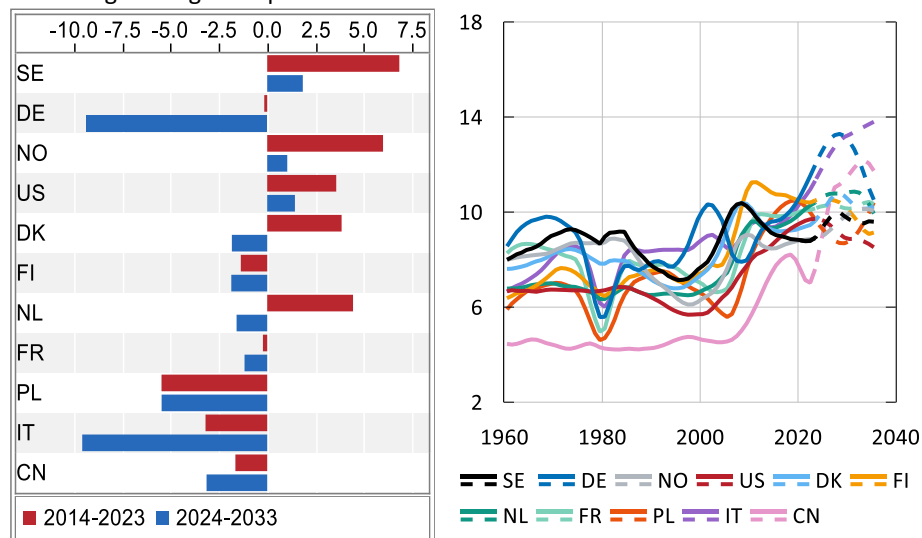
¹⁸ After 2025, however, the increase is mainly driven by groups that on average have a low labour force participation rate, see Häkkinen Skans and Wasén (2023).

¹⁹ In six out of ten municipalities, the number of people aged 20–66 is expected to decline up to 2033, see Swedish Association of Local Authorities and Regions (2024).

²⁰ However, in countries where women's labour force participation is very low, for example due to the lack of childcare facilities, it is conceivable that in the short term, lower fertility rates may have some positive effect on labour force growth if women enter the labour force instead of staying at home with children.

Figure 6. Population development 15–64 years and share of 15–64 over 60 years

Percentage change and per cent



Note. SE=Sweden, DE=Germany, NO=Norway, US=United States, DK=Denmark, FI=Finland, NL=The Netherlands, FR=France, PL=Poland, IT=Italy. The UN and Statistics Sweden have out-come data up to end of 2023.

Sources: UN DESA and Statistics Sweden.

A changing age structure in the labour force also affects productivity, which typically varies across working life. More experience and accumulated knowledge contribute positively to productivity. However, knowledge requirements and skills that are in demand often change with technological advances. This means that education, skills and experience gained early in life become less relevant, which negatively affects productivity. Factors associated with health problems later in life can also have a negative impact on productivity, particularly in occupations that are physically demanding. These counteracting forces mean that the relationship between age and productivity can generally be described as an inverted U, with productivity being lowest at the beginning and at the end of working life.²¹ However, the improvement in the health of older people, reflected among other things in longer life expectancy, means that the decline is likely to have been delayed over time. A similar relationship, i.e. an inverted

²¹ See, for example, Feyrer (2007) who finds an inverted U between age and total factor productivity (TFP) in a panel of 87 countries, with the 40–49 age group being the most productive. Liu and Westelius (2016) find a similar relationship on data for Japan. Aiyar et al. (2016) show that growth declines with an increase in the share of 55+ in the labour force and that this is mainly due to the negative effect on TFP. They estimate that the ageing population in Europe could reduce TFP growth by an average of 0.2 percentage points per year between 2014 and 2035. Maestas et al. (2023) find using data for the United States that an increase in the share of the population aged over 60 has a negative effect on GDP per capita growth, with one-third of the effect coming from labour supply and two-thirds from lower TFP. However, there are studies such as Van Ours and Stoeldraijer (2010) that do not find an inverted U on Dutch data. Furthermore, the fact that the relationship between age and productivity can be influenced by the industry in which individuals work, for example whether it is a physically demanding industry or a white-collar occupation, means that the composition of the business sector affects the overall outcome.

U, also appears to exist between age and entrepreneurship and innovation.²² Moreover, an ageing population may have a pure compositional effect on productivity, with relatively higher demand for certain labour-intensive services such as health care and care for the elderly (see also Section 3.2). In these sectors, productivity is on average lower than in other more capital-intensive sectors. All in all, this suggests that an ageing population dampens productivity growth.

Overall, an ageing population can be expected to weigh on economic growth through both the size of the labour force and productivity.²³ However, the research is not entirely unambiguous. A balancing factor may be that labour shortages instead lead to more automation and the use of advanced technology.²⁴ This means that the overall impact on GDP of an ageing population is also influenced by the investments made, and how well the labour force can absorb the new technology.

3.2 An ageing population brings changes in consumption patterns

The composition of demand is affected by an ageing population, among other things, as different age groups typically consume different types of goods and services, which can also affect relative prices in the economy.

Data show that consumption patterns of older people differ from those of younger people.²⁵ On average, older people consume relatively more domestically produced services such as health care and housing, and relatively less transport and clothing.²⁶ In addition, there is evidence that older consumers are less likely to change the composition of their consumption basket, i.e. they choose to continue buying the product they have always bought, but on the other hand, they have more time to shop, which means that they pay less for the same product than younger people do.²⁷

A change in consumption patterns with an increase in relative demand for, for example, health and social care services can affect prices in the economy. If the supply is

²² See Aksoy et al. (2019) and Azouley et al. (2020). The average age of business founders in the United States is around 42, and the average age of the founders of the fastest growing start-ups in the United States is 45.

²³ For example, the IMF has revised down its view of potential growth in Germany due to the effects of an ageing population on both labour supply and TFP growth, see IMF (2024).

²⁴ See Acemoglu and Restrepo (2017) who find that countries with a rapidly ageing population tend to adopt more automated technologies, such as industrial robots, which can compensate for the decline in GDP per capita driven by the ageing population.

²⁵ See data for the euro area in Nerlich and Schroth (2018), data for the United States in Nie and Gautam (2019) and Cravino et al. (2022), data for the United Kingdom in Atkinson and Hayes (2010), and data for the Netherlands in van Ewijk and Veerik (2012). According to the Household Expenditure Survey (HUT) for 1999-2001, there is a similar pattern in Sweden, see Statistics Sweden (2002).

²⁶ See also Giagheddu and Papetti (2018) for a breakdown of consumption into tradables vs non-tradables by age in several European countries and the United States.

²⁷ See Bornstein (2021) and Aguiar and Hurst (2007). These mechanisms imply that the demographic composition can affect both competition and prices, see also Brès and Angelini (2025).

inelastic (which depends on the availability and flexibility of the factors of production), the relative price of these services will increase. There is empirical evidence that an ageing population is driving the structural transformation of the economy towards a larger service sector, implying higher relative prices for services with a low import content (so-called non-tradables).^{28,29} This is due to difficulties in moving factors of production such as labour from one sector to another, and the size of the effect depends in turn on the flexibility of the labour market.

However, for example, healthcare is largely provided by the public sector in many countries, and households often do not pay the full cost of the service directly. In this way, this type of service is different from other types of goods and services. The household data underlying some of the studies undertaken are therefore not fully comprehensive, as they do not take into account the significant public expenditure on health and medical care services. The average cost of individual public consumption is significantly higher for the elderly.³⁰ Lower fertility rates and an ageing population will thus affect public consumption (and production) in particular. A higher proportion of older people increases the demand for health and social care services, while a lower proportion of children means that there is less need for pre-school, school and child-care services.

In all comparative countries except the Netherlands, the number of children aged 0-9 is expected to decline over the next decade (see figure 7). The expected decline in the number of children in Sweden is relatively large compared to other countries, and somewhat larger than the decline that began in the mid-1990s.³¹ At the same time, the number of people aged over 80 is expected to rise relatively substantially in all countries as a result of large birth cohorts in many countries around 80 years ago.³² The trend of an increasing number of people aged over 80 has been going on for some time as a result of the rising life expectancy, but a clear acceleration is expected in the coming years due to this cohort effect.

As a result of the demographic development, the employment needs in the Swedish welfare sector in the coming years are concentrated on care of the elderly.³³ The number of employees in care of the elderly needs to increase significantly in the coming years, while retirements are expected to be high. At the same time, the decline in

²⁸ Groneck and Kaufmann (2017) use panel data for 15 OECD countries to demonstrate this, while Cravino et al. (2022) demonstrates how ageing has driven structural change in the United States.

²⁹ Lis et al. (2020) show that the increased demand for non-tradables, in conjunction with an inflexible labour market, puts some upward pressure on inflation in the euro area over the period 1990–2030.

³⁰ “Individual public consumption”, in contrast to “collective public consumption”, is provided to a specific recipient and based on an individual need. In 2019, the average annual cost for people aged 25-54 was about SEK 43,000, while the cost for children aged 0-9 was about SEK 130,000 and for people aged over 80 about SEK 320,000, see National Institute of Economic Research (2024).

³¹ See footnote 11 for an explanation of the large fluctuations in the birth rate in Sweden in the 1980s/1990s.

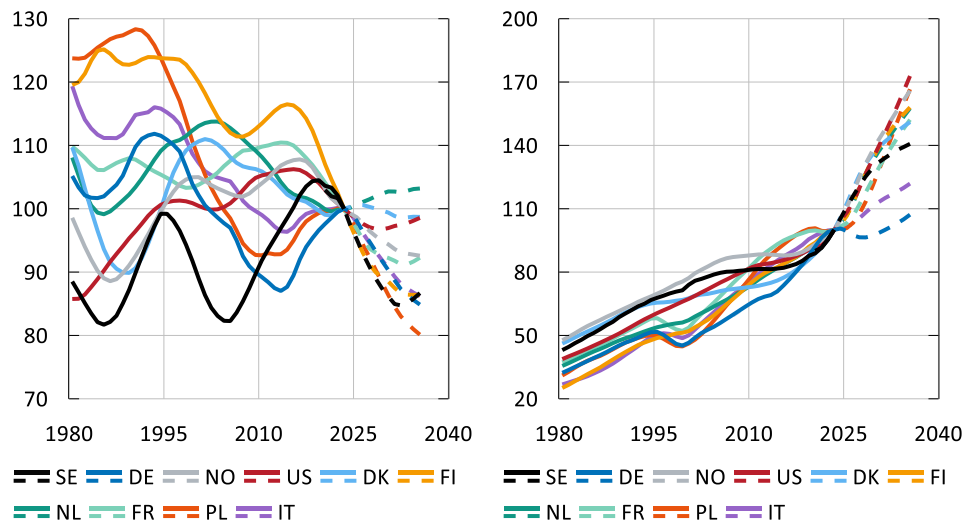
³² The slower development in the number of people aged over 80 in Germany is due to a relatively smaller and later 'baby boom' after the Second World War.

³³ See Swedish Association of Local Authorities and Regions (2024), which analyses the need of skills in welfare until 2033.

the birth rate reduces the need for staff in early childhood education and primary education, but the decline in staffing needs in this sector is not expected to compensate for the increase in staffing needs in care of the elderly.

Figure 7. Children 0-9 years and elderly older than 80 years

Index 100 = 2023



Note. SE=Sweden, DE=Germany, NO=Norway, US=United States, DK=Denmark, FI=Finland, NL=The Netherlands, FR=France, PL=Poland, IT=Italy. The UN and Statistics Sweden have out-come data up to end of 2023.

Sources: UN DESA and Statistics Sweden.

Overall, more people need to work in welfare in Sweden, while the labour force is expected to grow at a slow pace. To maintain the current level of welfare per user, and to increase employment in welfare, it is likely that relative wages will need to change, with higher wages in welfare occupations such as health care and care of the elderly. The extent to which relative wages will change depends partly on the flexibility of the labour market, given that the need for staff in other sectors can be assumed to decline at the same time, but also on the ability of the public sector to finance them.³⁴ The need to reallocate labour may also pose a challenge to wage formation models such as Sweden's, where the internationally competitive industry sets the norm because it does not take into account the need to attract labour to the domestic market-oriented parts of the economy.³⁵

³⁴ In a scenario with (only) 0.3 percentage points higher wage growth in local government relative to the business sector, public finances in Sweden are still considered sustainable up to and including 2050, but not in the longer term, see National Institute of Economic Research (2022).

³⁵ For a more detailed discussion, see Calmfors (2018) and Calmfors (2025).

3.3 Increased competition for labour

Thus, ageing affects the composition of demand and can thereby also affect relative prices and wages. In addition, a direct consequence of lower labour force growth may be a general shortage of labour relative to capital, which in itself may affect relative prices and drive up wages.³⁶ If, at the same time, population ageing implies lower productivity growth, this can be assumed to lead to increased inflationary pressures.

However, aggregate wage growth is also affected by composition effects, which can be assumed to counteract the effect of higher wage growth to some extent. If staff with a higher average wage level, such as older people retiring, can be replaced by staff with a lower average wage level, such as younger people, this can hold back aggregate wage growth in the economy.³⁷

3.4 Population growth affects construction

A direct effect of slower population growth is that it affects the need for housing and thus activity in the construction industry. One way of illustrating this is to look at the Swedish National Board of Housing, Building and Planning's forecasts for Swedish housing needs. However, they take into account both demographics and the need to address existing housing shortages. The latter means that the demand forecast is often high in relation to what is actually built, which is also affected by prevailing market conditions. According to the National Board of Housing, Building and Planning's 2023 estimate, 67,300 new homes were needed annually until 2030. The large downward revision of the population forecast has contributed to the fact that the need is now estimated to be less and instead amounts to 52,300 new homes annually.³⁸ In figure 8, it is however clear that the need for new housing solely due to the demographic developments is significantly lower than that. The contribution of residential construction to GDP growth in the coming years can be assumed to be relatively small overall.³⁹

Lower fertility rates and more pensioners can also be assumed to affect average household size, which can further be assumed to affect the size of housing demand and also housing prices. In addition, demographic trends may create regional imbalances as a result of different demographic trends and needs in different parts of the country. However, given the increase in the number of elderly people, many of whose

³⁶ For example, in Germany, where the working-age population has grown weakly over the past decade, labour shortages have trended upwards and, despite a weak economic situation with rising unemployment, are at an elevated level, see KfW-ifo (2024). Furthermore, this has spilled over into wage developments, not least in recent years (see Bundesbank (2024)).

³⁷ See, for example, Bank of England (2016) and Flodberg (2018).

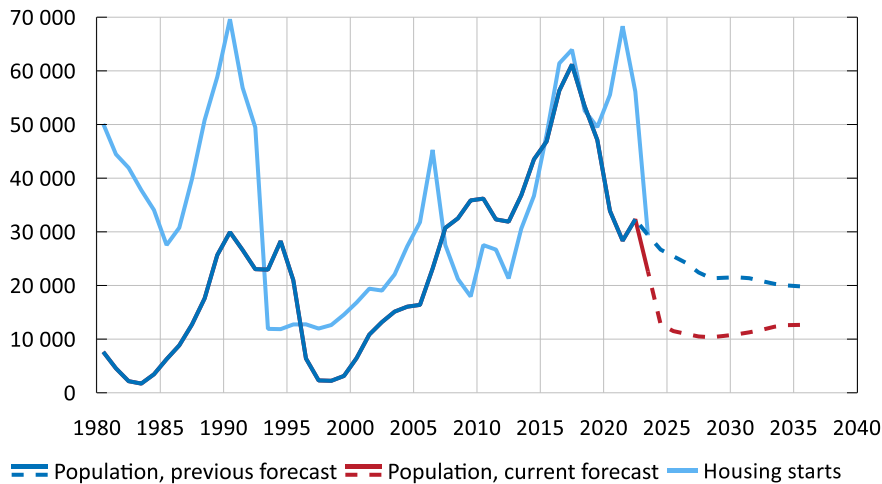
³⁸ The new assessment is valid for the years 2024–2033. The revision is also explained by the high number of housing completions in recent years. See the National Board of Housing, Building and Planning (2024).

³⁹ The impact on growth in the slightly longer term depends on the ease of shifting production factors such as labour from the construction sector to other sectors, and on the relative productivity of these sectors in relation to the construction sector.

households need more adapted housing, the need for new or remodelled housing may increase even in those regions that are not considered to have a need to build.

Figure 8. Housing starts and population development

Number and annual change in number



Note. To better illustrate the need for new housing, the population is divided by 2.2, which is the average household size in Sweden.

Sources: Statistics Sweden and the Riksbank.

3.5 Major impact on the sustainability of public finances and the pension system

Demographic developments play an important role in the evolution of public finances, both via effects on GDP and hence tax revenue developments, and on the expenditure side as a result of the increasing level of age-related expenditure.⁴⁰ A larger proportion of older people increases both the demand for welfare services and the provision of social transfers. At the same time, a lower proportion of children means that there is less need for preschool, school and childcare, as well as certain transfers such as child benefits.

An ageing population with an increased number of pensioners relative to those working also increases the burden on the pension system. The challenge is even greater in countries with low retirement ages and in countries where the pension system is based exclusively or mainly on the principle that the working population pays for the pensions of the retired (so-called pay-as-you-go systems).⁴¹ In these countries, the risk

⁴⁰ However, for public finances and the pension system, the economic dependency ratio, which takes into account the share of the population that is employed, is more crucial than the demographic dependency ratio.

⁴¹ The Swedish pension contribution is currently 18.5 per cent of salary, of which the majority, 16 per cent, goes to the income pension, which operates according to the pay-as-you-go model, and 2.5 per cent goes to the premium pension, which is funded. As a result of increasing life expectancy, Sweden raised the pension-related age limits in both 2020 and 2023, and a so-called 'target age' will be introduced in 2026. The

of increased public spending on pensions is particularly high, which is a challenge if the tax base is shrinking at the same time. Given that an ageing population also can be assumed to slow growth, this could lead to rising debt ratios.⁴² In particular, the challenge for Japan and Italy, where both the median age and government debt are already high, is likely to be great. It is likely that the ageing of the population will lead to a reform of welfare systems in many countries.

3.6 Demographics affect the neutral interest rate

For a small open economy like Sweden, the neutral interest rate, i.e. the real interest rate compatible with normal resource utilisation, is determined almost exclusively by structural changes in the rest of the world.⁴³ Global demographic changes are one of several structural changes in the economy that are assumed to affect the equilibrium between savings and investment, and thus the evolution of the neutral interest rate. According to the so-called life-cycle hypothesis, individuals plan their consumption and savings over their lifetime to smooth out their consumption. Consumption in a period then depends both on future expected wealth and on life expectancy. Incomes tend to be unevenly distributed over life, with lower income at the beginning of working life, which then grows over time and declines again in retirement. This is why savings are highest in mid-life and closer to retirement. A change in the age composition of the population and longer life expectancy thus affect aggregate savings.⁴⁴

There are a large number of studies showing that demographic changes in recent decades have contributed to the decline in the neutral interest rate.⁴⁵ Demographic changes can affect the neutral interest rate in several different, and partly opposing, ways. As the share of the population of retirement age is now rising in many countries, savings can be assumed to decline, which can thus be assumed to raise the neutral interest rate.⁴⁶ At the same time, increasing life expectancy means, all else being equal, that households will have to save more for a longer period of retirement, putting downward pressure on the neutral interest rate. Furthermore, a lower birth rate and lower labour force growth imply lower returns on capital and lower demand for

target age is set annually and six years before it is applied. For the years 2020–2024, it is decided to be 67 years, which thus applies in practice for the years 2026–2030. The calculation of the target age is based on life expectancy and, for example, the forecast for the target age for people born between 1981 and 1983 is now 69 years, see the Swedish Pension Agency for more information.

⁴² See Darvas et al. (2024), for an analysis of the impact of demographics on public debt in Europe under the new fiscal framework.

⁴³ For a more detailed review of the theory behind the neutral interest rate, and of the development of various explanatory factors that can be assumed to affect the neutral interest rate, as well as more references, see for example Lundvall (2023).

⁴⁴ It can also be assumed to affect the current account and exchange rate, see for example Camacho and Lindström (2021) for a description of savings, the current account and the interaction with the exchange rate. However, for reasons of delimitation, these effects are not described in more detail in this Staff memo.

⁴⁵ See, for example, Rachel and Summers (2019), Lunsford and West (2019) and Aucklert et al. (2021).

⁴⁶ However, there is research that, contrary to the predictions of the life-cycle hypothesis, shows that older people instead reduce their consumption and save more in connection with retirement, see Olafsson and Pagel (2024).

infrastructure investment, for example, which also lowers the neutral interest rate. There is also research highlighting that population ageing is associated with a higher degree of risk aversion, which increases the demand for safe assets. This in turn also leads to a lower neutral interest rate.⁴⁷ The sum of these different channels is uncertain. However, a number of studies find that the direct effects of demographics mentioned above will hold back the neutral interest rate globally for some time to come.⁴⁸ This affects central banks' monetary policy room for manoeuvre and is problematic when inflation is low and the policy rate is close to the lower bound.

However, demographic changes may also affect the neutral interest rate more indirectly via the impact on public finances and through the effect on productivity. The ageing population is one important reason why public debt in the United States is expected to increase, and thus also the supply of US government bonds. This means that the supply of safe and liquid assets in the economy increases, which can be expected to raise the neutral interest rate. At the same time, it appears that population ageing also has a negative impact on productivity growth (see Section 3.1), putting downward pressure on the neutral interest rate.

⁴⁷ See, for example, Ferreira and Shousha (2020) and Kopecky and Taylor (2022).

⁴⁸ Auclert et al. (2021) finds that, on balance, demographic changes can be expected to continue to hold back global interest rates in the coming decades by around one percentage point from their 2016 level. For the euro area, different estimates indicate that demographics can be expected to hold back interest rates by a further 0.5 percentage point until 2030, see Brand et al. (2018) for a compilation.

Concluding discussion

Demographic developments in high-income countries in particular can be expected to dampen potential GDP growth in the coming decade compared with the previous decade. All else being equal, growth will be significantly lower in most of the countries we have studied. This is due to both lower labour force growth and likely also due to negative effects on productivity growth. In particular, the development of the working-age population will dampen growth in Germany and Italy, but the slowdown in the Netherlands and Denmark is also expected to be relatively large. Potential growth in Sweden can also be assumed to be dampened by demographic developments, but not quite to the same extent.

The composition of demand is also affected by an ageing population. Developments in other countries may mean reduced demand for Swedish exports in the future, both because growth in several important trading countries will be lower and because the composition of demand in these countries can be assumed to be affected by the ageing of the population, with increased demand for domestically produced services. It is also reasonable to assume that the contribution of housing construction to GDP growth in Sweden will be relatively small going forward. The growing number of older people also means an increased demand for services that are largely provided and financed by the public sector in many countries, not least in Sweden. In order to attract staff, it is likely that relative wages will need to change with higher wages in, for example, elderly care. These activities are largely financed through taxes. It is therefore reasonable to assume that not only willingness to pay tax and political priorities, but also wage formation, will influence whether sufficiently high wages in health and care services can be offered to bring about such a structural transformation. At the same time, labour force growth is slowing, which can be expected to lead to increased competition for labour in the labour market in general and upward pressure on wages.

As with other projections, population forecasts are uncertain. However, given that the current population and age structure are known, there is a good chance of certain demographic variables being accurate. For example, we know that current fertility rates affect the development of people of working age some 20 years into the future, and we know how many people are already older and outside the labour force today. However, the exact development depicted in population projections made by the UN and Statistics Sweden is unlikely to materialise. Mortality could change, which could alter the picture, and unexpected migration patterns could change the development quite significantly. But given that fertility rates have been low in many countries for a long time, population ageing in many countries, and the challenge it poses, are more or less a fact. The Riksbank always takes demographic developments into account in its forecasting work, but in light of the major changes now expected in the relatively short term in Sweden and in many important trading countries, this analysis argues in favour of placing even more focus on such developments. Not least on the negative effects on productivity growth.

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APPENDIX 1 - Sensitivity analysis, different data sources

The choice of data source for demographic projections partly involves a trade-off between consistency and comparability, and timeliness. The UN projections, on which we largely rely here, are useful for a broader international comparison as they are globally comprehensive and based on the same assumptions. Eurostat and the OECD also produce population projections for a large number of countries. However, national statistical sources can be assumed to be more up-to-date, not least with regard to various national events. An example could be if there have been political decisions regarding immigration or if migration has recently changed significantly.

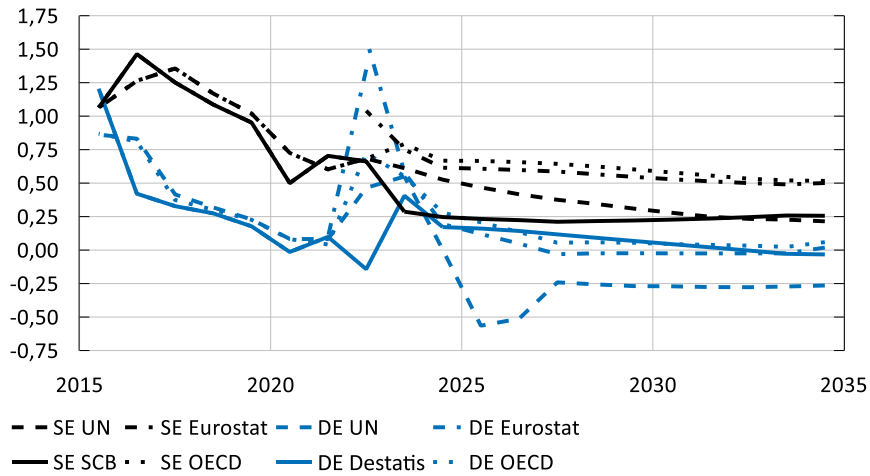
Figure 1 and Figure 2 illustrate the differences between various sources. Statistics Sweden's population projection for Sweden takes into account the low fertility rates in recent years and incorporates recent changes in migration policy. The UN forecast also appears to be relatively up to date, while other OECD and Eurostat forecasts include faster population growth in their projections. For Germany, the large immigration from Ukraine in recent years has played a major role in the development of the population, and there is clearly a large discrepancy in population development between the different sources both in terms of outcomes in recent years and in the short-term projections.⁴⁹ Similarly, in the comparison for the US, only the CBO seems to have updated its forecast with the increase in immigration to the US in recent years.⁵⁰ The data for Norway also show relatively large differences in outcomes in recent years, and also in short-term projections.

However, the picture that population growth will slow down in the slightly longer term compared to the last decade is not different. The different forecasts for each country are then relatively close to each other. The exceptions are the UN population growth projections for Norway and Germany, which stand out as low in the longer term compared to the others. The range of forecasts for Norway in the slightly longer term is also relatively wide.

⁴⁹ This also applies to Poland, which has experienced high immigration from Ukraine.

⁵⁰ Part of the difference between the CBO and the US Census can be explained by the fact that they use different underlying data, see Jensen et al. (2024).

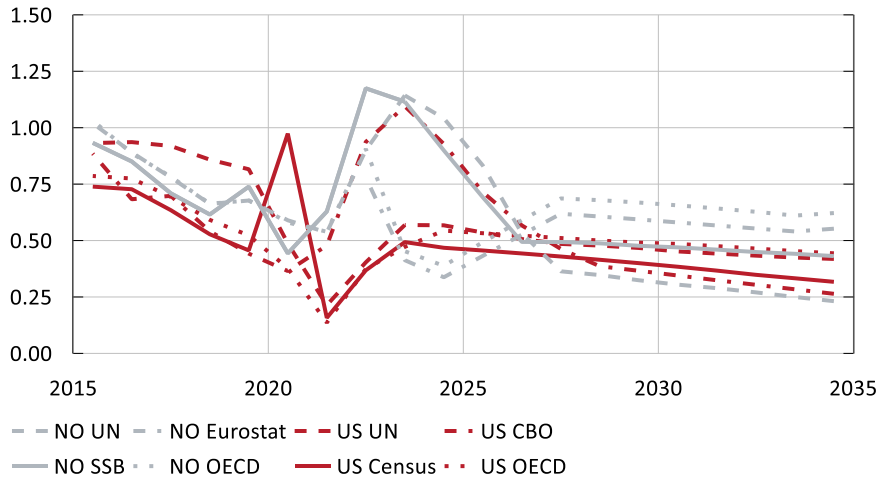
Figure 1. Population of Sweden and Germany, different demographic projections
Annual percentage change



Note. SE=Sweden, DE=Germany. Eurostat/OECD forecasts have outcomes up to and including 2021/2022, Destatis, the UN and Statistics Sweden (SCB) have outcomes up to and including 2023.

Sources: Destatis Statistisches Bundesamt, Eurostat, OECD, Statistics Sweden and US DESA.

Figure 2. Population of Norway and the US, different demographic projections
Annual percentage change



Note. NO=Norway, US=United States. Eurostat/OECD projections have outcomes through 2021/2022, CBO has outcomes through 2021, US Census has outcomes through 2022, and Statistics Norway (SSB) has outcomes through 2023. See further footnote 47.

Sources: Congressional Budget Office, Eurostat, OECD, Statistics Norway, UN DESA and US Census Bureau.

APPENDIX 2 – High-income, middle-income and low-income countries

High-income countries	Middle-income countries	Low-income countries
American Samoa	Albania	Afghanistan
Andorra	Algeria	Burkina Faso
Antigua and Barbuda	Angola	Burundi
Aruba	Argentina	Central African Republic
Australia	Armenia	Chad
Austria	Azerbaijan	Congo, Dem. Rep.
Bahamas, The	Bangladesh	Eritrea
Bahrain	Belarus	Ethiopia
Barbados	Belize	Gambia, The
Belgium	Benin	Guinea-Bissau
Bermuda	Bhutan	Korea, Dem. People's Rep.
British Virgin Islands	Bolivia	Liberia
Brunei Dar-Essalam	Bosnia and Herzegovina	Madagascar
Bulgaria	Botswana	Malawi
Canada	Brazil	Mali
Cayman Islands	Cabo Verde	Mozambique
Channel Islands	Cambodia	Niger
Chile	Cameroon	Rwanda
Croatia	China	Sierra Leone
Curaçao	Colombia	Somalia
Cyprus	Comoros	South Sudan
Czechia	Congo, Rep.	Sudan
Denmark	Costa Rica	Syrian Arab Republic
Estonia	Côte d'Ivoire	Togo
Faroe Islands	Cuba	Uganda
Finland	Djibouti	Yemen, Rep.
France	Dominica	
French Polynesia	Dominican Republic	
Germany	Ecuador	
Gibraltar	Egypt, Arab Rep.	
Greece	El Salvador	
Greenland	Equatorial Guinea	
Guam	Eswatini	
Guyana	Fiji	
Hong Kong SAR, China	Gabon	
Hungary	Georgia	
Iceland	Ghana	

Ireland	Grenada
Isle of Man	Guatemala
Israel	Guinea
Italy	Haiti
Japan	Honduras
Korea, Rep.	India
Kuwait	Indonesia
Latvia	Iran, Islamic Rep.
Liechtenstein	Iraq
Lithuania	Jamaica
Luxembourg	Jordan
Macao SAR, China	Kazakhstan
Malta	Kenya
Monaco	Kiribati
Nauru	Kosovo
Netherlands	Kyrgyz Republic
New Caledonia	Lao PDR
New Zealand	Lebanon
Northern Mariana Islands	Lesotho
Norway	Libya
Oman	Malaysia
Palau	Maldives
Panama	Marshall Islands
Poland	Mauritania
Portugal	Mauritius
Puerto Rico	Mexico
Qatar	Micronesia, Fed. Sts,
Romania	Moldova
Russian Federation	Mongolia
San Marino	Montenegro
Saudi Arabia	Morocco
Seychelles	Myanmar
Singapore	Namibia
Sint Maarten (Dutch part)	Nepal
Slovak Republic	Nicaragua
Slovenia	Nigeria
Spain	North Macedonia
St. Kitts and Nevis	Pakistan
St Martin (French part)	Papua New Guinea
Sweden	Paraguay
Switzerland	Peru
Taiwan, China	Philippines
Trinidad and Tobago	Samoa
Turks and Caicos Islands	São Tomé and Príncipe

United Arab Emirates
United Kingdom
United States
Uruguay
Virgin Islands (U.S.)

Senegal
Serbia
Solomon Islands
South Africa
Sri Lanka
St Lucia
St Vincent and the Gren-
adines
Suriname
Tajikistan
Tanzania
Thailand
Timor-Leste
Tonga
Tunisia
Turkmenistan
Tuvalu
Türkiye
Ukraine
Uzbekistan
Vanuatu
Vietnam
West Bank and Gaza
Zambia
Zimbabwe



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