



Federal Ministry  
for Economic Affairs  
and Climate Action

# Macroeconomic implications of demographic change

*Scientific Advisory Board at the Federal Ministry for  
Economic Affairs and Climate Action*

At several meetings, most recently on October 01, 2024, the Scientific Advisory Board at the Federal Ministry for Economic Affairs and Climate Action dealt with the topic of

## Macroeconomic implications of demographic change

and arrived at the following statement.

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# 1. Introduction

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Demographic change is nothing new. Nevertheless, the extent of its overall economic impact is still underestimated. Two indicators show the magnitude of the danger. On the one hand, the much-lamented shortage of skilled workers has now become a general shortage of labor that encompasses all qualification levels. The retirement of the baby boomers from the workforce has already begun and will continue over the next ten years. During this time, more than 4 million more people will retire than young people will join the workforce. In relation to the number of full-time equivalent employees, this is a decline of 10%.

A second indicator is the intensity of collective bargaining in 2023, which seems to reflect not only the desire to at least partially compensate for inflation, but also the shortage of labor and the associated strengthening of the employee side in wage negotiations. Furthermore, collective bargaining is not only about high wage demands, but also about reductions in working hours, which are likely to further exacerbate the shortage of labor. In view of the foreseeable demographic change, it can be assumed that this development will continue for several years. This is a fundamental change in the situation on the labor market: it is changing from a buyer's to a seller's market.

Discussions on the effects of demographic change have so far focused primarily on the sustainability of social systems, especially pay-as-you-go pensions (this Advisory Board's report September 2016 and May 2021) and long-term care (report June 2022).<sup>1</sup> This discussion has been rekindled by the second pension package with its planned increase in social spending (this Advisory Board's letter July 2023). However, the retirement of the baby boomers does not only affect the income and expenditure of the social security systems, but also the overall eco-

nomical development. The shortage of labor causes a shortage in the supply of goods and services that are produced. Imports can compensate for part of this, but this is only possible to a limited extent, especially in the service sector. In its latest annual report (SVR 2023/24), the German Council of Economic Experts estimates that the growth potential of the German economy will only be 0.4% per year over the next ten years, compared to 2.4% in the years before reunification and 1.4% between 2000 and 2019. The Council shows that this is mainly due to the shortage of labor. In addition, the decline in the number of workers is unlikely to be offset by stronger growth in labor productivity, as its trend is going in the opposite direction: productivity growth has been declining over the past 30 years.

This report therefore focuses on the shortage of labor and the decline in productivity growth. It first presents the multitude of real economic effects of the supply shortage. The following sections then look at the causes of this supply shortage. They estimate the extent to which the labor force is shrinking and what levers are available to counteract this. Section 3 describes the demographic development, while section 4 presents scenarios of labor shortages. Section 5 assesses the potential for increasing the labor supply in Germany through measures such as greater labor market participation. Section 6 then turns to the long-observed decline in labor productivity growth and examines possible causes and possible countermeasures. It also discusses whether enough capital is accumulated in an ageing society to finance investments that could increase productivity.

The report summarizes the recommendations in section 7. There is no single "silver bullet" to counteract the negative effects of demographic change on overall economic development. Instead, many

1 See Wissenschaftlicher Beirat (2016, 2021, 2022).

### Box 1: The German government's Growth Initiative

In its Growth Initiative in August 2024,<sup>2</sup> the German government announced several measures, which also address the challenges of demographic change. It contains measures to strengthen the labor supply, which are summarized and briefly commented on here.

1. **Older workers:** First, to create additional incentives for voluntary longer employment, employer contributions to pension and unemployment insurance shall be paid directly to employees who continue to work after the age limit. Second, such employees shall be able to choose between monthly supplements to their future pension as compensation for postponing retirement and a one-off "pension deferral bonus".
2. **Women:** In order to create incentives for second earners in marriages to work, the tax class combination III/V shall be transferred to the so-called factor procedure of tax class IV.
3. **Unemployed:** To facilitate the transition of the long-term unemployed into gainful employment subject to social security contributions, a premium is planned, which will not be offset against other transfers. Furthermore, violations of cooperation and reporting obligations within the framework of the citizen's income shall be sanctioned more severely.
4. **Migrants:** First, a fictitious permit for skilled workers shall be introduced in such a way that a work permit is deemed to have been granted if the responsible immigration authority has not made a decision within two weeks. Secondly, immigrants shall receive temporary tax relief.

The Advisory Board welcomes this Growth Initiative. The measures point in the right direction. However, their effect on economic growth is probably moderate in view of the challenges posed by demographic change. This report presents further-reaching proposals for structural adjustment to demographic change. Many of the desired effects can also be achieved without additional government spending.

<sup>2</sup> <https://www.bundesregierung.de/resource/blob/976020/2297962/ab6633b012bf78494426012fd616e828/2024-07-08-wachstumsinitiative-data.pdf?download=1>

individual measures are required in various policy areas. The report shows that Germany's untapped labor force potential is sufficient to significantly mitigate, if not avert, the negative consequences of a labor shortage. However, this requires structural adjustments, which in many cases require resources. These resources come in addition to the resources needed to combat climate change, the necessary modernization of the German infrastructure and defense, which add to the challenges of the demographic-related shortage of labor and the decline in productivity growth. A coordinating and prioritizing strategy is therefore necessary.

The Advisory Board recommends developing a *national strategy for economic policy in the face of demographic change* that has three pillars and substantially expands the Federal Government's "Growth Initiative" (Box 1). Pillar 1 aims to make better use

of Germany's existing labor force potential. The emphasis here should be on the labor market participation of women and older people, as this is where the greatest potential lies. Pillar 2 aims to halt the decline in productivity growth and, in the best case, reverse it. On the one hand, it must be ensured that modern technologies (digitalization, robots, artificial intelligence) are sufficiently available to replace the increasingly scarce workforce. In addition, increased educational efforts are needed to increase labor productivity. There is a risk that the investments required for this will be displaced by consumer spending or transfers (e.g. social security). Pillar 3 emphasizes the need to keep an eye on the overall economic context in order to avoid selective and only superficially helpful measures that can cause economic damage due to their negative feedback effects.

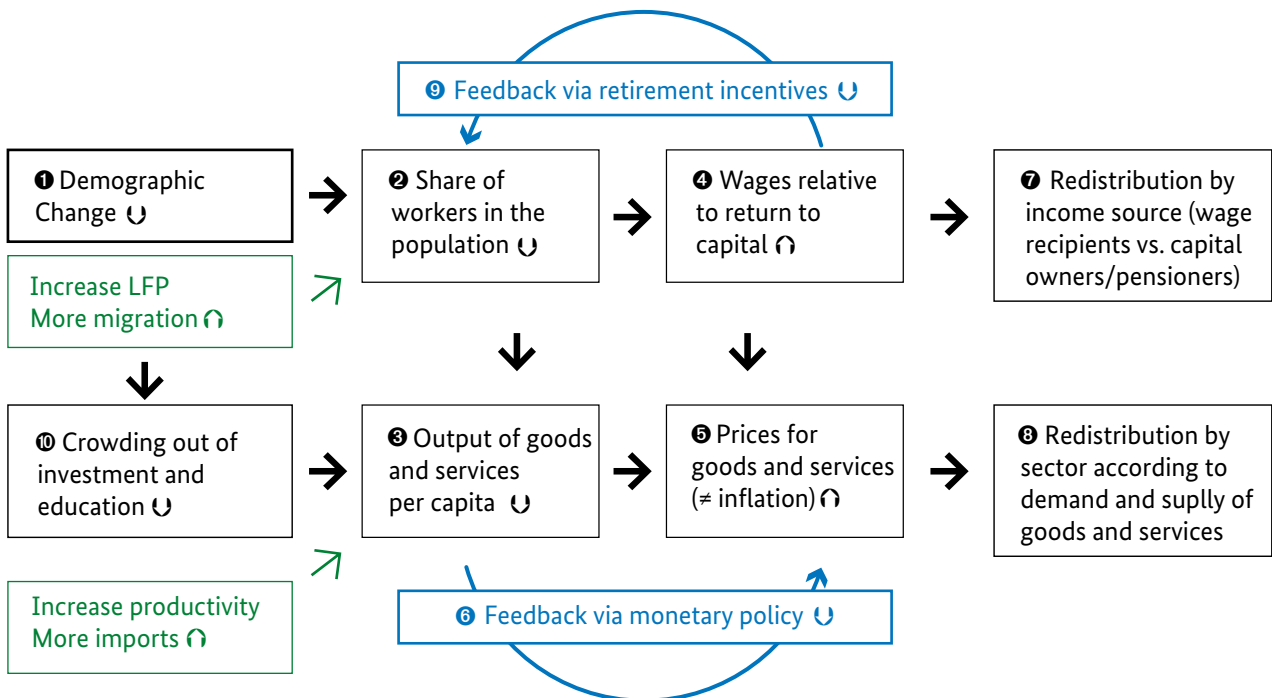
## 2. Effects of the supply shortage on the real economy

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Economic policy measures that address demographic change must be seen in the overall economic context. The effects of the labor supply shortage on the real economy exhibit a large variety and complexity. Figure 1 provides an overview of the most important mechanisms. These are explained below in the text.

Demographic change ❶ is leading to a dramatic reduction in the proportion of working people in the population. ❷ With fewer people in employment, ceteris paribus one can only produce a lower output of goods and services per head of the population. ❸ Box 2 explains the dependence of the markets for goods and services on events in the labor market.

Figure 1: Variety of macroeconomic effects due to demographic change



Source: own illustration

### Box 2: Goods market effects of a shortage of labor supply

To better understand the effects of a shortage of labor supply, the concepts of aggregate supply and aggregate demand developed in macroeconomic theory can be used. The aggregate supply function and the aggregate demand function describe relationships between the prices of goods and services expressed in monetary units and the quantities of goods and services traded where other markets are assumed to adjust. Strictly speaking, these are indices of prices and quantities; differences between the various goods and services are disregarded. A macroeconomic equilibrium corresponds to a combination of prices and quantities in which macroeconomic supply and macroeconomic demand match.

Macroeconomic supply and demand functions have similar properties to the supply and demand functions used in microeconomics for a single market, but are defined differently. The construction of these functions takes into account not only the behavior of the participants, but also the adjustment of other variables such as wages, interest rates and income. Thus, for each value of prices, the aggregate supply function denotes the quantity that is offered if the labor market mechanisms for determining wages, working hours and employment take account of prices, insofar as the information of the participants allows this. If these mechanisms impose fixed real wage targets, the aggregate supply can also be completely inelastic, so that price increases are neutralized by wage increases.

Aggregate demand is made up of demand for consumption, demand for investment, government demand for goods and services and the export surplus. Interest rates and incomes, and possibly also exchange rates, are treated as endogenous, i.e. consumer demand at given goods prices results from what private households demand at these goods prices and endogenously determined interest rates and incomes.

At given prices, a shortage in the supply of labor causes a reduction in the overall economic supply of goods and services due to a combination of higher wages and lower labor input. Unless compensated by technical progress, increased capital input or targeted policy measures, a decline in quantities produced is unavoidable. This results in a new macroeconomic equilibrium with higher prices, particularly for labor-intensive goods and services, and correspondingly lower volumes.

These price increases ensure that the quantities demanded adjust to the lower supply. Many increases hurt those negatively affected, but without price increases it is hardly possible to adjust demand to the reduction in supply. Even monetary policy cannot change the rise in the price of labor-intensive goods and services. The shortage of labor supply means that wage rates will tend to rise. ④ It is to be expected that there will be relatively high wage increases in the future. Unlike in previous decades, this is less an effect of the bargaining power of the trade unions than a consequence of the change in scarcity ratios, which could also have an effect on effective wages independently of collective wage agreements. Companies that have difficulties finding workers on the market will be prepared to pay higher wages of their own accord. However, both of these factors may also strengthen the power of the trade unions.

The shortage in the supply of labor leads to a shortage in the supply of goods and services. At given prices, less is offered, either because fewer workers are available or because the increase in wage costs makes production less attractive. The shortage of goods and services leads to higher costs for firms, which are reflected in price increases ⑤.

Demographic change therefore also poses new challenges for monetary policy. It is to be expected that there will be considerable price increases for several years as long as the process of labor supply shortages continues. This is not a monetary phenomenon, but a real economic one. If the ECB reacts to this within the scope of its mandate and neutralizes the price increases through monetary policy measures, the volume reductions will be correspondingly greater ⑥.

The shortage in the supply of goods and services available to the economy will be offset by a reduction in their use in consumption, investment, government spending, or a reduction of the current trade surplus (= increase in net imports from abroad). Regarding consumption, the reduction would result from consumers losing purchasing power. This effect primarily affects those people who are unable to benefit from the shortage on the labor markets themselves through higher wages and salaries ⑦. The development mentioned here influences the distribution of income in favor of those whose services are valued higher on the market due to scarcity premiums, and at the expense of those who ultimately have to pay these scarcity premiums without being able to benefit from higher scarcity premiums themselves ⑧. It also influences the distribution of wealth at the expense of those who own nominal assets and in favor of those who earn higher incomes with real assets or whose claims are fixed in monetary units.

Attempts to protect those negatively affected by this, e.g. by indexing incomes such as pensions, would make the volume reductions resulting from the price increases smaller for these people, but would increase the scope of the price increases overall, as the reductions in demand from other groups would have to be correspondingly larger ⑨.

If all negative real income effects of price changes are neutralized, demand will not adjust to the supply shortage. This can lead to feedback processes in which the shortage of supply causes wages and prices to rise. Indexation of incomes will then create scope for further wage and price increases without any limit being placed on this process.

The developments mentioned above harbor considerable potential for political conflict. The juxtaposition of rising living standards for those who benefit from development and falling living standards for others can cause considerable dissatisfaction. In addition to such intragenerational tensions, there is also the familiar intergenerational potential for conflict: the younger generation, which works to create the social product, will increasingly have to share this with the older generation by paying higher taxes and contributions. It is also likely that expenditures that benefit the younger generation (e.g. education, investment) will be crowded out by social spending in favor of the older generation ⑩. Avoiding these potential conflicts, or at least keeping them to a minimum, is a large challenge for economic policy.

### 3. Effects of demographic change on the old-age dependency ratio up to 2070

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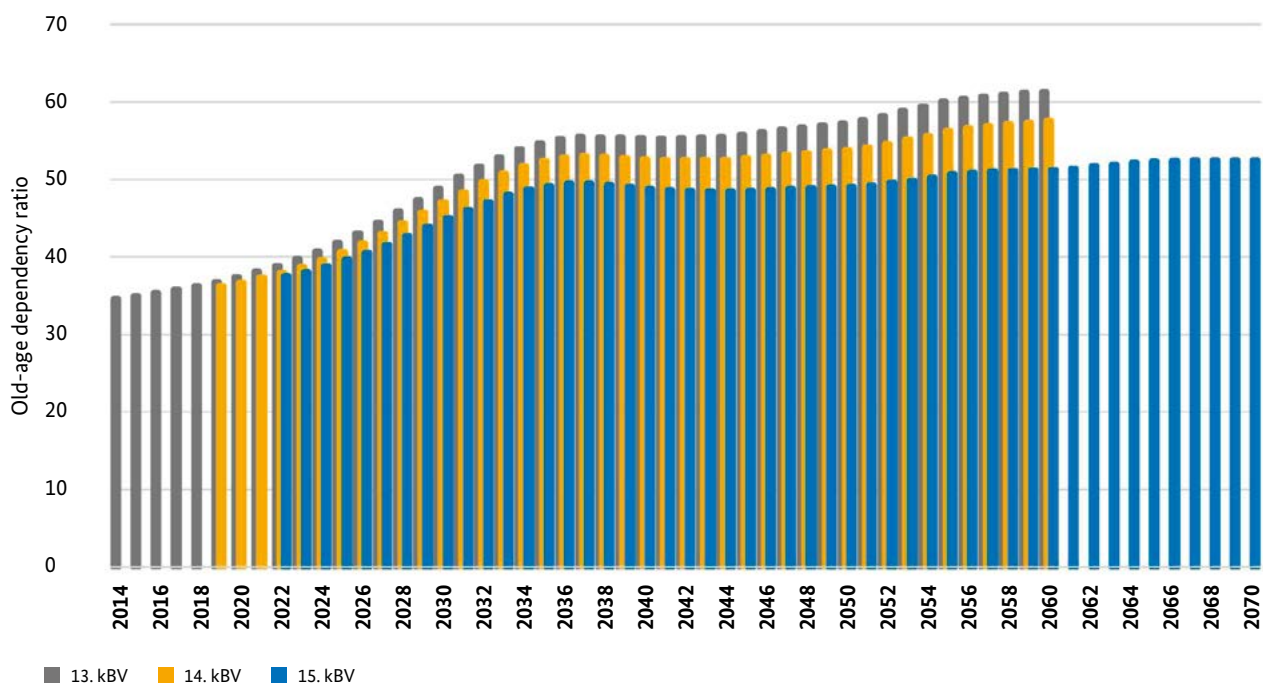
The change in the age structure of the population is unavoidable in the short and medium term. Even a significant increase in the birth rate could not change this in the next two decades because it takes so long for newborns to become workers. Increased immigration can alleviate the problem on the labor market, especially if migrants are well educated. However, it cannot solve the problem because immigration would have to be unrealistically high (Wiss. Beirat 2021; SVR 2023/24). This is addressed in section 5.

The change of the age structure means that there are relatively fewer people of an age associated with employment and relatively more people of an age at which most people are retired. This demographic structural change is best illustrated by the so-called old-age dependency ratio, which shows

the number of people aged 65 and over in relation to the number of people aged 20 to 64 (Figure 2).

Figure 2 is based on the projections according to the medium variants of the 13th, 14th and 15th coordinated population projections of the Federal Statistical Office (StaBA 2017, 2019, 2022). Other age thresholds for the old-age dependency ratio show the same qualitative picture: the old-age dependency ratio rises until the mid-2030s before reaching a plateau and increasing only slowly until 2060/2070. The old-age dependency ratio is therefore not heading for a peak, after which it will fall again, but will remain high in the long term and therefore remain a challenge for overall economic development. This is due to the assumption that life expectancy will continue to rise steadily, while the other demographic parameters (birth rate and

**Figure 2: Increase in the old-age dependency ratio 2005-2070 according to the latest population projections by the Federal Statistical Office (percent)**



Source: 13th to 15th coordinated population projections by the Federal Statistical Office; combination of the medium variants (G2-L2-W2).

net immigration) will remain at a constant level from 2033 onwards. The reasons for this development are described in the Advisory Board's report of June 2021 regarding proposals for a reform of the statutory pension insurance system. Box 3 describes the assumptions on which Fig. 2 is based.

It is striking that the 15th coordinated population projection (15th kBV) from 2022 projects a significantly lower shift of the age structure than the two previous population projections. This is mainly because the Federal Statistical Office assumes a significantly higher net migration (293,000 people

### Box 3: Assumptions of the 15th coordinated population projection

#### Medium variant G2-L2-W2

#### Assumption G2 on fertility: decline in 2022, then increase to the moderate level of 1.55 children per woman

In assumption G2 "moderate development of fertility", the total fertility rate initially falls to 1.48 children per woman in 2022. It then gradually rises to 1.55 children per woman in 2032 with a simultaneous increase in the average age of mothers at birth by about a year and remains constant thereafter. This is based on the assumption that mothers will continue to give birth to two children on average in the future and that mothers will account for around 78% of all women born in a given year. The final number of children per woman would first rise from the current 1.58 to 1.65 children and then fall to 1.55 children per woman.

#### Assumption L2 on life expectancy (moderate increase)

According to assumption L2 "moderate increase", men will reach an average life expectancy of 84.6 years at birth in 2070 and women 88.2 years. This corresponds to an increase of 6.0 years for men and 4.8 years for women compared to the 2019/2021 mortality table. The difference in life expectancy between men and women is reduced accordingly from 4.8 to 3.6 years. 65-year-old men can expect to live for 21.7 years in the last projection year, while women of the same age can expect to live for 24.6 years. The basis of the mean assumption L2 is the combination of the long-term trend development from 1970/1972 to 2017/2019 and the short-term trend development since 2010/2012.

#### Assumption W2 on net migration (moderate)

In the medium assumption W2, net migration increases from 329 thousand people in 2021 to 1.3 million in 2022 (Ukraine effect). In 2023, it decreases by around 60 % to 513 thousand people and then falls continuously until 2033 to 250 thousand. Between 2022 and 2070, about 14 million in total or 293 thousand people per year would immigrate on balance under this assumption.

on average in the years 2022-2070 in the 15th kBV instead of 200,000 people from 2021 in the 13th kBV) and a significantly lower increase in life expectancy (84.6/88.2 years for men/women by 2070 instead of 84.8/88.8 already in 2060). Conversely, the 15th kBV assumes a lower birth rate than the 13th kBV, which, however, has no noticeable influence on the old-age dependency ratio in the next two decades because this ratio only covers people aged 20 and over.

The higher net immigration is initially due to the unexpected influx of refugees since the start of the war in Ukraine. The Federal Statistical Office justifies the higher net immigration in the long term (250,000 people per year from 2033 onwards) with the Federal Government's efforts to recruit additional foreign workers due to the high shortage of skilled workers and the high risk of further crises and the resulting waves of refugees (see StaBA 2022). However, even taking into account the two waves of refugees in 2015 and 2022, the average net immigration over the last 20 years was only around 220 thousand people per year. An average immigration of 293 thousand people therefore seems high, especially as it is unclear whether immigration on this scale will be supported by the population.

The Federal Statistical Office justifies the lower increase in life expectancy with the development actually observed since 2008 (see StaBA 2022). Before 2008, the average annual increase in life expectancy at birth was around 0.3/0.2 years (men/women). Since 2008, however, it has only been 0.1 years for both genders. As the time period since 2008 becomes more important for forecasting mortality trends with each new population projection, the projected increases in life expectancy

decrease accordingly. The assumptions of the 13th and 14th kBV were already lower than in their respective predecessor forecasts. However, the discrepancy between the 14th and 15th kBV is even greater, which is because the trend calculation also includes the decline in life expectancy during the Covid-19 pandemic (StaBA 2022). In addition, the mortality tables for 2021 (i.e. during the pandemic) are chosen as the starting point for the extrapolation of future mortality tables. The underlying assumption is that the decrease in life expectancy expected during the pandemic will not be made up for after the pandemic. It is doubtful whether this assumption is realistic, as deaths tend to be brought forward during an epidemic. This implies lower mortality in the following years, which is already evident from the fact that age-standardized mortality has fallen in 2023.

It is also doubtful whether the assumed long-term increase in the birth rate to 1.55 women per child is a realistic assumption. In fact, the birth rate has fallen unexpectedly sharply in recent years to 1.36 children per woman (as of fall 2023).

Overall, the latest population forecast from the Federal Statistical Office is therefore more on the optimistic side in terms of the possible consequences of demographic change. At first glance at least, this means that the expected increase in the financial burden on the German social security system due to demographic developments will be lower than previously calculated because the number of pensioners is forecast to be lower due to lower life expectancy, while higher net immigration will mitigate the decline in the working population (see Thiede 2023). However, doubts about this optimistic assessment arise at a second glance and are reinforced by the recent development in

morbidity. Even if expenditures on old-age pensions were to be lower, there are increasing signs that this would be (over)compensated by higher expenditures for disability pensions, healthcare and long-term care.<sup>3</sup> It is also unclear whether the higher net immigration will result in a stable, higher number of people in employment in the long term. In the case of immigrants from Ukraine, for example, it is unclear whether they will remain in Germany in the long term.

What is particularly remarkable, however, is that even under these rather optimistic assumptions of the 15th kBV, the old-age dependency ratio will rise from 37% to 49% between 2020 and 2035. This is slightly less than under the assumptions of the 13th kBV, which predicted an increase to 54% but the core message that demographic change will massively reduce the proportion of people of working age remains the same. There is therefore still sufficient reason for concern.

3 A deterioration in health can already be observed in the USA and England. Börsch-Supan et al. (2021) provide initial evidence of this for Germany. Reasons include an increase in obesity and diabetes. The Federal Ministry of Health is currently reporting a “surprisingly sharp increase in the number of long-term care cases”: <https://www.mdr.de/nachrichten/deutschland/politik/lauterbach-mehr-neue-pflegefaelle-als-erwartet-sozialhilfe-zur-pflegeversicherung-100.html>.

## 4. Development of the number of workers until 2060

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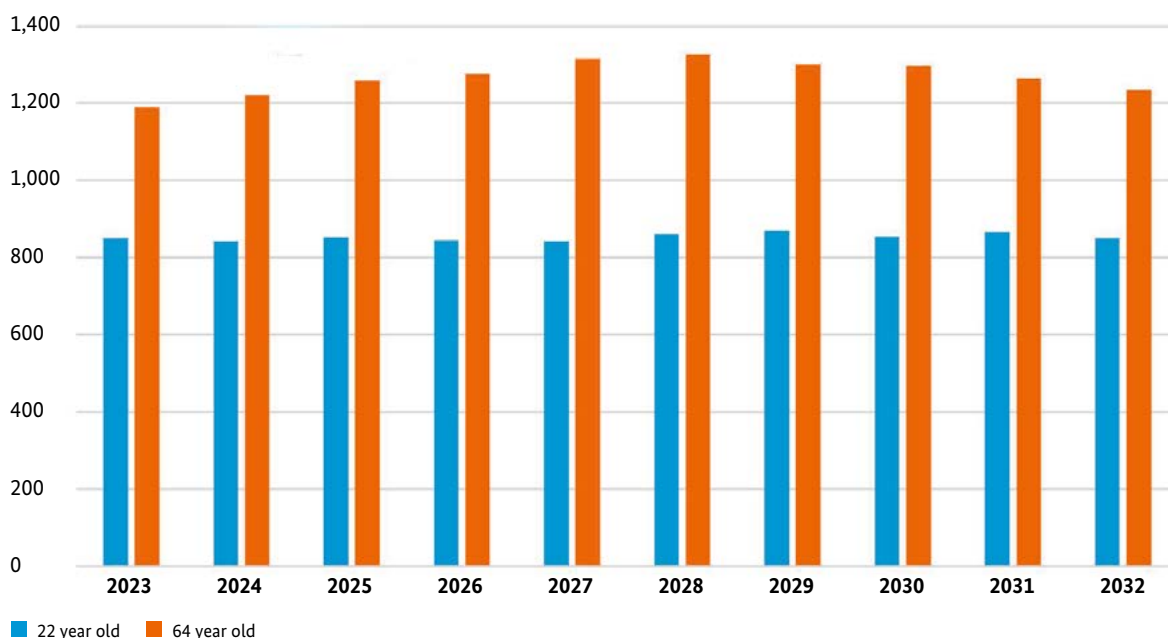


The impact of demographic change on the labor supply can be seen most impressively in the difference between the number of people leaving the labor market (median age approx. 64 years) and the number of people entering the workforce (median age approx. 22 years), see Figure 3.

This difference amounted to just under 340 thousand people in 2023, will rise to more than 470 thousand people by 2027 and then fall again to around 380 thousand people by 2032. In these ten years, more than 4 million more people will retire than young people will follow. Even under the favorable assumptions of the 15th kBV, this loss cannot be compensated for by migration.

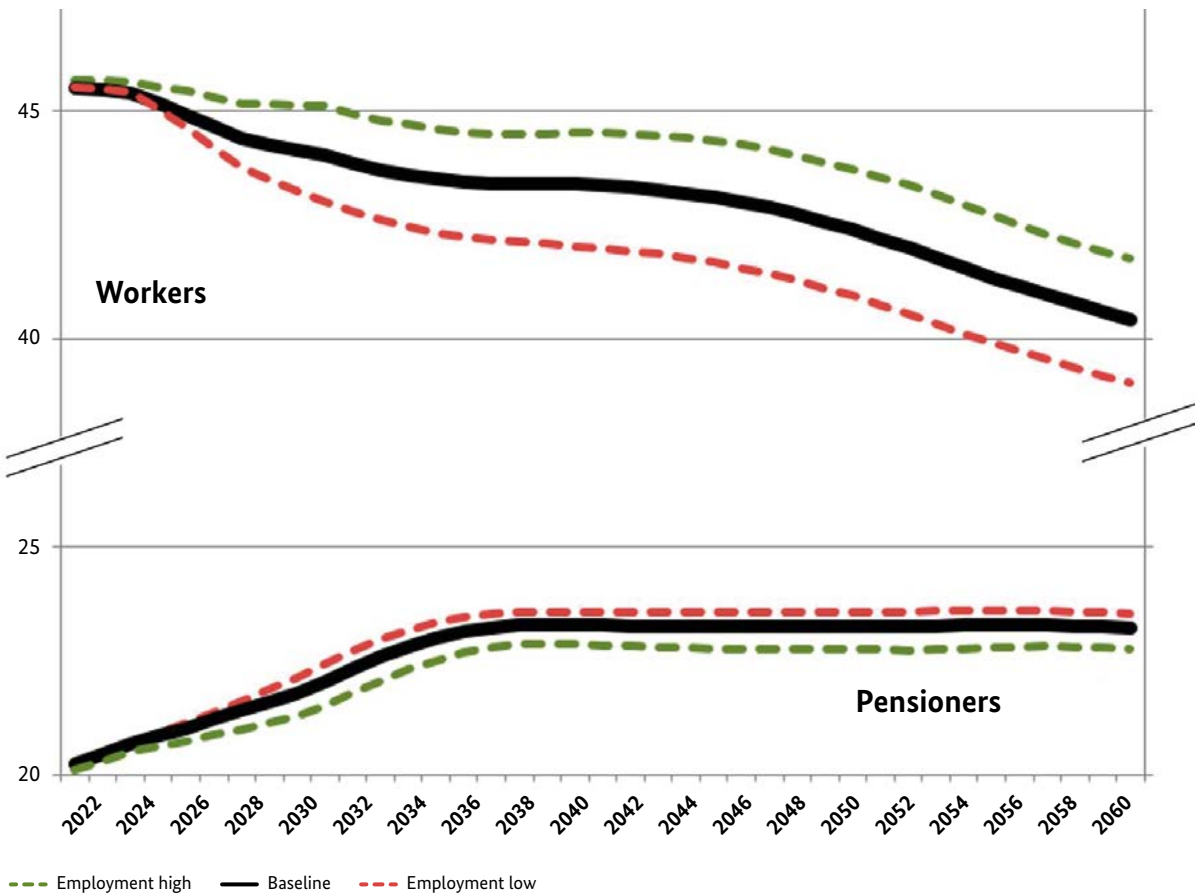
To determine the impact on the labor market, the number of individuals in working age must be multiplied by the expected labor force participation, ideally the number of hours per employee per year. This depends on the structure of employment, i.e. labor force participation by age and gender, which in turn depends on the retirement age, the part-time rate of women and similar parameters. How these parameters will develop in the future is more uncertain than demographic trends. Figure 4 shows the range of possible labor market developments in terms of the number of workers and pensioners. The base scenario is based on the average demographic development of the 15th kBV and a development of the labor market based on the

**Figure 3: Number of individuals of average age entering and leaving the labor market (thousands).**



Source: 15th Coordinated Population Projection of the Federal Statistical Office; combination of the "moderate" variants (G2-L2-W2).

Figure 4: Number of workers and pensioners (in millions)



Source: Own calculation based on the 15th coordinated population projection, the medium variant of the Pension Insurance Report 2022 and the variants in the report of the 2020 pension reform commission (see Box 4).

short-term assumptions of the medium variant of the Pension Insurance Report 2022 (BMAS 2022), the spring forecast of the Federal Government (BMWK 2023) and the joint forecast of the German economic institutes for 2023 (“Gemeinschaftsdiagnose 2023”). The variants correspond to those of the German pension reform commission (“Kommission Verlässlicher Generationenvertrag 2020”) and assume various changes in behavior, e.g. a later retirement age and a lower part-time employment rate for women. These are described in detail in Box 4.

While the number of pensioners will increase by around 3 million by 2035, the number of workers will fall by 2 million in the base scenario. The estimated range for the number of pensioners is relatively small. It is significantly larger for the number of workers. However, the number of workers will decline in any case, in the best case by 1 million, in the worst case by slightly more than 3 million. As the total population will not decline until 2035, but will increase by around 1 million according to the 15th kBV, the proportion of workers in the

population will fall. This increasing scarcity of labor is the economic essence of demographic change in Germany, as opposed to a shrinking population such as in Japan, for example.

These projections of labor supply do not take into account possible changes in behavior that are currently being discussed under the heading of “work-life balance”. Shorter working hours (e.g. a four-day week) and more part-time work, including among

men, would further reduce the supply of labor beyond those predicted due to demographic change. However, it is currently not possible to reliably estimate whether long-term changes in behavior are actually taking place and what quantitative effects these will have, as there is currently little evidence of the possible causes (changes in preference, income effects, falling fixed costs of work or a mixture of these) (see e.g. Bick et al. 2022).

#### Box 4: Assumptions on employment

	Employment low	Baseline	Employment high
<b>Employment rates</b>	By age and gender: average ratios remain constant at the current level	Cohort-specific rates remain constant at the current level.	Convergence of cohort-specific female employment rates with those of West German men
<b>Retirement behavior</b>	All workers enrolled in the public pension system choose the earliest possible pension start date	$\frac{1}{3}$ adjustment, $\frac{1}{3}$ remains with deductions, $\frac{1}{3}$ in reduced earning capacity or similar.	Postponement analogous to the increase in the statutory retirement age
<b>Part-time quota</b>	Consistently at the current level	Consistently at the current level	Between 2020 and 2030, the proportion of women working part-time will fall linearly to half that of men, but not more than half

Source: Kommission Verlässlicher Generationenvertrag

5. How large is the untapped labor potential; how can it be activated?

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One obvious strategy to compensate for the loss of workers is to better integrate the currently untapped potential of older, younger, female and migrant workers into the labor market. In the following, we estimate this potential by comparing Germany with similar European countries in terms of living standards and social benefits, which have higher labor force participation rates across age, gender and nationality. Figure 11 at the end of this section summarizes the results.

### 5.1 Labor force potential of older workers

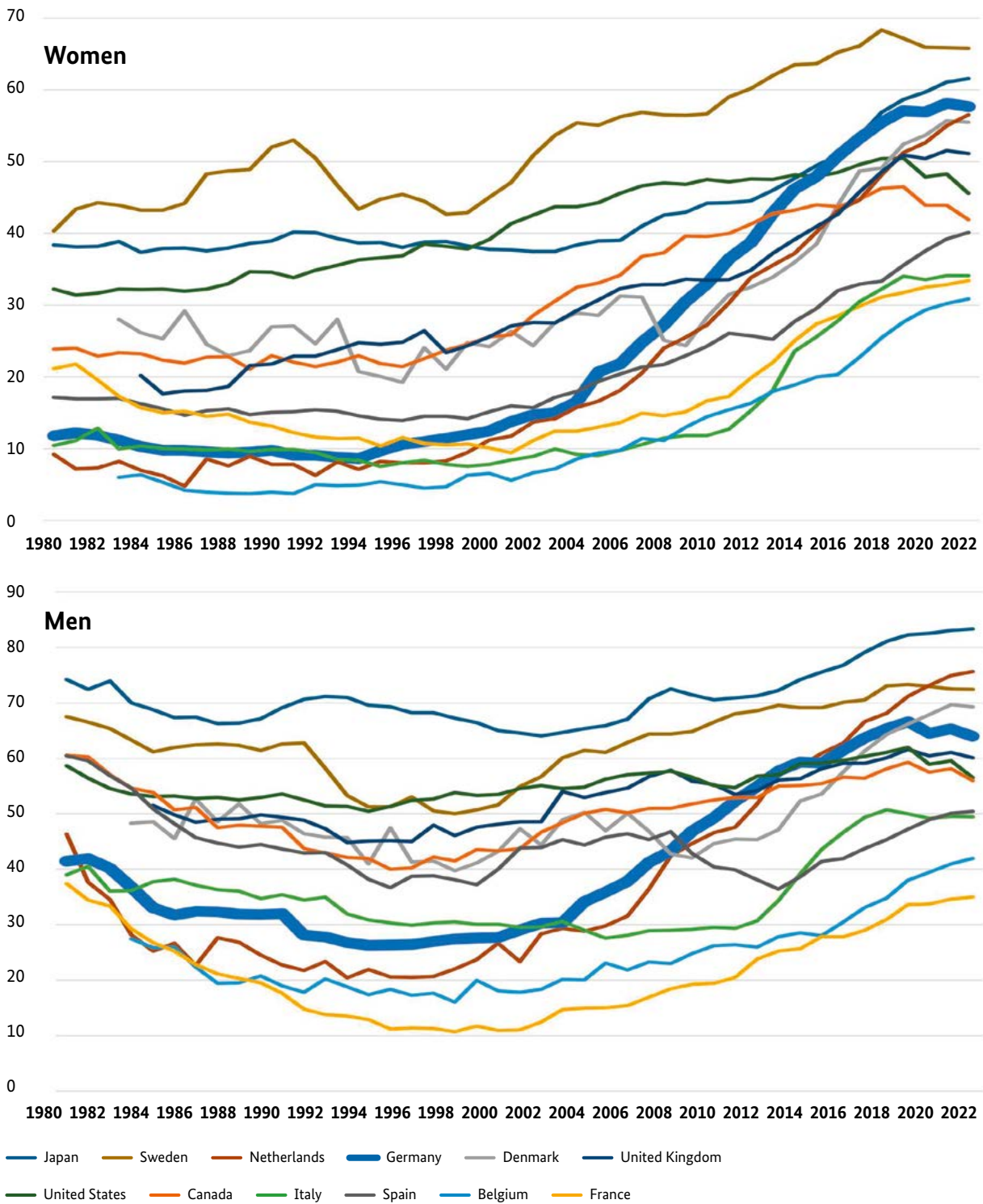
Germany has already made great progress in exploiting the labor force potential of older people. The employment rate of people aged between 60 and 64 has risen enormously in European comparison, see Figure 5. The particularly strong increase in the employment of women at this age is compounded by the general rise in female employment.

Sweden is a European pioneer in exploiting the potential of older people. This also applies to people who have not yet reached the statutory retirement age. If Germans aged 55–64 had the same age-specific employment rates as Swedes, there would be around 440 thousand additional workers available. This would compensate for the discrepancy between those entering and leaving the market in one year, as shown in Figure 3. The difference is even greater at an older age. If Germans over the age of 65 had the same age-specific labor force participation rates as Swedes, there would be around 890 thousand additional workers available, i.e. a total of 1.3 million people.

Measures to increase the labor force participation of older people are well known. This Advisory Board has referred to these instruments on several occasions (Wissenschaftlicher Beirat 2016, 2021, 2023). Empirical studies show that both the increase in the employment rate in Germany visible in Figure 5 and the international differences in this rate are largely due to the incentive effects of the pension reforms since the 1990s (Börsch-Supan and Coile 2024), although their partial unwinding is currently under discussion. Added to this are the changes in the duration of unemployment benefits (Riphahn and Schrader 2020), which were accompanied by higher incentives to work. The main difference between Sweden and Germany is that Sweden has a higher standard retirement age, which automatically increases with life expectancy; furthermore, Sweden has no early retirement programs that correspond to the German “retirement at 63” (Börsch-Supan and Coile 2024).

The so-called block model of partial retirement, which is chosen by around 90 percent of people in partial retirement, has a further negative incentive effect. For example, a five-year 40 percent partial retirement can be structured in such a way that the person works full-time for two years and then not at all for three years, so that their exit from the labor market is brought forward by a further three years. This reduces the likelihood of voluntary continuation of employment subject to social insurance contributions.

Figure 5: Development of the employment rate of people aged between 60 and 64 in international comparison, 1980–2022



Source: OECD.Stats, retrieved on 08.04.2024.

## 5.2 Labor force potential of younger people

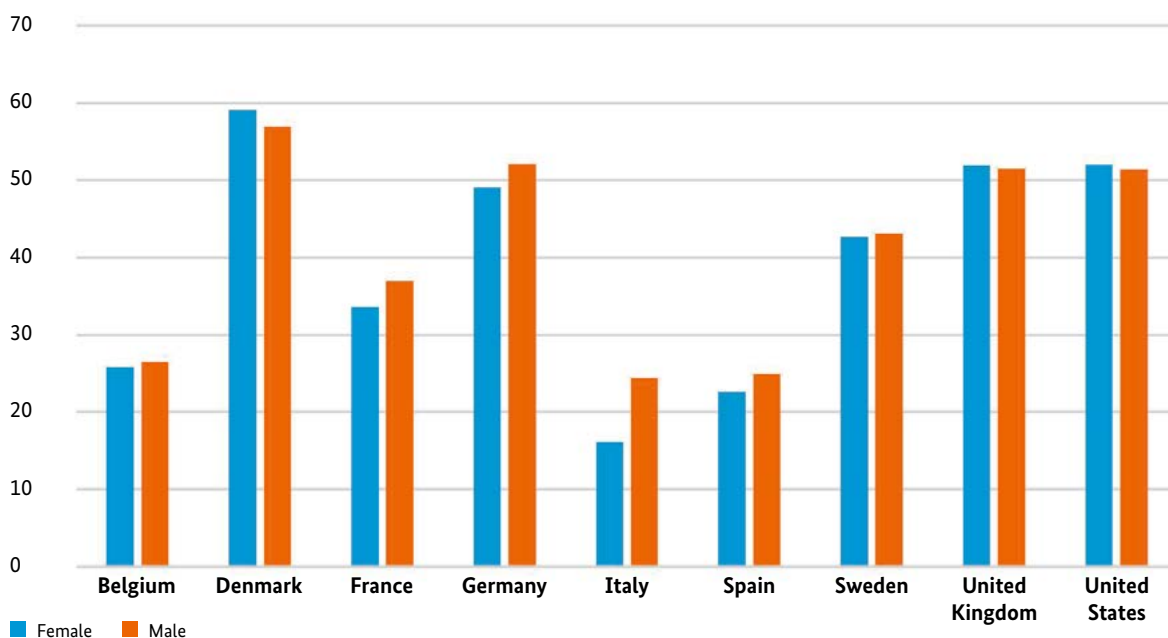
In international comparison, Germany has a high employment rate for people aged 15–24, see Figure 6. Only Denmark has a higher employment rate in this age group.<sup>4</sup> If this were also achieved in Germany, almost 620 thousand additional workers would be added, whereby the part-time rate in this age segment is very high.

If we look at the slightly older age group, in this case 20–34-year-olds, the almost 18% of this age group, who do not have a vocational qualification, stand out (Federal Institute for Vocational Educa-

tion and Training, 2023). These are 2.7 million individuals. In 2023, the unemployment rate for individuals without a vocational qualification in Germany was 20.8%, around seven times higher than for individuals with a vocational or school education (3%). If this higher unemployment rate could be prevented, there would be an additional potential of around 480 thousand individuals in the 20–34 age group.

Areas for policy action emerge when looking at the composition of this group, which is analyzed in the Vocational Training Report 2023 (Bundesinstitut für Berufsbildung 2023). 74% of those who do not have a school-leaving qualification also do not

Figure 6: Youth employment rate (ages 15-24) in international comparison, 4th quarter 2023



Source: Eurostat (lfsa\_ergan, accessed 10.05.2024)

<sup>4</sup> The employment rates are measured comparably in accordance with Eurostat specifications and include periods of training if these are remunerated, e.g. in Germany's dual system.

have a vocational qualification. Measures are therefore needed in the school sector to reduce this figure. But even among people who have a secondary general or intermediate school leaving certificate, almost a quarter (23%) have no vocational qualification. This includes many people with migration experience. While the proportion of German nationals without a vocational qualification is 11.7% (1.7 million people), this figure is 37.4% for foreign nationals and as high as 64% for immigrants from crisis and war zones. This may not only be due to a lack of integration at school, but also to the non-recognition of qualifications acquired abroad (see section 5.4).

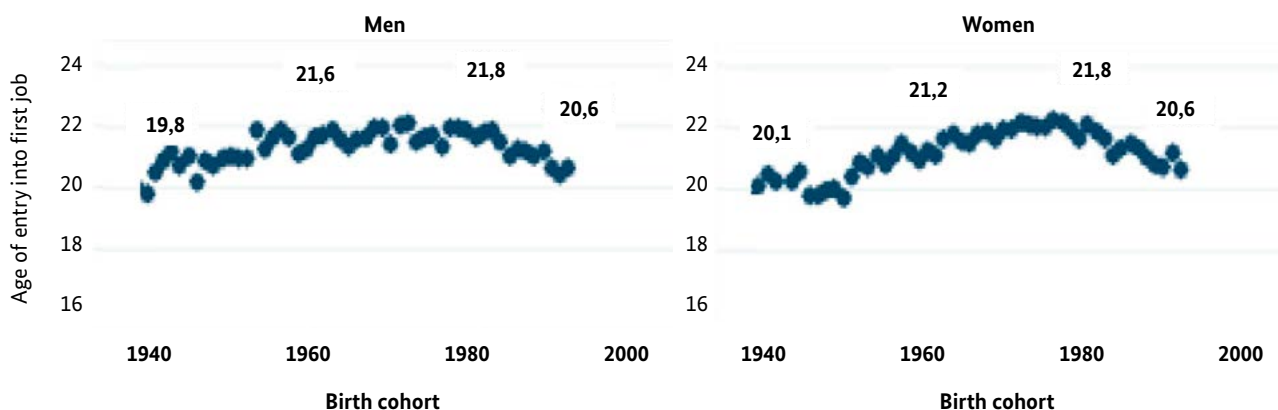
Finally, there have been several attempts to lower the age at which people enter the workforce in Germany, such as the reduction of the Gymnasium to 8 years and the introduction of Bachelor's and Master's degree courses. Figure 7 shows that the trend towards an increasingly later age of career entry, which was visible up to the 1970–1975 cohorts, was reversed from around the cohort born in 1980 or later. However, it is unclear whether there is a causal link to the education reforms, especially as

the reduction of the Gymnasium to 8 years has largely failed. Although the average time it takes to complete a first degree has fallen significantly since 1999 with the gradual introduction of Bachelor's and Master's degree courses as part of the Bologna reform, it has been rising again since 2016 (Statista, accessed in May 2024).

### 5.3 Labor force potential of women

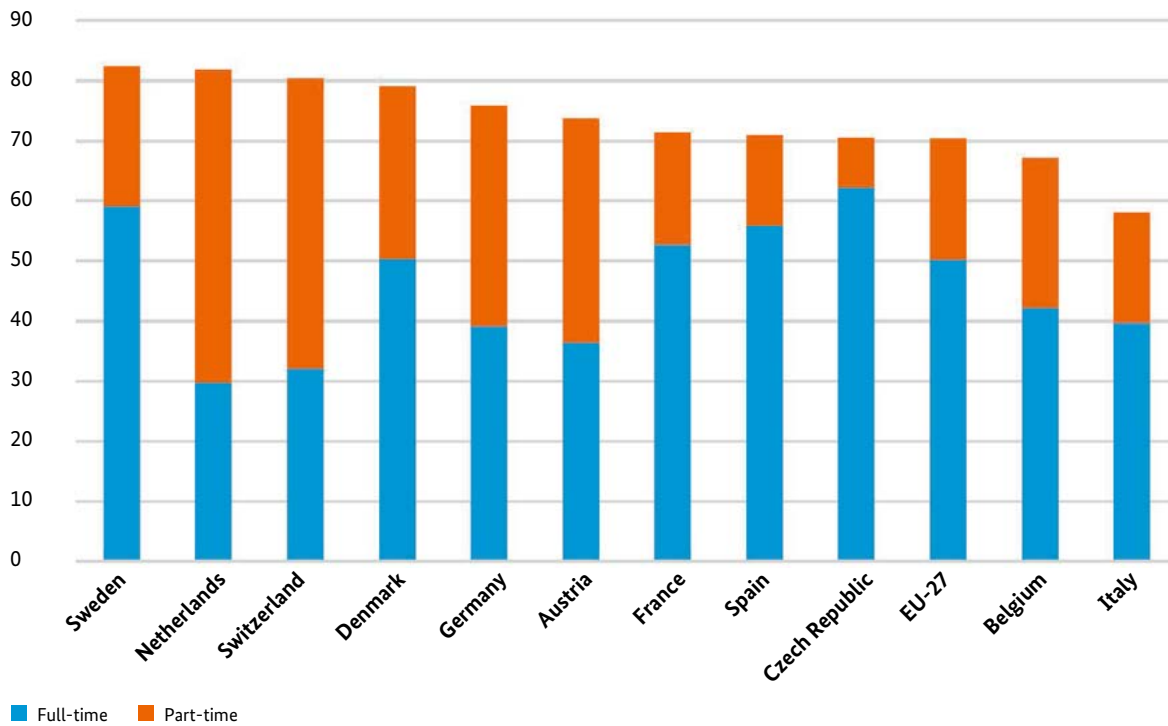
Germany has a relatively high female employment rate compared to other European countries, but the proportion of women in full-time employment is relatively low, see Figure 8. Sweden is once again leading the way. If German women had the same employment rate as in Sweden, there would be an additional 1.7 million workers in Germany. Given the current high proportion of part-time work, this would correspond to 1.3 million full-time equivalents. If the Swedish proportion of full-time female employees were also reached, the additional full-time equivalents would increase to around 2.5 million.

**Figure 7: Average age at first employment subject to social insurance contributions, birth cohorts 1940–1990**



Source: Börsch-Supan, Ferrari and Goll 2020

Figure 8: Female employment rate in European comparison, 4th quarter 2023



Source: Eurostat (lfsa\_ergan, accessed 10.05.2024)

In order to better exploit this potential, one should close the gaps that still exist in the availability of childcare, which prevent mothers from taking up or expanding employment (Section 5.3.1). Moreover, existing distortions in the tax and contribution system should be abolished to eliminate or at least mitigate the negative work incentives for married women (Section 5.3.2).

### 5.3.1 Deficits in the availability of childcare

Although there has been a legal entitlement to a childcare place for all children from the age of two

since 2013, this has not yet been fulfilled across the board. In its “State Monitoring of Early Childhood Education Systems”, the Bertelsmann Foundation calculated at the end of 2023 that there is a nationwide shortage of around 430,000 childcare places.<sup>5</sup> The shortage itself results to a large extent from a lack of staff, so that one can speak of a vicious circle here, because the shortage of nursery staff reduces the labor force participation of parents. In addition to the lack of places, the shortage also manifests itself in the insufficient reliability of childcare, for example when childcare times agreed with parents cannot be adhered to.

<sup>5</sup> <https://www.bertelsmann-stiftung.de/de/themen/aktuelle-meldungen/2023/november/mehr-plaetze-und-bessere-qualitaet-in-kitas-bis-2030-wenn-jetzt-entschlossen-gehandelt-wird>

The federal states have also failed to do this. In 2018, the Bundestag passed the so-called “Good Childcare Act”, which, among other things, provided 5.5 billion euros to the federal states between 2019 and 2022, which they were allowed to use to improve the quality of childcare, but also to reduce parental contributions. As a result, two federal states, Berlin and Mecklenburg-Western Pomerania, abolished parental contributions completely, while Saarland decided to follow suit in 2023 and abolish contributions in four stages by 2027. In other federal states, the last 1, 2, 3 or 4 years of childcare are free of charge, while Hamburg and Hesse offer freedom from fees for 5–6 hours per day of care (Geis-Thöne 2024). It should be borne in mind that parental contributions traditionally only cover a small proportion of childcare costs<sup>6</sup> and in the vast majority of municipalities depend on the parents’ income, meaning that their abolition has mainly benefited parents with high incomes. It can therefore be assumed that parents who wish to work would be better served if the federal funds were invested in creating additional places and improving the quality of childcare instead of reducing contributions.

### 5.3.2 Negative work incentives in the tax and contribution system

#### a) Marginal employment

Employees in marginal employment with monthly earnings of up to EUR 538 are exempt from income tax and social security contributions. Hence, this form of employment is particularly interesting for married couples with a high marginal tax burden. In 2023, around 60% of all marginally employed persons were women; in September 2023, this amounted to around 2.5 million women (Federal Employment Agency 2024).<sup>7</sup> Older studies point to the very low transition rate of women in marginal

employment into employment subject to social security contributions (Eichhorst et al. 2012, BMFSFJ 2012). Figure 9 shows the situation in 2017, when the mini-job earnings threshold was €450. Immediately above the mini-job earnings threshold, the number of employment relationships drops dramatically.

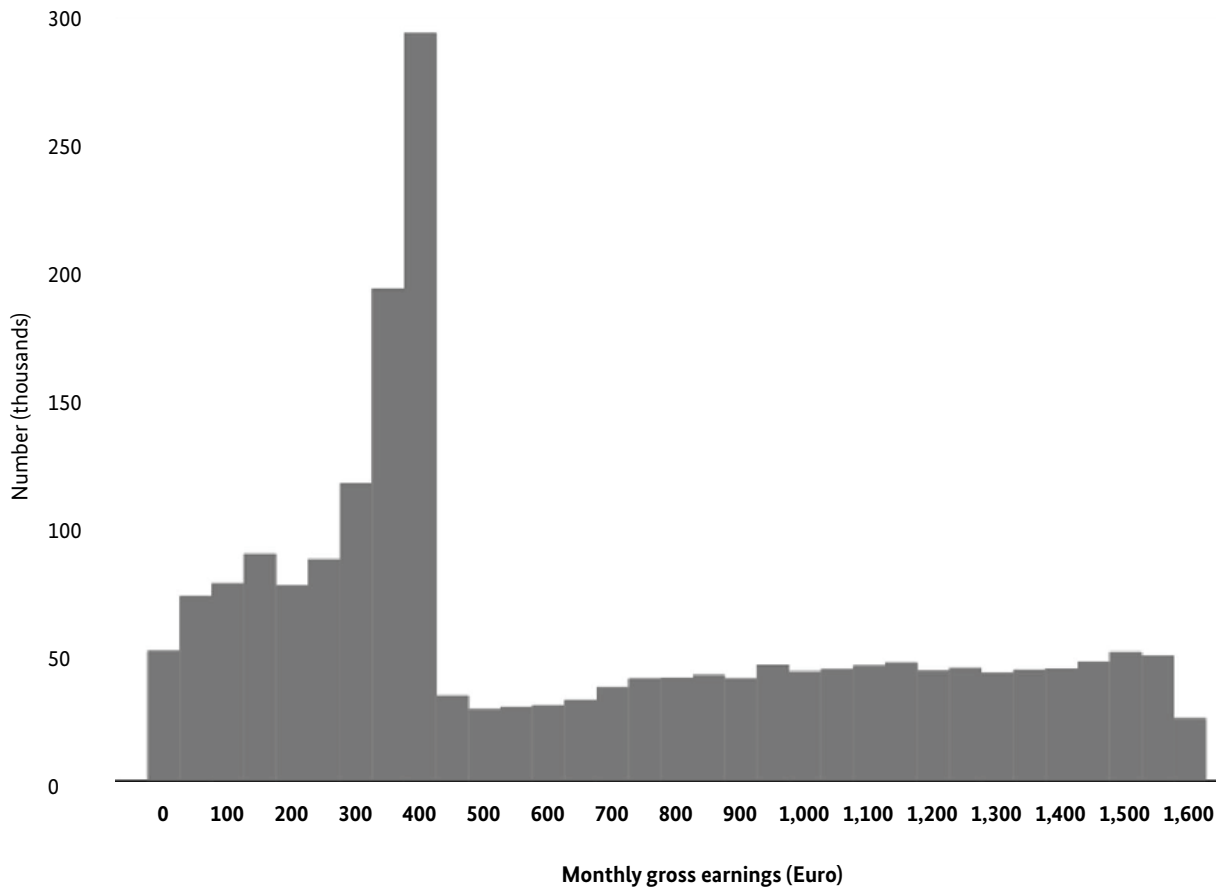
The low transition rates are unsurprising given the high tax burden that kicks in at the earnings threshold for mini-jobs (Gudgeon and Trenkle 2023, Tazhitdinova 2020). The high marginal tax burden at this earnings threshold makes it unattractive for marginally employed persons to expand their job offer beyond the earnings threshold of (today: 2024) EUR 538. Although social security contributions in the mid-job range (i.e. for income between EUR 538 and EUR 2000 per month) are subsidized and therefore increase on a sliding scale, the jump in the tax burden at the EUR 538 threshold remains considerable, especially for second earners in marriages. In addition, changes to mini-jobs – for example after a birth - have unfavorable long-term effects on the labor market success of those affected (Collischon, Cygan-Rehm, Riphahn 2024). The introduction of midi-jobs has hardly improved the probability of transitioning from mini-jobs to regular employment (Herget and Riphahn 2024).

Various policy measures can be considered to overcome the mini-job trap. The key would be to avoid or reduce the jump in the tax burden at the mini-job earnings threshold. This could be achieved by including mini-jobs in the tax liability; this would have no effect on single employees due to the basic tax-free allowance. For second earners in marriages, this would eliminate the mini-job trap. An extension of the midi-job subsidies for social security contributions

<sup>6</sup> Dohmen (2016) speaks of 5 to 25 percent.

<sup>7</sup> Men are more likely to use this form of employment as a sideline.

**Figure 9: Distribution of gross monthly earned income up to 1600 euros, 2017**



**Note:** The chart describes the frequency distribution of gross monthly earnings in the lower income bracket in 2017. It includes people aged 30–59 who were registered with the statutory unemployment insurance scheme.

Source: see Herget and Riphahn (2024) based on the SIAB.

to income tax is also theoretically possible. Alternatively, the jump point at the mini-job earnings threshold would be avoided if such a midi-job subsidy started at the first euro earned instead of at the mini-job earnings threshold. Any reform would have effects both on labor force participation and on the intensity of labor supply. Simulations of the quantitative effects of specific reform scenarios can be found in Eichhorst et al. (2012), Bach et al. (2018) and Blömer et al. (2021). The latter estimate that the conversion of mini- and midi-jobs into jobs subject to social security and tax with increasing

social security contributions of up to EUR 1,800 could bring an additional 42,000 full-time equivalents onto the labor market.

#### **b) Contributions to the statutory health insurance**

In contrast to income tax, which is characterized by a progressive rate and the application of the household principle to married couples, contributions to statutory health insurance are degressive because the contribution does not increase any further above an assessment threshold of currently (2024) EUR 5,175 per month. The individual principle

applies, i. e. each member of a health insurance is required to pay contributions based on their own income. Married persons who do not receive their own wage income are “co-insured with their spouse”, which is not a privilege of marriage, but is consistent in that the contribution is a certain percentage of earned income and these persons do not receive their own income.<sup>8</sup>

This regulation contains incentives for married couples in which one partner (A) earns more and the other (B) less than the contribution assessment ceiling, as this couple can reduce their total contribution to the statutory health insurance by A earning more, e.g. through overtime, and B earning the same gross amount less by reducing their working hours. As the person earning less is usually the woman, this is an obstacle to employment for women. One way to remove this obstacle would be to apply the household principle to the statutory health insurance as well. The total contribution of the couple would then be based on the sum of both earned incomes up to twice the contribution assessment ceiling, and the division between the two partners would no longer play a role.

### c) Contribution-free co-insurance for spouses of civil servants

Even clearer are the negative incentives to work for spouses of civil servants who are not subject to social security contributions, who can claim the allowance (of up to 70%) for their medical expenses, provided they do not exceed an earnings limit (currently around EUR 20,000 per year). This is an exemption limit. Exceeding it results in a high financial loss and therefore prevents many spouses from working more.

### d) Splitting rule in the income tax for couples

Just over half of the working-age population is married. In contrast to many other countries, Germany treats married couples as a single unit for taxation purposes: a married couple whose total income is earned half by both partners pays the same taxes as a married couple with the same total income earned entirely by one person, in practice predominantly the man, while the other person (usually the woman) does not work. Spousal splitting notionally divides the total income of a married couple equally between the two people, so that the marginal tax rate is exactly the same for both. This mitigates the progression of the tax rate and reduces the tax burden, except in cases where both earn the same income or both incomes fall within the top tax rate bracket. From the perspective of an individual, this creates a strong negative (positive) work incentive effect for the lower (higher) earning person, in most cases the woman (man): Compared to individual assessment, she is burdened with a higher (lower) marginal tax rate. However, the two effects do not balance each other out; the negative effect predominates. In the event of a revenue-neutral reform of spousal taxation, the greatest labor supply effects are therefore to be expected in marriages with a large income difference, i. e. mostly from spouses of high-earning men (see also Scientific Advisory Board of the BMF, 2018).

Various alternatives to spousal splitting appear legally possible, in particular the so-called “real splitting” or the transferable basic tax-free allowance. The Council of Economic Experts looked at both models in its 2013 annual report. Simulation calculations are also available in other studies, e.g. RWI (2013), Müller et al. (2013). A more recent study by Blömer et al. (2021) sees the greatest employment effects for women, amounting to 141,000 full-time

<sup>8</sup> In contrast, the reverse situation, where single people with no earned income have to pay a statutory minimum contribution for their health insurance cover, represents a deviation from the principle of wage-based contribution collection.

equivalents, in a combined reform of the spousal splitting and mini-job systems, if such a reform is fully implemented.<sup>9</sup>

#### e) Choice of tax classes III/V

The same reasoning applies to the choice of tax class III/V. It also provides a negative incentive to work for second earners, see the report by this Advisory Board on the shortage of skilled workers (2015). This is because tax class III/V allocates the full basic tax-free allowance of the married couple to the partner who has chosen tax class III. The person in tax class V therefore has the impression that they have to pay a higher marginal tax rate, making their own work less worthwhile. This only affects the deduction on the partner's monthly payslip and not the couple's final tax liability. But even if this impression is not correct, it is likely to influence the choice of working hours in many cases. The current federal government has therefore announced that it will abolish these tax classes and make the factor method mandatory for the tax class combination IV/IV, which can already be chosen today. The announcement was confirmed in February 2024, but the new regulation is not due to take effect until 2030.

### 5.4 Labor force potential of migrants

In principle, the global labor force potential through immigration is inexhaustible from a German perspective, but de facto it is limited by the willingness and ability to integrate. Many immigrants from non-EU countries have difficulties gaining a foothold in the German labor market, see Figure 10. The employment rate among people applying for asylum is 42.5%, while the figure for immigrants

from Ukraine is just under 25%. This is in contrast to immigrants from EU countries, where the employment rate is only slightly lower than the overall employment rate.

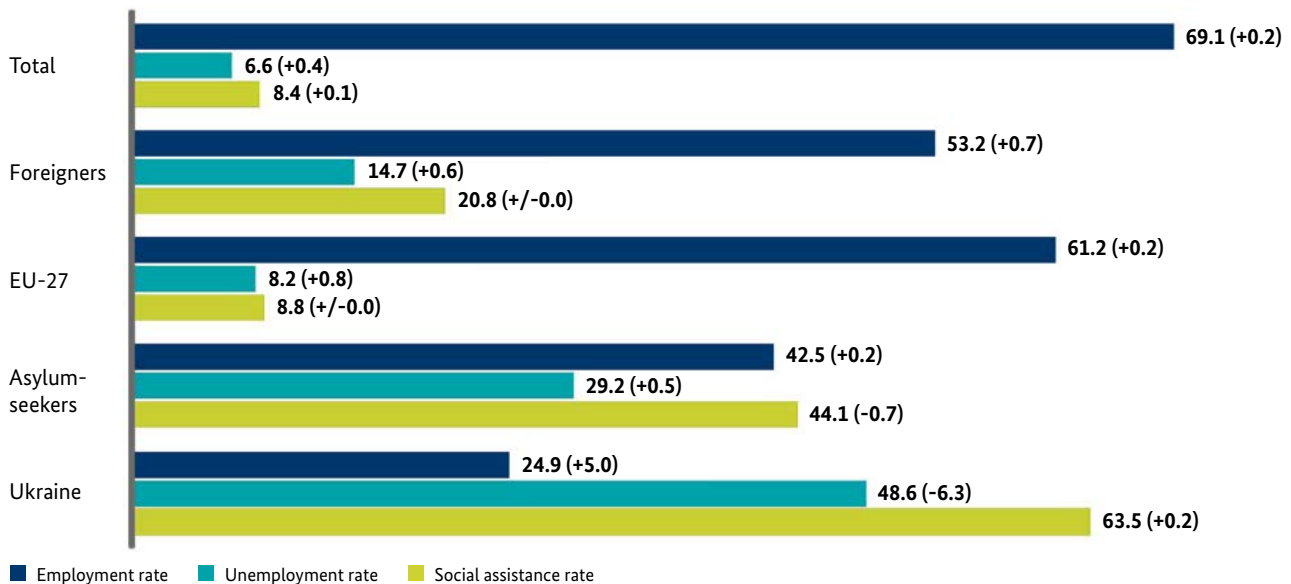
In January 2024, a total of 13.9 million non-Germans were living in Germany, including around 5.1 million people from the EU, 2.1 million people from countries of asylum origin and 1.2 million people from Ukraine. However, net immigration differs greatly from the existing figure, as immigration and emigration are balanced for most countries of origin, while net immigration from countries of asylum origin and Ukraine continues to predominate. Of the annual net immigration of 293,000 people assumed in the 15th kBV, only around 110,000 people enter the German labor market each year according to the above-mentioned employment rates.

While there is still little evidence available for people who immigrated from Ukraine due to its recency, Brücker et al. (2024a and b) analyzed the employment rates of refugees who arrived between 2013 and 2019. He shows that the employment rate rose steadily with the length of stay: seven years after their arrival it was 63%, after eight years 68%. For the cohort that arrived in 2015, the employment rate in 2022 was 64% (men 75%, women 31%). In comparison: the average employment rate of the population with their own migration experience<sup>10</sup> was 70% in 2022, and the population average was 77%. This means that the employment rate of those who fled to Germany in 2015 is almost as high as the average rate of the migrant population eight years after their arrival. Moreover, with a remaining difference of 9 percentage points (7 percentage points when adjusted for age differences), it has already come very close to the population average.

9 The fact that this effect does not occur immediately is due to grandfathering. Current plans to reform the taxation of spouses generally stipulate that new rules only apply to marriages entered into after their introduction.

10 In other words, migrants who have moved here themselves (first-generation immigration).

Figure 10: Labor market indicators by nationality, January 2024



Source: IAB Immigration Monitor, March 2024

In principle, therefore, not only is the global labor force potential through immigration very large from a German perspective, but it would also be possible to bring immigrants into the German labor market more quickly through increased integration efforts.

An important factor in this context is the recognition of professional qualifications from abroad. Brücker et al. (2021) demonstrate the long-term positive causal effects of professional recognition on the employment and income of immigrants. Transparent and rapid recognition of foreign qualifications can both accelerate integration for existing immigrants and increase the attractiveness of the German labor market for potential migrants with professional qualifications. The recently passed Skilled Immigration Act points in the right direction with its point system but still requires a great deal of bureaucracy.

Another obstacle is the slow processing of residence and work permits by German embassies abroad and local immigration offices in Germany, which in turn is often due to a lack of staff. The Skilled Immigration Act does nothing to change this. The long processing times and complicated procedures are a deterrent, especially for highly qualified workers. For example, an application for an employment permit may only be made after a tenancy agreement has been submitted, even if an employment contract has been submitted, which makes it difficult to submit an application from abroad.

There is also a lack of initiatives to proactively recruit skilled workers from EU countries and countries with comparable economic power, such as the USA, in spite of the fact that these workers are typically integrated very quickly (see Figure 10).

## 5.5 Summary: Untapped labor potential of up to 5 million people

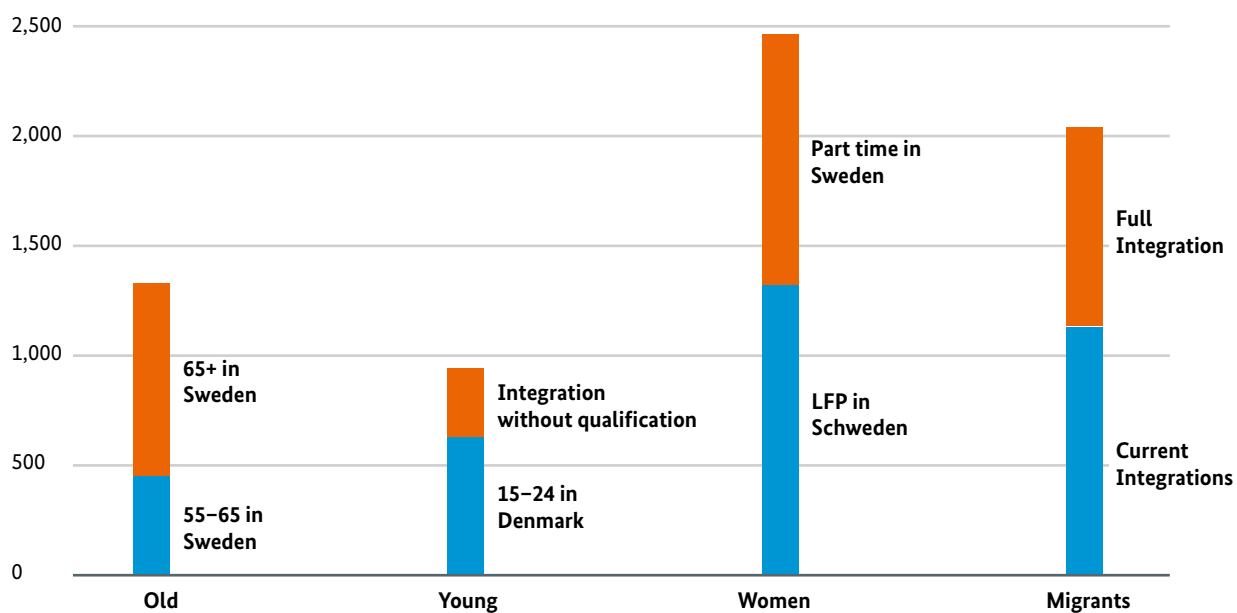
Figure 11 summarizes the results of this section. If the employment rate of older individuals in Sweden were also achieved in Germany, the labor force would increase by around 1.3 million individuals, whereby the employment rates of the two countries differ particularly from the age of 65 onwards.

Only Denmark has a higher employment rate among young people than Germany. If this were also achieved in Germany, almost 620 thousand workers could be added. By avoiding the additional unemployment of individuals who have not obtained a vocational qualification by the age of 35, an additional potential of around 320,000 individuals would be available in the 25–34 age group.

The greatest potential lies in increasing the labor supply of women. If German women had the same employment rate as in Sweden, around 1.3 million full-time equivalent workers would be added in Germany. If the Swedish share of full-time employed women were also reached, the additional full-time equivalents would increase to around 2.5 million women.

Based on the current employment rate of immigrants from non-EU countries, the potential for increasing the labor supply through immigration is significantly lower in relation to the increased labor force participation of women. With the currently prevailing employment rates, only around 110,000 of the 293,000 annual immigrants estimated by the Federal Statistical Office will be net active in the German labor market. In the 10-year period considered

Figure 11: Untapped labor potential (in thousands of full-time equivalents)



Source: Own calculations according to sections 5.1 to 5.4.

here, this would be 1.1 million people. However, full integration, which would achieve the employment rate of German nationals, would create an additional 910,000 workers in this period.

These estimates do not differentiate between different qualification levels, which is important for closing the skill gap. Nevertheless, the message of Figure 11 is clear: Germany's untapped labor force potential of 6.7 million individuals is significantly higher than the labor shortfall of around 4 million individuals shown in Figure 3.

# 6. Declining productivity growth and demographic change

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The shortage of labor could also be offset by higher productivity of the existing workforce, especially as technological progress has generally been regarded as the main source of long-term economic growth since Solow (1956). However, Figure 12 shows that GDP growth per hour worked has been trending downwards for some time in all OECD countries, including Germany. Whether this development is linked to population ageing is controversial, but it plays an important role in the overall economic impact of population ageing. Pro and contra arguments are presented in this section.

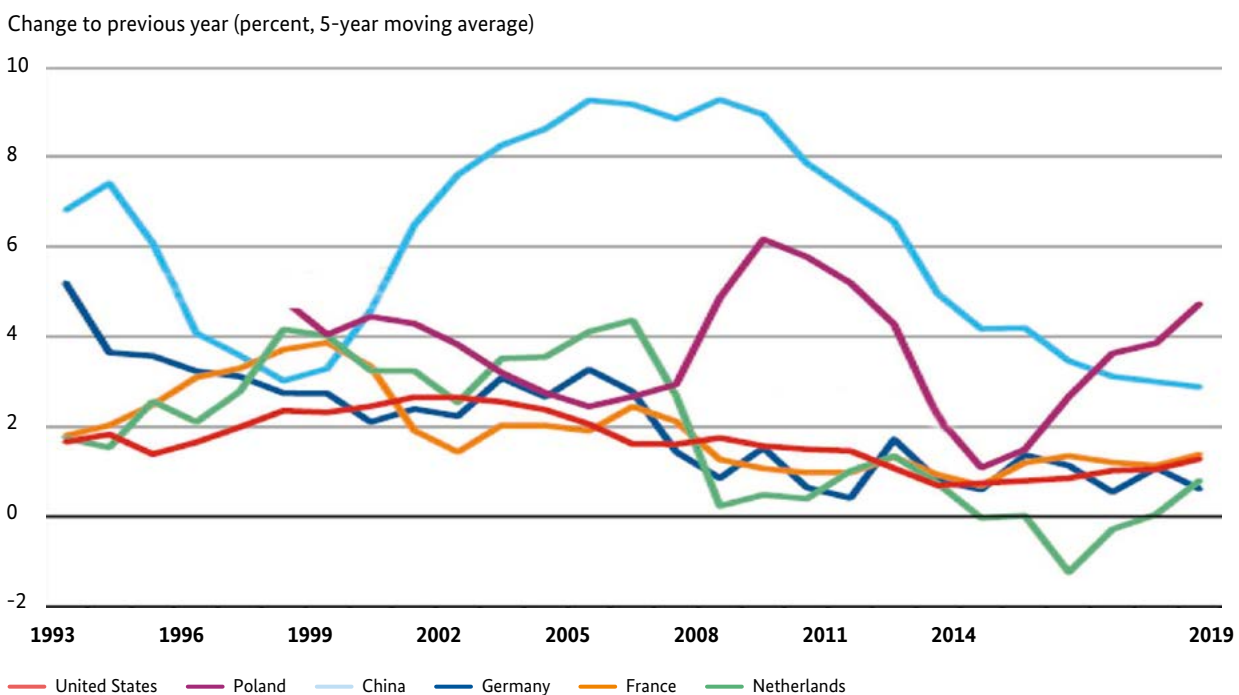
On the pessimistic side, Cowen (2011), Eichengreen (2015), Summers (2015), Gordon (2015) and others see population ageing as a major threat to economic growth and a new episode of what Hansen (1939) called “secular stagnation”. Behind this pessimistic

view is the idea that people’s productivity initially increases after a learning phase and then declines again as they get older.

Others are more optimistic and argue that productivity could increase due to, rather than despite, population ageing. Acemoglu et al. (2014), Kluge et al. (2014), Mokyr (2014) and Glaeser (2014) argue that better education and the impact of new technologies (digitalization, robots, artificial intelligence) will offset the demographic effects.

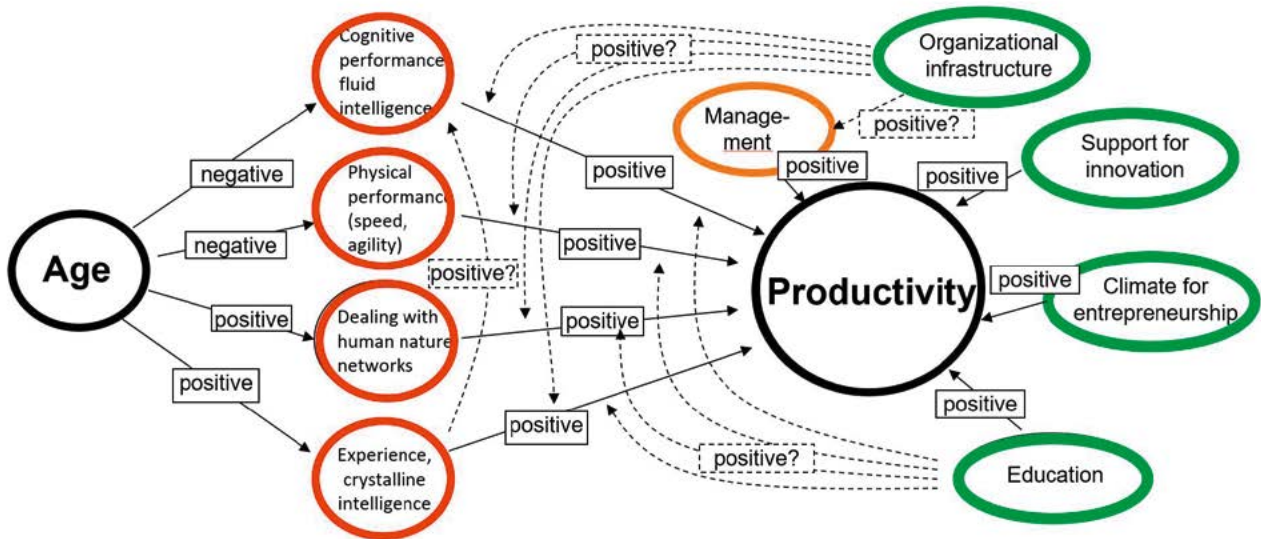
The correlations between age and productivity are complex. Figure 13 shows the most important correlations. On an individual level, people’s cognitive and physical performance declines relatively early on. On the other hand, a person’s experience and networks continue to grow into very old age.

**Figure 12: Growth in labor productivity (GDP per hour worked)**



Source: German Council of Economic Experts 2023, Figure 22-349-01

Figure 13: Relationships between individual age and productivity



Source: Börsch-Supan, Düzgün and Weiss (2006)

Moreover, people do not work alone, but in teams, a company, a working group, so that the ability to organize work processes productively plays an important role at this middle level. Ultimately, the productivity of an entire economy also depends on the educational efforts of a country and its organizational infrastructure. Behind the slowdown in productivity growth visible in Figure 12 are therefore a large number of microeconomic mechanisms that offer approaches for policy interventions that can dampen these negative effects.

### 6.1 Empirical findings on productivity in old age

At first glance, it would appear that the pessimists are right, as the old-age dependency ratio in Europe, the USA and China rose during the period shown in Figure 12, while productivity growth tended to fall. However, this finding is not causal; moreover,

the reverse is true for the period between 1960 and 1985, for example.

The protagonists' conclusion of "secular stagnation" is also unconvincing for Germany, as population ageing in Germany has only led to a change in the age structure, but not to a shrinkage. Therefore, population ageing could only have had a negative impact on economic growth if older workers were less productive than younger workers. However, there is no basis for this at the micro level (see also the report by this Advisory Board on the Reform of the Statutory Pension Insurance Scheme from June 2021). The perception that people's labor productivity peaks after a learning phase at a relatively young age (around the third decade of life) and then declines steadily is widespread. However, the available empirical evidence does not confirm this perception. The most methodologically convincing studies at the micro level (Malmberg et al. 2008, Göbel and Zwick 2009, Börsch-Supan and Weiss

2016, and Börsch-Supan, Hunkler and Weiss 2021) calculate age productivity profiles for standard activities that increase up to the age of 50–55 and then remain constant. These microeconomic studies show that the more sophisticated econometric methods are used, the higher the relative productivity of older employees is measured. This is because these methods are better able to eliminate the opposing selection effects caused by less productive people retiring earlier, while at the same time more productive people are more likely to move from standard jobs to management positions not included in the data.

At the macro level, the relationship between population ageing and productivity development is controversial. The majority of studies finds that a high age dependency ratio contributes negatively to GDP per capita, labor productivity and/or total factor productivity (TFP) (e.g. Aiyar et al. 2016, Maestas et al. 2016, Aksoy et al. 2019, and Kotschy and Sunde 2018). Acemoglu and Restrepo (2017) is one of the few studies that does not find a negative correlation between GDP per capita and conventional measures of population ageing. They argue that ageing has created an incentive to invest more in technological progress, e.g. automation. The reason for the contradictory results is that it is almost impossible to identify causal relationships at the macro level.

The results at the micro level (consistently high productivity of older people in standard jobs) and the majority of studies at the macro level (age dependency ratio correlates negatively with productivity growth) appear to contradict each other. However, this is not the case. The microeconomic studies cannot be directly extrapolated to the aggregate level because they measure the productivity of older workers compared to younger workers in a technological and organizational environment that is held constant either by design or by control. In reality, however, this environment

depends on factors such as education, innovation and entrepreneurship, which vary across countries depending on their age structure.

## 6.2 The macro environment for productivity growth

These environmental factors form impact channels that can explain the macroeconomic correlation between the age dependency ratio and productivity.

### a) Innovations and qualification

A first candidate for such a channel is innovation. Feyrer (2007) and Aiyar et al. (2016) relate total factor productivity (TFP) growth to measures of public and private spending on research and development, patents and similar measures using regressions and correlation analysis. Gründler and Potrafke (2021) regress the number of patents and the number of scientific journal articles on the age dependency ratio and find a negative correlation. Many papers refer to Jones (2010) and related literature on peak performance, which show that scientists and other high performers are most productive in their 30s. They conclude that the low proportion of young people in ageing economies reduces the likelihood of developing breakthrough innovations.

There is also evidence to the contrary. The automotive study by Börsch-Supan and Weiss (2016) evaluates process innovations as a function of the age and finds no decline with age. Ilmakunnas and Miyakoshi (2013) differentiate between low and high qualifications in their analysis of TFP growth. They find that age is negatively correlated with productivity for low-skilled workers but positively for high-skilled workers. Moreover, the use of more information and communication technology (ICT) is generally a positive factor for TFP, but its effect is higher for high-skilled workers than for low-skilled

workers. The effects of population ageing are therefore influenced not only by the extent of ICT investment but also by the composition of the workforce. Long-term historical findings also point in this direction. Using a panel of 21 OECD countries over the period 1870-2009, Ang and Madsen (2015) show that highly qualified employees are more innovative and that their propensity to innovate increases strongly with age.

### b) Entrepreneurship

Meaningful studies on the role of entrepreneurship are rare. Gründler and Potrafke (2021) provide an overview and show that the number of entrepreneurs and self-employed individuals in a country is negatively correlated with the country's age dependency ratio. The general assumption behind this finding is that older individuals are less likely to start a new business (Azoulay et al. 2020), as they tend to be more risk-averse than younger individuals (Dohmen et al., 2011; Falk et al., 2018). As a result, fewer companies are founded in an ageing population.

### c) Composition of government expenditure

Another channel through which population ageing affects innovation and entrepreneurship, and thus productivity, is through the composition of government spending. Innovation and entrepreneurship are often subsidized or given tax breaks due to their positive externalities. However, in an ageing population, governments are typically forced to spend large portions of their budgets on pensions, healthcare and long-term care, potentially crowding out spending on research and development that supports innovation and entrepreneurship. There is an extensive literature on this point, which suggests that spending on the younger generation, including education and family support, is lower in ageing societies (e.g. Poterba 1998; Boeri et al. 2002; Galasso and Profeta 2007; Meier and Werding 2010).

These findings are not free of criticism, as the discussion by Tepe and Vanhuysse (2009) shows. It is also unlikely that this mechanism can explain the current decline in productivity growth, as the current workforce grew up when the old-age dependency ratio was still relatively stable. However, rather than current productivity, this public spending channel with its crowding-out mechanism is likely to affect future productivity.

## 6.3 Investments and capital supply

Higher productivity requires investment. In addition to investments in education and training, investments in automation and digitalization (robots, artificial intelligence) increase productivity. A further threat to overall economic productivity arises if population ageing also leads to lower capital investment (Poterba 2001, Börsch-Supan 2019, Ferrero et al. 2019, Röhe and Stähler 2020). The reasons for this are, for example, that falling interest rates offer less incentive for younger people to save and that older people are more likely to liquidate their capital holdings than to accumulate additional savings.

### a) Declining income from investments

Population ageing causes the returns on investments to fall because it is becoming more difficult for the older generation to sell assets to the younger generation. This applies to both securities and real estate (Mankiw and Weil 1989) since, due to demographic change, there are fewer young buyers than older sellers. At the same time, in a world with two factors of production (labor and capital), the relative price of capital falls when wages rise due to the scarcity of labor. Macroeconomic equilibrium models of overlapping generations give a rough quantitative impression of the extent of this effect (Börsch-Supan and Ludwig 2009). The strength of this mechanism depends in particular on the international integra-

tion of the capital markets. It is strongest in a closed economy but does not disappear even with mobile capital because only part of the capital is invested abroad and this often in countries that are also subject to demographic change. However, the quantitative consequences of this decline are manageable (Poterba 2001, Börsch-Supan et al. 2007). Annual returns without international diversification (i. e. with all savings invested in Germany) will fall by around 0.6 percentage points between 2010 and 2030, with diversification in the EU area by around 0.3 percentage points over the same 20-year period, and with diversification within the OECD by around 0.15 percentage points. In view of the other events on the international capital markets, the demographic effect on investment income is therefore barely measurable and hardly an obstacle to productivity-enhancing investments.

#### **b) Scarcity of capital through saving in old age**

First of all, Modigliani's life cycle hypothesis, according to which people liquidate their savings as soon as they retire, is not confirmed in Germany. In some

cases, savings actually increase in old age (Börsch-Supan 2003). Rising life expectancy is not a convincing reason for this behavior, as households underestimate the cohort effect of a rising life expectancy. Surveys show that people base their decisions on current rather than cohort life expectancy, where the former reflects the past more than the future (Schüler 2023). One reason for the high savings rate in old age appears to be the risk of long-term care expenditures, particularly the high costs of an accommodation in a good quality nursing home or the financing of a home carer since social care insurance only covers part of the costs. This would explain the accumulation of savings into old age, but would imply a reduction in savings in the 2040s when the baby boomers become in need of care. Due to the foreseeable increase in tax and contribution burdens (servicing current debts, paying higher contributions for pay-as-you-go financed pensions, health and long-term care insurance), the younger generation's savings could then also fall and the supply of capital could decline, which would make productivity-enhancing investments more difficult.

# 7. Recommendations

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Climate change and wars are preoccupying politicians for good reasons. However, the risks of demographic change must not be forgotten. The report shows that the overall economic impact of demographic change could be massive. Not only will the supply of labor in Germany decrease by around 10% over the next 10 years, but the goods and services that are produced in Germany will also become scarcer. Potential growth will be lower, which will further restrict the already narrow scope for policy. Wages and prices will rise, which in turn will trigger distributional effects that could be difficult to resolve politically. Employees may initially be happy about rising wages. However, this only applies to gross wages, while net wages are more likely to fall due to the expected increase in taxes and contributions. The fact that demographic change is currently accompanied by a decline in labor productivity growth makes the situation even more difficult, as in principle the shortage of labor could be offset by higher productivity of the existing workforce.

Not much can be done about the causes of demographic change in the short and medium term. Rather, rising life expectancy is a gift of medical and social progress. Even in the longer run, effective interventions are limited since a higher birth rate could only alleviate the shortage of labor in around 20 years' time, and there are limits to the acceptance and integration of immigration.

### National strategy for economic policy in the face of demographic change

It is therefore important to mitigate the complex negative effects of demographic change. The potential to do so exists, as this report has shown. The Advisory Board therefore recommends developing a national economic policy strategy for demographic change consisting of three pillars. Pillar 1 consists of measures to make better use of Germany's exist-

ing labor force potential. The priority here is on the participation of women in the workforce, the better integration of immigrants and the continued employment of older people, as this is where the greatest potential lies in terms of numbers. A labor market with more flexible conditions would help to actually utilize the untapped potential of the workforce. Pillar 2 pursues the goal of halting the decline in labor productivity growth and, in the best case, reversing it. It must be ensured that modern technologies (digitalization, robots, artificial intelligence) are sufficiently available to replace the increasingly scarce workforce. In addition, increased educational efforts will help to increase labor productivity in the long term. Pillar 3 is about keeping an eye on the overall economic context in order to avoid selective and only superficially helpful measures that are harmful due to their macroeconomic feedback effects.

The idea of a national strategy to adapt to demographic change is not new. In 2011, the Federal Government presented a demography report and a year later a comprehensive demography strategy. In 2015, it developed this further under the title "For more prosperity and quality of life for all generations". In reality, however, this has hardly played a role in economic policy. The core problems of labor shortages and declining productivity were only addressed in passing and the proposed measures were not focused on them. The Advisory Board urges that the demographic challenges are now be taken seriously and that the core problems of labor shortages and declining productivity growth be addressed as a policy priority.

The problems of supply shortages addressed in this report come at a time when there is a considerable need for private and public investment for other reasons. The transformation of the economy with regard to climate change and the existing significant deficiencies in state services and public infrastructure

require a high level of additional investment. These additional investments are necessary. Otherwise, there is a risk that the problems of supply shortages will be exacerbated, as infrastructure deficiencies will affect business productivity. It is also important in this respect that governments and parliaments see the various policy areas in a macroeconomic context and set clear economic policy priorities as part of a demography-oriented strategy.

### Pillar 1: Activate untapped potential in the labor supply

On the one hand, Germany will lose around 400 thousand workers per year over the next ten years, i.e. a cumulative total of well over 4 million people of working age. On the other hand, despite demographic change, Germany still has a large untapped labor force potential (Figure 11). Based on the size of this potential, the highest priority is to increase the labor supply of women. If German women had the same employment rate as in Sweden, there would be around 1.3 million full-time equivalent workers in Germany. If the Swedish share of full-time employed women were also reached, the additional full-time equivalents would increase to around 2.5 million women.

Measures to increase the employment of women are:

1. Creating additional daycare places and improving the quality of care. Market scarcity signals in the form of prices (e.g. considerable cost differences between childcare for children over and under the age of three) should be applied so that existing places can be distributed more efficiently in the current shortage situation. Finally, federal funds should not be invested in reducing contributions for high earners, but in creating additional places and improving the quality of care.

2. Smoothing out the high marginal tax and contribution burdens in the low-wage sector and abolishing the “mini-job trap” in order to facilitate the transition of women from marginal employment into employment subject to social security contributions,
3. Reform of the taxation of spouses in income tax towards a system that significantly reduces the marginal tax rates on the incomes of second earners,
4. If one wants to remove the barriers to employment for women resulting from the levying of contributions in statutory health insurance, one way would be to apply the household principle in statutory health insurance as well. If the couple’s total contribution was based on the sum of both earned incomes up to twice the contribution assessment ceiling, the division between the two partners would no longer play a role.

The existing simulation studies also show that particularly large effects can be expected when these measures are combined. Better childcare would give mothers the opportunity to work more in the first place, and a combined reform of the tax and contribution systems, including the mini-job regulations, would increase work incentives considerably more than the sum of the work incentive effects of the individual measures would suggest.

In second place is the untapped labor force potential of older people. If the over 55s in Germany had the same age-specific employment rates as in Sweden, around 1.3 million additional workers would be available.

This Advisory Board has made several times proposals for measures to increase the employment of older people (most recently in its May 2021 report) and these were taken up by the German Council of Economic Experts in its 2023/24 annual report:

5. Abolition of the so-called “pension at 63” or at least a restriction to those who are not entitled to a reduced earnings capacity pension but whose health is impaired,
6. Abolition of the block model in partial retirement,
7. Increase in the statutory retirement age after 2030 if life expectancy continues to rise,
8. Actuarially correct increases and reductions that no longer reward earlier retirement but instead create incentives to work longer compared to the current situation. At the same time, a ban on age discrimination similar to the US legislation is needed to end the de facto ban on working beyond the age limit in many sectors.

The potential to increase the labor supply through immigration is significantly lower in relation to the increased labor force participation of women and older people, as is the potential to bring younger people into the labor market. Of the 293,000 annual net immigrants assumed in the latest population projection by the Federal Statistical Office, only around 110,000 people per year enter the German labor market. Measures that could increase this figure are

9. A transparent and rapid recognition of foreign qualifications,
10. Increased additional qualifications for immigrants: This applies both to children and young people, for whom the education system is not

adequately equipped given the existing challenges of numerous pupils without German language skills, and to the further training of adults to facilitate their entry into the German labor market,

11. The accelerated processing of work and residence permits by the German embassies and the municipal foreigners’ offices as soon as an employment contract has been concluded, and the abolition of complicated procedures: e.g. the need to conclude a rental agreement before entering the country.
12. Immigrants from EU countries and countries with comparable economic power, such as the US, should be recruited more proactively than in the past.

As far as earlier entry into the labor market is concerned, attempts to shorten school and study durations currently appear to have little potential. However, the number of 2.7 million 20–34 year olds who do not have a vocational qualification deserves attention, as their unemployment rate of 20.8% is far above average. By avoiding this unemployment, an additional potential of around 480,000 people would be available. As a large proportion of them have a migration background, more education and integration efforts would also be recommended here as a measure.

## Pillar 2: Increase labor productivity

The decline in productivity growth exacerbates the resource problem caused by the scarcity of labor. Recommendations follow from the analysis of individual productivity:

13. Because, contrary to popular belief, there is no decline in individual productivity in standard jobs in old age – rather, the value of job-specific experience compensates for the decline in agility – this experience must be retained for as long as possible. Older people should therefore remain in the workplace where they can use their experience for as long as possible.
14. Improved part-time regulations can support this. It is better to keep older people working part-time than to force them to choose between full-time work and retirement, which is to the detriment of full-time work.
15. Wages that automatically increase with age can have harmful side effects, because if productivity remains the same with age, it is then more attractive for employers to hire younger employees than to keep older ones.

At the macroeconomic level, population ageing has a negative impact on aggregate productivity because the environment for individual economic behavior is changing. The following economic policy conclusions can be drawn from the analysis of the corresponding impact channels:

16. Innovation: An important channel for the decline in overall economic productivity growth is the negative correlation between population ageing and innovation. Digitalization, robots and artificial intelligence can not only replace the missing workforce, but also make the existing workforce more productive. Obstacles to further

digitalization and the use of robots and artificial intelligence should therefore be removed. The Advisory Board refers to its letter on the European regulation of artificial intelligence (AI Act) from May 2024.

17. Entrepreneurship: A second channel is the negative correlation between population ageing and entrepreneurship. Entrepreneurship requires start-up capital (Samila and Sorenson 2011), which is often difficult to obtain, especially in Germany (Achleitner et al. 2006). State support for innovation and entrepreneurship would be important, especially in ageing economies, due to their positive external effects and would be at least partially self-financing through future tax revenues generated by higher productivity in the future.
18. Infrastructure: Productivity growth also depends on the physical and administrative infrastructure. A productivity enhancement program therefore includes bringing the physical infrastructure up to date and initiating the process of reducing bureaucracy, see the report by this Advisory Board on Public Infrastructure in Germany from July 2020.
19. Education and training: In the long term, labor productivity depends on the quality of the population's education and training. The competence levels measured in the current tests are falling. Policymakers must focus their attention on the younger generation. Education and research, as well as innovation and infrastructure, form the foundation of higher productivity. Spending on education, research, innovation and infrastructure should not be squeezed out, as this leads to lower productivity growth. Ultimately, this also puts social spending at risk since a lower GDP can only finance lower social spending.

20. **Public sector:** Government bodies must also increase their productivity through innovation. The Advisory Board recommends developing strategies to streamline administrative processes and reduce government staffing requirements, including through digitalization. In order to overcome the obstacles that the autonomy of the federal states and local authorities places in the way of such reforms, the federal and state governments should agree on these strategies and coordinate their implementation, including through the use of financial incentives for local authorities and government agencies.
21. **Reducing bureaucracy:** In the course of adopting and evaluating legal norms, the amount of personnel required for implementation by the authorities, the judiciary and those affected should also be examined. The more detailed the regulations are, the more resources are needed for implementation and monitoring. A high level of regulation helps to avoid individual case scandals but can entail disproportionately high costs in the form of personnel costs or administrative friction that places an unreasonable burden on those affected.

### Pillar 3: Avoid selective interventions and consider feedback effects

The measures of the first two pillars can partially offset the shortage of labor supply caused by demographic trends but probably not fully compensate for it. The effects of the supply shortage on the prices of goods and services outlined above have a large probability to actually happen. Disruptions to international supply chains, a reduction in the international division of labor, particularly in trade with China, and increases in the price of imported raw materials and intermediate products could exacerbate these effects.

If such developments occur, politicians will be under pressure to protect those negatively affected. However, we must be aware that it is not possible to protect all those negatively affected in such a constellation. A shortage of supply necessarily entails restrictions. The only question is for whom and to what extent.

The political discourse in a democracy harbors the danger of a selective approach in which the overall context is ignored. Attempts are made to help those who are currently protesting particularly vigorously in the media. The adjustments which spare these beneficiaries then have to be made elsewhere. There, the need for adjustment is increased, which is likely to lead to further protests. The consequence of selective interventions can significantly worsen the overall macroeconomic development.

To avoid this, economic policy needs a long-term strategy that encompasses the overall economic context. It should place the individual measures under discussion for dealing with the shortage of overall economic supply and the associated price increases in the overall context of demographic development, and then set clear priorities. The design of such a national strategy for economic policy in the face of demographic change depends on the priorities that politicians wish to set. However, it is important that policymakers recognize the problem of setting priorities and consciously tackle it instead of indulging in the illusion that everyone can be protected from the negative consequences of supply shortages. This includes not only the active implementation of measures such as those mentioned above, but also the omission of measures that cause damage from a macroeconomic perspective.

Goods and services that are produced in Germany or imported into Germany are allocated to private consumption, investment, exports or use by the state.

Adapting to a supply shortage requires a reduction in one or more of these uses or an increase in imports compared to a situation without this shortage.

Attempts to protect those affected not only increase the need for adjustment elsewhere, but can also reinforce the reduction in supply via feedback effects since the price increases would be correspondingly more drastic. The problems of individual measures in the various categories are discussed below.

**Private consumption.** A reduction in private consumption can occur automatically for those who do not benefit from higher wages and prices themselves, especially pensioners.

22. The Advisory Board warns against a complete indexation of pensions to the development of nominal wages and prices. Although indexation protects pensioners from the need to further restrict their consumption, demand elsewhere must be reduced all the more. Automatic indexation mechanisms such as the stop line in the “Pension Package II” exacerbate the problems.

Attempts to restrict the private consumption of those who benefit from higher wages and prices, for example through higher pension contributions and higher taxes, can exacerbate the supply shortage due to their incentive effects.

23. This consideration also speaks against covering the pension insurance deficits by increasing contributions or through additional allocations from general budget funds.

**Monetary policy and investments.** An increase in inflation does not only affect incomes, but also assets. Price and wage increases reduce the purchasing power of nominal asset values, in savings accounts of all kinds and in debt instruments. There is therefore likely to be considerable political pressure for the central bank to halt or neutralize this development.<sup>11</sup>

In fact, monetary policy could slow or halt the upward trend in prices if it set interest rates high enough. This would reduce private investment. This would then bear the brunt of the adjustment to the supply shortage. However, Germany has already weak private investments, a weakness that would then be amplified. Attempts to balance demand and supply through interest rate policy would further burden future economic development and reinforce volume reductions through their investment effect.

**Exports and imports.** A reduction in exports and an increase in imports could occur automatically if rising wages and prices reduce the competitiveness of products manufactured in Germany. This would be a natural consequence of the lower supply in Germany. Embedding the German economy in the eurozone could also help to ensure that this effect is not quickly counteracted by a currency devaluation.

If this happens, it is to be expected that the lobby, media and politicians will denounce the reduction of the export surplus due to reduced competitiveness as a problem, as they have done in the past. However, this reduction would be less of a problem than part of the solution to the problem of adjusting overall economic demand to the reduced supply.

11 The ECB’s mandate to ensure “price stability” is occasionally also interpreted as a mandate to protect savers; Kirchhof (2021), for example. From this interpretation, one could even derive the demand for a reversal of price increases that have already taken place. The German Bundesbank has never accepted such a demand, but has always interpreted the mandate for “price stability” in a forward-looking manner, based on the current price level, in accordance with the principle that “bygones are forever bygones”.

24. The Advisory Board therefore recommends that the effect of reducing the export surplus should not be impaired.

**Government demand for goods and services.**

Government demand is particularly important in the labor market. More than ten percent of employees work in the public sector. A reduction in government demand for goods and services could make a significant contribution to adapting to the shortage of supply. However, there are also warnings of harmful side effects here. This applies in particular to public investment and government services, the judiciary and police, schools and universities, defense and transport. Shortcomings and the need to catch up in these areas have been the subject of public debate for some time.<sup>12</sup>

25. The Advisory Board would find it fatal if the problems addressed in this report were to perpetuate or even deepen the shortcomings in the public sector. This would not only further impair the efficiency of the state and the infrastructure provided by the state, but also the willingness of companies to make private investments. Instead, resources should be freed up to eliminate the shortcomings by increasing efficiency and reducing bureaucracy, see recommendations 20 and 21 above.

**Conclusion:**

The three pillars contain a wealth of recommendations for taking individual measures here and not taking them there. There is no “miracle cure” to counteract the negative effects of demographic change on overall economic development. It is precisely because of this multitude of necessary actions that a coordinating and prioritizing national strategy for economic policy in the face of demographic change is necessary, which not only keeps an eye on the immediate focal points, but also on the overall economic context with its feedback effects.

12 For public investments, see the Advisory Board's reports from 2020 and 2023.

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# Appendix: Reports of the Scientific Advisory Board to the Federal Ministry for Economic Affairs and Climate Action since April 1948

Available via the Scientific Advisory Board's website:

<https://www.bmwk.de/Navigation/EN/Ministry/Advisory-Boards/advisory-boards.html>

The roots of the Scientific Advisory Board to the Federal Ministry for Economic Affairs and Energy go back to the time of the Second World War. From 1943, some of the later members of the advisory board met under the chairmanship of Prof. Erwin von Beckerath to prepare Germany's economic future after the war. This so-called "Consortium Erwin von Beckerath" merged into the Advisory Board, which was founded at the beginning of 1948 and formally constituted on January 23, 1948 in Königstein/Taunus at the invitation of the Administrative Office of Economy, the predecessor of the Federal Ministry for Economic Affairs and Energy.

The Advisory Board had the following 17 founding members:

Prof. Dr. Franz Böhm,  
Prof. Dr. Walter Eucken,  
Prof. Dr. Walther G. Hoffmann,  
Prof. Dr. Wilhelm Kromphardt,  
Prof. Dr. Adolf Lampe,  
Prof. Dr. Elisabeth Liefmann-Keil,  
Prof. Dr. Alfred Müller-Armack,  
Prof. Dr. Oswald v. Nell-Breuning,  
Prof. Dr. Erik Nölting,  
Prof. Dr. Hans Peter,  
Prof. Dr. Erich Preiser,  
Prof. Dr. Ludwig Raiser,  
Prof. Dr. Heinz Saueremann,  
Prof. Dr. Karl Schiller,  
Prof. Dr. Otto Veit,  
Prof. Dr. Gerhard Weisser,  
Prof. Dr. Theodor Wessels.

