

## »» Skills shortage marks a turning point: The times of guaranteed growth are over

No. 414, 23 January 2023

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Prosperity has grown in Germany for more than 70 years, interrupted only by brief phases of recession. A growing workforce and sufficient labour productivity growth rates have ensured that economic growth could be seen as guaranteed. All the German economy needed to do was keep up with international competitors and digest temporary shocks. Those days are over. The foundation for further prosperity gains is crumbling.

Skills shortages are already affecting the business operations of half of all enterprises. This is primarily due to weak productivity growth. Labour productivity per worker has increased by a meagre 0.3% annually since 2012. If this low rate of productivity growth continues and the decline in the domestic workforce accelerates at the same time, it will mark a turning point. Before the end of the decade, Germany would enter an era of permanently stagnating and possibly gradually declining prosperity.

Continuing losses in prosperity would likely result in growing distribution conflicts and rising competition over access to scarce resources. The current crisis already illustrates that long-term energy policy and climate action goals set for the future are temporarily taking a back seat in a bid to prevent prosperity declines and economic losses today.

The present study draws up scenarios to investigate the contributions which different regulating variables for bolstering the supply of or demand for skilled labour would have to make in order to offset the demographically induced decline in the domestic supply of skilled workers. This would prevent a drop in per-capita GDP, in other words overall economic prosperity. We have analysed the regulating variables of increasing labour force participation, boosting immigration and raising labour productivity. The analysis yielded the following key findings.

Offsetting the demographically induced decline in the domestic supply of skilled labour solely by increasing the labour force participation of today's working-age population would require raising the employment rate in the age group of 15 to 64-year-olds from currently 79 to 89% by the year 2035. More than anything, it would mean significantly increasing the employment rate of women, but also of men. Thus far, only the employment rate of women is growing steadily, and much more slowly than would be required. As a result of misdirected incentives or family obligations, a large portion of women in Germany, many of whom are highly skilled, often work part-

time or in jobs for which they are overqualified. Many therefore prefer to stay out of the workforce altogether.

Offsetting the decline in the supply of labour by increasing labour force participation in the age group of 65+ would require increasing the employment rate in this age group from currently 8 to 27% by the year 2035. Raising the regular retirement age to 67 years will do far too little to achieve this and even less if the effect were to be diluted by new rules on deduction-free early retirement. This does not even take into account that women and pensioners are far more likely to work part-time than men of working age. Besides, women are much less likely to opt for careers in STEM fields, which are important for the country's innovative and competitive strength.

Foreign workers currently contribute around 60% to employment creation in Germany. In order to offset the decline in the domestic supply of employable workers with migrants alone, net immigration of employable people aged 15 to 64 years would need to reach one million already in 2022. Net immigration in this age group would then need to increase to 1.3 million by the middle of the decade, and only under the assumption that they bring equal skills to the table. If we also take into account the fact that insufficient language skills and lack of skills recognition mean that foreign workers in Germany are much more likely to work in unskilled occupations than their domestic peers, net immigration in that age group would have to grow to 1.8 million. Permanent net immigration on that scale appears unrealistic. What would be all the more important is to improve the conditions for further increasing the labour force participation of nationals, especially of women, but also for further bolstering labour productivity growth.

It would be an omission to ignore labour productivity in efforts to ease the skilled labour shortage. After all, the development of labour productivity determines demand for labour and skilled workers. It therefore greatly influences the skilled labour shortage as well. Offsetting the decline in the domestic supply of labour by increasing labour productivity would require increasing productivity growth per worker by around 1% each year. That could be done by automating human activities, making workflows more efficient and improving the conditions for investing in physical assets, human capital and innovations, but also by increasing the number of hours worked.

Improving the productivity growth rate would reduce the need to work more hours to maintain overall economic prosperity. If it were possible to raise labour productivity growth per worker through automation and improved production conditions again to 1.5 to 2%, this could take the pressure from the debate around longer working hours and raising the retirement age.

The increases in labour force participation, migration and productivity identified in the scenarios would only be sufficient to stabilise the supply of workers and overall economic prosperity in itself. More would need to happen to raise economic growth further, as well as to avoid a growing skills shortage in STEM occupations, nursing and healthcare professions as well as other public service occupations.

Securing present prosperity and ensuring further prosperity growth therefore requires a comprehensive mix of measures. These will include incentives for higher labour force participation, particularly for women and older workers, improved child daycare and nursing services, needs-based training and lifelong learning, attracting more women to STEM roles and management positions, improving digital expertise and greater efforts to bring in skilled workers from abroad. In order to revive the feeble labour productivity growth rate and thus reduce the demand for skilled labour, it will above all be necessary to invest and innovate more with the aim of increasing productivity.

Individually none of these measures would be sufficient but in combination they could make a large difference. Achieving this will also require education and motivation. Often it is precisely the people who could benefit most from lifelong learning and further training who are least motivated. It also means delivering more and faster skills and German language training for migrants. Greater efforts also need to be undertaken to nurture enthusiasm for school subjects and occupations in the areas of science, technology, engineering and mathematics. A mandatory year of social service for young people, on the other hand, would be rather counterproductive to address the skills shortage. It would require young people to spend a year doing unskilled work instead of acquiring qualifications as quickly as possible and contributing to society as skilled professionals.

A number of measures have already been initiated. These include measures aimed at reconciling work and family life, increasing digital education, focusing labour market policy more strongly on building skills and reforming the German Skilled Labour Immigration Act. But more needs to be done to secure the level of prosperity and economic growth. The adoption by the German Federal Government of a new employment, skills and workforce strategy is a very welcome first step. It must now be fleshed out and implemented with dedication and the envisaged measures must be improved and supplemented where necessary. That will require initiative on the part of the government but also, and in particular, on the part of the employable population, businesses and their organisations and associations. The success of a market economy is built first and foremost on personal initiative.

### Methodological design of the scenarios

Under the present study, four scenarios with a time horizon up to the year 2035 were calculated on the basis of the following underlying assumption or question: Without immigration, the ratio of employable persons aged 15 to 64 years to total population will drop more steeply in future. That means the ratio of total population to employable people will increase more sharply. Assuming the employment rate, total hours worked per worker and the labour productivity rate all remained steady, this in itself would cause gross domestic product to contract in the years leading up to 2035.

In the scenario 'Employment rate 15 to 64', we calculated how strongly the employment rate in the age group of 15 to 64-year-olds would need to increase in future in order to individually offset the decline in the ratio between the population aged 15 to 64 years and total population. In the scenario 'Employment rate 65+' we conducted this calculation for the group of people aged 65 and older. The calculations were made solely on the basis of headcount, that is, without considering the significantly higher part-time employment rates among women and older employees and differences in career choices between women and men that also determine what skills will be available in the future.

In the scenario 'Immigration' we calculated how high net immigration would have to be in order to maintain a steady ratio of 15 to 64-year-olds to total population. In itself, this would prevent a decline in per-capita GDP. The underlying development of the resident population was derived from the Federal Statistical Office's G2L2W0 population scenario, which predicts a population decline in a net zero immigration scenario.

The need for migrants under the scenario 'Immigration' is much higher than in scenarios that simulate how high migration would have to be to maintain a constant labour force potential. If stabilising the number of employable workers were the only concern, in a situation of constant labour force participation it would be sufficient to increase net migration to up to 700,000 working-age people. In order to maintain the ratio of employable people to total population on a steady level, however, migrant intake will have to roughly double. That is because the number of pensioners is growing significantly and migration increases the population requiring services. The scenario does not consider the fact that underage migrants enter working age while older migrants enter retirement age during the period under observation. The fourth scenario 'Productivity' shows how strongly labour productivity per worker would have to increase in order to individually offset the impact on per-capita GDP of the decline in the ratio of 15 to 64-year-olds to total population.

The four scenarios allow conclusions to be drawn on whether it is realistic to assume that a single regulating variable such as a higher migrant intake, for example, is sufficient to offset the impact of the imminent decline in the resident workforce on per-capita GDP, or whether this requires a mix of measures. The revealed trends in the regulating variables that would have to be initiated would merely suffice to individually prevent a decline in per-capita GDP, and only when

leaving out qualifying aspects. In order to boost economic growth, more would need to happen.

**Boosting labour force participation of women and older workers still holds potential but ...**

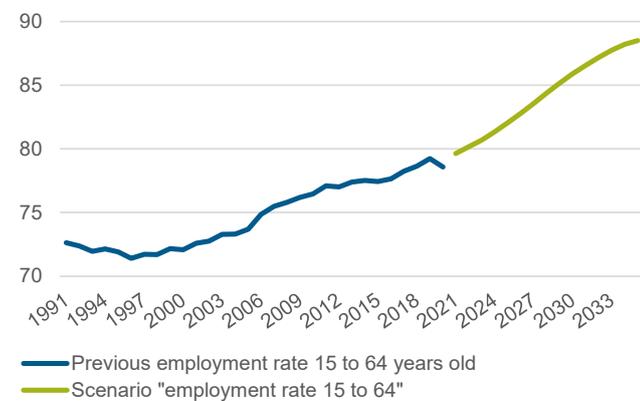
**Labour force participation of working-age people is not growing fast enough**

Without any migration, the population of today's working age from 15 to 64 years would drop by 8.5 million from the year 2020 up to the year 2035. The total population, however, would decline by just 4.9 million.<sup>1</sup> In itself, this would lead to a decline of 11% in per-capita gross domestic product by the year 2035. One way of responding to the decline in the resident workforce is by increasing labour market participation.

The employment rate in Germany has grown very gradually over the past decades. (The employment rate is defined as the ratio of employed and unemployed persons to total working-age population.) For the population of current working age, that rate rose from 73 to 79% from 1991 to 2019. It would have to increase to 89% by the year 2035 in order to in itself prevent the gap in the supply of skilled workers from widening further (Figure 1).

**Figure 1: The employment rate in the age group of 15 to 64-year-olds would have to rise much faster and grow by a further 10 percentage points**

Employment rate in the age group of 15 to 64 years in per cent. The scenario 'Employment rate' shows how steeply the rate in the age group of 15 to 64 years would have to rise in order to maintain the ratio of employable persons to total population in this age group. Employment rate=employed plus unemployed persons in relation to total population in that age group.



Source: German Federal Statistical Office, KfW Research.

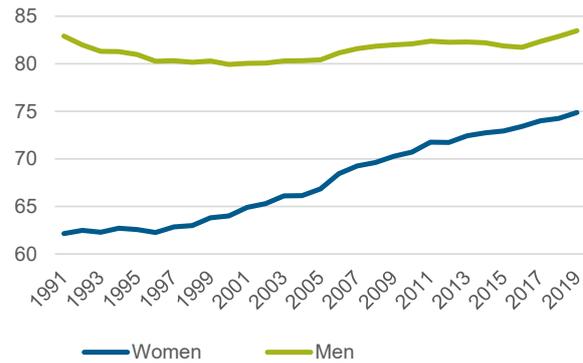
For that to occur, the employment rate would have to rise much faster in future and increase significantly among men as well, which is doubtful. The momentum in increasing labour force participation comes mainly from women. Their employment rate already increased from 62 to 74% from 1991 to 2019 (Figure 2). The employment rate of men, however, stood at a good 83% in 2019 – insignificantly higher than in 1991, so that potential might have already been largely exhausted.

Nevertheless, a comparison with other European nations shows that it should be possible to increase the employment rate of both women and men. In the Netherlands, the EU champion of labour force participation, the employment rate in the age group of 15 to 64-year-olds is just under 84%, which is significantly higher than in Germany. According to Eurostat surveys, the employment rate there was around 80% for

women and 87% for men in 2021. At the same time, the part-time employment rate in the Netherlands was 43%, significantly lower than in Germany. And there, too, the employment rate is much lower than the rate that would be required in Germany to prevent losses in prosperity resulting from skills shortages by merely increasing labour force participation among the working-age population.

**Figure 2: The employment rate of women is still rising, while that of men has remained steady over the long term**

Employment rate of women and men in the age group of 15 to 64-year-olds in per cent



Source: German Federal Statistical Office, KfW Research

**Women are less likely to choose STEM occupations, which are crucial to Germany's innovative capacity**

According to surveys conducted by the Federal Employment Agency, a mere 17% of the 7.7 million employees subject to mandatory social security contributions in STEM occupations are women (STEM= science, technology, engineering, mathematics). That proportion has remained nearly steady in the past years. It would need to change radically if the gaps resulting from men leaving the workforce were to be filled with a growing supply of female specialists. Otherwise there is a risk of a growing shortage of junior IT, engineering, technology and science experts that would increasingly cripple the innovative and competitive strength of the German economy.

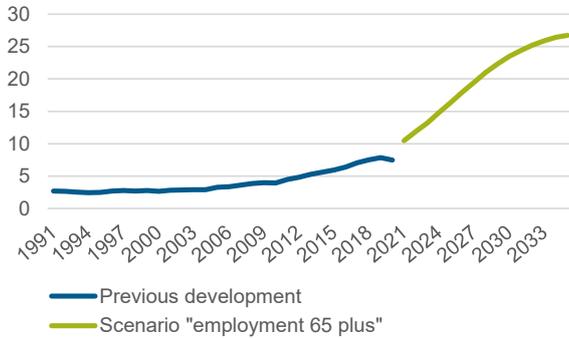
**The labour force participation of people of current retirement age is also rising too slowly and raising the retirement age to 67 will do little to change this**

The employment rate of people aged 65 and over rose from 3 to 8% from 1991 to 2019. In order for the age group of 65+ to be able to offset the decline in the domestic supply of workers aged 15 to 64 (merely on a headcount basis), their employment rate would have to increase to 27% by the year 2035. This would require the trend to a higher labour force participation of retirement-age workers to speed up significantly (Figure 3).

Gradually raising the retirement age to 67 by the year 2030 will not be enough to achieve this. Under the assumption that this would increase labour force participation among 67-year-olds to that of the age group of 55 to 65-year-olds, the employment rate in the age group of 65+ would increase by only 3 to 11% by the year 2030. The much higher goal would nonetheless be theoretically achievable. In Japan the employment rate in the age group of 65+ was 26% in the year 2021. But that, too, would be sufficient only if the much higher part-time rate among pensioners is disregarded.

**Figure 3: The employment rate in the age group of 65+ would have to increase much faster and rise by a further 19 percentage points**

Employment rate in the age group of 65 and older in per cent. Employment rate=employed plus unemployed persons in relation to total population in that age group. The scenario '65 plus' illustrates how steeply the employment rate in the age group of 65 and older would need to rise in order to offset the decline in the ratio of employable persons aged 15 to 64 years to total population.



Source: German Federal Statistical Office, KfW Research

**The trend to part-time work is diminishing the effect of greater labour force participation**

The population groups who contribute to increasing labour force participation are most likely to work part-time. For women the part-time employment rate in 2021 was 49% compared with 12% for men and it has so far been on the rise.<sup>2</sup> The part-time employment rate in the age group of 65 to 75 years was 79% in 2020. The number of hours worked per employee per year has fallen steadily in the past decades, mainly as a result of the growing part-time employment rate, and the trend is unabated (Figure 4). This is noticeably diminishing the effect of growing labour force participation on the supply of skilled workers and has led to a situation in which labour productivity per person employed has hardly increased anymore since the year 2012.

**Courses of action**

The following measures can help enhance the contribution of greater labour force participation on the supply of skilled workers:

**Substantially increase support for the employment of girls and women:**

Remove misguided incentives and introduce further measures to better balance work and family life in order to further improve the conditions for women to work and pursue a career, particularly those with high qualifications.

Attract more women to leadership positions. To achieve this it would be beneficial to have a societal culture in which training and educational institutions, the state, businesses, media, family and friends encourage and support girls and women to become more involved in the workforce, strive to move up occupational hierarchies and become entrepreneurs.

Do more to get girls and young women at school and in training interested in STEM occupations.

**Figure 4: The number of hours worked per worker is on the decline**

Hours worked per worker per year.



Source: German Federal Statistical Office, KfW Research

**Improve professional child daycare and nursing care:**

Expand free and low-cost professional child daycare and nursing care. Expanding these services requires a sufficient supply of qualified educators, teachers and care professionals to be trained and attracted from other countries. Allowing child daycare and nursing care workers from third countries to work in Germany even without a formal professional qualification can also be helpful. According to EU surveys, at least one quarter of part-time workers in Germany are working reduced hours because they are looking after children or family members in need of care. A comparison with Sweden suggests that expanding professional child daycare can bring about another substantial increase in the employment rates of parents.<sup>3</sup>

**Reduce misguided incentives in the tax and transfer system that make work unattractive:** This could involve, among other things, reforming the income tax splitting for married couples.<sup>4</sup> Other measures under discussion involve abolishing the free inclusion of spouses in health insurance policies and abolishing or reducing the extensive tax exemption on mini jobs, which makes it unattractive for low income earners to seek employment subject to mandatory social security contributions with a higher number of working hours. These reforms could supplement each other in their impacts. That would effectively increase work incentives for women in particular.<sup>5</sup>

**Raise the retirement age with a bonus** for working longer voluntarily. One way of increasing the regular retirement age would be a model in which employees can continue to choose to retire early but receive a higher pension as a bonus if they choose to work longer. The bonus could be determined by actuarial calculations. That would ultimately mean expanding the flexible start of retirement age, which is already possible.

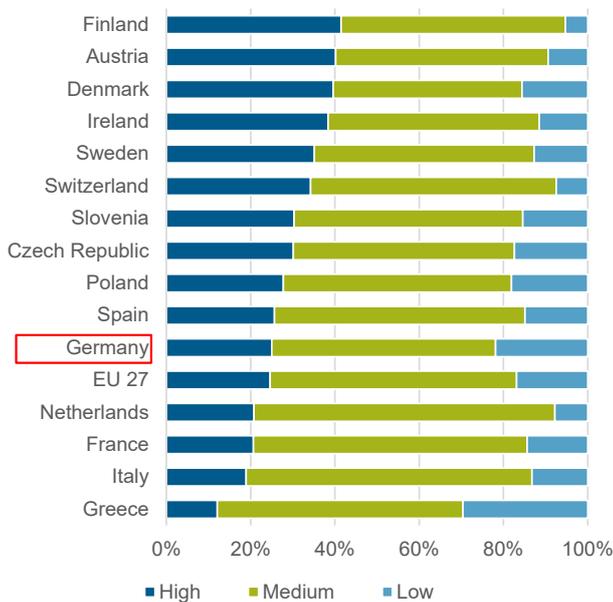
**Improve work motivation:** Other helpful measures include efforts to give work a better image and make working conditions and the working environment more attractive in order to increase labour force participation. The public debate sometimes conveys the impression that gainful employment was an imposition, particularly after the age of sixty. That is surely the case for older workers in particularly demanding occupations. However, cultivating such a fundamental attitude among the working-age population has measurable negative consequences. According to surveys by Eurostat, Germany is among the EU countries with rather low work satisfaction

levels (Figure 5). What is also worth noting is that according to the EU surveys – and contrary to what the public debate suggests –, working pensioners in Germany are particularly likely to be highly satisfied with their work (36%) and especially unlikely to be dissatisfied (15%).

Germany could learn from its neighbours how to value employment more. In Finland, Norway and Austria more than 40% of employees stated that they were highly satisfied with their work and in Switzerland that rate was even 76% in the age group of 65+.

**Figure 5: Germany is among the EU countries with rather low levels of work satisfaction**

2018 survey on job satisfaction, responses broken down into high, medium and low



Source: Eurostat, illustration by KfW Research.

**Upskilling helps employed and unemployed people better harness their potentials**

In the quest to secure the supply of skilled labour, training can achieve the following:

**Keep workers fit for the structural transformation and protect them from unemployment**

In the year 2019, some 11 million employees subject to mandatory social security contributions were working in jobs where 70% to 100% of activities can already be completed by machines – and the trend is rising. The potential for automation is highest in manufacturing occupations, where on average nearly 84% of activities could be performed by machines.<sup>6</sup> Furthermore, changes in international supply relationships and the transition to climate neutrality are altering the economic structure. Business leaders and employees must continue learning throughout their working lives in order to keep up with the pace of change.

**Safeguard the competitiveness of the German economy and the provision of basic services**

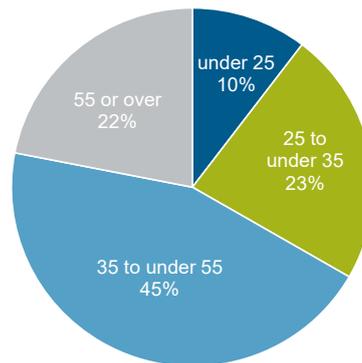
Particularly in STEM occupations, Germany needs an adequate supply of skilled workers and academic experts in order to keep up with international competitors, maintain the innovative strength of its businesses and move ahead on climate action. There is a risk of severe shortages here, as 22% of STEM employees are over the age of 55 and will retire within the next 12 years (Figure 6). Growing shortages also exist among physicians and in other medical and nursing professions, putting pressure on healthcare services.<sup>7</sup>

**Reduce the high number of employees without qualifications.**

In 2020, 8.6 million people of working age in Germany had no qualifications and were neither attending school nor undergoing training. Lack of qualifications is associated with a high risk of unemployment. The unemployment rate in 2021 stood at 21% among unskilled workers but only at 3.6% among workers with skills.

**Figure 6: More than one fifth of STEM workers will retire by 2035**

Percentage shares of STEM workers subject to mandatory social security contributions by age group



Source: Federal Employment Agency, illustration by KfW Research

**Courses of action**

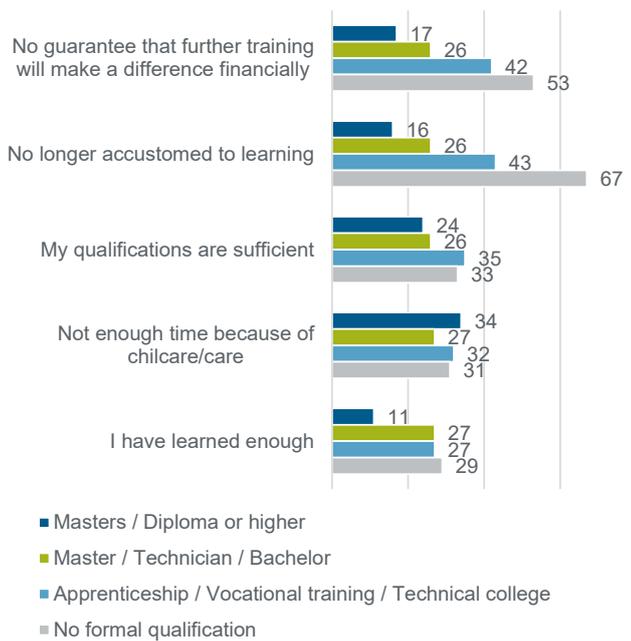
In order to achieve the educational objectives stated above, workers and jobseekers, businesses and government agencies can target a range of leverage points:

**Promote people’s motivation to learn and continue learning:**

A culture of staying fit for the structural transformation and technological progress throughout the entire working life must build on personal initiative. The motivation to continue learning is by far the lowest among low-skilled workers. In a survey conducted by the Institute for Employment Research (IAB), two thirds of unskilled workers stated they were not interested in further training because they were no longer accustomed to learning and 53% said so because there was no guarantee of financial benefit (Figure 7). However, skilled workers are often discouraged from seeking further training for the same reasons.

**Figure 7: The lower a person's skill level, the lower the motivation to engage in further training**

The five main reasons against further training. IAB employee survey of 2017



Source: IAB, selection and illustration by KfW Research.

In order to create a culture of lifelong learning it is necessary to do more to highlight the benefits of education, motivate people to learn and create good learning conditions and positive learning experiences. If employed workers are to upskill or reskill, modular courses that are compatible with their working hours need to be created, along with online courses, financial support and transparency through appropriate quality-controlled training. Temporary income losses can be mitigated to enable people to acquire formal skills later in life.

**Secure the provision of basic services and innovative strength:** Opportunities and incentives for learning and continuing education must be improved especially in areas where skilled workers are needed to secure the provision of basic public services and safeguard the innovative strength and competitiveness of the economy. This applies to areas such as STEM occupations, healthcare and nursing occupations and education. Improving digital learning schemes and getting girls and women more interested in STEM subjects and roles can be helpful in this regard. Attractive remuneration and working conditions are also important.

**Secure entrepreneurial succession:** The competitiveness of the economy crucially depends on an adequate supply of competent and dedicated entrepreneurs and managers. In order to ensure adequate entrepreneurial succession and raise the level of professionalism of managers, it may be helpful to teach necessary skills such as independent entrepreneurial thinking and acting already in schools, universities and in-company training.

**Support less well educated people early:** Children from educationally disadvantaged families must be motivated to engage in self-directed learning. Compulsory free early childhood education can significantly improve later career

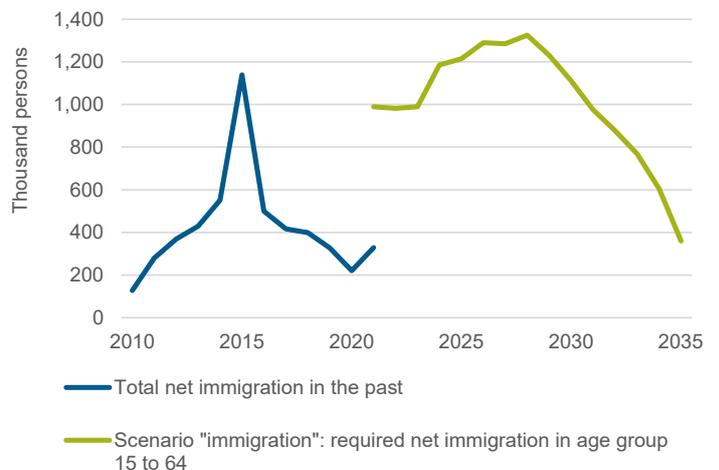
opportunities. Motivating people with a low level of schooling to undertake vocational training as early as possible is also important. The scarce funds earmarked for vocational training for unemployed people should be used particularly for those who have good prospects of succeeding.

**Germany would need well over one million migrants each year to replace retiring skilled workers**

Keeping the share of 15 to 64-year-olds in total population steady through immigration alone would require a net intake of around one million migrants in that age group already in 2022.<sup>8</sup> By the year 2026, net immigration in that age group would have to rise to nearly 1.3 million (Figure 8). For comparison: Net migration was just 221,000 in 2020 and 329,000 in 2021. In 2022 the level of migration was high enough due to the high number of Ukrainian refugees. But refugee migration is no substitute for targeted skilled migration. The intake of workers with skills that fit domestic needs is nowhere near enough to prevent in itself the creeping decline in prosperity resulting – in itself – from the decline in working-age population in the country.<sup>9</sup> A permanent net migration intake of more than one million people per year appears unrealistic.

**Figure 8: Germany would need net immigration of more than one million each year to offset the decline in the domestic labour supply**

The scenario 'Immigration' highlights the level of net immigration required each year in order to maintain a steady ratio of 15 to 64-year-olds to total population.

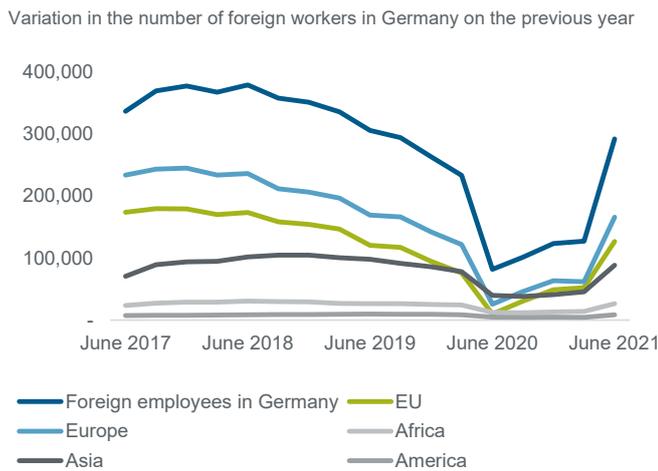


Source: German Federal Statistical Office, KfW Research

Furthermore, the increase in foreign workers in Germany slowed already in the years preceding the coronavirus pandemic instead of accelerating (Figure 9). This was particularly the case with workers from European countries, who play the most important role by far for skilled migration, but also workers from Asia, the Americas and Africa. A large portion of migrants from Asia and Africa are asylum seekers. Asylum-seeker intake is no substitute for targeted skilled migration, partly because of their uncertain and temporary residence status.<sup>10</sup>

In other words, the trend is heading in the wrong direction. It remains to be seen to what extent the Skilled Immigration Act of 1 March 2020 and the planned reforms will do anything to change this. What is already clear is that no amended law in itself can remedy the absence of German language skills or qualifications needed to meet labour market requirements.

Figure 9: The number of foreign employees in Germany is growing, but at an increasingly slower rate.



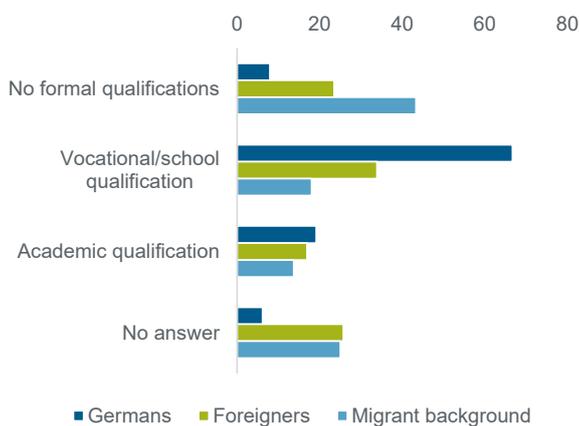
Source: Federal Employment Agency, KfW Research.

**Migrants often have no formal qualifications and are relatively likely to work in unskilled jobs**

Furthermore, migrants often lack the qualifications needed to fill skilled positions. The survey conducted by the Federal Employment Agency among employees subject to mandatory social security contributions revealed that in October 2021 only 8% of Germans but 24% of workers holding foreign citizenship had no formal qualifications (Figure 10). Among workers from countries in Asia and Africa who were granted asylum status the rate was 43%.

Figure 10: Foreign workers in Germany are much less likely to have qualifications than Germans

Share of employees subject to mandatory social security contributions by origin. Survey conducted by the Federal Employment Agency in October 2021.



Source: Federal Employment Agency, KfW Research

The share of foreigners without formal qualifications may be even higher because one quarter of them gave no details about qualifications. One indication of this is that 38% of foreign workers are employed in unskilled jobs, which is a much higher proportion than the share of workers reporting no qualifications would suggest. Only 13% of German workers are employed in unskilled jobs. From this it follows that there are 87,000 skilled workers with vocational or academic qualifications for every 100,000 domestic workers, but only 62,000 for every 100,000 workers with a migrant background.

**Can Ukrainian refugees remedy the skilled labour shortage in Germany?**

The expectations should be much lower. This is also illustrated by the following facts:

According to preliminary data, one million Ukrainian refugees were registered in Germany in the year 2022, mostly women and children.

The number of workers from Ukraine stood at 120,000 in October 2022, 64,000 more than in the same month of the previous year.

In December 2022, 373,000 Ukrainians were registered as jobseekers in Germany.

That means only a minority of refugees have been able to enter the labour market so far. <sup>11</sup> This should hardly come as a surprise because the first step is to provide refugees with accommodation and clarify formalities, and only a small proportion speak German. Furthermore, it is uncertain to what extent they will continue to work in Germany indefinitely.

Data on the Ukrainians who have already resided in Germany for some time allow conclusions to be drawn about the prospects for integrating Ukrainian refugees:

Ukrainians living in Germany have a high level of formal education. Fifty per cent have a tertiary degree and a further 14% have post-secondary qualifications, which primarily means vocational training.

The proportion of workers employed in complex specialist occupations, however, is significantly lower than the share of tertiary degree holders. Around 30% of Ukrainian employees perform unskilled or semi-skilled jobs. <sup>12</sup>

According to these data, the skills they have are being underutilised. One major reason is that they lack or at least did not have the necessary German language proficiency when they entered the country. Sample surveys of earlier immigrants revealed that a mere 10% had good or very good German language skills in the first two years living in Germany, a good one third did so after three to five years and a good half of them after six to 10 years. <sup>13</sup>

The employment rate of earlier immigrants aged 18 to 64 years was more than one third in the first two years and exceeded 50% after around 10 years. If we apply these figures to the refugees and take into account the high proportion of refugee children, up to 250,000 of the refugees so far registered could enter the labour market in Germany in the next two years, and a high share of them presumably in unskilled positions.

Given the considerable effort of integrating and providing for refugees, taking in refugees is an economically inefficient way of enlarging the workforce, particularly in the light of the very high unemployment rate among low-skilled workers in Germany who only qualify for unskilled or semi-skilled jobs. Welcoming refugees is first and foremost an act of humanity and solidarity.

### Courses of action

If immigrants are to make a substantially larger contribution to closing the skills gap, much more needs to be done to attract young people from other countries to work in Germany and integrate them into the labour market. The following are key factors:

**Early acquisition of German language skills enabling high-level professional communication.** If it takes most immigrants years to acquire these skills, this poses a dilemma: So long as they do not have the German language skills required for skilled occupations, they can only work in unskilled jobs. If after three to five years they have acquired that level of skills, they have little desire to undertake years of training during which they forego earning an income.

### Recognition and acquisition of vocational qualifications.

The younger the immigrants are, the more likely they are to successfully train and train up. An analysis conducted by the IAB among people without formal qualifications revealed that it is rare for people to pursue formal training after the age of 25.<sup>14</sup>

One approach already being practised is to increasingly teach the required German language skills and vocational qualifications to young foreign job applicants before they even start work in Germany. But so far there is muted interest in this approach.<sup>15</sup> In order to change this, the barriers would need to be identified and removed. Another possible approach can be to enable and attract young people from other countries to stay in Germany on a work-and-travel programme.

### If workforce productivity remains stagnant, per-capita GDP is likely to decline persistently even before the end of this decade

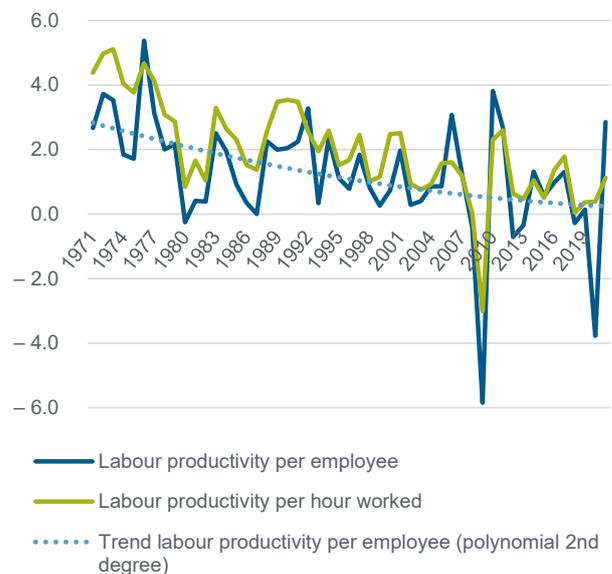
Labour productivity growth has slowed significantly (Figure 11). Since 2012, productivity per hour worked has increased by only 0.8% on average each year. On a per-worker basis, it has since grown by 0.3% per annum. The weak productivity growth rate significantly exacerbates the impact of the declining domestic supply of skilled labour because it increases the number of working hours required to maintain prosperity and prosperity growth.

On behalf of KfW Research, the Cologne Institute for Economic Research has forecast the economic growth rate in Germany on the basis of a population scenario prepared by the Federal Statistical Office. It has calculated that real gross domestic product can grow by just under 1% annually from 2026 to 2040. That, however, would require labour productivity per worker to increase by 1.4% per year. If productivity growth remains on the same weak level as in recent years and if the working-age population decreases significantly at the same time, a period of gradual decline in prosperity could set in three to four years from today.<sup>16</sup>

Offsetting the demographically induced decline in the domestic supply of labour by increasing labour productivity alone would require increasing labour productivity growth per worker by 0.7 to 1% per year (Figure 12). That would not yet generate any economic growth. All it would do is prevent a decline in per-capita GDP.

Figure 11: Labour productivity per person employed has nearly stagnated in the past years

Variation in labour productivity per worker and per hour worked in per cent on the previous year



Source: German Federal Statistical Office, illustration by KfW Research

Strengthening productivity growth would first and foremost require greater investment in equipment and research and development. That investment was very weak in 2020 and 2021. Fixed capital formation in machinery and equipment plunged by 11% in 2020 and was still well below the pre-crisis level in the second quarter of 2022. Investment in intellectual property has since stagnated. It grew at high rates prior to the coronavirus crisis.

### Courses of action

If the current investment and innovation weakness persists, the downward productivity growth trend may potentially continue and initiate a decline in labour productivity per worker as well. That would aggravate the skilled labour shortage additionally. In order to avoid this, investment and innovation activity would need to be strengthened, particularly as the high level of economic uncertainty caused by the Russia conflict is also making businesses reluctant to invest. This would require a package of measures:

**Improve the enabling conditions:** This includes all measures aimed at improving the environment for investment, innovation and innovative start-ups:

- Reduce deficits in business infrastructure, especially digital infrastructure,
- Launch an educational initiative as described above to attract more students to enrol in STEM subjects in order to increase digital literacy among the working-age population,
- Improve the efficiency of state bureaucracy, deregulate and accelerate planning and approval procedures,
- Improve the conditions for knowledge dissemination and know-how transfer,

- Financial support and incentives, assumption of risk by the state and cost reduction for innovations and productivity-enhancing investments,
- Strengthen competition hampered by corporations that dominate the market and cartels.

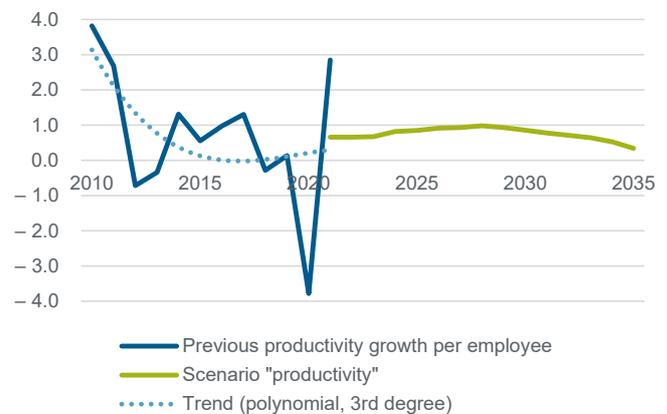
**Link digitalisation with automation and lean concepts:** As described, great potential exists for automating tasks. That means there is also great potential to increase labour productivity at least through technology. Nonetheless, the hoped-for surge in overall economic productivity from digitalisation in Germany has obviously failed to materialise so far.

Studies have concluded that significant productivity increases can often be achieved by linking the use of modern digital technologies with the concepts of lean production (manufacturing) and lean management (administration and services).<sup>17</sup> They constantly explore whether and how manpower and the use of other resources can be reduced by making production methods and workflows more efficient. This can reduce existing skills shortages.

There are understandable reservations and resistance to automation and the leveraging of efficiency potentials. Skilled workers may regard digital expert systems as devaluing their experiential knowledge, and jobs may be lost. Reservations and fears must be addressed where they are unjustified. Employees who see threats to their jobs or are affected by job losses should be informed early and supported in finding new jobs where necessary. Businesses, chambers of commerce, job centres, trade unions and other job placement, continuing education and training institutions can contribute to this.

**Figure 12: Worker productivity growth would need to rise to 1% per annum**

Variation in labour productivity per worker in per cent on the previous year. The scenario 'Productivity' shows how strongly labour productivity per worker would have to increase in order to individually offset the impact of the decline in the ratio of 15 to 64-year-olds to total population on per-capita GDP.



Source: German Federal Statistical Office, KfW Research

## Conclusion

The analysis has shown that a number of levers need to be moved to reduce the skills shortage to such an extent that the prosperity level is secured and can continue to rise. This can benefit low-income groups in particular. Positive interactions between the various measures as a whole can achieve more than merely implementing stand-alone measures. Thus, a digital education initiative cannot fully realise its potential until businesses and public institutions invest more in digital technologies that add value and develop these further. This can be supplemented by attracting more women to STEM occupations through the removal of misguided incentives, the expansion of child daycare and education policies. If economic growth is secured in this manner it will also make it easier to mobilise resources for climate action and environmental protection, the mobility transition, digitalisation, national defence and other challenges for Germany's future.

<sup>1</sup> This development is derived from the Federal Statistical Office's G2L2W0 population scenario, which estimates the development of the population in a net zero immigration scenario.

<sup>2</sup> Contractually agreed part time without short-time work.

<sup>3</sup> Cf.: Geis-Thöne, W. (2021): Stand und Entwicklung bei den familienpolitischen Zielen im europäischen Vergleich (*Situation and development of family policy goals in a European comparison* – our title translation, in German), IW-Report 39/2021 p. 34 f, accessed via [Stand und Entwicklungen bei den familienpolitischen Zielen im europäischen Vergleich - Institut der deutschen Wirtschaft \(IW\) \(iwkoeln.de\)](#) (as at 17 October 2022).

<sup>4</sup> Cf. Council of Economic Experts. (2021, eds.): Anreizwirkungen des deutschen Steuer- und Transfersystems auf das Erwerbsangebot von Zweitverdienenden (*Incentive effects of the German tax and transfer system on the labour market participation of second income earners* – our title translation, in German), Working Paper 06/2021 and Bach, S. et al. (2021): Reform proposal for marriage taxation in Germany: De facto income splitting with a transferable amount equal to the basic personal allowance is a good compromise, DIW Weekly Report 41 2020, accessed via [20-41-1.pdf \(diw.de\)](#) (as at 26 July 2022).

<sup>5</sup> Blömer, M. et al. (2021): Raus aus der Zweitverdienerinnenfalle, Reformvorschläge zum Abbau von Fehlanreizen im deutschen Steuer- und Sozialversicherungssystem (*Getting out of the second income earner trap, reform proposals for removing misguided incentives in the German tax and social security system* – our title translation, in German), Bertelsmann Stiftung, accessed via [211011\\_studie\\_raus\\_zweitverdienerinnenfalle.pdf](#) (as at 26 July 2022).

<sup>6</sup> Cf. Dengler, K. and Matthes, B. (2021): Auch komplexere Tätigkeiten könnten zunehmend automatisiert werden (*More complex tasks could also increasingly be automated* – our title translation, in German), IAB Kurzbericht, 13 / 2021, accessed via [Folgen des technologischen Wandels für den Arbeitsmarkt: Auch komplexere Tätigkeiten könnten zunehmend automatisiert werden \(iab.de\)](#).

<sup>7</sup> For more on skills shortages by occupation see: [Individual issues - statistics of the German Federal Employment Agency \(arbeitsagentur.de\)](#), by economic sector: [KfW-ifo Skilled Labour Barometer | KfW](#) and the analyses of the Kompetenzzentrum Fachkräftesicherung –KOFA (Centre of Excellence on Securing Skilled Labour): [Studien und Branchenchecks zum Thema Fachkräftemangel - KOFA \(Studies and sectoral analyses on skilled labour shortages](#) – our title translation, in German) (as at 31 August 2022).

<sup>8</sup> Workers aged 15 to 64 years today account for 97% of the entire workforce. Here the analysis was limited to this age group for reasons of simplification. Including people of a higher age would make no significant difference to the argument.

<sup>9</sup> 'In itself' means: If the resident population develops as predicted in the W2L2W0 scenario, that alone will cause gross domestic product to fall by 11% by the year 2035 unless the decline in working age population is offset by higher migration, an increase in the employment rate, longer working hours or an increase in labour productivity.

<sup>10</sup> Cf. Kubis, A. and Röttger, C. (2019): Der Löwenanteil der Geflüchteten wird in kleinen und mittleren Betrieben eingestellt (*The lion's share of refugees is hired by small and medium-sized enterprises* – our title translation, in German), IAB Forum, accessed via [Der Löwenanteil der Geflüchteten wird in kleinen und mittleren Betrieben eingestellt - IAB-Forum](#) (as at 26 July 2022).

<sup>11</sup> Brücker, H. et al. (2022): IAB-Zuwanderungsmonitor (*IAB Immigration Monitor*) August 2022, accessed via [Zuwanderungsmonitor August 2022 \(iab.de\)](#) (as at 26 July 2022).

<sup>12</sup> Cf. Brücker, H. (2022): Geflüchtete aus der Ukraine: Eine Einschätzung der Integrationschancen (*Refugees from Ukraine: an assessment of their chances of integration* – our title translation, in German), IAB-Forschungsbericht 4/2022, accessed via [Geflüchtete aus der Ukraine: Eine Einschätzung der Integrationschancen \(iab.de\)](#).

<sup>13</sup> Cf. *ibid.* p. 16.

<sup>14</sup> Dietrich, H. et al (2019): Soziale Herkunft, Lebensverlaufereignisse und die verspätete Aufnahme einer beruflichen Ausbildung formal Geringqualifizierter (*Social origin, life course events and delayed start of vocational training of people with low formal skills* – our title translation, in German), Kölner Zeitschrift für Soziologie und Sozialpsychologie (2019) 71: 357–383, accessed via [Dietrich2019\\_Article\\_SozialeHerkunftLebensverlaufse.pdf](#) (as at 9 August 2022).

<sup>15</sup> Cf. Expert Council of German Foundations on Integration and Migration (2020): Stellungnahme zur Weiterentwicklung 2021 der Deutschen Nachhaltigkeitsstrategie (*Comments on the further development of the German Sustainability Strategy in 2021* – our title translation, in German), accessed via [H:/Arbeitsmarkt%20Migration/201030\\_Stellungnahme\\_SVR\\_Nachhaltigkeitsstrategie\\_2021\\_final.pdf](#) (as at 9 August 2022).

<sup>16</sup> Cf. Müller, M. (2021): Deutschland muss produktiver werden, um die künftigen Herausforderungen zu meistern (*Germany must become more productive to meet the challenges of the future* – in German only), Focus on Economics No. 356, KfW Research, and Cologne Institute for Economic Research (eds., 2021) *Wie lässt sich das Produktivitätswachstum stärken? (How can productivity growth be strengthened?* – Our title translation, in German only), IW-Gutachten, accessed via [Wie lässt sich das Produktivitätswachstum stärken? \(kfw.de\)](#) (as at 9 August 2022).

<sup>17</sup> Cf. Hochschule Karlsruhe – Technik und Wirtschaft et al (2021): Wertschöpfungspotenziale 4.0 (Value creation potentials 4.0 – our title translation, in German), accessed via [Wertschöpfungspotenziale 4.0. Bewertung der ungenutzten Wertschöpfungspotenziale der baden-württembergischen und deutschen Industrie in Zeiten der Digitalisierung der Wertschöpfung \(Value creation potential 4.0. Assessing unused value creation potentials of manufacturers in Baden-Württemberg and Germany in the era of digitalisation of value creation – our title translation, in German\) \(fraunhofer.de\)](#) and Ebber, R. and Lennings, F. (2020): Lean-Administration – das verschenkte Potenzial! (Lean administration – the squandered potential! – Our title translation, in German), ifaa | Betriebspraxis & Arbeitsforschung 240, p. 31 to 42, accessed via [Lean-Administration – das verschenkte Potenzial! \(arbeitswissenschaft.net\)](#) and Eisele, O. (2020): Lean Information Management (LIM), Schlanke Gestaltung von Information und Kommunikation (Lean information management (LIM), lean design of information and communication – our title translation, in German), ifaa – Institut für angewandte Arbeitswissenschaft, [Lean Information Management \(LIM\) – Schlanke Gestaltung von Information und Kommunikation \(arbeitswissenschaft.net\)](#) (as at 31 August 2022).