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Labour and Competitiveness in Germany: Embracing the Transformation to Boost Productivity

Despite the current economic weakness and Germany being seen as the "sick man of Europe", the country's labour market has proved to be fairly robust so far. Dependent employment has continued to rise – albeit at a slow pace. At 77.4%, Germany had one of the highest employment rates of all OECD countries in the first quarter of 2024, a plus of 1.6 percentage points compared to the fourth quarter of 2019 (OECD, 2024).

Yet, the economic weakness is now clearly visible in the labour market. The number of vacancies fell from a record high of 2 million in the fourth quarter of 2022 to 1.3 million in the third quarter of 2024. Although the unemployment rate is much lower than the OECD average, it is now rising, too. The combination of falling vacancies and rising unemployment has dimmed the job prospects of the long-term unemployed (those unemployed for more than a year) compared to pre-COVID-19 levels. This is particularly true for low-skilled individuals (those without a vocational or university degree), whose unemployment rate is about 20% and who make up 60% of the long-term unemployed. At the same time, there is a shortage of skilled workers and many of the vacancies for jobs requiring their expertise remain unfilled.

This policy paper presents some key empirical facts about the German labour market and examines various challenges, with a special focus on skills as a key driver of competitiveness. In addition to skill shortages, Germany also faces rapid demographic change, with an ageing labour force, while simultaneously navigating the challenges of digitalisation and decarbonisation. High energy prices in the aftermath of the Russian invasion of Ukraine have slowed down productivity growth, weakening exports. The risk of deglobalisation weighs heavily on the German economy, putting pressure on its competitiveness in key industries.

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Employment and total hours are above pre-COVID-19 levels

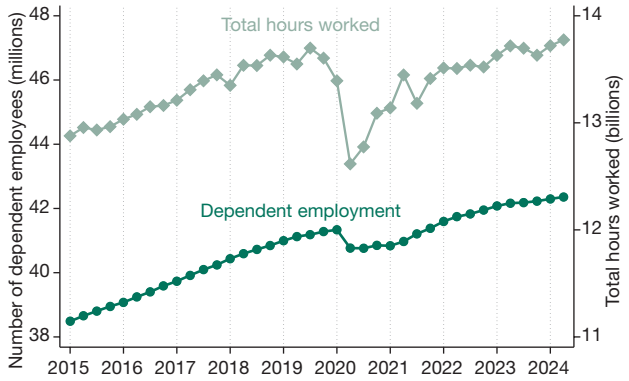
Employment development continues to be positive in Germany. From 2015 to the second quarter of 2024 (see Figure 1), there has been strong growth in total dependent employment (+10%) and total hours worked (+7%). This overall upward trend was disrupted by the COVID-19 pandemic but has resumed, especially for dependent employment. Recently, the increase of dependent employment has been almost exclusively driven by individuals with a migration background, already illustrating the repercussions of the increasingly ageing German population.

In the case of dependent employment, the pre-pandemic level was surpassed in the third quarter of 2021. In contrast, for hours worked, the most recent figures are only a sliver above 2019 levels. The pandemic-induced decline in total hours was stronger and lasted longer than the decline in employment, due mostly to the intense use of short-time work (*Kurzarbeit*). Taken together, these trends imply a decrease in the number of hours worked per employee, owing to an increase in part-time work. This is partly due to the higher labour force participation rates among women, for whom part-time work is common. While dependent employment is still growing, self-employment has been falling for a while, and is well below its pre-pandemic level.

Productivity growth is slow

Figure 2 shows aggregate productivity growth since 2000, as captured by GDP per worker and GDP per hour worked. Apart from the crisis in 2009/2010, productivity grew quickly during the 2000s, in almost parallel fashion for both workers and hours. Throughout the 2010s, a gap between the two measures opened up, with hourly productivity increasing at a higher clip than per capita productivity. Productivity per worker has been stagnant since 2017 and, hence, since well before the pandemic. COVID-19 itself registers as a one-year blip. Because of

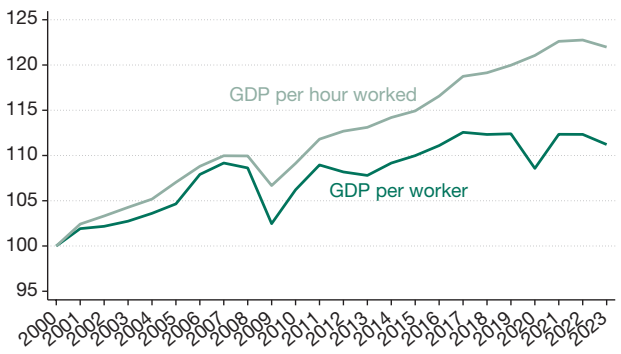
Figure 1
Dependent employment and total hours works in Germany



Notes: Quarterly data. Self-employed are excluded.

Source: Destatis (2024a).

Figure 2
Aggregate productivity growth in Germany
Index, 2000 = 100



Notes: Annual data. Real gross domestic product divided by number of dependent employees and by total hours worked.

Source: Computed based on data from Destatis (2024a) and Destatis (2024b).

the short-time work policy reducing the number of hours worked, productivity per hour continues to increase until 2022 but falls in 2023. Overall, the poor productivity growth is a major concern regarding Germany's competitiveness. Particularly in countries outside of Europe – like in the US, China or the rest of Asia – productivity has been growing much more, eroding Germany's relative standing as a manufacturing hub.

To foster productivity growth, there is a need for investment, especially with regards to the digital transformation. Recent research has examined the impact of the pandemic on digital transformation. Gathmann et al. (2024) show that the COVID-19 pandemic led to a push in digital investments in German firms. These investments were complemented by firm-provided training and helped firms to insure employment and to avoid short-time work. Most of these digital investments, however, were undertaken by high-performance firms, suggesting that the crisis deepened the digital divide between firms. Arntz et al. (2024) confirm the finding on the digital divide and moreover show that investments in frontier digital technologies were actually adversely affected by the pandemic. In a similar vein, the German Council of Economic Experts (SVR, 2024) is concerned about the low investment level both in the private and the public sector, which is likely to be one of the main contributions to the current subdued state of the economy, in particular for the weak economic development in manufacturing.

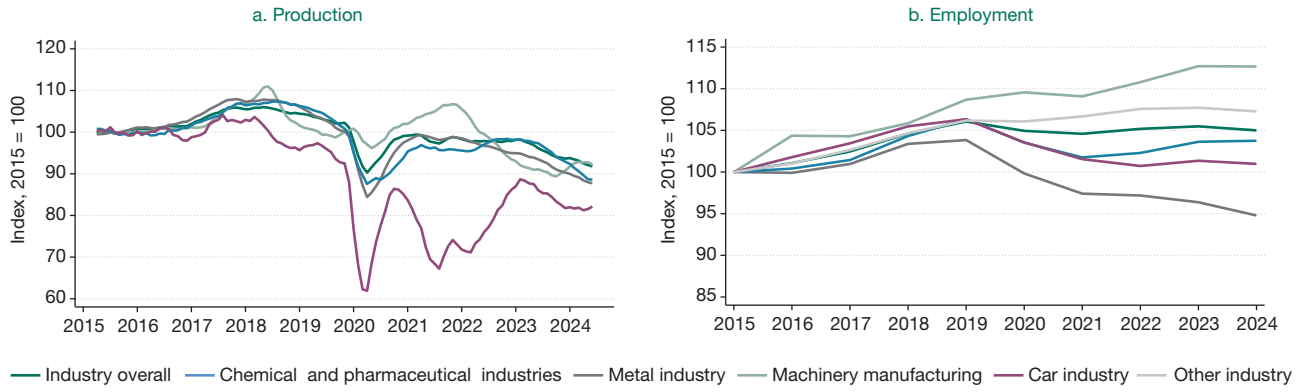
For years, employment in Germany has been growing particularly sharply in the health, care and education sectors, parts of the economy which tend to exhibit relatively slow productivity growth (Bauer et al., 2024). In contrast, employment in higher-productivity sectors – such as manufacturing, which we discuss in greater detail below – increased to a lesser degree and is now shrinking. This reallocation of employment towards lower-productivity sectors is likely to contribute to weak productivity growth – although there is a lack of credible empirical evidence on this issue.

Stagnation in manufacturing industries

Manufacturing industries have formed the backbone of the German economy in the past. Yet, these industries have been stagnating for some time now. Figure 3 illustrates the generally negative developments in production and employment that have been happening since about 2018. The important car industry in particular shows a marked downward trend in both measures, especially for production. Similar adverse changes can be observed for the metal industry and for machinery manufacturing.

Production and employment increased during the COVID-19 pandemic in the chemical and pharmaceutical industry. Employment continued to increase persistently until 2024, while production has shown a negative trend since 2022. However, this masks the heterogeneity between the chemical and pharmaceutical industries. The latter is still expanding, whereas production in the chemical industry is shrinking. Industry production overall recovered in 2021 after COVID-19 yet stayed below its prior levels. After stagnating until early

Figure 3
Industry production and employment in Germany



Notes: Panel (a) shows 7-month moving averages of the monthly production index; panel (b) shows annual employment.

Sources: Destatis (2024c); Federal Employment Agency (2024).

2023, overall industry production is now contracting as well. Industry employment has been flat since 2020 after a very small decline between 2019 and 2020.

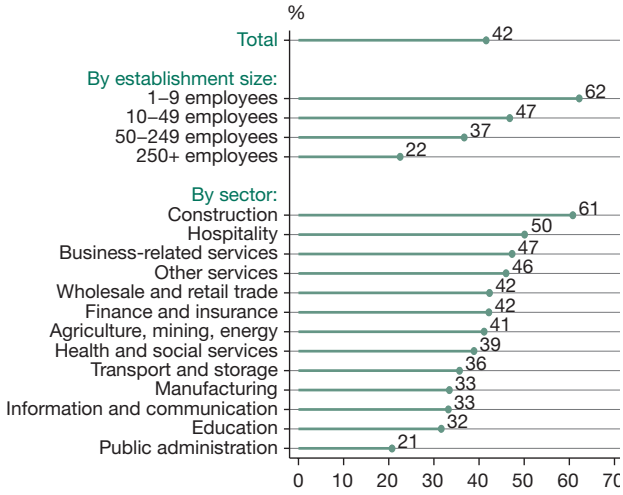
Two key immediate reasons account for the poor economic performance of manufacturing industries (SVR, 2024): the weakness of exports, especially the fall in exports to China, which has been ongoing for a while; and increased energy prices since and due to the Russian war of aggression against Ukraine. On top of that, the car industry has been hit by a deteriorating demand for electric cars while simultaneously facing stiff competition from Chinese automakers – both in China and worldwide. Productivity is at best inching upward in manufacturing, a fact possibly tied to a lack of investments in frontier (digital) technologies (Arntz et al., 2024). Altogether, key manufacturing industries paint a picture of a loss of competitiveness (SVR, 2024).

Skilled labour shortages despite economic weakness and low reallocation rates

Despite the economic crisis, there still is a shortage of skilled labour and, as previously mentioned, service industries such as health, nursing and education absorb an ever-increasing number of employees. Drawing on survey data from the IAB Establishment Panel, Figure 4 shows the share of unfilled vacancies for skilled workers in 2023, thereby illustrating the continuing skills shortage.

The total share of unfilled vacancies for skilled positions (those requiring a vocational training degree or a tertiary degree) stood at 42% in 2023. Labour shortages are particularly pronounced in smaller firms as well as in the construction and hospitality sector. In manufacturing, the share amounts to one third, a relatively low figure compared to most other sectors. Large firms and the public sector find it easiest to fill vacancies for skilled workers.

Figure 4
Share of unfilled vacancies for skilled workers in Germany in 2023



Notes: Share of unfilled vacancies among all vacancies for skilled workers a firm would like to fill. Positions for skilled works are those requiring completed vocational training or a tertiary degree.

Source: IAB Establishment Panel.

Arguably, the shortage of skilled labour by itself is likely to contribute to subdued economic growth, hampering investments as well as productivity growth.

This relationship could be driven by a low rate of reallocation to new, innovative jobs that are associated with higher productivity levels. Bennewitz et al. (2022) show how the reallocation of jobs, or turnover, i.e. the sum of job separation rates and hiring rates, fell during the pandemic. Moreover, the hiring freezes in 2020 prompted a later increase in the number of vacancies until the end of 2022, among which a large share could not be filled (Kubis, 2022). At a time when the necessity of an economic transformation receives a great deal of attention, the employment reallocation that would be expected to go hand in hand with such a transformation is not apparent in the data at all. To the contrary, the process of transforming the economy is slowed down by meagre job mobility.

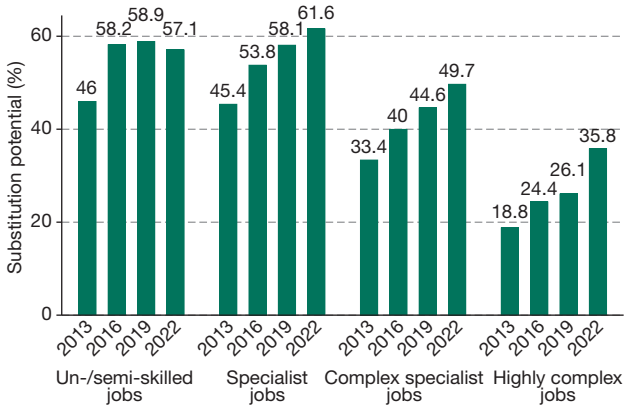
The rescue measures – such as short-time work for the labour market – successfully stabilised the labour market during the pandemic; however, they also potentially contributed to slowing down the transformation process. But as of now, there is no empirical evidence on whether the widespread use of short-time work actually negatively affected reallocation in Germany.

Embracing the transformation induced by digitalisation and decarbonisation

Digitalisation and decarbonisation are drivers of change in the economy and the labour market. They provide opportunities for growth and new jobs, while also threatening existing jobs. Figure 5 displays substitution potentials and their change between 2013 and 2022, split by the requirement level of an occupation. Generally speaking, occupations involving simpler tasks are at greater risk of being replaced by digital technologies, while highly complex tasks are less vulnerable. This is because digital technologies can perform programmable tasks and this is most easily implemented for simple routine tasks, which make up the majority of work in un- or semi-skilled jobs. In 2013, 46% of all tasks performed in un- or semi-skilled jobs could theoretically be replaced by digital technologies, while this applies to only 19% of all tasks in highly complex jobs (see Figure 5).

However, accounting for progress in digital technologies over time, more complex tasks can also be replaced. Thus, the substitution potentials are increasing noticeably for complex specialist jobs and highly complex jobs, while stagnating from 2016 onwards for un- and semi-skilled jobs. In 2022, 57% of all tasks performed in un- or semi-skilled jobs (plus 11 percentage points compared to

Figure 5
Potential for digital substitution in various jobs in Germany



Notes: The substitution potential measures the share of tasks that can theoretically be replaced by computers and digital technologies. This information was extracted using text mining methods from the German occupation-net (BERUFENET) for the years 2013, 2016, 2019 and 2022. The information is available for eight-digit occupations and can be retrieved for individual occupations on https://job-futuromat.iab.de/.

Source: Data taken from Grienberger et al. (2024).

2013) can be replaced by digital technologies, whereas this applies now to 36% of all tasks in highly complex jobs (an additional 17 percentage points).

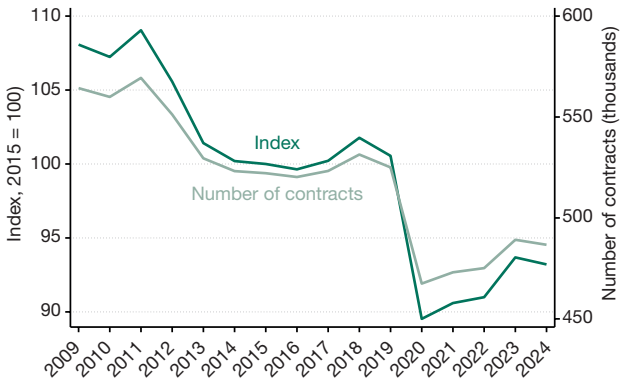
The use of digital technologies can reduce employment in occupations with high substitution potentials and can thus positively impact labour productivity. However, this has not yet happened at a large scale and it is unlikely that jobs will completely disappear (Grienberger et al., 2024). Rather, the use of digital technologies changes the tasks performed in an occupation (the job content) and expands the scope of business activities. Correspondingly, employees will have to work effectively with and adapt to (new) digital technologies. Therefore, training the workforce's digital skills is crucial for tapping the potential to increase productivity and make the digital transformation a success.

Similar to the digital transformation, the ecological transformation – associated with the goal of decarbonising the economy – requires new skills, for instance so-called green skills. The greenness-of-jobs index, developed at IAB based on the German occupation-net (BERUFENET), provides one measure of the prevalence of green skills and how they are distributed across occupations and industries. Based on this indicator, there is evidence that occupations involving green skills have been growing disproportionately over the last decade and that the number of apprenticeships in greener oc-

Figure 6
Establishment-provided training in Germany

Source: IAB Establishment Panel.

Figure 7
New apprenticeship contracts in Germany



Notes: The data are from Federal Institute for Vocational Education and Training (BIBB).

Source: Weller et al. (2024).

cupations has been increasing notably (Brixy et al., 2023).

Labour, in particular human capital, is a driver of productivity. The transformations of the economy and the labour market require changes in the tasks performed in existing jobs and increased mobility to new jobs. For both stayers and movers, training and more versatile skills will be necessary in an ever-changing world of work. Only by embracing the transformation this way and grasping its opportunities can the stagnation of productivity be overcome and growth prospects improved.

The slump in (vocational) training

Even though there is a clear need for more training, measures of various types of training suggest that this is simply not happening. This deficit poses a major challenge for a successful transformation of the German economy.

First, we consider the provision of further training by firms for the existing workforce that nominally completed their job training in the past. With rapid advances in technology, lifelong learning is becoming all the more important. Figure 6 displays the amount of firm-level training based on the annual IAB survey of establishments, the Establishment Panel. During the 2010s, the share of establishments providing training remained relatively constant, while the share of employees participating in training increased continuously from 31% in 2011 to 36% in 2019. After this period of growth in the share of worker participation in firm-level training with little volatility, there was a sharp drop in firm-level training during the pandemic and a subsequent slow recovery. Training in 2023 (a distinctly post-pandemic year) is still markedly lower than in 2019: both the share of establishments providing training and the share of employees participating in training is lower, by six percentage points and four percentage points, respectively.

Second, we turn to the German vocational training and education system, often considered a source of German competitiveness. The apprenticeship system also shows signs of ailing. As Figure 7 attests, after a strong decline in the early 2010s and a period of moderate growth later in the decade, the number of new apprenticeships fell sharply during COVID-19. Following the pandemic, there was a slow recovery until 2023 and the number of new apprenticeship contracts declined again slightly in 2024, staying below half a million every year since 2020. The number of new apprenticeship contracts matches in 2024 is more than 10% lower than in 2019.

The fact that both firm-level training and the number of new apprenticeship contracts have not returned to their pre-COVID-19 levels points to a considerable lack of investment in the skills of the workforce. In this context, the developments in schooling outcomes are discouraging as well: PISA test results have become worse in Germany over time (OECD, 2023), and there is a substantial number of adolescents every year that are leaving school without obtaining a certified school degree.

While human capital is one of the most important assets that the German economy has, there is a significant threat that this asset could deteriorate further during the transformation process. This suggests that relatively high unemployment rates and acute skill shortages might coexist in the future. Given the projected decline in the labour force population due to demographic change, Germany cannot afford a high degree of mismatch in the labour market. Strong investments in and incentives for training and education are hence needed to counteract the current negative trend. With the

advances in artificial intelligence, the potentially disruptive next round of labour market effects is soon on its way.

Conclusions

Transformation pressures driven by digitalisation and decarbonisation are changing the labour market. Despite the currently weak economic development of Germany, the shortage of skilled workers is likely to worsen due to an ageing workforce, even with a high employment rate compared to other countries. At the same time, key manufacturing industries are exhibiting subpar economic performance, and productivity is stagnating. To effectively address these problems, Germany needs to embrace the transformation by actively fostering the transition to new business models and jobs, especially in manufacturing. Greater physical investment is needed, especially in digitalisation, which needs to go along with greater employee mobility and further training for employees. This way, labour productivity can increase significantly, thereby saving on manpower without sacrificing prosperity and simultaneously securing employment in well-paid jobs. Both improvements of and investment in education and vocational training are urgently needed. Otherwise, Germany – the largest European economy – will continue to lose its competitiveness and thus not overcome its sluggish economic growth.

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