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Imbalances between supply and demand

Recent causes of labour shortages in advanced economies

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Abstract

In the wake of the COVID-19 pandemic, numerous high-income countries encountered heightened vacancy rates and labour shortages, which persisted into 2023. This paper examines the dynamics underlying labour market fluctuations in advanced economies, such as cyclical movements, structural shifts and pandemic-induced trends. The surge in labour demand following economic reopening varied across sectors, as sustained fiscal support measures bolstered demand, contributing to a pronounced uptick in vacancies. Statistics on labour force participation and working hours highlight the intricacies of the supply side of the labour market. However, long-term projections reveal challenges stemming from population ageing, which were exacerbated by pandemic-induced retirements and gender disparities in employment. Shifts in migration patterns further shaped labour dynamics, with sectors such as healthcare, education, and information and communications technology grappling with skills shortages. Geographical mismatch and decreased labour mobility underscored the limitations in reallocating workers across regions. This analysis stresses the multifaceted nature of labour market challenges following the pandemic, urging policymakers to adopt nuanced strategies to address persistent labour shortages and structural transformations in advanced economies.

This work is the result of background research in preparation of the ILO research department's 2024 WESO Trends report.

About the author

Lisa Feist is an independent research consultant regularly collaborating with the ILO Research Department on projects concerned with labour shortages and labour imbalances, employment diagnostics, and labour flows. She holds a MSc in Economics from FAU Erlangen-Nürnberg.

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Acronyms

CPS	Current Population Survey (United States)
EU	European Union
ICT	information and communications technology
ISIC Rev. 4	International Standard Industrial Classification of All Economic Activities: Revision 4 (United Nations, 2008)
OECD	Organisation for Economic Co-operation and Development
STEM	science, technology, engineering and mathematics
WEF	World Economic Forum
WHO	World Health Organization

Executive Summary

Coming out of the COVID-19 health crisis, many high-income countries faced increased vacancy rates and labour shortages. As of 2023, unfulfilled labour demand (expressed in vacancies) remained elevated across advanced economies, albeit somewhat below its peak in 2022. Shortages may be driven by an insufficient supply of labour, by excessive or abruptly rising demand, by an inefficient allocation of candidates to open positions, or by a combination of these factors. These movements are partly cyclical in nature, although structural shifts also play a role, and their extent and impact are yet to be fully understood. Labour demand rose strongly as economies opened after pandemic closures. This surge in demand happened economy-wide but to different degrees in different sectors. Statistics on labour force participation and working hours shed light on the supply side of the labour market. Having suffered a serious blow in 2020, labour force participation generally recovered slowly throughout 2021 and 2022, although the speed of recovery varied greatly by country and group status such as sex and age. Mean weekly hours decreased in a number of advanced economies, with some variation in different sectors. This may still have some impact on the availability of workers and labour shortages, as explained in the report.

Sustained fiscal support measures in many high-income countries have maintained a high level of (labour) demand, which partly contributed to an abrupt surge in vacancies. Over the long term, the working-age population is projected to shrink in many advanced economies as a result of population ageing. The pandemic accelerated this trend in a number of ways. First, in the United States and the United Kingdom, older workers increasingly decided to leave the labour market through retirement. Second, in many countries women – especially mothers – have continued to face challenges since the pandemic and the gender employment gap has widened, often as a result of dissimilar sectoral composition and the more precarious nature of female employment. Third, migration patterns across countries have changed since the pandemic. In the European Union (EU), the number of hours worked among migrants remains at a lower level than pre-2020. Looking at the sectoral level, skills shortages affect several key sectors, especially healthcare, education, and information and communications technology, brought about by significant changes in labour demand. Furthermore, studies on geographical mismatch show that there is very little room for allocation of workers across geographical entities in the EU and the United States, as labour surpluses have become a rarity and labour mobility has decreased. Changes in the preferences and behaviour of workers, including their willingness to accept difficult working conditions, may be an additional factor behind the struggle of firms to find suitable candidates. Finally, consumer demand has seen some changes since 2020, which has had an indirect impact on the type of jobs available.

▶ Labour shortages: A brief overview

Labour shortages occur when labour demand exceeds the available supply of labour. This is the case whenever the number of unfilled vacancies significantly and durably exceeds the number of available workers in a specific (economic or geographical) area. Labour shortages have been a topic of discussion for several years, especially in high-income countries, where population ageing is bound to reduce the working-age population, which is in turn likely to lead to shortages in (skilled) staff in the future (OECD 1998; WEF 2011). On the one hand, labour shortages are a sign that the labour market is in imbalance. According to standard economic theory, if the demand for labour exceeds its supply, the current wage level should move up and increase supply. On the other hand, supply might be low (or lower) for reasons other than wages, such as skills mismatch, worker preferences or other concomitant societal changes.

Labour shortages can have severe economy-wide consequences. They not only harm businesses, by hindering growth and the exploitation of a nation's full economic potential, which reduces overall welfare; they also contribute to a growing cost-of-living crisis. When products are manufactured and services rendered at a higher cost, due (for instance) to higher wages or higher investment in technology, product prices will rise.

In the medium term, the Korn Ferry Institute forecasts a global talent shortage of 85 million workers across the globe by 2030 (Korn Ferry 2018).[1] Estimating worker deficits for countries from all regions, the study finds that the Americas might face a deficit of 23.9 million workers, a large fraction of which is driven by Brazil. Europe, the Middle East and Africa, meanwhile, would see a deficit of 14.3 million workers, which is dwarfed by the forecast deficit of 47 million workers in Asia and the Pacific. However, the study also states that these shortages are driven "by a shortage of skills rather than a shortage of people" (Korn Ferry 2018, 42).

The discussion around labour shortages has received renewed attention in the wake of the COVID-19 pandemic as labour markets attempt to come to terms with the consequences of the health crisis. Since health restrictions have ended in most countries,[2] labour market recovery is under close observation by national and international institutions (Causa et al. 2022; Duval et al. 2022; ILO 2023). Even though shortages of (skilled) labour might be caused by a host of reasons that are unrelated to COVID-19, some of them have been exacerbated or exposed by the health crisis. Looking at labour demand, national fiscal policies to spur the economy after the pandemic have given a push to vacancy creation. Combined with pent-up demand after two years of reduced consumption – and forced savings – in certain sectors, this has led to exceptional increases in the demand for labour. On the labour supply side, the pandemic caused short-term reductions in labour supply among certain groups, such as parents (particularly mothers), older and vulnerable workers, and those affected by COVID-19 or long COVID.

This working paper investigates whether these reductions are likely to be long-term and to permanently reduce labour supply. In addition, structural issues, such as the effects of population ageing on longer-term labour supply, have begun to materialize in certain countries where the "baby boomer" generation has started to leave the labour market. This, too, might have been partly triggered by the pandemic, as in-person working was considered to be particularly dangerous for older workers. This paper presents relevant statistics on labour supply and demand and summarizes the recent literature on labour shortages and their proximate causes in advanced economies.

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[1] The report extrapolates past growth rates and labour force forecasts from ILO labour statistics (ILOSTAT) to estimate future shortages.

[2] The Oxford COVID-19 Government Response Tracker had stopped updating its database for all countries except China as of 31 December 2022.

▶ 1 Labour supply and demand: Overview statistics

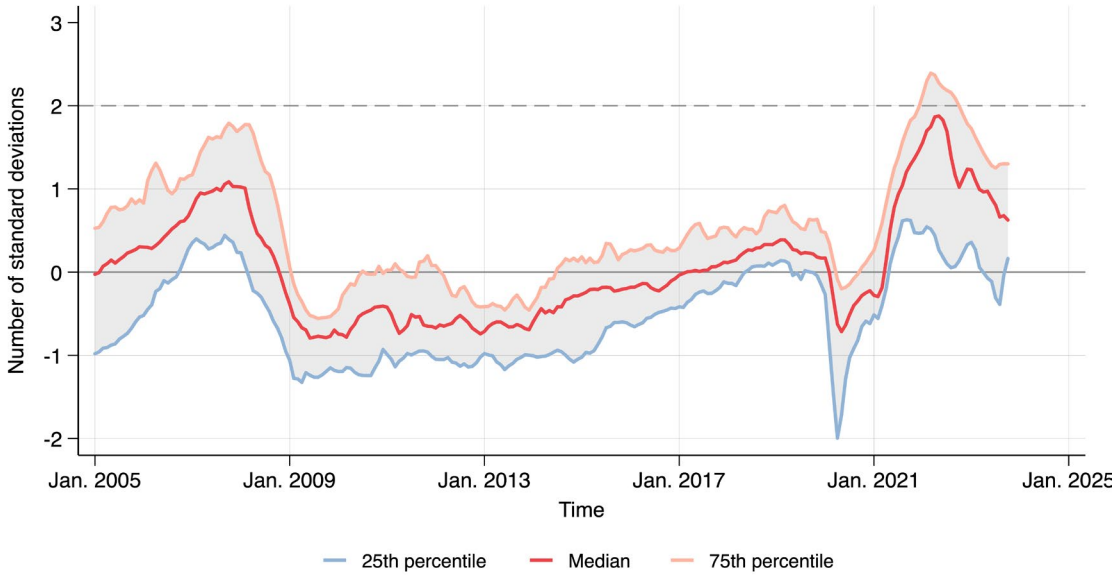
Labour demand

Vacancies

Vacancies are the most direct measure of (unfulfilled) demand for labour. Since the pandemic, numerous advanced economies have seen soaring rates of unfilled vacancies, even as labour markets recovered and unemployment started to fall.

Figure 1 looks at the number of vacancies, expressed in terms of standard deviations from the mean, for a panel of (mostly) advanced economies. It shows that the median country of the sample dropped below one standard deviation from its average over time in 2023. Each line remains above its respective maxima of the past decade despite visibly declining since 2022. In addition, the variation across countries has increased, as shown by the expansion of the area between the 25th and 75th percentiles.

▶ **Figure 1. Unfilled vacancies, expressed as standard deviations from the mean, in selected countries, Jan. 2005–May 2023**



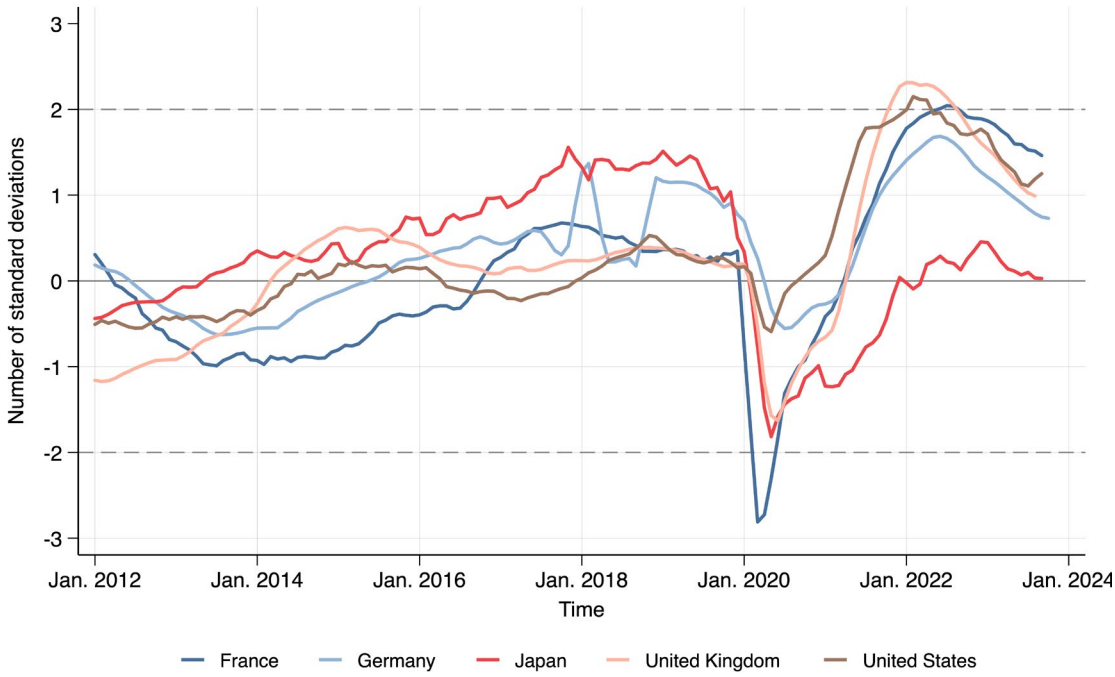
Note: The figure shows the median, 25th and 75th percentiles of the three-month moving average of vacancies for 18 mostly advanced economies: Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Japan, New Zealand, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, Thailand, United Kingdom, Unites States.

Source: Trading Economics, calculations by the ILO.

Figure 2 shows vacancies in selected high-income economies, again expressed as the number of standard deviations from the historic mean. In some of the economies, vacancies in 2022 rose to levels exceeding two standard deviations from the mean, indicating very tight labour markets. Japan is the only exception, where the labour market appeared to be less tight in 2022 than it was between 2017 and 2019. In the course of the year 2022, most countries showed the first signs of relaxation and slowly receding numbers of vacancies. Nonetheless, all countries

except Japan remained more than one standard deviation above the mean as of May 2023, and all except Germany and Japan were still at levels far exceeding the highest points observed before the pandemic.

▶ **Figure 2. Unfilled vacancies, expressed as standard deviations from the mean, in selected high-income countries, Jan. 2012–May 2023**



Source: Trading Economics, calculations by the ILO.

A quick way to gauge the relationship between labour supply and demand is the Beveridge curve, which plots the vacancy rate – that is, the number of vacancies expressed as a proportion of all jobs – against the unemployment rate, representing the available supply of labour. This downward-sloping curve results from datapoints throughout the business cycle, in which high vacancy rates are usually associated with low levels of unemployment during economic expansions, and vice versa during recessions. It can also give an indication of changes in labour market efficiency, for instance if a given level of the vacancy rate is associated with a higher unemployment rate than was historically the case. Such an outward shift might be due to an increase in labour market distortions such as mismatch, or changes in the labour supply, or both.

In the European Union (EU), for example, the Beveridge curve has experienced an outward shift over the past two decades, while the Beveridge curve for the euro area is located even further outwards than that of the EU as a whole (Eurostat 2023b). The US Beveridge curve has also shifted upwards and outwards, with soaring vacancy rates since January 2021, and a consistently higher number of job openings than unemployed persons since May 2021 (BLS 2023).

These statistics show that many high-income and upper-middle-income economies appear to be faced with similar difficulties in fulfilling employers' demand for workers. This is clearly visible at the aggregate level.

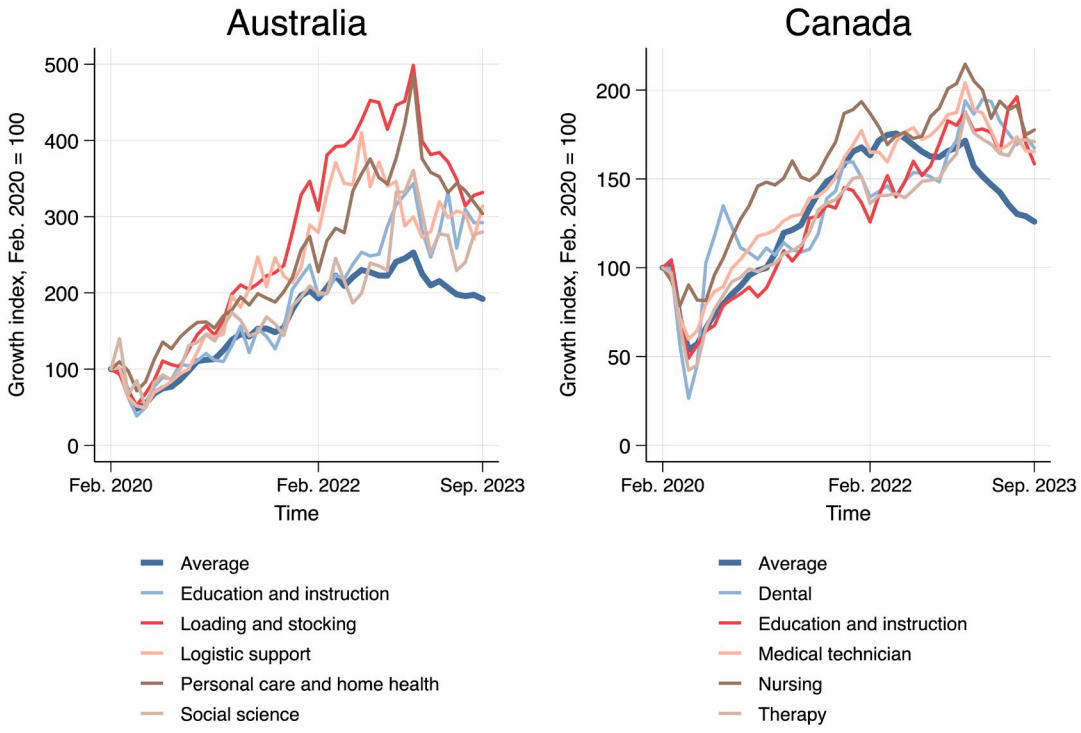
However, as shown in the next section, there are also stark differences in terms of labour shortages at the sectoral and occupational levels.

Job postings by economic activity in selected economies

Job postings data from Indeed Hiring Lab show the development of job postings throughout the pandemic at the sectoral/occupational level.[3] From the start of the pandemic, many of the occupations with the highest increases in job postings on Indeed were in the health sector (figures 3–6). For example, physicians and surgeons were among the categories with the top five highest growth rates in four of the seven countries with available data.[4] Job postings related to dental care, personal care and home health, and therapy were present in the top five of three of the countries. The average increases across sectors/occupations ranged from 22 per cent in the United Kingdom and 92 per cent in Australia.

In Australia and Canada, between February 2020 and September 2023, the highest increases occurred in essential sectors: education, logistics and health in Australia; health and education in Canada (figure 3). Data from Statistics Canada (2023) show that overall labour market tightness had started to ease by 2023. At the occupational level, however, only 5 of 10 aggregate occupational groups experienced receding vacancy numbers in 2023 Q1 compared to the previous quarter; in the other five groups, there were ongoing hiring difficulties, and vacancies in health occupations were increasing (Statistics Canada 2023).

▶ **Figure 3. Growth rates in job postings, Australia and Canada, Feb. 2020–Sep. 2023**



Note: Feb. 2020 = 100. The graphs show the five economic sectors with the highest index values in Sep. 2023 compared to Feb. 2020. "Average" represents the total unweighted average across all sectors, including those not shown here.

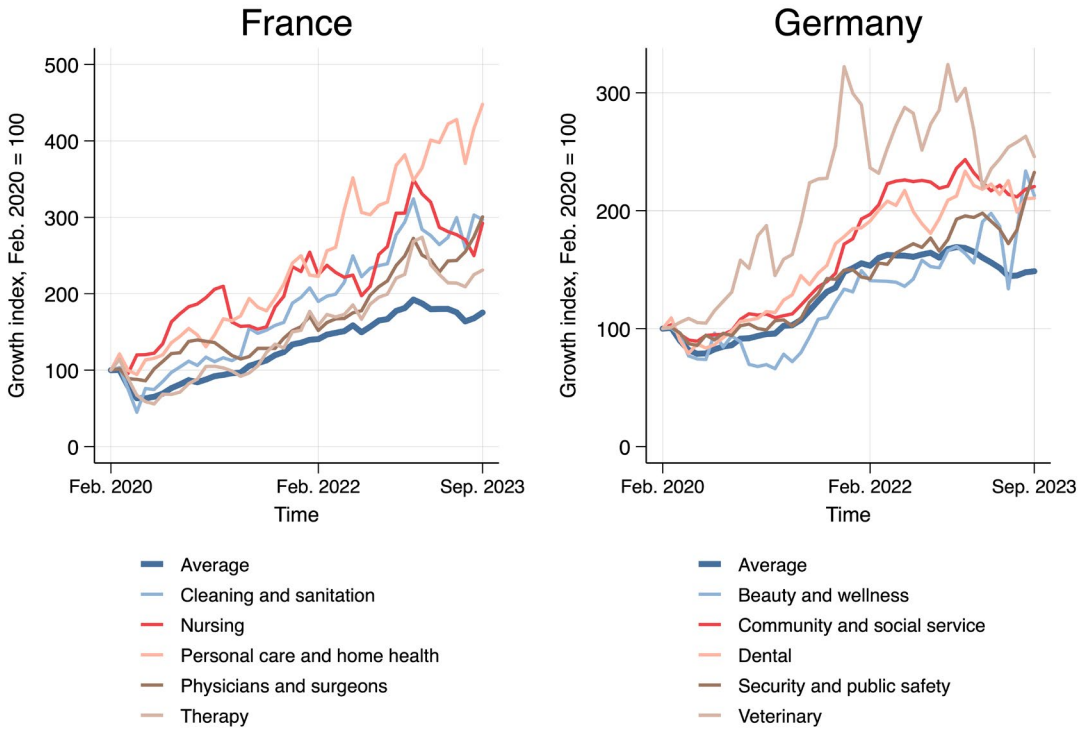
[3] Indeed Hiring Lab, "Real-Time Job Posting Data". The sector definition of Indeed data does not follow international nomenclature; see Appendix I for a complete list of Indeed sectors/occupational categories.

[4] This section only reflects the use of Indeed data by country and does not take account of selection bias in the search tool, so country data should not be compared directly. On representativeness of online job advertisements, see Napierala, Kvetan and Branka (2022); Beręsewicz and Pater (2021).

Data source: Indeed Hiring Lab.

In France the highest growth rates of Indeed job postings occurred in health occupations, as well as in cleaning and sanitation (figure 4). In Germany the picture was more mixed but increases in job postings between February 2020 and September 2023 were highest in several typically low-pay categories (beauty and wellness; community and social service; security and public safety).[5]

▶ **Figure 4. Growth rates in job postings, France and Germany, Feb. 2020–Sep. 2023**



Note: Feb. 2020 = 100. The graphs show the five economic sectors with the highest index values in Sep. 2023 compared to Feb. 2020. "Average" represents the total unweighted average across all sectors, including those not shown here.

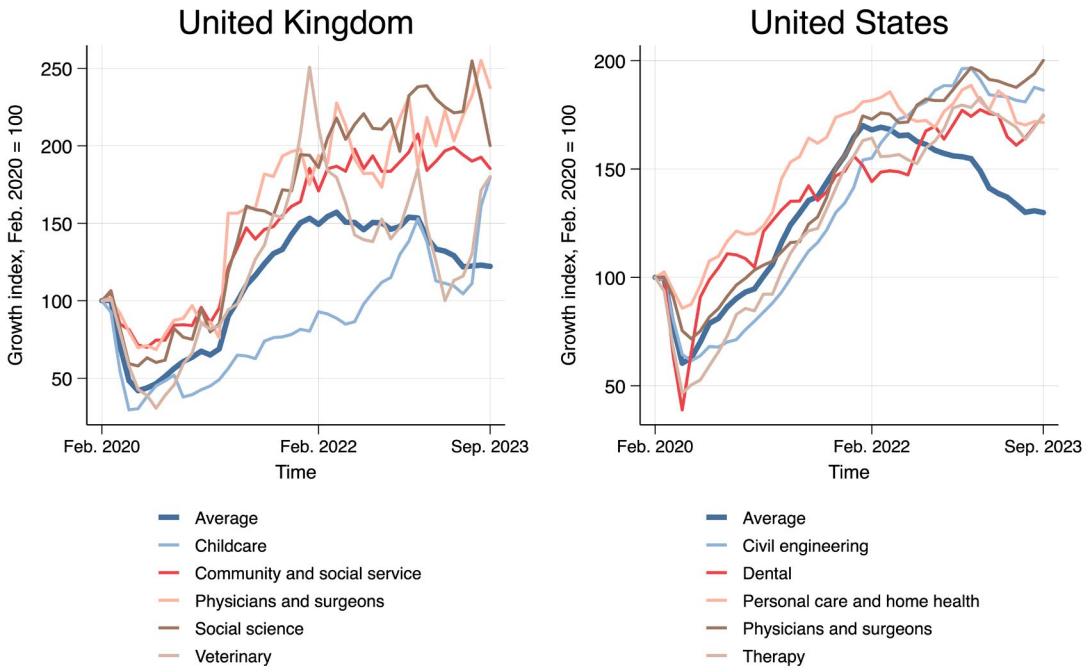
Data source: Indeed Hiring Lab.

In the United Kingdom the cross-sectoral average receded from the start of 2023 (figure 5). This was not the case, however, for the three categories with the highest growth rates: community and social service, physicians and surgeons, and social science. Childcare and veterinary postings surged again throughout 2023 after a brief period of falling. Again, these categories were heavily skewed towards health and social work.

In the United States the industries contributing most to aggregate labour market tightness were professional and business services, healthcare and social assistance, and accommodation and food services (Birinci and Ngân 2023). Job postings data from Indeed confirm continuously increasing growth rates in several healthcare categories.

[5] Differences in sector-level observations shown in Appendix II are likely to stem from differences in sectoral definitions, granularity, and some selection bias in the search tool compared to national data.

▶ **Figure 5. Growth rates in job postings, United Kingdom and United States, Feb. 2020–Sep. 2023**

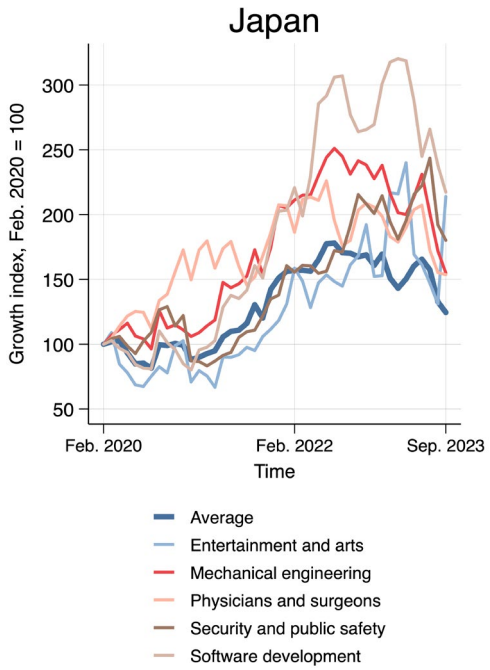


Note: Feb. 2020 = 100. The graphs show the five economic sectors with the highest index values in Sep. 2023 compared to Feb. 2020. "Average" represents the total unweighted average across all sectors, including those not shown here.

Data source: Indeed Hiring Lab.

In Japan most of the sectors with the highest relative increases between February 2020 and September 2023 experienced strong increases throughout 2021 but flattened out in 2022 and 2023 (figure 6). Postings were less geared towards healthcare than those in other countries, but physicians and surgeons were still one of the fastest-growing categories.

▶ **Figure 6. Growth rates in job postings, Japan, Feb. 2020–Sep. 2023**



Note: Feb. 2020 = 100. The graph shows the five economic sectors with the highest index values in Sep. 2023 compared to Feb. 2020. "Average" represents the total unweighted average across all sectors, including those not shown here.

Data source: Indeed Hiring Lab.

In sum, based on the Indeed dataset of job postings, health-related occupations experienced the highest increases between February 2020 and September 2023, pointing to widespread shortages in these countries' health sectors. Other frequently cited categories – in job postings and other sources combined – include transportation and storage, education and social services, and the accommodation and hospitality sectors.

Labour supply

Labour is supplied by people of working age available to work – the extensive margin – as a function of their working time – the intensive margin. As observed during the pandemic, labour market adjustment can happen swiftly through a change in the number of hours worked rather than the number of people at work. On the other hand, the extensive margin evolves more slowly and is predominantly affected by structural rather than cyclical factors.[6]

Labour shortages might occur because fewer people are working or looking for a job. Indeed, the pandemic has had an asymmetrical impact on the global workforce and reduced the supply of labour, which might continue to contribute to ongoing labour shortages. Section 2.2.1 presents statistics on labour force participation rates for a selection of countries experiencing

[6] Female labour force participation is known to be affected by cyclical factors such as the "added worker effect" (Lundberg 1985; Mincer 1962).

labour shortages. In addition, average working hours might have changed in the course of the pandemic; section 2.2.2 looks at total and average working hours by sector.

Extensive margin: Labour force participation rates

This section shows quarterly labour force participation rates by sex and aggregate age bands in a selection of countries: Canada, the United States, Australia, France, Germany and Japan (tables 1–6).

In Canada young workers (15–24 years) experienced the strongest initial decline in 2020 Q2 – by 8.7 percentage points – compared to the same quarter in the previous year (table 1). This decrease was higher for young women (10.4 percentage points) than for young men (6.9 percentage points). Throughout 2021 and 2022, young workers' participation rates recovered to their usual seasonal levels. By 2023 Q3, prime-aged workers (25–54 years) and workers aged 55–64 participated at rates similar to or higher than before 2020, although the latter experienced a more protracted recovery. In contrast, participation of those aged 65+ remained at slightly lower rates throughout 2022 than in 2019, driven in particular by male older workers, and then recovered in 2023. Youth participation also remained lower in 2023 Q3 than in 2019 Q3, especially among young women. In the first three quarters of 2023, overall participation was only slightly lower – less than 0.3 percentage points – than in the first three quarters of 2019.

▶ **Table 1. Quarterly labour force participation rates in Canada, by sex and age group, 2018 Q1–2023 Q3**

Sex	Total					Male					Female				
Age	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+
2018 Q1	65.0	61.3	86.5	65.7	14.6	69.5	61.5	90.5	70.9	19.4	60.7	61.0	82.6	60.6	10.4
2018 Q2	66.1	66.7	87.2	66.1	14.4	70.7	66.9	91.2	72.2	19.0	61.6	66.5	83.2	60.1	10.4
2018 Q3	66.5	69.7	87.4	66.6	13.6	71.1	70.0	91.4	72.7	18.1	62.0	69.3	83.5	60.7	9.8
2018 Q4	65.5	61.6	87.6	67.1	14.2	69.8	62.1	91.3	72.7	18.4	61.3	61.2	83.9	61.6	10.5
2019 Q1	65.0	60.2	87.1	66.1	15.0	69.1	60.2	90.6	72.1	18.9	60.9	60.3	83.7	60.1	11.6
2019 Q2	66.5	67.7	87.8	66.9	15.0	71.1	67.3	91.6	73.6	19.7	62.1	68.0	84.1	60.4	11.0
2019 Q3	66.8	70.7	87.7	67.0	14.7	71.6	70.4	92.0	73.4	19.6	62.1	71.1	83.5	60.8	10.5
2019 Q4	65.6	62.8	87.6	67.3	15.0	69.8	62.2	91.2	72.5	20.0	61.5	63.5	84.0	62.3	10.7
2020 Q1	64.3	59.5	86.6	66.4	14.7	68.6	59.0	90.2	72.1	19.5	60.2	60.0	83.0	60.8	10.5
2020 Q2	62.3	59.0	84.1	63.8	13.7	67.3	60.4	88.2	70.5	18.3	57.6	57.6	80.0	57.2	9.7
2020 Q3	65.6	69.4	87.2	66.2	13.7	70.5	69.6	91.4	72.9	18.5	60.8	69.1	83.0	59.6	9.6
2020 Q4	65.0	60.9	87.9	67.6	14.1	69.4	60.8	91.7	73.4	18.8	60.6	60.9	84.1	61.9	10.0
2021 Q1	64.4	59.0	87.4	67.7	14.4	68.9	59.9	90.9	73.2	19.2	60.1	58.0	83.9	62.3	10.2
2021 Q2	65.5	64.8	87.8	68.3	14.5	70.1	65.2	91.7	74.2	19.2	61.1	64.5	84.0	62.6	10.4
2021 Q3	66.3	70.2	88.1	68.3	14.1	70.9	69.8	92.0	74.5	18.9	61.8	70.5	84.2	62.3	10.0
2021 Q4	65.3	62.8	88.6	67.9	14.2	69.5	61.6	92.2	73.4	19.1	61.2	64.0	84.9	62.6	10.0
2022 Q1	64.8	61.7	88.2	66.9	14.4	68.7	60.3	91.4	72.4	18.7	61.0	63.2	84.9	61.6	10.7
2022 Q2	66.0	67.4	88.9	66.8	14.7	70.0	66.8	92.3	72.5	18.5	62.0	68.1	85.6	61.2	11.4
2022 Q3	65.9	69.4	88.5	66.6	14.5	70.3	69.1	92.3	72.6	18.7	61.6	69.7	84.7	60.8	10.9
2022 Q4	65.1	62.6	88.7	67.2	14.8	69.1	62.0	92.0	72.3	19.1	61.2	63.2	85.3	62.2	11.0
2023 Q1	65.0	62.3	88.5	67.8	14.6	68.7	61.2	91.6	72.9	18.7	61.4	63.3	85.5	62.9	11.0
2023 Q2	66.0	67.0	89.0	68.2	15.0	70.1	67.0	92.3	73.1	19.4	62.1	66.9	85.7	63.4	11.2
2023 Q3	66.2	69.5	88.8	67.6	15.1	70.5	69.7	92.3	73.1	19.7	62.0	69.3	85.3	62.2	11.0

Note: Relative change in labour force participation in each age group is indicated by changing gradation of colour between dark blue (highest value) and dark red (lowest value); the 50th percentile is shown in white. Comparison of colour should not be made across columns or across countries.

Source: ILOSTAT.

Data on participation rates in the United States show a far more protracted recovery process than in Canada (table 2). Average participation across all demographic groups reached pre-pandemic levels only at the end of the period under review (2023 Q3). At a more granular level, the data show that, as in Canada, by 2023 Q3 young workers (15–24 years) participated at levels typical of the period before 2020, subject to strong seasonal fluctuations. As of 2023 Q3, prime-aged workers (25–54 years) and those aged 55–64 participated at levels similar to or even higher than before the pandemic. However, older workers of both sexes (65+ years) continued to be

less likely to participate in the labour market than in 2019. Overall participation in 2023 Q3 was 0.4 percentage points lower than in 2019 Q3.

▶ **Table 2. Quarterly labour force participation rates in the United States, by sex and age group, 2018 Q1–2023 Q3**

Sex	Total					Male					Female				
Age	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+
2018 Q1	62.7	54.3	82.0	64.6	19.2	68.9	55.3	89.1	70.8	23.5	56.8	53.3	75.1	58.9	15.7
2018 Q2	63.0	56.0	81.9	65.0	19.6	69.4	57.1	89.1	71.4	24.3	56.9	54.8	74.9	59.1	15.9
2018 Q3	63.0	56.7	81.9	64.9	19.7	69.2	57.3	88.8	71.2	24.4	57.2	56.0	75.2	59.0	15.8
2018 Q4	62.9	53.9	82.4	65.4	19.8	68.7	53.8	89.0	71.6	24.0	57.4	54.0	76.0	59.6	16.3
2019 Q1	62.9	54.0	82.6	65.3	20.0	68.9	54.3	89.4	71.3	24.1	57.3	53.7	75.9	59.7	16.7
2019 Q2	63.0	56.5	82.1	65.2	19.8	69.2	57.6	88.9	71.6	24.5	57.1	55.5	75.5	59.2	16.0
2019 Q3	63.3	58.1	82.3	65.5	20.3	69.6	59.2	89.0	71.8	25.2	57.5	57.0	75.8	59.7	16.2
2019 Q4	63.2	54.9	83.0	65.5	20.5	69.0	55.3	89.2	71.6	25.1	57.8	54.4	77.0	59.8	16.8
2020 Q1	62.9	54.5	82.9	65.4	20.3	68.7	54.8	89.2	71.5	24.8	57.5	54.2	76.8	59.7	16.7
2020 Q2	60.8	51.8	80.5	64.3	18.8	66.8	52.4	87.1	70.6	23.3	55.2	51.2	74.1	58.4	15.2
2020 Q3	61.7	55.2	81.0	64.9	19.3	67.8	56.4	87.7	70.8	23.9	56.0	54.0	74.5	59.4	15.7
2020 Q4	61.5	54.2	81.2	64.3	19.3	67.3	54.8	87.6	70.2	23.8	56.0	53.6	75.0	58.8	15.7
2021 Q1	61.3	53.6	81.3	64.3	18.7	67.1	54.4	87.6	70.1	22.9	55.8	52.8	75.2	58.8	15.2
2021 Q2	61.7	56.1	81.3	64.7	18.7	67.7	57.3	87.9	70.7	23.2	56.0	55.0	75.0	59.1	15.1
2021 Q3	61.9	57.3	81.6	64.8	18.8	68.1	58.6	88.2	70.8	23.5	56.2	56.1	75.1	59.3	15.0
2021 Q4	61.8	55.0	82.0	64.6	19.3	67.5	55.8	88.2	70.2	23.8	56.4	54.2	76.0	59.4	15.6
2022 Q1	62.1	54.0	82.3	65.4	19.2	67.9	54.8	88.5	71.1	23.9	56.7	53.2	76.3	60.0	15.3
2022 Q2	62.3	56.1	82.4	65.2	19.0	68.0	57.1	88.6	70.8	23.5	56.8	55.1	76.2	59.9	15.2
2022 Q3	62.4	57.5	82.5	64.8	19.2	68.2	58.4	88.6	70.7	23.7	57.0	56.5	76.4	59.3	15.5
2022 Q4	62.1	54.7	82.6	65.3	19.5	67.8	55.6	88.5	71.5	23.8	56.7	53.8	76.7	59.3	15.8
2023 Q1	62.4	55.2	83.1	65.5	19.1	68.0	55.8	88.9	71.4	23.2	57.1	54.6	77.3	59.9	15.7
2023 Q2	62.6	56.7	83.3	65.4	19.1	68.2	57.3	89.2	71.4	23.0	57.3	56.1	77.4	59.7	15.8
2023 Q3	62.9	57.8	83.3	66.1	19.3	68.4	58.1	89.4	71.5	23.1	57.6	57.4	77.3	60.8	16.1

Note: Relative change in labour force participation in each age group is indicated by changing gradation of colour between dark blue (highest value) and dark red (lowest value); the 50th percentile is shown in white. Comparison of colour should not be made across columns or across countries.

Source: ILOSTAT.

In Australia young workers (15–24 years) were also the most affected demographic group with respect to labour force exits, as their participation in 2020 Q2 undercut that in 2019 Q2 by 6.4 percentage points (table 3). Subsequently, the participation rates of most groups recovered throughout 2022 to reach higher levels than before the pandemic; the exceptions were women aged 65+ and prime-aged men (25–54 years), for whom this recovery did not happen until 2023.

▶ **Table 3. Quarterly labour force participation rates in Australia, by sex and age group, 2018 Q1–2023 Q3**

Sex	Total					Male					Female				
Age	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+
2018 Q1	65.8	69.2	84.4	66.4	13.6	71.2	69.3	90.4	73.7	17.5	60.6	69.0	78.5	59.4	10.1
2018 Q2	65.7	67.9	84.6	66.5	14.0	71.0	68.1	90.5	72.9	18.1	60.7	67.6	78.8	60.4	10.3
2018 Q3	65.4	66.6	84.2	66.9	14.1	70.8	67.1	90.2	73.1	18.7	60.1	66.1	78.3	60.9	10.1
2018 Q4	65.7	67.8	84.5	66.9	14.4	71.1	68.1	90.6	72.8	18.8	60.6	67.5	78.6	61.4	10.4
2019 Q1	65.8	69.3	84.4	66.5	14.2	71.2	69.8	90.4	72.4	18.8	60.6	68.8	78.5	60.9	10.3
2019 Q2	66.1	68.1	85.0	67.4	15.0	71.4	68.1	90.9	73.7	19.6	61.0	68.2	79.3	61.3	11.0
2019 Q3	65.9	67.0	85.1	67.5	14.9	71.1	67.4	90.8	73.8	19.0	60.9	66.6	79.5	61.5	11.2
2019 Q4	66.0	68.2	85.1	67.3	14.9	71.0	67.9	90.7	73.4	18.8	61.2	68.4	79.7	61.4	11.5
2020 Q1	66.0	69.7	85.1	67.0	14.4	71.0	69.2	90.8	73.0	18.1	61.2	70.2	79.5	61.3	11.1
2020 Q2	63.5	61.7	83.3	65.9	13.5	68.7	61.9	89.4	72.1	17.2	58.5	61.4	77.4	60.1	10.3
2020 Q3	64.6	65.1	84.1	67.2	14.1	69.7	64.5	89.6	73.9	18.3	59.8	65.6	78.7	61.0	10.5
2020 Q4	66.0	68.5	85.3	68.2	14.8	70.9	68.2	90.8	74.3	19.0	61.1	68.9	79.9	62.3	11.2
2021 Q1	66.2	70.0	85.5	67.8	15.3	71.3	69.7	90.9	73.8	19.8	61.4	70.4	80.2	62.1	11.3
2021 Q2	66.3	69.2	85.8	68.6	15.0	71.1	68.5	91.1	74.3	19.4	61.6	70.0	80.7	63.3	11.1
2021 Q3	65.1	66.1	84.8	67.9	14.9	69.9	65.8	89.9	73.6	19.5	60.4	66.4	79.8	62.4	10.8
2021 Q4	65.8	69.0	85.2	68.4	15.0	70.5	68.8	90.2	74.0	19.5	61.2	69.2	80.4	63.0	11.0
2022 Q1	66.4	71.5	85.7	69.4	14.7	70.9	70.6	90.3	75.2	19.0	62.1	72.4	81.2	63.9	10.8
2022 Q2	66.8	71.9	86.2	69.7	15.0	71.3	71.0	90.8	75.4	19.5	62.5	72.8	81.8	64.2	11.0
2022 Q3	66.4	71.0	86.1	68.5	15.0	70.9	70.0	90.5	74.7	19.4	62.1	72.0	81.7	62.6	11.1
2022 Q4	66.9	72.0	86.4	68.4	15.5	71.4	71.0	91.0	74.8	19.8	62.5	73.1	82.0	62.4	11.7
2023 Q1	66.8	72.7	86.3	68.5	14.9	71.4	72.7	91.0	74.2	19.0	62.3	72.7	81.7	63.0	11.3
2023 Q2	67.0	71.1	87.0	69.1	15.3	71.5	71.3	91.3	74.2	19.7	62.8	70.9	82.7	64.3	11.4
2023 Q3	66.6	69.8	86.6	69.0	15.2	71.1	69.8	90.9	75.0	19.4	62.3	69.8	82.3	63.3	11.5

Note: Relative change in labour force participation in each age group is indicated by changing gradation of colour between dark blue (highest value) and dark red (lowest value); the 50th percentile is shown in white. Comparison of colour should not be made across columns or across countries.

Source: ILOSTAT.

Workers participated at higher rates in 2023 than in 2019 across the board in France, where labour force participation had stagnated for several years leading up to the pandemic (table 4). The second quarter of 2020 saw the steepest declines for young and prime-aged workers, while participation decreased more slowly for older workers aged 55+, reaching its typical seasonal trough in 2020 Q4. Apart from the differences between groups typically present in most countries – a generally lower level of participation by women and very low participation among those aged 65+ – the recovery after the pandemic occurred fairly evenly. The increases were particularly strong among young workers (up 7.8 percentage points between 2019 Q2 and 2023 Q2), especially young women (up 9.1 percentage points).

▶ **Table 4. Quarterly labour force participation rates in France, by sex and age group, 2018 Q1–2023 Q2**

Sex	Total					Male					Female				
Age	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+
2018 Q1	55.6	33.1	87.5	61.6	3.8	60.2	36.7	92.4	63.7	5.0	51.4	29.5	82.9	59.7	2.9
2018 Q2	55.5	34.2	87.6	60.0	3.5	60.1	37.7	92.4	62.5	4.3	51.3	30.7	83.0	57.6	2.8
2018 Q3	55.7	37.9	87.5	58.3	3.2	60.4	41.7	92.2	60.9	4.1	51.5	34.1	82.9	55.9	2.5
2018 Q4	55.6	37.2	87.7	57.4	3.2	60.1	40.6	92.3	59.7	4.3	51.5	33.7	83.3	55.2	2.4
2019 Q1	55.3	33.0	87.4	62.3	3.9	59.7	36.1	91.8	65.3	5.1	51.4	29.8	83.2	59.5	3.0
2019 Q2	55.2	33.8	87.3	61.0	3.9	59.7	36.8	92.0	63.3	5.2	51.2	30.7	82.9	58.8	3.0
2019 Q3	55.1	36.4	87.0	58.8	3.5	59.6	38.8	91.8	61.3	4.8	51.0	33.9	82.5	56.4	2.5
2019 Q4	55.4	36.2	87.8	58.5	3.5	59.7	39.4	92.0	61.0	4.8	51.5	33.0	83.8	56.2	2.5
2020 Q1	55.0	32.5	87.3	63.1	4.2	59.4	35.7	91.9	65.6	5.4	51.0	29.2	83.0	60.8	3.2
2020 Q2	53.3	30.9	85.0	60.1	3.9	57.6	33.2	89.5	62.6	5.1	49.4	28.5	80.7	57.8	2.9
2020 Q3	55.0	36.6	87.5	59.4	3.6	59.4	39.5	92.3	61.6	4.5	51.0	33.5	82.9	57.3	2.9
2020 Q4	54.8	35.3	87.5	58.9	3.4	58.9	37.3	91.8	61.5	4.4	51.1	33.3	83.4	56.4	2.7
2021 Q1	55.4	33.7	87.7	64.8	4.1	59.3	35.8	91.9	66.9	4.9	51.8	31.6	83.8	62.9	3.4
2021 Q2	55.7	36.2	88.0	63.4	3.9	59.7	38.4	92.2	65.8	4.9	52.0	34.0	83.9	61.2	3.2
2021 Q3	56.4	41.8	88.2	62.1	3.9	60.3	43.3	92.4	64.2	4.8	52.8	40.4	84.2	60.1	3.2
2021 Q4	56.1	39.8	88.3	60.9	3.9	60.1	42.1	92.5	63.0	5.0	52.3	37.3	84.3	58.9	3.0
2022 Q1	55.9	36.2	88.1	65.4	4.7	59.8	38.4	92.0	67.2	6.1	52.3	34.0	84.3	63.7	3.6
2022 Q2	56.1	39.4	88.0	64.3	4.5	60.2	42.0	92.2	66.0	5.9	52.4	36.8	84.0	62.7	3.3
2022 Q3	56.5	43.8	88.2	62.5	4.3	60.5	46.2	92.3	64.2	5.5	52.9	41.3	84.3	61.0	3.4
2022 Q4	56.2	41.7	88.4	61.3	4.2	60.1	44.3	92.4	62.9	5.4	52.5	39.0	84.5	59.8	3.3
2023 Q1	56.1	40.7	88.4	61.0	4.2	60.0	43.4	92.4	62.5	5.3	52.5	37.8	84.6	59.5	3.3
2023 Q2	56.3	41.6	88.4	61.8	4.3	59.9	43.3	92.3	62.7	5.3	52.9	39.8	84.6	60.9	3.5

Note: Relative change in labour force participation in each age group is indicated by changing gradation of colour between dark blue (highest value) and dark red (lowest value); the 50th percentile is shown in white. Comparison of colour should not be made across columns or across countries.

Source: ILOSTAT.

Table 5 shows labour force participation rates for Germany. Data are not available for 2020, but the decline induced by the pandemic is still clearly evident in the data for 2021 (though the levels then were not unprecedented – similarly low levels prevailed at the beginning of 2018). If the recovery of total labour force participation was rather protracted, this appears to be driven mainly by male workers, especially male prime-aged workers (25–54 years), whose participation recovered somewhat slowly compared to the other subgroups, which was partly attributable to their already high level of participation. By 2023, overall participation had reached similar levels to before the health crisis.

▶ Table 5. Quarterly labour force participation rates in Germany, by sex and age group, 2018 Q1–2019 Q4 and 2021 Q1–2023 Q2

Sex	Total					Male					Female				
Age	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+
2018 Q1	61.0	49.8	87.6	72.8	7.2	66.5	51.7	92.3	77.9	10.1	55.6	47.6	82.7	68.0	4.9
2018 Q2	60.9	49.0	87.5	73.1	7.3	66.5	51.6	92.2	78.1	10.0	55.5	46.1	82.6	68.1	5.1
2018 Q3	61.5	51.0	87.9	73.7	7.7	67.0	52.9	92.6	79.1	10.5	56.1	49.0	83.0	68.4	5.4
2018 Q4	61.8	51.4	87.8	74.7	7.6	67.2	53.8	92.3	79.5	10.4	56.5	48.7	83.2	70.0	5.4
2019 Q1	61.5	51.3	88.0	73.9	7.4	67.1	54.1	92.6	78.7	10.4	56.1	48.2	83.2	69.3	5.1
2019 Q2	61.6	50.6	87.9	74.3	7.8	67.2	53.2	92.5	79.2	10.7	56.2	47.8	83.1	69.6	5.4
2019 Q3	62.0	51.8	88.2	74.9	7.9	67.3	54.3	92.8	79.8	10.7	56.8	49.2	83.6	70.1	5.7
2019 Q4	62.6	52.0	88.1	75.6	8.2	68.2	55.3	92.7	80.1	11.1	57.2	48.6	83.4	71.1	5.8
2020 Q1															
2020 Q2															
2020 Q3															
2020 Q4															
2021 Q1	59.6	50.8	86.3	73.4	7.4	65.2	54.2	90.9	78.2	10.2	54.3	47.2	81.6	68.7	5.1
2021 Q2	60.1	51.1	87.0	73.4	7.5	65.4	54.0	91.2	78.1	10.0	55.0	48.1	82.6	68.8	5.6
2021 Q3	61.0	52.9	87.7	74.5	7.6	66.2	55.4	91.9	78.9	10.1	55.9	50.1	83.4	70.2	5.5
2021 Q4	61.2	53.3	87.6	74.8	8.0	66.3	55.5	91.6	79.1	10.7	56.2	51.0	83.6	70.6	5.8
2022 Q1	60.6	53.2	87.6	74.7	7.9	66.0	55.5	92.1	78.6	11.0	55.4	50.6	83.0	70.8	5.5
2022 Q2	61.1	52.5	88.0	75.4	8.3	66.4	55.2	92.4	79.6	10.9	56.0	49.7	83.4	71.2	6.2
2022 Q3	61.5	53.9	87.8	75.6	8.7	66.8	56.6	92.2	80.0	11.6	56.4	51.1	83.4	71.2	6.5
2022 Q4	61.9	54.9	87.9	75.7	8.8	67.2	57.7	92.1	79.9	11.7	56.8	51.9	83.6	71.6	6.5
2023 Q1	61.9	54.3	88.0	75.8	8.7	67.4	56.8	92.5	80.2	11.8	56.7	51.6	83.4	71.5	6.3
2023 Q2	61.3	53.9	88.1	76.5	8.7	66.5	56.5	92.3	80.1	11.6	56.4	51.1	83.8	73.0	6.4

Note: Relative change in labour force participation in each age group is indicated by changing gradation of colour between dark blue (highest value) and dark red (lowest value); the 50th percentile is shown in white. Comparison of colour should not be made across columns or across countries.

Source: ILOSTAT

Japanese participation rates have been rising steadily for several years and broadly continued this trend throughout 2020, although the pandemic led to some stagnation or even slight decreases in some subgroups of the labour force (table 6). The decline in 2020 was far less pronounced than in other countries, as participation rates did not fall below their comparatively low levels of 2018. Between 2018 Q3 and 2023 Q3, overall participation rose by 1.6 percentage points (0.6 percentage points among men and 2.5 percentage points among women). The slight increase in male participation was mostly due to gains in the older age groups (55+), as male prime-aged workers (25–54 years) already participated at a comparatively high level of around 95 per cent. Women, in contrast, increased their participation across all age groups in this period, but most notably among prime-aged workers (up 3.9 percentage points) and those aged 55–64 (up 5.2 percentage points).

▶ **Table 6. Quarterly labour force participation rates in Japan, by sex and age group, 2018 Q1–2023 Q3**

Sex	Total					Male					Female				
Age	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+	Total	15–24	25–54	55–64	65+
2018 Q1	60.7	44.6	87.1	76.4	23.7	70.5	43.3	95.7	88.3	32.9	51.6	46.1	78.2	64.8	16.7
2018 Q2	61.7	48.5	87.3	76.7	25.0	71.4	48.0	95.6	88.8	34.3	52.6	49.1	78.8	64.8	17.9
2018 Q3	61.6	48.2	87.5	77.0	24.8	71.2	47.4	95.7	88.1	34.1	52.6	49.1	79.1	66.0	17.6
2018 Q4	61.9	48.2	87.8	77.6	24.9	71.5	48.1	95.9	89.3	34.0	52.9	48.4	79.5	66.1	17.9
2019 Q1	61.4	46.7	87.7	78.0	24.5	70.9	46.0	95.7	89.0	33.7	52.6	47.5	79.6	67.3	17.4
2019 Q2	62.2	50.7	87.8	77.7	25.5	71.6	49.0	95.5	88.6	35.4	53.4	52.5	79.9	66.9	18.0
2019 Q3	62.2	49.6	88.1	77.8	25.5	71.4	48.4	95.6	89.1	35.0	53.6	50.9	80.5	66.6	18.2
2019 Q4	62.2	49.3	88.2	78.3	25.6	71.6	48.6	95.7	89.0	35.1	53.5	49.9	80.4	67.6	18.4
2020 Q1	61.9	47.7	88.1	79.0	25.0	71.3	47.0	95.8	89.9	34.5	53.1	48.6	80.1	68.3	17.7
2020 Q2	61.6	49.0	87.6	78.1	25.3	71.2	48.2	95.3	89.1	35.0	52.7	49.8	79.6	67.1	17.9
2020 Q3	62.1	49.6	87.6	78.9	25.8	71.7	49.1	95.5	90.0	35.3	53.1	50.1	79.5	67.9	18.4
2020 Q4	62.2	47.9	88.4	79.2	25.8	71.4	47.6	95.8	89.8	35.0	53.6	48.2	80.8	68.7	18.6
2021 Q1	61.8	47.6	88.1	79.3	25.2	71.2	46.4	95.7	89.9	34.7	53.1	49.0	80.1	69.0	18.0
2021 Q2	62.3	49.7	88.3	79.1	25.7	71.5	49.0	95.7	89.9	34.7	53.7	50.5	80.6	68.4	18.8
2021 Q3	62.4	50.1	88.5	79.0	25.7	71.5	49.4	95.7	89.7	35.0	53.8	50.8	81.2	68.5	18.5
2021 Q4	62.0	48.0	88.2	79.2	25.6	71.1	47.6	95.3	89.8	35.0	53.4	48.4	80.9	68.6	18.3
2022 Q1	61.9	45.8	88.3	80.0	25.1	71.0	45.0	95.3	90.0	34.6	53.4	46.7	81.0	70.1	17.8
2022 Q2	62.8	50.3	88.9	80.0	25.6	71.7	49.3	95.6	90.3	34.8	54.5	51.5	82.0	69.7	18.6
2022 Q3	62.9	50.1	89.1	80.2	25.9	71.8	49.2	95.6	90.3	35.5	54.6	51.1	82.4	70.2	18.5
2022 Q4	62.5	48.6	88.6	80.1	25.7	71.2	47.1	95.3	90.2	34.6	54.4	50.2	81.7	70.1	18.9
2023 Q1	62.3	46.9	88.5	80.6	25.6	71.0	45.6	94.9	90.5	35.1	54.1	48.2	81.9	70.8	18.3
2023 Q2	63.0	51.1	89.1	80.6	25.7	71.6	49.3	95.4	90.9	34.8	55.0	52.9	82.6	70.4	18.8
2023 Q3	63.2	51.1	89.4	80.8	25.8	71.8	50.1	95.5	90.6	35.1	55.1	52.3	83.0	71.2	18.6

Note: Relative change in labour force participation in each age group is indicated by changing gradation of colour between dark blue (highest value) and dark red (lowest value); the 50th percentile is shown in white. Comparison of colour should not be made across columns or across countries.

Source: ILOSTAT.

Across these countries, which all experienced labour shortages to different degrees in the period under review, participation rates were mostly at levels similar to or higher than before the pandemic. A notable exception was workers aged 65+ in the United States, whose labour force participation remained at a reduced level. In Japan, participation rates saw the smallest increments among prime-age male workers, who already participated at very high levels. In both France and Germany, participation was consistently higher than before the health crisis, which does not preclude the possibility of further increments in some groups. Although vacancies rose quickly at the beginning 2021 – following a temporary drop in 2020 – this rise did not appear to be the driving force behind persisting labour shortages. Indeed, the very substantial recovery of participation in most groups suggests that the pool of people working or available for work had not shrunk in comparison to pre-COVID times. This suggests that other factors must be contributing to the ongoing labour shortages.

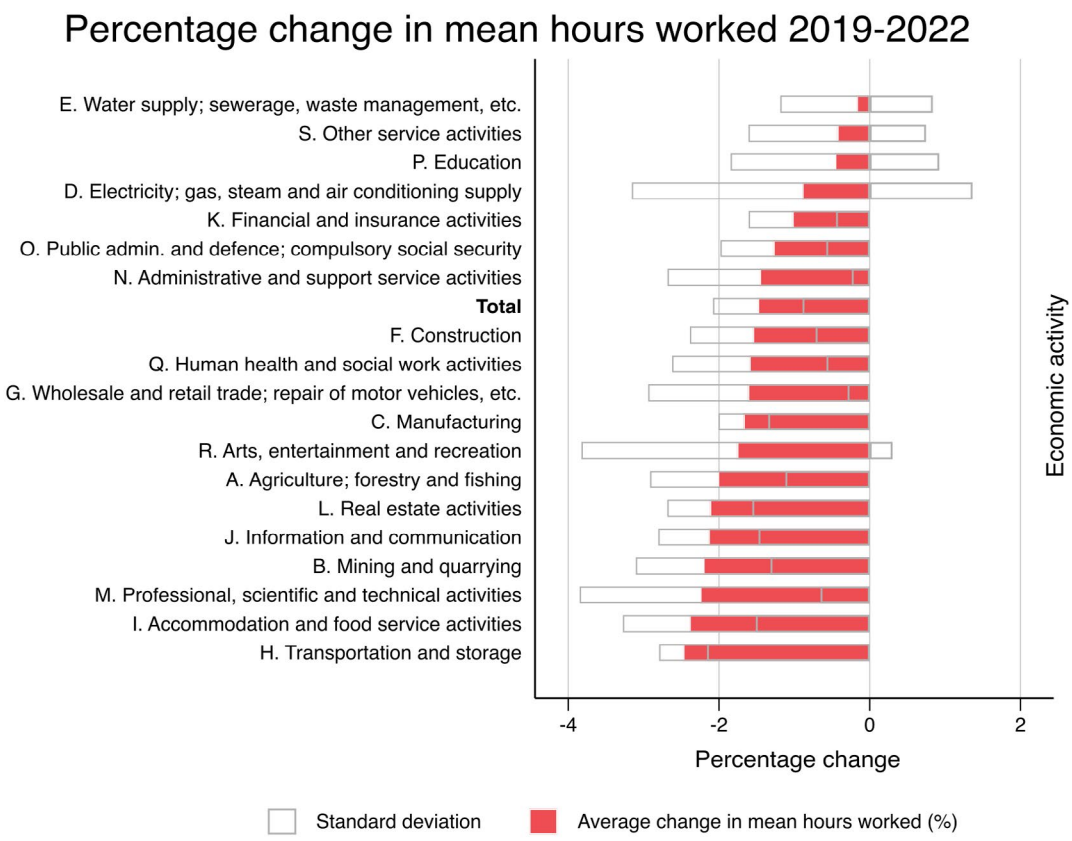
Intensive margin: Working time

In addition to the number of workers that are available to participate in the labour market, labour supply is defined by the number of hours they are willing and available to work under current conditions. Changes in mean hours actually worked give an indication of the intensive margin of labour supply. This measure counts the average number of hours per week on the main (paid) job. Figure 7 shows the percentage change of mean weekly hours actually worked in the same group of countries as in the previous section (excluding Canada) over the period 2019–2022. It shows that some of the sectors with the largest relative decrease in working hours were information and communication (J), accommodation and food service activities (I), and transportation and storage (H).[7] All three sectors have struggled, to different degrees, with labour and skills shortages in high-income countries in recent years. According to Colijn (2023), working hours

[7] The classification of economic activities/sectors used in this section is based on United Nations, International Standard Industrial Classification of All Economic Activities: Revision 4 (ISIC Rev. 4) (2008).

have generally decreased in the euro area, but the fall has been especially marked in sectors with labour shortages.

▶ **Figure 7. Percentage change in mean hours worked, by economic activity, 2019–2022**



Note: Percentage change weighted by employment. Classification of economic activities is based on ISIC Rev. 4 (categories T, U and X are excluded). Countries included: Australia, France, Germany, Japan, United Kingdom, United States; Canada excluded because of different sector definitions.

Source: ILOSTAT.

Reductions in mean hours worked may be the result of several factors. They could stem either from compositional effects in job creation or from a reduction in the working time of existing employment relationships. The latter could happen, for example, because of higher sickness rates or as a result of changes in preferences on the part of employees and/or employers. In some of these instances, reduced working time might contribute to shortages, as the hours dedicated to paid work are lower than they could be. For example, workers might choose part-time employment or work fewer hours because of unpaid care responsibilities, but – given the right circumstances – would be willing to work more hours. What these circumstances are depends heavily on the national context and the particular limiting factors mainly responsible for preventing full-time employment. First, part-time employment is distinctly more prevalent among women than men; and since it is particularly common among women with children, it is intimately linked to national education systems and the availability of childcare provision.[8] The pandemic

[8] See data on childcare gaps in (for example) Germany and the United States, and see ILO and Asian Development Bank (2023) for similar needs in Asia and the Pacific.

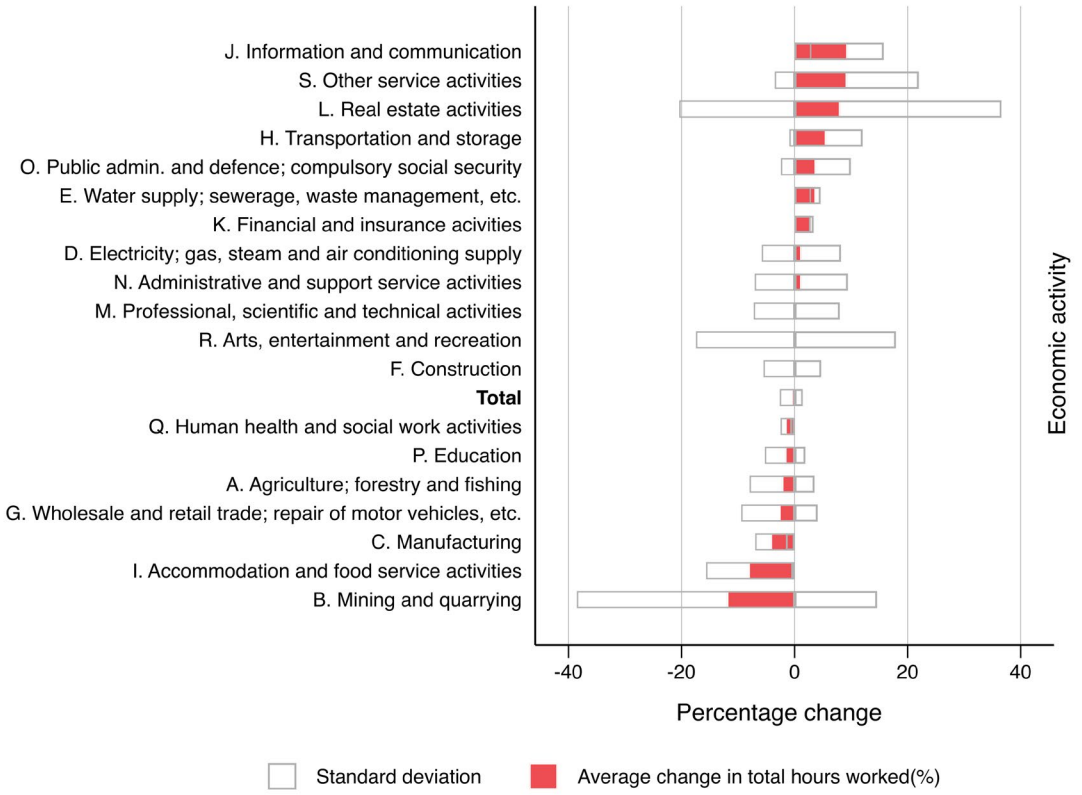
and ensuing mitigation measures that affected the labour market, including school closures, pushed workers with family responsibilities to reduce their working hours, which in turn created hidden labour market slack. At the same time, the possibility of working part-time opens up employment possibilities to groups that would otherwise not be available to work at all, such as parents, older workers choosing partial retirement, or people with disabilities that prevent them from working full-time.

At the same time, working hours may be lower because firms engage in labour hoarding (Colijn 2023; Arce et al. 2023). This has been the case in Europe in several broad sectors coming out of the pandemic (EC 2023b). Businesses in the United States appear to have become more reluctant to let go of workers as well (Leduc and Oliveira 2023).

Total hours are the product of mean weekly working hours and employment, and thus consider the extensive margin of employment (figure 8). When looking at the sectors with the largest decreases in mean working hours (figure 7), several observations stand out. First, employment grew in the information and communication sector (J), but average hours dropped significantly. This indicates that there was growing demand that was only partly satisfied. In transportation and storage (H), a similar picture emerges. Rising consumption in this area is likely to have driven up demand for workers as well.[9] Growing demand for labour is thus an important driver for shortages in these sectors. Second, both mean and total hours shrank in accommodation and food service activities (I). In this sector, existing demand was not translated into meaningful job growth – shortages were driven to a greater extent by restrictions in supply than by rises in demand.

[9] See section 3.2.4 for a discussion of pandemic-induced changes in consumer behaviour.

▶ **Figure 8. Percentage change in total hours worked, by economic activity, weighted by employment, 2019–2022**



Note: Classification of economic activities is based on ISIC Rev. 4 (categories T, U and X are excluded). Countries included: Australia, France, Germany, Japan, United Kingdom, United States; Canada excluded because of different sector definitions.

Source: ILOSTAT.

▶ 2 Labour shortages and their underlying reasons: Recent literature

In addition to the possible limitations of labour supply discussed above, this chapter presents further potential reasons for hiring difficulties following the COVID-19 pandemic. They are linked to shifts in labour supply, on the one hand, and to the allocation of workers, on the other. Most are linked to long-term, structural conditions that influence the demand for and supply of labour.

Possible reasons for shrinking labour supply include a falling working-age population and barriers to participation for certain groups such as women and various vulnerable groups. Indeed, the working-age population has started to shrink at an accelerating pace in certain economies (ILO 2023), a trend that may have been accentuated by increases in inactivity due to health-related issues (such as long COVID) and among workers who have started to leave contact-intensive jobs. As discussed above, some groups may have left the labour force or find themselves in part-time work or underemployment. Female labour force participation (especially that of mothers) was adversely affected during the pandemic (ILO 2023). The same is true of other vulnerable groups such as elderly people and low-skilled workers (Duval et al. 2022). As the previous section showed, participation has since largely recovered.

In theory, efficient labour allocation may be impeded by a variety of factors, such as skills mismatch, administrative or cultural and language barriers, information asymmetries, and missing or inefficient (public or private) employment agencies. The pandemic may have worsened some of these impediments. For example, skills mismatch may have increased as economies faced an accelerated digitalization across all sectors, leading to some skills obsolescence. Also, it may have given rise to potential new factors tied to worker preferences, such as growing unwillingness to work in certain occupations or to tolerate certain working conditions.

The following sections provide an overview of existing recent literature on the drivers of labour shortages stemming from decreased labour supply, on the one hand, and from impediments to an efficient allocation of labour, on the other. Analyses of countries and regions are presented where data and research on the relevant topic are available. In parallel to the data on labour force participation presented in section 2.2.1, section 3.1 looks at labour shortages through the lens of general labour supply. How does demographic change affect the labour market, and what do recent studies have to say about subgroups of the population that have remained out of the labour force since the pandemic? Section 3.2 then considers factors that inhibit the efficient allocation of labour.

Labour supply

Population ageing

Population ageing is due to a combination of increasing longevity and falling birth rates. The demographic shift is a well-studied topic in which scenarios including population growth, mortality rates and migration patterns have been considered (see, for example, Bloom and Luca 2016; Vollset et al. 2020). Together with fixed or slow-adjusting retirement ages, this shift results in shrinking workforces and growing old-age dependency, straining public pension systems where they are in place. It also means that employers face an increasingly smaller pool of talent and will have to adjust their work processes to an older workforce whose demands and capabilities are different from those of younger cohorts (for an overview, see ILO 2023, 105).

Demographic change has adverse effects on enrolment rates in higher education, employment and the economy at large. College enrolment rates in the United States had already been declining for a decade, losing 2 million students since 2012, a dynamic that was further exacerbated by the pandemic. Consequently, higher-education institutions may have to compete for students and have a reduced capacity to train skilled labour for potential employers. At the broader economic level, this development might hamper human capital accumulation in the long run and thus diminish economic growth prospects (Hetrick et al. 2021).

In the case of Germany, Fuchs, Söhnlein and Weber (2021) find that the demographic effect alone, ignoring migration flows and changes in behaviour, would reduce the labour supply by 7.2 million persons by the year 2035, compared to 2020. This substantial reduction could be slightly offset by making better use of the available potential and increasing participation rates among women and older workers, but a stable labour force would be achieved only with a constant inflow of migrants (about 400,000 a year).

The megatrends principally affecting Japan's workforce in the coming years are an ageing workforce, technological change and a polarizing labour market, leading to a skills imbalance and talent shortage that are among the greatest in the OECD (OECD 2021b). Nishioka (2023) attributes the shrinking labour supply and ensuing shortages in Japan to the low potential for growth of the Japanese labour force, as participation rates among older people (65+) that had been growing before the pandemic stagnated at the onset of the health crisis. This suggests that there is little capacity to further increase participation among older people. Japan is recognized as one of the countries most affected by population ageing.

Albrieu (2022) points out that population ageing is also set to become an increasing concern across countries in the global South in the coming decades, especially in Latin America and East Asia. These countries already tend to struggle with high informality rates, worsening dependency ratios in public social security and pension systems. As dependency ratios are projected to increase at a faster rate than has been the case in the global North, they will have to face a reorganization of the labour market during the period of the "demographic dividend", before their working-age population starts to shrink.

Participation of older workers

In addition to these long-term structural developments, which change the composition of the workforce in terms of age structure, the pandemic had an asymmetrical impact on the labour force with respect to age, as noted in section 2.2.1. Several studies show this impact in the UK and US labour markets. The impact on older people has been far less pronounced in Europe, where participation has generally returned to or exceeded pre-pandemic levels.

Hornstein et al. (2023) estimate group-specific trends in labour force participation by age, gender and educational attainment in the United States. They find that more than two thirds of the one percentage point decline in total participation can be explained by a decline in trend participation. Of this decline in trend, again two thirds are attributable to composition effects, with the negative age effect (−0.7 percentage points) on participation prevailing over the positive education effect (+0.2 percentage points). The rising share of older workers in the workforce thus decreases total participation. The authors go on to predict a further decline of one percentage point in the coming decade.

Hetrick et al. (2021) find that the pandemic accelerated the process of population ageing leading to labour shortages, because baby boomers retired in greater numbers than in previous years and were not replaced from younger generations. Indeed, Fry (2020) shows that in the United States the number of new retirees born between 1946 and 1964 (the boomer generation) more than doubled in 2020 compared to 2019 – 3.2 million versus 1.5 million, respectively (the number

of retired boomers had been growing by around 2 million a year since 2011). These studies on US labour force participation confirm observations made in the previous chapter.

Pizzinelli and Shibata (2023) also show that the share of workers aged 55–74 who left the labour force for retirement increased during the pandemic both in the United States and in the United Kingdom. This was the case in both high- and low-income households; it might have been induced in part by health considerations and further incentivized by favourable financial market conditions. In both countries, these departures to retirement accounted for about 35 per cent of the aggregate employment rate gap compared to pre-pandemic levels. Another study finds that, in the United Kingdom, workers aged 50–70 who left the workforce for retirement came disproportionately from higher-paying professional jobs (Murphy and Thwaites 2023).

Using data until the end of 2021, Duval et al. (2022) note that the employment of low-skilled and older workers remained below its pre-pandemic trend in several high-income countries.[10] Older workers' withdrawal accounted for about one third of the remaining employment gap compared to 2019. The authors conjecture that this was partly caused by health considerations and facilitated by favourable conditions on financial markets up until the end of 2021.

Female workers

The labour force participation rate of women is notoriously lower than that of men across the globe, with large differences between countries (see section 2.2.1). The pandemic, with its health restrictions, reduced working hours, workplace and school closures and layoffs, forced millions of mothers to leave the labour force in 2020 (Azcona et al. 2022). Employment declined particularly among women with small children. By the end of 2021, their inactivity accounted for 15 per cent of the employment gap in the United States compared to the pre-pandemic trend (Duval et al. 2022). Most studies identify conflicting obligations between women's care work and employment and a consequent effect on the sectoral composition of female employment. On average, female-dominated sectors were more affected by workplace closures and layoffs, and the pandemic also had a higher negative impact on part-time and informal work, which is often female-dominated. Observing that the pandemic hit women's employment harder than in past recessions – in which men were disproportionately affected by job losses – several studies speak of a "shecession" arising in 2020 (Alon et al. 2021; Bluedorn et al. 2021; Fabrizio, Gomes and Tavares 2021).

Alon et al. (2021) analyse data from six countries' labour force surveys (Canada, Germany, the Netherlands, Spain, the United Kingdom and the United States) and find that there is some heterogeneity in the response of women's employment. There is a clear gender gap in the response of hours worked – the intensive margin – for Germany, Canada and the United States. In contrast, only in the United States do they find a large gender gap in employment changes – the extensive margin. Other countries show smaller changes to both the intensive and the extensive margins at the aggregate level, but the analysis of individual characteristics reveals that (for instance) having school-aged children had a negative impact on the gender gaps even in countries where the overall gap was small. Looking at long-term consequences of these changes in female labour supply, the authors argue that "lowered earning prospects after an unemployment spell are more likely to result in a persistent reduction in labor supply" (Alon et al. 2021, 5). Fabrizio, Gomes and Tavares (2021) also find that women with small children were disproportionately affected by employment losses in the United States. These losses were even higher for women with lower education levels and African-American women.

[10] Countries included in the sample: Australia, Canada, Japan, United Kingdom, United States, and an employment-weighted panel of European countries.

Looking at a panel of 38 countries using OECD and Eurostat data, Bluedorn et al. (2021) find that, by 2020 Q2, the gender gap in employment had risen in 20 of the countries included in the sample. Using a subsample of 20 EU economies, they find that, in eight out of nine countries affected by a "shecession", the gap was driven by the sectoral composition of female employment. They, in turn, find that this reduction in employment for women happened more on the extensive than on the intensive margin, while hours worked decreased more for men than for women in most studied countries.

Using data for Canada (the Canadian Labour Force Survey), Singh, Shirazi and Turetken (2022) find that Canadian women were more likely to become unemployed and see their wages decline as a consequence of the COVID-19 pandemic than their male counterparts, worsening the gender pay gap. Reichelt, Makovi and Sargsyan (2021) analyse data retrieved from an online survey about working arrangements and the division of household labour for Germany, Singapore and the United States. They find that women were significantly more likely to make changes to their working arrangements during the pandemic than men (working from home, reducing working hours, transition to unemployment) across the observed countries.

Health impacts of COVID-19

The pandemic has impacted the global workforce in many ways, the worst of which is early death due to infection. Across the globe, as of February 2023, the World Health Organization (WHO) counted 6.8 million confirmed COVID-19 deaths.[11] In the United States a quarter of COVID-19 deaths were individuals of working age (15–64). In addition to these losses, long-term sickness due to COVID-19 (long COVID), affecting 20 per cent of those infected by the virus according to WHO, might have a significant impact on activity measures of the labour markets (WHO 2022).

Using data from the Current Population Survey (CPS), conducted by the US Census Bureau, Goda and Soltas (2022) find that health-related absences attributable to COVID-19 infections reduced the likelihood that affected workers would be in the labour force one year after their reported absence. The authors estimate that, through various channels, COVID-19 had reduced the US labour force by 0.2 percentage points, or 500,000 workers, by June 2022.

Also using CPS data, Sheiner and Salwati (2022) estimate the effects of long COVID and enhanced teleworking possibilities on labour force participation and working time.[12] They estimate, first, that 420,000 have withdrawn from the labour force as a result of long COVID, corresponding to 281,000–683,000 workers, or 0.2–0.4 per cent of the US labour force aged 16–64. Second, those who stayed in the labour force despite long COVID reduced their working hours by 2.2–3.2 per cent on average (corresponding to 20,000–39,000 full-time equivalent workers). Third, there is evidence that remote work increased the labour force participation among workers with disabilities aged 45–64, such that there appeared to be a small counterbalancing effect to the increases in inactivity. However, this is likely to be a composition effect, as the incidence of long COVID increases with patients' age (NYSIF 2023).

Using data from the Understanding America Study (UAS) from 2021,[13] Ham (2022) finds that people with long COVID who stated that their condition affected employment or working hours were 10 percentage points less likely to work and, on average, worked 50 per cent fewer hours than individuals who stated that they had not been infected with the virus. Applying these figures on work reduction to representative data on long COVID from the US Census Bureau's Household Pulse Survey, Bach (2022b) estimates that the US workforce shrank by about 1.8 million full-time equivalents in 2022 as a result of long COVID. An earlier, more conservative estimate found that

11 WHO COVID-19 Dashboard.

12 The CPS covers disability in detail but does not specifically ask about long COVID. In the absence of a direct measure, the authors define long COVID as the difference between reported disability for 2022 and the 2017–2019 trend (Sheiner and Salwati 2022, 4).

13 The UAS is a web-based household study at the University of Southern California with 14,000 respondents.

the labour force had lost 1.6 million workers to long COVID, corresponding to 15 per cent of the 10.6 million unfilled jobs at the time (Bach 2022a).

In the United Kingdom 460,000 workers left employment and became inactive between the beginning of the pandemic and late 2022 because of long-term sickness, resulting in a total of 2.5 million inactive individuals (Murphy and Thwaites 2023). This rise in inactivity has been more pronounced in the United Kingdom than in other OECD countries, such that it dropped from the seventh highest labour force participation down to 15th. Since the pandemic, a higher share of those who are inactive cite long-term health issues as the main reason for their inactivity.

Long COVID has increased the likelihood of people leaving the workforce in the United Kingdom and may have contributed to as many as 80,000 withdrawals from the workforce between 2020 and the end of 2021 (Reuschke and Houston 2022). In addition, a large proportion of those who left the workforce with long COVID had been active in elementary occupations such as farming, construction and cleaning.

In addition to long COVID, the pandemic situation has caused a deterioration of mental health outcomes across OECD countries, with measures of anxiety and depression exploding in 2020 compared to 2019. French longitudinal data show that prevalence of anxiety and depression correlates with people having less secure employment, lower education levels and/or lower income, tying labour market outcomes directly to the mental health impact of COVID-19 (OECD 2021c). The lion's share of the COVID-19 crisis burden was carried by already vulnerable groups with only marginal attachment to the labour market (OECD 2021a), posing challenges to public employment services.

These studies demonstrate the potential link between the pandemic and decreasing mean hours worked beyond the extent of what might be expected in a typical post-crisis economic recovery.

Migration

In many advanced economies, the only source available to grow the labour force is inward migration. The health crisis caused by COVID-19 has had a sizeable impact on international migration as States closed their borders and imposed restrictions on international travel and migration. The absence of permanent settlement of migrants in destination countries might have decreased the supply of labour, especially in low-pay sectors in which migrants are more likely to work. The employment patterns of migrants who are already present in the country may also have changed as a result of the health crisis, either because they tend to work in sectors that were more affected by workplace closures, or because they are not treated in the same way as native-born workers, or because of behavioural changes (such as greater labour market participation on the part of women to offset their spouses' job losses).

The OECD *International Migration Outlook 2022* shows that, in 2021, permanent-type migration to OECD countries almost returned to pre-crisis levels, with a 22 per cent growth rate relative to 2020 that was mostly driven by the major receiving countries (of which Canada, Italy, the United Kingdom and the United States had the highest year-on-year growth rates) (OECD 2022). Despite this increase, permanent-type migration was still 10 per cent lower in 2021 than in 2019 (corresponding to over 500,000 persons). In Australia, Japan, New Zealand and the Republic of Korea, it remained lower than in 2019 and 2020, hinting at a particular pattern for countries of Asia and the Pacific region. Looking at labour migration in particular, several countries saw strong increases (Canada, Italy, the United Kingdom and the United States, although in the case of Italy, the increase was probably attributable to a change in policy), leading to a total increase of 45 per cent in labour migration to OECD countries compared to 2020, and 13 per cent compared to

2019.[14] Temporary labour migration, especially seasonal workers during the harvesting season, remained relatively stable throughout the OECD even during the pandemic. In contrast, in the case of other types of temporary migrants such as working holiday-makers, international trainees and intra-company transferees, numbers decreased significantly in two consecutive years (2020 and 2021). Looking at movement from countries of origin to OECD receiving countries, the biggest impact of the pandemic was seen in migration flows from China and India, both of which practically halved in 2020 compared to 2019, with some of the biggest relative decreases in migration from China to Japan and New Zealand (OECD 2022). These changes in international migration are likely to have had a sizeable impact on the available supply of labour in receiving countries, especially in lower-skilled occupations where many migrant workers are employed.

The OECD *International Migration Outlook* also observes that labour market outcomes of migrants were different from those of native-born workers in several aspects (OECD 2022). First, they were more likely to work in low-pay sectors; and second, they were more likely to lose their employment in economic downturns (in other words, employment was more cyclical for migrants, in part due to sectoral composition). Hence employment of migrants in OECD countries both decreased more steeply at the onset of the health crisis and recovered more strongly in the subsequent upturn. A look at the intensive margin – hours worked – shows that the number of hours worked by foreign-born persons in the EU was on average lower in 2021 than the pre-crisis level (OECD 2022). These statistics show that the lower arrival rate of migrant workers, combined with their lower participation and work intensity, might lead to lower availability of labour in host countries.

Looking at migrant shares in low-skill occupations in Canada and the United Kingdom, Duval et al. (2022) find a negative correlation between the change in the share of foreign workers and the change in vacancies in the same sectors (data points 2019–2021). This is true for low-skill occupations but not for high-skill occupations, for which the correlation is slightly positive. Descriptively, this implies that a decrease in foreign workers is indeed linked to sectoral labour shortages in low-skill occupations.

Spain and the United States have extended the right to work for asylum-seekers, especially to prevent and reduce shortages in the agricultural sector (OECD 2022). During the pandemic, across the EU, countries had policies in place for essential sectors with looming labour shortages, especially in agriculture, health and transport; these sectors were exempted from otherwise widespread migration restrictions (EMN and OECD 2021). The European Commission has also taken action to increase immigration from outside the EU to address labour and skills shortages (EC 2023c).

Japan had a usual inflow of 100,000–200,000 foreign workers before the pandemic but saw the numbers decrease in 2021. Nishioka (2023) attributes the short-term decrease in the Japanese labour force largely to this halt in migration due to health restrictions; while the author expects a recovery as restrictions end, the low growth of labour force participation among older people and women is likely be more persistent.

Discussing whether increased migration is a viable solution for labour shortages in the United Kingdom, where labour has become scarcer as a result of both COVID-19 and Brexit, Manning (2021) remarks that migration is not suitable to address widespread economy-wide labour shortages, as this would simultaneously increase aggregate demand, thus further increasing the demand for labour. Instead, according to the author, migration policy should be localized and targeted at affected sectors, depending on the seriousness and causes of the shortage (that is, directed at essential and bottleneck sectors only). In this sense, migration might appear to be an easy fix for employers facing shortages, which could otherwise be addressed by improving working conditions and pay. In sum, Manning argues that facilitating migration into sectors with immediate labour needs can be a short-term solution, while more time-consuming measures,

[14] 2021 data are estimates; country methodology differs with respect to data collection (fiscal versus calendar year).

such as training and education in the appropriate occupations, are deployed over the medium and long term.

Allocation of labour

The previous sections have shown that labour shortages, while observable at the aggregate level, occur asymmetrically across the economy, suggesting that they are driven by skills mismatch, lack of geographical mobility or changing worker preferences.

Skills mismatch

Skills mismatch occurs when employees possessing a specific skill set or level of education and the jobs that require them cannot be matched up or aligned, in such a way that unemployment coexists with open vacancies. Such mismatch in employment means that the employment relationship does not reach its full potential of productivity. After the pandemic, skills mismatch may have increased through two channels: first, labour market turbulence during the pandemic – layoffs, short-time work schemes, workplace closures and ensuing immediate sectoral shifts of labour needs – may have increased mismatch and contributed to labour shortages as economies reopened; and second, the pandemic accelerated structural changes in demand and long-term trends, such as digitalization and the shift away from physical shops to e-commerce, while adding to others, such as the decarbonization of economies and other technological advancements. Skills mismatch is known to be a by-product of demographic and technological change (Acemoglu 2002). Regarding longer-term changes in skills needs in the world of work, skills mismatch is under close observation by policymakers and researchers and has produced a vast body of literature.[15]

Gauging the immediate impact of the COVID-19 crisis on skills mismatch in the United States and the United Kingdom, Pizzinelli and Shibata (2023) find that, although mismatch rose at the beginning of the crisis, it had returned to previous levels by September 2021. Using US Current Population Survey data and UK Labour Force Survey data, they find that mismatch contributed little to the observed sluggish employment recovery. Instead, they see preliminary evidence that the chief culprits for the initially slow increments in employment were mainly supply-side factors: reduced female labour supply, early retirement, and changes in preferences, especially among low-skilled workers.

Similarly, Duval et al. (2022) do not see a rise in mismatch as an important contributory factor to shortfalls in the employment rate, which is tantamount to labour shortages, in advanced economies.[16] Although the observed countries' respective Beveridge curves might have shifted outwards during the pandemic, this process was reversed as the sectors that had been hit hardest recovered and workers were reallocated to newly created jobs, resulting in mismatch receding. The authors find that the contribution of mismatch remained under one fifth of total employment contraction at its peak; and they see little evidence, so far, to support the idea that a rise in mismatch was due to structural transformation, especially in comparison to the aftermath of the Great Recession after 2008.

Kiss, Turrini and Vandeplas (2022) analyse the contribution of skills mismatch to variations in unemployment and matching efficiency during the pandemic years 2020 and 2021 in the euro area. The mismatch indicator used in the analysis measures the dispersion of employment rates across skill levels, with higher discrepancies implying greater skills mismatch. The authors view

[15] For an overview of the literature, see, for example, Brunello and Wruuck (2021) and McGuinness, Pouliakas and Redmond (2018).

[16] The countries included in the analysis are Australia, Canada, Japan, Spain, the United Kingdom and the United States. The authors measure mismatch as the gap between observed and optimal allocation of new hires, following the matching function approach of Şahin et al. (2014), and estimate its contribution to the observed employment rate gap.

the contribution of mismatch as existent but short-lived, and the immediate sectoral economic impacts as transitory.[17]

In Europe, the European Centre for the Development of Vocational Training (Cedefop) identified several mismatch priority occupations in 2016: STEM and ICT professionals;[18] medical doctors, nurses and midwives; and teachers (with some exceptions by country). While some shifts have occurred since this analysis,[19] the reasons adduced to explain the skills shortages and mismatch remain relevant: ICT and STEM professions see insufficient numbers of graduates from upper-secondary and higher education to meet rising demand; the skills shortage among teachers is driven to a large extent by population ageing (it is proving difficult to replace retiring teachers); and the ageing population increases demand for healthcare professionals to provide medical services and care work. The report cites academic entry requirements and unattractive working conditions (poor pay, shift and weekend work, etc.) as exacerbating factors. To tackle these skills shortages, Cedefop suggests stimulating relevant skills supply through education and training, tapping unused reserves of labour and skills, and upskilling employees (Cedefop 2016).

As a consequence of increases in skills mismatch in the long run, Fuller et al. (2022) notice that degree requirements have become less important in job advertisements and that this development started a few years prior to the pandemic for certain occupations. These results may indicate that firms have lowered their requirements either because of a shrinking candidate pool or because they found that educational degrees do not optimally predict skills for certain jobs (especially in ICT). In this development, the authors see the potential to increase diversity and inclusion, considering the substantial barriers to college education for certain minorities.

Despite these indications of change in hiring behaviour among employers, it appears that some have yet to catch up with workers' willingness to switch occupations and industries. During the pandemic, workers in the United Kingdom increasingly directed their job searches towards occupations and industries with rising demand for labour (Carrillo-Tudela et al. 2023). The share of jobseekers targeting occupations with growing employment levels rose from 58 per cent in June 2020 to 70 per cent in January 2021, and the share of jobseekers targeting growing industries increased from 41 per cent to 50 per cent in the same time period. However, candidates coming from declining occupations who targeted growing ones did not achieve their desired transition as often as candidates coming from growing occupations. This suggests a certain hesitancy among employers to hire switching candidates.

Geographical mismatch and mobility

Labour shortages can occur heterogeneously across geographical areas, especially if mobility between geographical entities is low.[20] In theory, this might be due to cultural and language barriers, housing market barriers or occupational licensing (including mutual diploma recognition systems). In areas such as the EU, with its distinct national labour markets, information asymmetries are also likely to play a role. For the aftermath of the Great Recession, studies found that geographical mismatch contributed to unemployment only to a minor extent (Marinescu and Rathelot 2018; Şahin et al. 2014). In the current debate around labour shortages, geographical mismatch is of interest because, if shortages arise asymmetrically across countries or regions, increasing geographical mobility could contribute to their alleviation. Depending on the level of imbalances, this may require policy decisions at the national or international level.

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17 The authors point out that mismatch might increase in the long run as a result of structural trends, such as population ageing, lower mobility and migration, some of which the pandemic has accelerated.

18 STEM = science, technology, engineering and mathematics; ICT = information and communications technology.

19 Cedefop has published updates on skills forecasts at the country level since 2022.

20 Section 3.1.5 touched on labour mobility in the form of migration, looking at the potential of migration to increase labour supply in receiving countries. This section considers studies specifically looking at geographical mismatch.

The Japanese job-opening rate – the number of job openings per jobseeker registered at the public employment service Hello Work – was at its highest level in 2019. More granular data show that there are far fewer regional differences in the aggregate job-opening rate than in the past. If shortages are equally serious across regions, there is little room for alleviation by means of increased cross-regional labour mobility (OECD 2021b). Kotera and Schmittmann (2022) also find that mismatch in the Japanese labour market increased in 2020 compared to previous years as a result of reduced mobility.

A report commissioned by the European Labour Agency, analysing information on labour shortages and surpluses across 30 European countries, finds that the occupations that were cited most often as shortage occupations were in four areas: healthcare, software, construction and engineering (accounting for 21 of 28 listed shortage occupations) (McGrath 2021). Most of the software and healthcare occupations were also listed in a second ranking of the most "severe" shortages in the surveyed countries. When comparing surplus and shortage occupations to check whether increased cross-border mobility could ease some of these tight labour markets, it became apparent that only 12 of the 28 shortage occupations were listed as surpluses elsewhere, and the other 16 included all the software and healthcare occupations with labour shortages. The results suggest that, while Europe could benefit from increased worker mobility, the potential to alleviate shortages on a broad scale is limited. The impact of the pandemic is most visible in healthcare occupations, where shortages appear more often than in previous reports. In contrast, software occupations showed strong employment growth throughout the pandemic.

Intra-EU mobility is not likely to be able to significantly reduce labour shortages across EU countries, according to the European Commission (EC 2023a). The occupations with the highest shares of movers within the EU require low-to-medium skills (such as cleaners and helpers), probably because the language barriers that exist between European States are less prone to impede employment in these areas. On the other hand, the highest growth rates in employment and the highest vacancy rates at EU level were recorded for professionals, especially in the ICT sector. According to the report, given the current levels and structure of intra-EU labour mobility, cross-border movements are not sizeable enough to substantially counter existing shortages, especially in higher-skilled occupations. In addition, the migratory flows that do exist can worsen shortages in the countries of origin in the more widespread shortage occupations, for example in the Slovakian and Hungarian health sectors (EURES 2022).

EURES (2022) presents detailed information on regional imbalances and shortage occupations in Europe. The report shows that, even within some countries, a lack of labour mobility prevents labour imbalances being corrected. In theory, workers moving from economically less developed areas to more productive ones could alleviate shortages in the latter. In Eastern Europe, some reasons for this lack of mobility are the culture of staying in the local area and difficulties in engaging in upskilling and training in less developed areas. In Scandinavia, in contrast, it is the mobility of young workers moving towards the southern, more populated areas that drives some of the shortages in the northern parts of Norway and Sweden.

Economic development and attractiveness to potential movers differ greatly by geographical area. In Europe, intra-EU mobility patterns show increasing polarization as workers flock to already economically thriving areas, leaving more structurally disadvantaged areas behind. This further decreases the ability of these latter areas to catch up and attract much needed workers in shortage occupations (ESPON 2019). Other ongoing trends will affect regions asymmetrically and are likely to create some geographical mismatch. Pending structural reforms pertaining to climate change and decarbonization efforts may require – in addition to reskilling and training – increased efforts to strengthen mobility of workers. Looking at the geographical dispersion of labour supply and demand for green jobs in the Republic of Korea, Song et al. (2021) find that there are significant regional imbalances, especially between the Seoul metropolitan area and other regions. EURES (2022) finds similar imbalances in Sweden, as the thriving green industry in the north requires more mechanical engineers than are currently available.

Although few studies on recent changes in geographical mismatch exist, those that are available suggest that some of the labour shortages prevailing across advanced economies are widespread and sometimes too similar in nature across high-income countries to be entirely levelled out by geographical mobility within these entities. The challenge for policymakers will be to provide detailed forecasts of labour demand and to incorporate policies on labour mobility into national efforts to satisfy this demand. Considering the vast labour needs and the limited potential and sometimes willingness to move within geographical areas to significantly counter these shortages, it is likely that such policies will include international migration from countries with growing working-age populations (see section 3.1.5).

Preferences and working conditions

In addition to the aforementioned factors, employers may face a reduced pool of talent in their sector due to behavioural changes among the potential labour force. Ebbers (2022) cites a shift in workers' expectations as one of the factors exacerbating global labour shortages. This may concern workers' attitudes towards working conditions or pay, or changes in generational preferences. Indeed, tight labour markets have the potential to allow workers to regain some negotiating power regarding working conditions and pay. Such an increase in the reservation wage is potentially welfare-improving.

Causa et al. (2022) take stock of quit rates in 2021 across OECD economies and see increases compared to 2019 in all but four OECD Member States. In addition to cyclical factors that may enhance workers' bargaining power to negotiate working conditions in a tight labour market, the authors see structural factors at work. Worker's preferences may have changed, especially in low-quality jobs with poor working conditions and low pay, as evidence from the United States suggests, where rises in quit rates were highest in low-pay sectors (Causa et al. 2022, 18).

This view is also supported by evidence from the United States and the United Kingdom presented by Pizzinelli and Shibata (2023), who observe higher rises in vacancies in low-skilled occupations, while these also experienced the sharpest declines during the pandemic. In the first half of 2021, low-skilled jobs saw higher wage growth rates than medium- and high-skilled jobs. Indeed, data show that the highest proportional rise in vacancies was observed for jobs with lower pay and precarious working conditions (such as truck drivers, cleaners, food industry workers and warehouse workers) in both countries. In the United States, quit rates were higher in low- and medium-skilled jobs than in high-skilled ones, indicating a change in behaviour. Seeing this sharp decline in supply and rise in demand for low-skilled labour suggests that this factor indeed contributes to labour shortages in low-pay sectors.

Reich (2023), addressing the lamented labour shortages among American businesses, also argues that, rather than a shortage of labour, there is a shortage of jobs paid well enough for workers to be willing to fill them, and refers to continuously declining real wages as the cost of living rises.

Discussing labour shortages in Germany, the economist Simon Jäger has argued that these shortages are merely a sign that the laws of supply and demand are at work: workers are not willing to work in certain sectors at current wage levels, which reduces the supply of labour, and employers could largely resolve the professed shortages by increasing salaries and improving working conditions (Bartel 2023). He argues that there is potential to reduce unfulfilled demand for labour: as real wages have declined, care workers (for instance) – who are in particularly short supply – have expressed willingness to return to the care sector if working conditions were significantly improved. In essence, an inefficient allocation of resources – workers and salaries – caused by information asymmetries and policy decisions prevents workers from moving to their most productive use, amounting to mismatch.

Zwysen (2023) offers similar arguments. He presents evidence from the EU Labour Force Survey that labour shortages have increased more in sectors with lower pay and worse job quality.[21] Sectors with larger increases in shortages also have higher shares of young, less educated and migrant workers. According to this line of argument, the observed current labour shortage – while also stemming from structural factors and permanent societal changes – may "turn out to be a shortage of people willing to work strenuous and badly remunerated jobs" (Zwysen 2023, 6).

The ability to pay higher wages and improve working conditions is also tied to firm performance. Higher-performing firms in terms of profitability also tend to perform better with respect to employee wellbeing (De Neve, Kaats and Ward 2023). This implies, conversely, that firms with worse working conditions tend to be the less profitable ones.

Recent numbers on wage growth in the United States show that wages have started to rise in sectors more strongly affected by labour shortages, especially in the hospitality sector. However, real wages across OECD countries decreased in 2023 compared to the previous year (OECD 2023).

Working conditions play an important role in filling jobs, especially in a tight labour market. Having many workers of the baby boomer generation leave for retirement also shifts the focus onto the generation moving into the labour market. Younger workers tend to prefer more flexible working arrangements with respect to working time and place, as is illustrated by a survey conducted by Deloitte among millennials and members of so-called Generation Z (Deloitte 2023).[22] In choosing an employer, respondents stated that work–life balance was a top priority. Illustrating the impact of these preferences on labour market decisions, the survey finds that, among those who currently work in hybrid or remote roles, three quarters would consider looking for a new employer if their current one required them to come to the office full-time. The discussion of vacancy rates at the sectoral level in Germany (section 2.1.2) also shows that it is often the preferences of young people that create shortages, for example in retail, construction and the hospitality sector.

Changes in consumer demand

Consumers were forced to drastically change their behaviour in 2020. Containment policies intended to restrict the spread of COVID-19 caused a shift from offline to online shopping, while the absence of commuters and white-collar workers in city centres reduced consumption in service industries in urban areas. Work-from-home measures increased spending in areas outside city centres, and this change has not reverted after pandemic measures were lifted, suggesting permanently altered patterns of consumption (Alipour et al. 2022). This has implications not only for offline businesses in the retail and service sectors, but incidentally also for city planners.

In the case of the United States, Levanon and Sigelman (2022) see much of the structural change in the world of work, and the jobs that are available, in permanent changes in consumer and business behaviour. They use online job postings (Emsi Burning Glass data) from the United States to observe changes in demand in different business areas and find four main structural trends. First, business travel saw a sudden halt in 2020 and is unlikely to fully recover as firms reduce business travel to a strict minimum, affecting the hospitality industry (hotels, conference services) and transport industry (railway, bus, travel booking). Second, online shopping has skyrocketed since the pandemic and continues to dampen in-person shopping, shifting employment from retail to e-commerce. Third, remote work is, at least in hybrid forms, here to stay and affects local service industries (commercial real estate, restaurants, dry cleaning, etc.). Finally, the

[21] Job quality is measured as incidence of involuntary part-time and temporary contracts; working evenings, nights, weekends and shifts; having no control over order or content of work; working under high pressure; and being required to work flexibly.

[22] The survey was conducted among 22,856 individuals born between 1983 and 2004 in 44 countries; it does not claim representativeness with respect to any territory or age group. As defined in the survey, millennials are those born between 1983 and 1994; members of Generation Z between 1995 and 2004.

authors cite a further growth in digital modes of interaction, which causes employment to grow in areas such as software and online publishing, but decreases labour demand in others, including traditional media and market research (Levanon and Sigelman 2022, 2).

▶ Conclusion

While vacancy data show the first signs of relief after a great surge following the pandemic plunge, many studies predict labour shortages to be a long-term problem across the globe. It is likely that these shortages will remain prevalent over the medium and long term if structural causes are not appropriately addressed. Indeed, national economic policies aimed at fighting pandemic-induced job losses have sustained the demand for labour, and the phasing-out of these recovery programmes, as well as high inflation rates, might take heat off the market. When it comes to long-term global labour shortages, most studies find that the main culprits are population ageing and a changing world of work.

The reasons for labour shortages could theoretically stem from both the demand and the supply sides. On the one hand, firms look for different and changing types of candidates and skill sets in light of technological change, structural change in the context of decarbonization and digitalization, and/or changing consumer demand. On the other hand, labour force participation has changed, at least temporarily, in certain groups, especially women, migrants, older people and low-skilled workers. More recent trends, triggered and/or intensified by the COVID-19 crisis, are not yet widely understood for many countries – for example, apart from the United States and the United Kingdom, there is a lack of studies on the effect of long COVID on the labour force. This effect could act on both the extensive and the intensive margins. Mean weekly hours actually worked are down in many countries, particularly in a subset of sectors beset by shortages. In addition, mean hours worked have diverged from total hours worked, which typically happens during recoveries but might, in this instance, contribute to intensifying shortages.

Overall, labour force participation has recovered in the countries presented in section 2.2. In some countries, participation rates observed in 2022 and 2023 even exceed those before 2020, with some remaining pockets of reduced participation. At the intensive margin, mean hours actually worked per week are lower than before the crisis in a number of countries, especially in sectors where labour shortages prevail. Changes in migration patterns have also had an impact on labour supply and should be considered when formulating policies addressing labour shortages. In Germany, for example, sustained shortages of skilled workers are looming unless targeted migration policies ensure the availability of workers from abroad. Overall, the extent to which different socioeconomic groups were differently affected by the pandemic has illustrated how the smooth functioning of entire labour markets hinges on the participation of these groups.

According to several studies, skills mismatch increased temporarily across advanced economies during the pandemic, but mostly receded as economies recovered. However, the often-cited long-term megatrends – population ageing and technological change – are creating shifts in skills needs that are currently not sufficiently addressed by educational and migration policies. Independently of the impact of the pandemic, geographical mismatch hinders the efficient allocation of workers to jobs, on account of cultural barriers and lower worker mobility as societies age.

Lastly, how will changing preferences shape the world of work? While some of the observed behaviour with respect to salary, job changes, part-time work and work–life balance appear to be cyclical and to stem from shifting negotiating power in tight labour markets, there seem to be other, longer-term changes at work as well. For instance, if they can, younger workers opt for higher education and tend to steer clear of sectors where working conditions are arduous.

These observations suggest avenues for future research on factors driving labour shortages and the policies addressing them. First, although many of the pandemic-induced setbacks appear to have been overcome and fluctuations ironed out, further research is needed to better understand the long-term impacts on labour market outcomes of seemingly temporary developments such as unemployment spells, withdrawal from the labour force and mismatch. The scope of research should also expand to cover more countries as far as the data allow. Second, the strong impact the pandemic had on already disadvantaged groups could be an opportunity

for policymakers to find ways to support improvements in working conditions and increase the gender balance in strongly gender-segregated sectors. Third, and finally, high vacancy rates and labour shortages may remain an abiding phenomenon for years to come, with – broadly speaking – shrinking populations in advanced economies and expanding ones in many developing economies. Countries will need to explore the development of more streamlined migration policies to ensure that current wealth levels can be maintained. To do this, there is a need for better data to predict labour demand by sector and occupation, and to inform education and migration policies, in both receiving and sending countries.

Policies to address labour and skills shortages could and should explore different angles. First, economies should exploit the unused potential of workers, including women, older workers and migrants, who are willing to work (more) if conditions allow. This entails facilitating access to flexible and affordable childcare to enable parents to participate in the labour market at higher rates. It is also necessary that employers should consider the rigid requirements imposed on candidates, which might move away from diplomas towards competences and skills. In occupations and sectors where working conditions and wages drive workers away from available jobs, an improvement in these areas could significantly increase candidate pools. Lastly, the allocation of suitable candidates to appropriate and decent jobs requires some degree of mobility, which tends to be lower when housing costs are rising or subject to uncertainty, but also among older workers who represent a rising share of the labour force.

Appendix I. Indeed Hiring Lab sector and occupations

1	Accounting	**21**	Hospitality and tourism	**41**	Personal care and home health
2	Administrative assistance	**22**	Human resources	**42**	Pharmacy
3	Agriculture and forestry	**23**	IT operations and helpdesk	**43**	Physicians and surgeons
4	Architecture	**24**	Industrial engineering	**44**	Production and manufacturing
5	Arts and entertainment	**25**	Information design and documentation	**45**	Project management
6	Aviation	**26**	Installation and maintenance	**46**	Real estate
7	Banking and finance	**27**	Insurance	**47**	Retail
8	Beauty and wellness	**28**	Legal	**48**	Sales
9	Chemical engineering	**29**	Loading and stocking	**49**	Scientific research and development
10	Childcare	**30**	Logistic support	**50**	Security and public safety
11	Civil engineering	**31**	Management	**51**	Social science
12	Cleaning and sanitation	**32**	Marketing	**52**	Software development
13	Community and social service	**33**	Mathematics	**53**	Sports
14	Construction	**34**	Mechanical engineering	**54**	Therapy
15	Customer service	**35**	Media and communications	**55**	Veterinary
16	Dental	**36**	Medical information		
17	Driving	**37**	Medical technician		
18	Education and instruction	**38**	Military		
19	Electrical engineering	**39**	Mining		
20	Food preparation and service	**40**	Nursing		

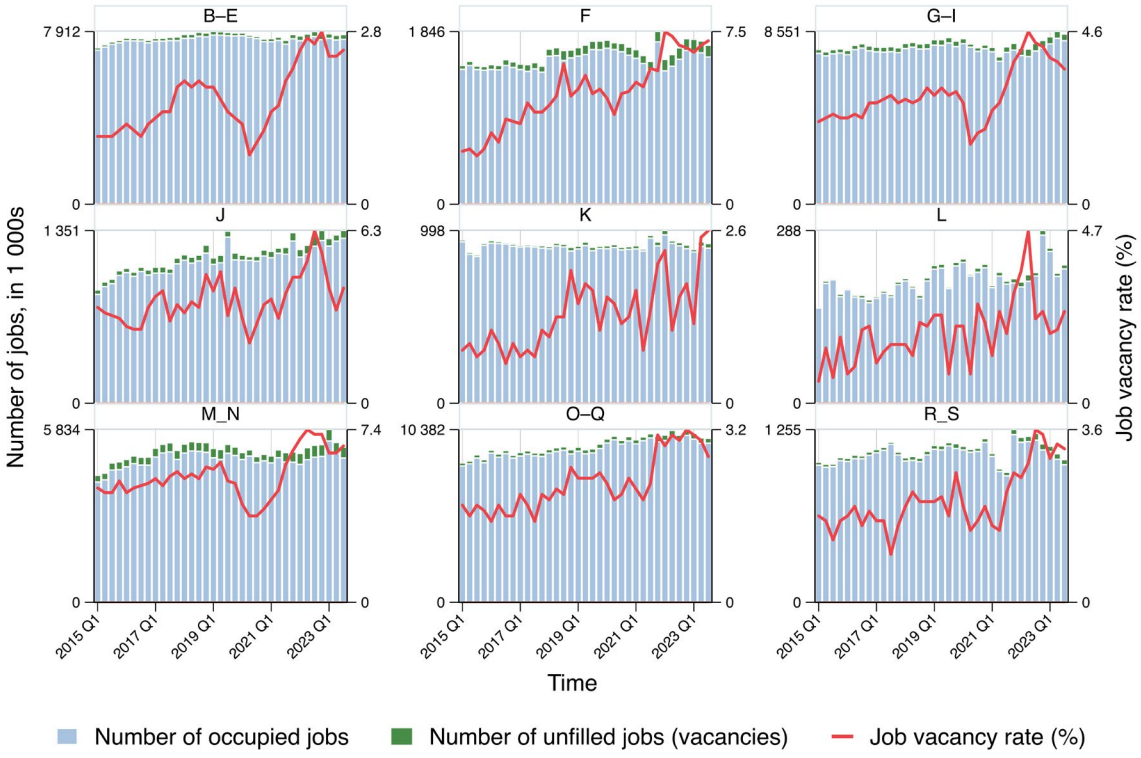
Source: Indeed Hiring Lab.

Appendix II. Vacancies by economic activity in Germany

To illustrate different possible drivers of shortages across sectors, this appendix focuses on the case of Germany. Vacancy data from Eurostat show that vacancies rose in both absolute and relative terms across almost all sectors after 2020 and peaked at some point in 2022 (figure AII.1). In the information and communications technology (ICT) sector (J),[23] the number of both vacant and occupied jobs increased, pointing to demand-driven shortages – partly owing to cyclical demand surges and partly for structural reasons. Demand outpaced supply, and shortages consequently intensified after 2020. In other sectors, the number of jobs stagnated or receded compared to numbers from before the pandemic, while the number of vacancies increased, suggesting that shortages were more supply-driven – firms appeared unable to fill existing jobs, let alone produce meaningful job growth. Throughout 2022, this was the case in the industry sector (B–E) and the wholesale and retail trade, transport, accommodation and food services sector (G–I), although the number of jobs in the latter increased slightly in 2023. In public administration, defence, education, human health and social works activities (O–Q), both a surge in demand and limited supply appear to have driven rising vacancies and shortages.

[23] ICT, in NACE terminology, is information and communication (IC).

▶ **Figure AII.1. Number of vacancies and occupied jobs by economic activity, Germany, 2015–2023**



B–E = Industry (except construction)

F = Construction

G–I = Wholesale and retail trade, transport, accommodation and food service activities

J = Information and communications technology (ICT)

K = Financial and insurance activities

M_N = Professional, scientific and technical activities; administrative and support service activities

O-Q = Public administration, defence, education, human health and social work activities

R_S = Arts, entertainment and recreation; other service activities

Note: Seasonally adjusted, not calendar-adjusted, data. Sector definitions (aggregated) derived from NACE (Statistical Classification of Economic Activities in the European Community).

Source: Eurostat, author's calculations.

Rising demand: Technological change and shifts in skill requirements in the ICT sector

The number of occupied jobs in the ICT sector grew by about 50 per cent between 2015 and 2023 but was not able to transform the totality of vacancies into jobs (see figure AII.2). The pandemic has further fomented ongoing digitalization efforts and accelerated structural shifts in the economy, such as shifting consumer demand away from physical shops towards e-commerce. Other digital advances such as the Internet of Things (IoT), big data and artificial intelligence (AI) have created further rifts between market demand and available skills. As firms in this sector tend to be highly productive and pay comparatively high wages, shortages are likely to be the result of skills and educational mismatch and not, prima facie, a missing incentive in terms of pay. Research by Burstedde (2023) confirms that labour shortages in Germany are especially pronounced in the ICT sector and occupations related to digitalization. Employment growth in the observed occupations has been significant over the past decade, especially in expert-level ICT jobs. At the same time, employment growth was below its potential as a consequence of recruiters' inability to find candidates, particularly in digital electrical and electronic occupations, which require mid-level training.[24] The author predicts that, assuming that pre-2020 trends continue, the shortage in occupations linked to digitalization could reach over 100,000 unfilled vacancies by 2026.Limited labour supply: Departure of staff and lack of young talent in hospitality and retail

Limited labour supply: Departure of staff and lack of young talent in hospitality and retail

In trade, transport, accommodation and food services (G–I), the number of occupied jobs declined or stagnated, while vacancies were on the rise. The number of occupied jobs only recently started to rise towards levels seen before 2020, although the number of vacancies has been consistently high since 2021. Some of these subsectors fell victim to the health measures imposed throughout the pandemic, such as restricted travel and limited access to restaurants and retail shops. These closures and uncertainty throughout the pandemic pushed workers out of the hospitality industry: the net flow was almost –100,000 in 2020.[25] Of those who switched sector and left hospitality, the highest number – around 35,000 – ended up in retail (Jansen and Risius 2022). It appears that many of these flows were permanent: employment in food services was still below pre-pandemic levels in 2022. The reduction disproportionately affected marginal employment (Destatis 2023a). The likely culprits of this exodus were uncertainty, working nights and weekend shifts, low pay, and potential health risks due to the contact-intensive nature of the work. In other words, this shortage is most likely driven by a shift of labour supply away from hospitality. As for the retail sector, employment recovered from its 2020 trough but failed to attract sufficient applicants to fill open positions. Again, current working conditions and low pay tend to deter young candidates from choosing retail occupations.

Imbalances at work: Demographic change and difficult working conditions in the health sector

In sectors O–Q (public administration, defence, education, human health and social work activities), the health sector represents the majority of workers, with about 6 million employees.[26] Job numbers are about 20 per cent higher than in 2015 but have plateaued since 2020. The health sector faces the challenge of demographic change in two ways: first, there is a growing need for skilled medical and care personnel for an ageing population, leading to an increase in demand for such personnel; and second, an ageing workforce weighs on labour supply in the long run. Difficult working conditions with respect to working hours, understaffing and low pay pose further challenges. Consequently, the number of vacancies has remained elevated since 2021. Indeed, the pandemic highlighted the need for structural reforms and better working conditions,

[24] The share of foreign-born workers in the ICT sector is higher than in the remaining labour market, as is the share of international students in ICT study fields compared to other fields. This highlights the role of migration in recruitment efforts (ILO 2020).

[25] Around half the employees in retail and hospitality are female, and a majority of them work part-time (Bundesagentur für Arbeit 2023).

[26] Data on vacancies are not available at more granular sectoral disaggregation levels after 2017.

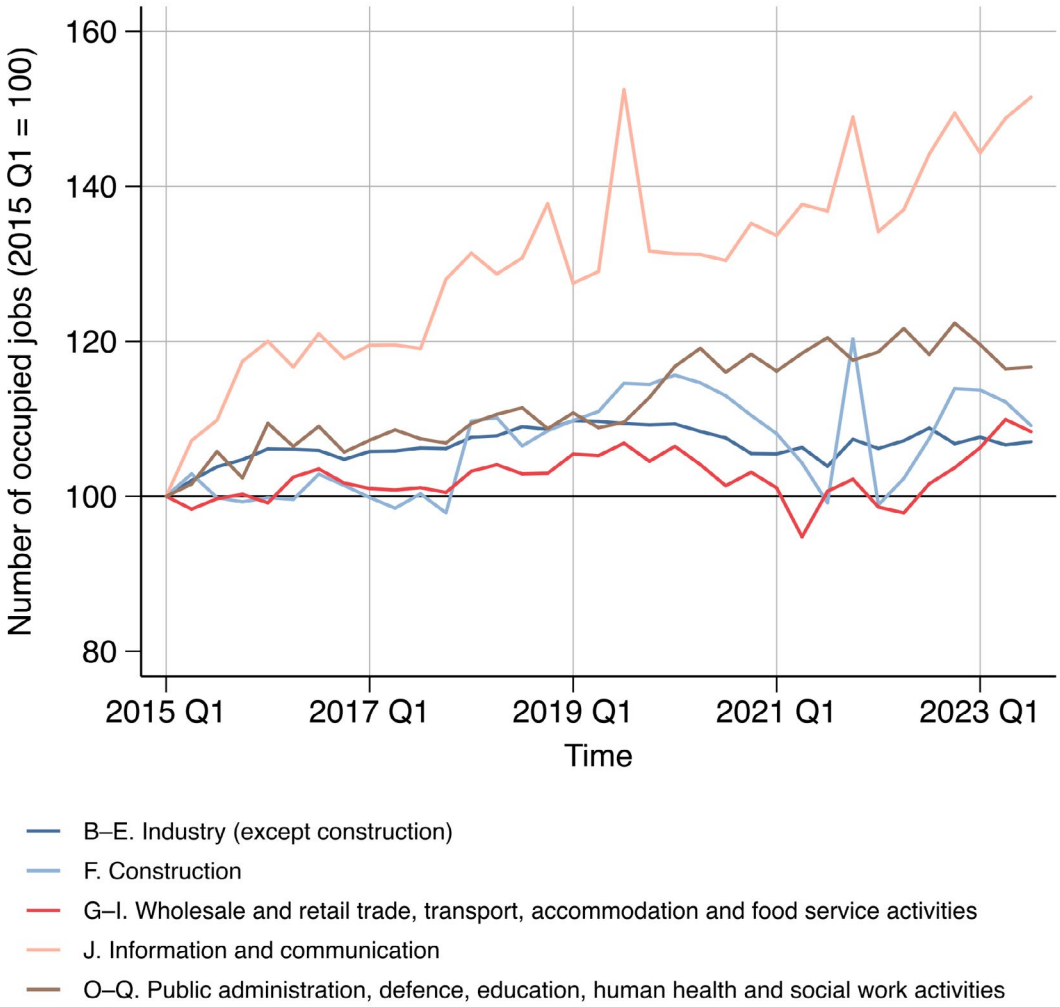
as it further increased workloads and working hours for medical personnel, and thus reduced incentives to join and stay in the health sector. Survey data suggest that improvements in these issues would increase willingness to pursue health occupations (Auffenberg et al. 2022; PwC 2022). Shortages in the health sector are, in sum, the product of increasing demand in the long run and worsening incentives to join the health workforce, suppressing labour supply.

Sustained demand and tough working conditions: Construction

The construction sector fared comparatively well throughout 2020 and quickly returned to its long-term upward trend in employment, propped up by the post-COVID fiscal stimulus and, at least until 2022, low building and loan interest rates. At 8.7 per cent in 2022 Q1, the share of unfilled jobs in construction reached the highest observed vacancy rate across sectors. More recently, higher interest rates and energy prices and fears of rising labour costs have had a cooling effect on the sector. Still, as many as 70 per cent of surveyed construction firms see labour shortages as a major risk to their business development (DIHK 2023). In 2023 Q2, more than 6 per cent of construction jobs remained unfilled. The sector faces difficulties attracting young talent, as working conditions are comparatively tough and a growing portion of young cohorts opt for higher education rather than apprenticeships in construction. Although there is potential for further automation and wage raises in the construction sector in the face of labour shortages, upward of 80 per cent of firms have less than 10 employees and might not be able to bear this additional investment (Eurostat 2023a).[27] The outlook for firms is mixed, as private housing loans recede with rising interest rates, while civil engineering firms are slightly more optimistic, counting on public infrastructure projects related to climate and energy policies linked to the green transition (DIHK 2023).

[27] The construction sector registered 17.3 per cent of total business insolvencies (sectors A–S) in Germany between January and May 2023 (Destatis 2023b). In comparison, only 11.3 per cent of total registered firms (sectors B–S, excluding public administration, defence and social security) and 5 per cent of dependent employees were active in the construction sector in 2021 (Destatis 2022).

▶ **Figure AII.2. Indexed number of occupied jobs in selected economic activities, Germany, 2015–2023**



Note: Index – 2015 Q1 = 100.

Source: Eurostat, author's calculations.

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