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European Labor Markets and the COVID-19 Pandemic

Fallout and the Path Ahead

Prepared by Sakai Ando, Ravi Balakrishnan, Bertrand Gruss, Jean-Jacques Hallaert, La-Bhus Fah Jirasavetakul, Koralai Kirabaeva, Nir Klein, Ana Lariau, Lucy Qian Liu, Davide Malacrino, Haonan Qu, and Alexandra Solovyeva

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Executive Summary

In 2020, the COVID-19 pandemic caused by far the largest shock to European economies since World War II. Yet astonishingly, the EU unemployment rate had already declined to a record low by December 2021, and in some countries the labor force participation rate is at a record high. This departmental paper documents that the widespread use of job retention schemes (JRSs) has played an essential role in mitigating the pandemic's impact on labor markets and thereby facilitating the restart of European economies after the initial lockdowns. Nonetheless, it also highlights the daunting labor market challenges in the post-pandemic era, many of which are legacies from pre-pandemic days, including major structural changes that the pandemic has simply accentuated. Unless these are addressed, major job losses relative to a pre-pandemic baseline may well materialize. That said, European labor markets will likely exit the pandemic in much better shape than following previous recessions, providing policymakers a potentially crucial head start in navigating the structural transformations that lie ahead and in making sure nobody gets left behind. This opportunity should not be wasted.

A rapid and forceful policy response at both EU and national levels prevented labor market outcomes being much worse than initially feared. Indeed, the analysis in this paper suggests that the unemployment response to the historic pandemic-induced fall in activity was much more muted than previous economic cycles would have suggested. In addition to other policy support, this largely reflects the widespread use of JRSs that is estimated to have mitigated the rise in the euro area unemployment rate in 2020 by 2½ percentage points, keeping about 4 million workers in their jobs.

More recently, as activity has recovered, labor market conditions have improved remarkably, albeit with a high degree of heterogeneity across countries. This turnaround has been much more rapid than following the global financial crisis (GFC) and European sovereign debt crisis. Nonetheless, concerns about important labor market scarring remain in specific sectors. Contact-intensive services have been disproportionately affected, and workers in these sectors, who tend to be low-skilled, young, with temporary employment arrangements have been hit harder, potentially exacerbating underlying inequality trends. Underemployment also remains elevated in some countries. Importantly and in large part reflecting the unknowns surrounding the pandemic's dynamics and legacies—as the recent emergence of the Omicron variant clearly underscores—the outlook for European labor markets is subject to a high degree of uncertainty, posing significant challenges to policymakers.

Looking ahead, as policy support measures are further phased out and firms adjust their operations to the post-pandemic era, some workers may be laid off, potentially creating limited near-term upward pressures on unemployment rates. Having said that, the recent unwinding of JRSs in some countries (for example, the United Kingdom) has not translated into higher unemployment rates so far, likely reflecting strong labor demand. But to the extent that it also reflects reversable transitions into inactivity and lags given notice periods, some unemployment pressures may merely be delayed.

Thinking longer term, our simulations demonstrate that the pandemic is likely to have further accentuated precrisis trends—including from digitalization, automation, and climate change policies—which were already expected to result in significant reallocation of workers across sectors and occupations. Under a pre-pandemic baseline, about 5 million jobs would have been created over the next 10 years in the largest four euro area countries, with the pandemic reducing this by up to 1½ million.

Taking all this together, there are three key policy areas to focus on: adjusting JRSs, facilitating job-to-job transitions, and minimizing scarring, and protecting the most vulnerable. Specifically:

- *Adjusting JRSs*. As the direct effect of the pandemic and containment measures on economic activity fades, countries should normalize the generosity of short -time work schemes (STWs) to precrisis standards and phase out wage subsidies. Remaining sector-specific support should be determined by health-related indicators and restrictions, with continued eligibility to generous STW conditions and access to wage subsidies increasingly restricted to sectors that are still facing temporary and significant revenue losses. Support through JRSs should become time-limited in all circumstances, with clear maximum duration limits linked to the normalization of the sanitary situation. Once the crisis is over and working hours normalize, countries that intend to maintain STWs as part of their regular policy toolkit should consider adopting experience rating schemes to avoid excessive use in some sectors and associated cross-subsidies.

- *Facilitating job-to-job transitions*. As always, high degrees of labor and product market flexibility and sound macroeconomic policies are essential to facilitating reallocation. Temporary and targeted hiring subsidies and wage-loss insurance could pave the way for job creation given lingering uncertainty among potential employers. Subsidies can also be used to incentivize workers to move to other areas with better labor prospects, addressing a well-documented information failure. Although challenging given previous experiences, policies should seek to address the likely rise in skill-mismatches by ensuring efficient reskilling and upskilling of the workforce, with a strong focus on digital skills.

- *Minimizing scarring and protecting the most vulnerable*. Providing educational and vocational programs to those who may find it difficult to transition to new jobs or enter the labor market would help them meet changing labor market demand. Moreover, the pandemic has shone a bright light on fault lines in social safety nets and social protection institutions. Ensuring that these adequately cover the vulnerable—young, temporary, low-skilled, and gig/independent workers—is critical.

Glossary

AEs	Advanced Economies
ALMP	Active Labor Market Policies
BLS	US Bureau of Labor Statistics
EA4	Euro area largest four economies (France, Germany, Spain, and Italy)
EEs	Emerging Economies
EPL	Employment Protection Legislation
CEDEFOP	European Centre for the Development of Vocational Training
FTE	Full-Time Employment
GFC	Global Financial Crisis
GVA	Gross Value Added
HS	Hiring Subsidies
ICT	Information, Communication and Technology
JRS	Job Retention Scheme
PPP	Paycheck Protection Program
SURE	Support To Mitigate Unemployment Risks in Emergency
STWs	Short-Time Work Schemes
UB	Unemployment Benefits
WSs	Wage Subsidies

1. Introduction and Conclusions

The initial phase of the COVID-19 pandemic resulted in extraordinary labor market dislocations and hardship across Europe, and the subsequent labor market turnaround has been incredibly strong and quick. The pandemic shock—a unique combination of global supply and demand shocks—generated widespread economic disruptions with a devastating human toll. Several waves of infections forced policymakers to impose mobility restrictions to protect lives, curbing economic activity and amplifying pre-existing vulnerabilities. Together with adverse confidence effects and exceptional uncertainty, the repeated lockdowns resulted in a sharp economic contraction—far exceeding that of the GFC—and consequently a significant deterioration in labor markets across Europe. More recently, labor market conditions have improved remarkably rapidly compared to previous economic cycles, with the EU unemployment rate declining to a record low in December 2021, albeit with a high degree of heterogeneity across countries. Labor force participation and employment rates are also at record highs in some countries. In terms of hours worked, EU labor markets have yet to fully recover with total hours worked in 2021Q3 remaining about 1 percentage point below the end-2019 level, and inactivity—although gradually declining—remains above its precrisis trend.

This departmental paper aims to assess the impact of the pandemic and policy responses on European labor markets and provide policy recommendations for the challenges ahead. It presents an overview of labor market developments in European countries since the onset of the pandemic and discusses the role of adopted policies during the peak of the crisis and the recovery period. In addition, the paper analyzes how sectoral and demographic differences have contributed to the heterogeneous labor market outcomes across sectors and countries, and how they may result in different recovery paths going forward. To develop recommendations on the appropriate mix and phasing of labor market policies depending on country circumstances, the paper examines the experience from previous pandemics, analyzes labor market recovery scenarios, and estimates the pandemic-induced potential reallocation needs for selected European countries.

Rapid and massive policy responses at both EU and national levels have cushioned the pandemic's impact on unemployment despite the historic output contraction. To avoid a massive increase in unemployment and protect jobs, EU countries introduced JRSs or expanded existing ones, using in part EU funds that were mobilized through the temporary Support to Mitigate Unemployment Risks in Emergency (SURE) instrument. The design and coverage of JRSs varied significantly across countries, with the estimated number of participants in France, Germany, Italy, and Spain—which account for more than three-quarters of euro area JRSs take up—surpassing 20 million at the peak of the crisis in April 2020. As a result, job shedding was contained to about the same as in the GFC, despite a much sharper decline in economic activity. Absent the widespread coverage of JRSs, euro area unemployment is estimated to have peaked to about 10½ percent in 2020, more than 2½ percentage points higher than actual outturn. However, total hours worked (the "intensive margin") declined at the sharpest rates on record, reflecting a strong decline in average hours per worker.

The pandemic's impact has been highly uneven across countries, sectors, and population groups. COVID-19's impact on output varied significantly across European countries given different initial conditions, policy support, and underlying growth, among other factors (IMF 2021d). Contact-intensive services were more affected given heightened pandemic-related health concerns and relatively slower adaptation of activity to the virus. Workers in such sectors—who account for nearly one-third of total employment and tend to be low-skilled and young, with temporary employment arrangements—were hence hit harder.[1] Indeed, the

[1] See Chapter 1 in IMF (2020b).

unemployment rate among these population groups has increased disproportionately, suggesting that they may be subject to sizable reallocation, especially if changes in consumer preferences and firm work practices persist.

More recently, labor markets have recovered surprisingly rapidly, as vaccination levels have risen markedly and mobility has normalized. Vaccination has been effective in containing hospitalization and mortality rates and in lifting mobility, despite the spread of more transmissible variants. Domestic and external demand have started to recover as consumer and business confidence has improved, and contact-intensive services have started adapting to the "new normal," making the activity less sensitive to lingering containment measures and social distancing. With still sizable policy support, the EU unemployment rate has declined to a record low and vacancies have recovered fast. The tightening of labor market conditions has pulled people out of inactivity, increasing the EU labor force participation rate to a record-high level. However, underemployment remains elevated in some countries and despite total hours worked having yet to fully recover, labor shortages in various industries have emerged. The latter likely reflects worsening skill mismatches triggered by the pandemic, a slow matching process, a possible shift in workers' preferences, limited cross-border worker flows, and prolonged use of JRSs that may reduce incentives for job search.

JRSs have been highly effective in mitigating job losses, but modest near-term upward pressures on unemployment could emerge as they are phased out. Using Okun's law estimates, the analysis suggests that the response of the unemployment rate to the fall in activity during the pandemic was much more muted than the historical relation would have suggested, largely reflecting the expansion of JRS. At the sectoral level, the fall in total hours worked was much greater in the hardest-hit sectors, such as trade, transportation, and hospitality. Going forward, as policy support measures are phased out and firms adjust their operations to the post-pandemic era, some workers may be laid off. This, together with a continued increase of labor force participation in some countries, could create limited near-term upward pressures on unemployment rates. It should be noted, however, that the recent unwinding of JRSs in some countries (for example, the United Kingdom) has not translated into higher unemployment rates so far, likely reflecting both strong labor demand, transitions into inactivity (with some older workers retiring early), and potentially important lags given notice periods.

As the recovery advances, the guiding principle should be to continue scaling back JRSs toward precrisis standards. The pandemic induced a temporary—albeit prolonged and differentiated—shock to firms' revenue that justified the increase in the generosity and sectoral coverage of existing JRSs and the introduction of new schemes. As the direct effect of the pandemic and containment measures on economic activity fades, countries should normalize the generosity of STWs to precrisis standards and phase out wage subsidies (WSs), with remaining sector-specific support determined by health-related indicators and restrictions. Continued eligibility to generous STW conditions (for example, large or full share of the cost of unworked hours paid by the government) and access to WS support should be increasingly restricted to sectors that are still facing temporary and significant revenue losses as a direct consequence of ongoing sanitary restrictions. Support through JRSs should become time-limited in all circumstances, with clear maximum duration limits linked to the normalization of the sanitary situation. Once the crisis is over and working hours normalize, countries that intend to maintain STWs as part of their regular policy toolkit should consider adopting experience rating schemes to avoid excessive use in some sectors (for example, related to seasonal work) and associated cross-subsidies.

As significant reallocation over the medium term is expected, facilitating job-to-job transitions is a key policy priority. Our long-term simulations demonstrate that precrisis trends—including from digitalization, automation, and climate change policies—were already expected to result in significant reallocation of workers across sectors and occupations. And while uncertainty remains high, the pandemic is likely to have further accentuated those reallocation needs (for example, employment in information, communication, and technology, and professional services is likely to increase; while employment in trade, transportation,

accommodation, and construction is likely to decline). On a net basis, total pandemic-related job losses in the largest euro area countries are estimated at 1-1½ million by 2030, partly offsetting the significant job gains under the pre-pandemic baseline (5 million, 2018–30). Past experiences suggest that a critical element for successful labor reallocation is minimizing transitions through spells of unemployment or inactivity, especially for lower-skilled workers. High degrees of labor and product market flexibility and sound macroeconomic policies will undoubtedly be important to this. Temporary and targeted hiring subsidies and wage-loss insurance—which would incentivize vulnerable workers to move to occupations and sectors that offer lower pay initially—could pave the way for job creation given lingering uncertainty among potential employers. Subsidies can also be used to incentivize workers to move to other sectors with better labor prospects, addressing a well-documented information failure. Ensuring efficient reskilling and upskilling of the workforce would be essential to address the likely rising skill-mismatch problems and to enhance digital skills, although this may be challenging as previous experiences suggest.

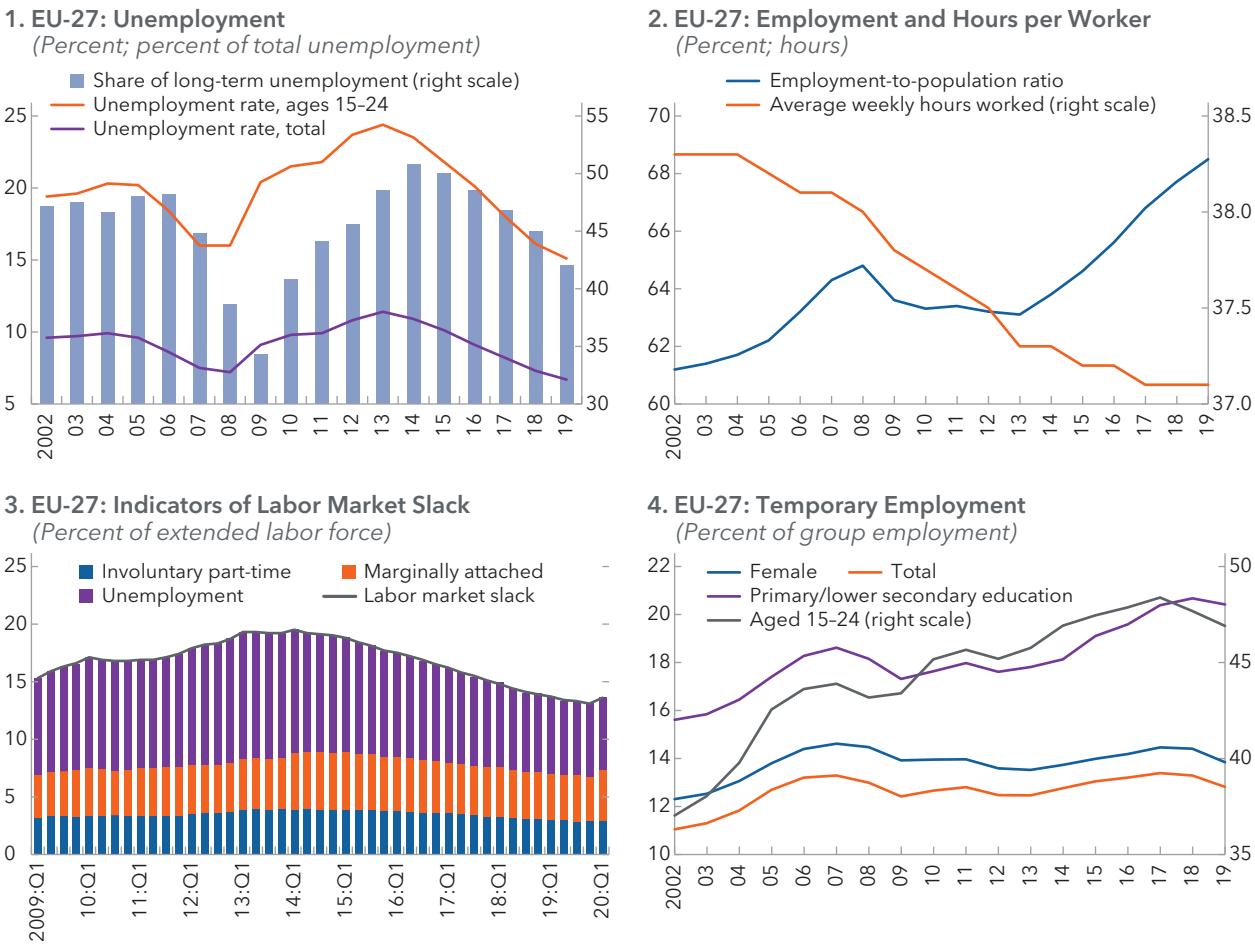
The pandemic has shone a bright light on fault lines in social safety nets and social protection institutions, and these need to be urgently addressed. The ongoing pandemic is also disproportionately affecting low-skilled and young workers, exacerbating underlying inequality trends. Targeted policies will be needed to protect and support the vulnerable, who may find it difficult to transition to new jobs or enter the labor market, including by providing educational and vocational programs that are adapted to the ongoing transitions and post-pandemic labor demand. Moreover, many of the jobs created during the pandemic were for gig or independent workers (for example, on e-commerce, development of digital platforms, delivery riders), who are often excluded from work-related benefits and safety nets available for standard workers. The extent to which this reflects a more persistent change in the structure of employment, safety nets will need to be adjusted accordingly. Indeed, making sure the social safety nets and social protection institutions adequately cover the vulnerable—young, temporary, low-skilled, and gig/independent workers—is critical to making sure nobody is left behind.

The paper is structured as follows. The developments in the European labor market prior to the pandemic are described in Chapter 2. Chapter 3 discusses the impact of the COVID-19 crisis and the recovery so far. Chapters 4 and 5 analyze the main drivers of the differential response of labor market outcomes to the COVID-19 shock across countries and sectors, respectively. Chapter 6 takes stock of the labor market policies adopted to mitigate the effects of the pandemic, with focus on JRSs. Chapter 7 looks at the recovery prospects by presenting unemployment forecasts at the aggregate level and illustrating the potential labor reallocation needs—across sectors and occupations—in the European labor markets as the economies recover. It also examines labor market dynamics following previous pandemics. Chapter 8 discusses the challenges of designing labor market policies in a highly uncertain environment, highlighting policy priorities. Chapter 9 concludes.

2. Pre-Pandemic Landscape

Labor market conditions in Europe improved significantly in the precrisis period and remained tight even during the slowdown of 2018–19 (Figure 1). The economic expansion that followed the sovereign debt crisis was accompanied by strong job growth and falling unemployment across many European countries. The steady decline in unemployment, which was larger in emerging European countries than in most advanced European economies, mainly reflected favorable business cycle conditions and structural factors such as migration and labor market reforms. Youth unemployment rate and the incidence of long-term unemployment declined on average during this period, although by 2019 their levels were still high in some countries (for example, Greece, Italy, Spain). Robust employment growth was facilitated by rising labor force participation—supported by higher education levels and a progressive increase in older workers' participation—but labor underutilization remained significant, with declining hours per worker, and a large number of discouraged workers and involuntary part-timers, particularly in advanced economies (AEs). Following moderate increases in 2013–17, the share of temporary workers in EU-27 declined in 2018–19, though still at high levels in some countries (for example, Portugal, Spain) and population groups (young and with low levels of education).

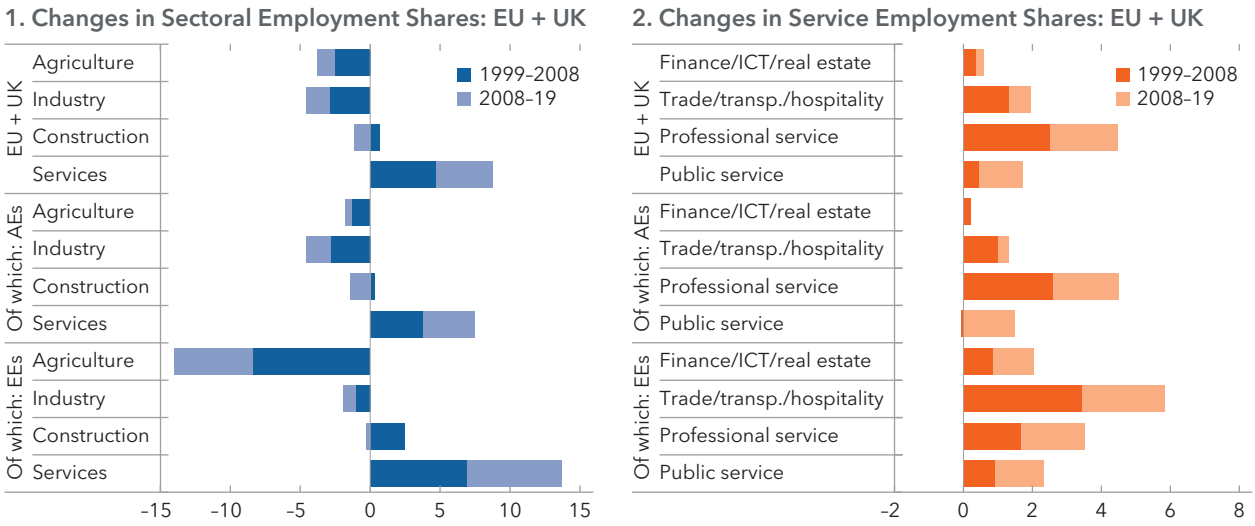
Figure 1. Precrisis Trends in the European Labor Market



Sources: Eurostat; and IMF staff calculations.

Employment growth was largely driven by a sustained expansion of the service sector. This trend reflected both efficiency gains in the industry and agricultural sectors as well as shifts toward high-value-added services (IMF 2018). Over the past two decades, the share of the service sector in total employment has gained nearly 10 percentage points on average across Europe (Figure 2). The increase was larger among emerging economies (EEs) than among AEs, and was primarily driven by trade, hospitality, and public services. For AEs, an additional source of the increase was professional and administrative services, in part, due to an expansion of staffing and other human resource firms.[2] These expanding sub-service activities are relatively more contact-intensive and less teleworkable, increasing vulnerability to COVID-19.

Figure 2. Sectoral Shifts in the European Labor Market, 1999–2019
(Percentage points)



Sources: Eurostat; and IMF staff calculations.

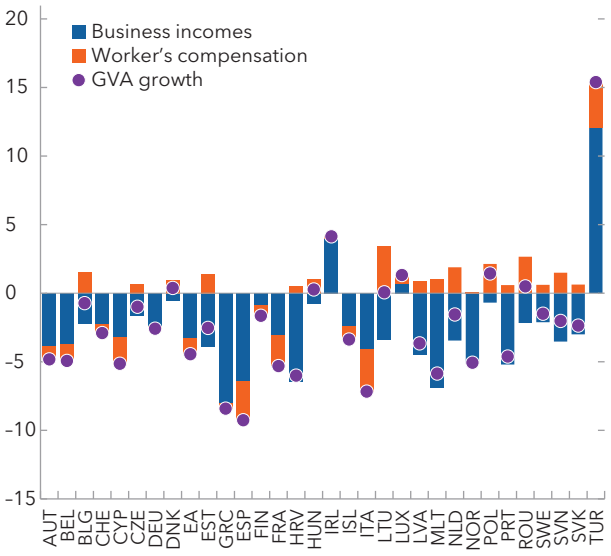
[2] Examples include outsourcing and/or subcontracting companies, employment placement agencies, and temporary staffing agencies. Workers in these companies are counted as employment in professional and administrative services, regardless of the actual activity they perform.

3. Pandemic Impact and Recovery So Far

A. Pandemic's Macroeconomic Impact

The historic pandemic-driven output contraction in 2020 was largely borne by businesses, but workers also absorbed a sizable share of the adjustment. A decomposition of the nominal growth of gross value added (GVA) into its income components for EU-27 countries shows that the 4½ percent contraction in GVA in 2020 was largely driven by a decline in corporate profits—similar to the pattern observed during the GFC. However, the composition of GVA growth in 2020 varied greatly across European countries. For instance, in economies such as Germany and Portugal, the decline in GVA growth was almost entirely absorbed by firms, whereas in countries such as Spain, France, and Italy, the contribution from lower worker compensation was sizable. In the United States, both the compensation of employees and the net operating surplus increased in 2020 but at a slower pace than in 2019.

Figure 3. Decomposition of GVA Growth, Total, 2020
(Percent, year-over-year)

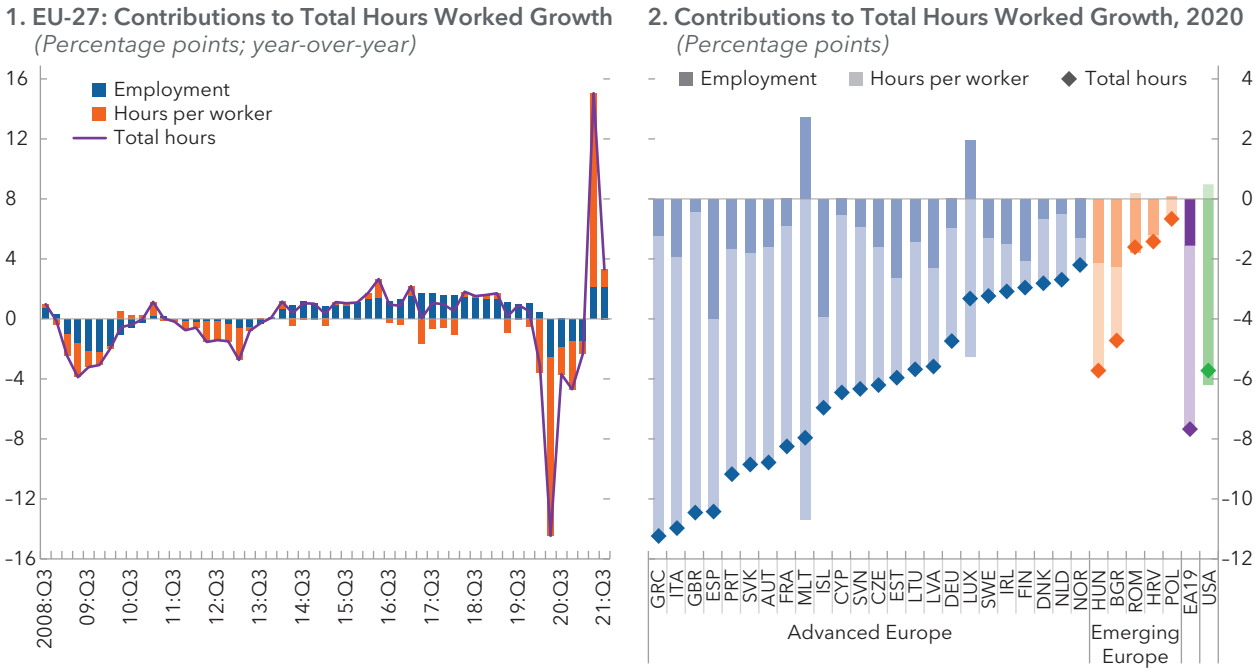


Sources: Eurostat; and IMF staff calculations.
Note: GVA is current price in domestic currency. GVA = gross value added.

While employment declined, most of the adjustment occurred through hours worked per employee. The employment rate in EU-27 went down by nearly 2 percentage points between 2019Q4 and 2020Q2 (see Figure 5), but the adjustment in hours was significantly larger. At the onset of the crisis, total hours worked in the EU-27 declined by nearly 15 percent, which was almost 4 times higher than during the GFC, while the decline in EU-27 employment was about the same as in GFC (3 percent, 2020Q2). At the aggregate level, the fall in total hours worked was mostly explained by a strong decline in average hours per worker, reflecting both supply and demand factors. However, there was large cross-country heterogeneity due to several factors, including the pandemic's intensity, different policy responses, and sectoral composition. For example, some EE countries experienced significant declines in hours per worker, but not as large as those observed in AEs, likely reflecting different policy measures. These developments contrast with those in the United States, where the adjustment was mostly along the extensive margin (Figure 4 and Box 1).

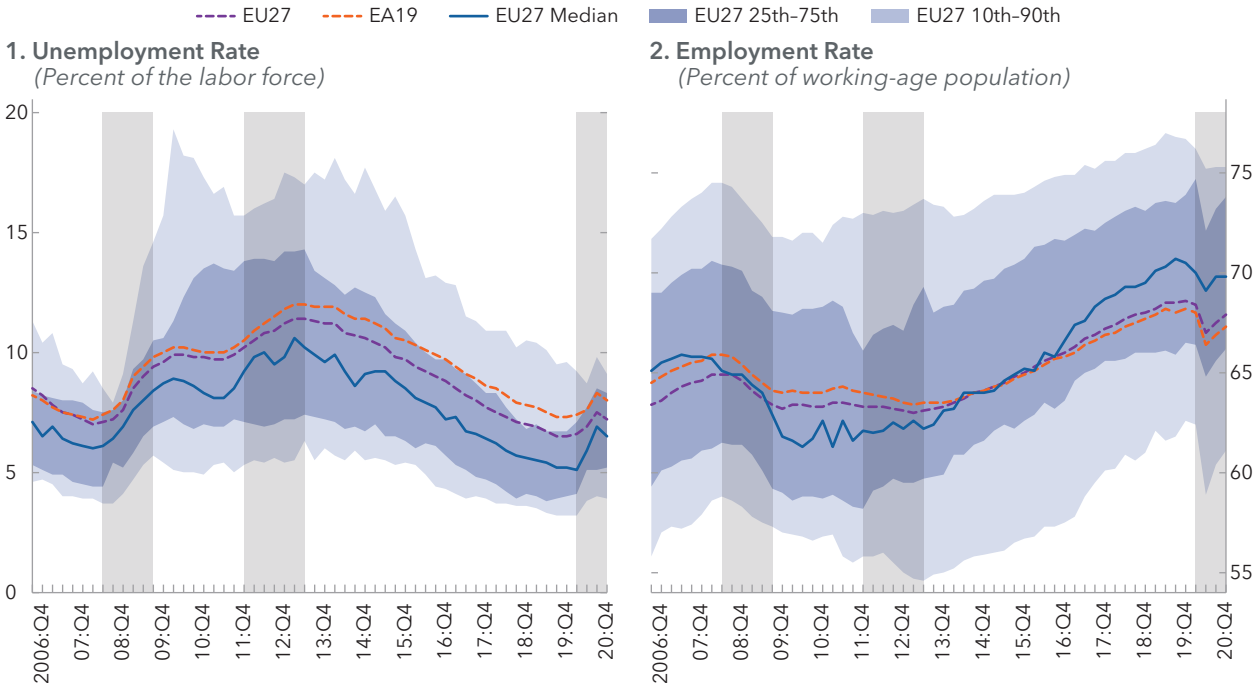
Adjustment via the intensive margin rather than via unemployment was facilitated by a high take-up of JRSs (Chapter 4). To avoid mass layoffs and a surge in unemployment, which would be inefficient in the case of a temporary shock—notably because of the firing and hiring costs and the loss of firm-specific human capital—European countries have resorted to policies encouraging labor hoarding. Some countries imposed a ban on economic layoffs, but most countries relied on policies reducing labor costs, including by reducing social contributions or expanding existing/introducing new JRSs (see Box 2 for definitions of the main labor market instruments). JRSs reduced labor costs by providing firms with a subsidy for their existing jobs. The subsidy can be for hours worked (typically the case under WSs) or unworked STWs. Indeed, while the unemployment rate in EU-27 peaked at 7.8 percent in August 2020 (Figure 5), an augmented measure of unemployment for

Figure 4. Labor Market Adjustment: Extensive and Intensive Margins



Sources: Eurostat; Office for National Statistics; and IMF staff calculations.

Figure 5. Unemployment and Employment Rates

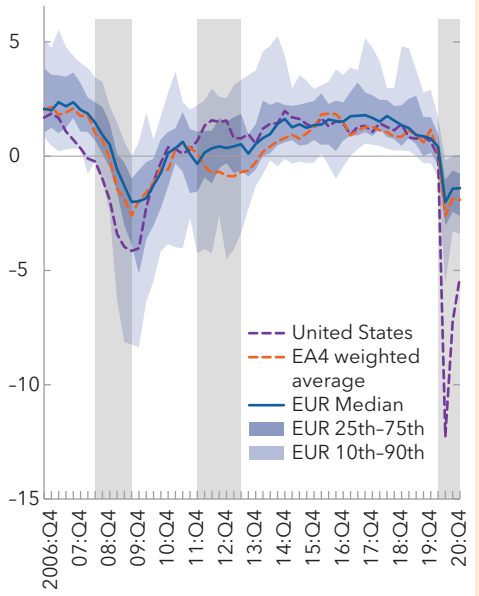


Sources: Eurostat; Centre for Economic Policy Research (CEPR); and IMF staff calculations.
Note: Gray-shaded areas correspond to CEPR-based recessions for euro area business cycles.

Box 1. A Comparison of Dynamics in Advanced Europe versus the United States

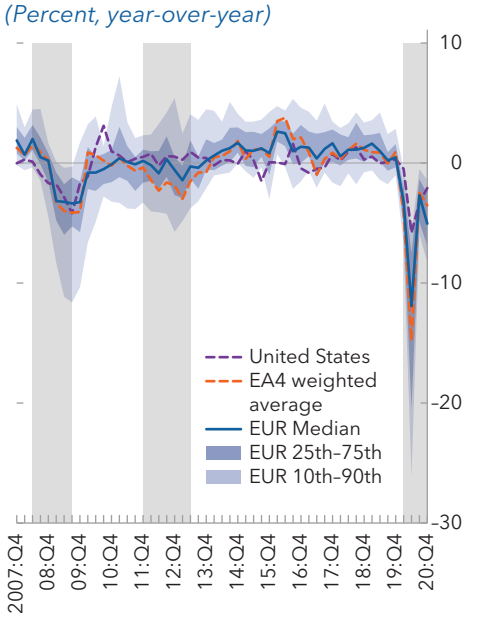
Most of the labor market adjustment in the United States in 2020 occurred through employment ("extensive margin"). The decline in total hours worked—of about the same magnitude as during the GFC—was entirely driven by employment, which dropped by an unprecedented 12.3 percent year over year in 2020Q2. In the same quarter, the number of unemployed workers more than tripled and the unemployment rate jumped to an unprecedented 13.0 percent, even though labor force participation declined. Over the whole year, on average, US employment fell by 6.2 percent and the unemployment rate increased by 4.4 percentage points, compared to a decline of 1.4 percent and an increase of 0.4 percentage points in EU-27, respectively.

Box Figure 1.1. Employment Growth
(Percent, year-over-year)



Sources: Centre for Economic Policy Research; Eurostat; and IMF staff calculations.
Note: Gray-shaded areas correspond to CEPR-based recessions for euro area business cycles.

Box Figure 1.2. Actual Hours Worked Growth
(Percent, year-over-year)



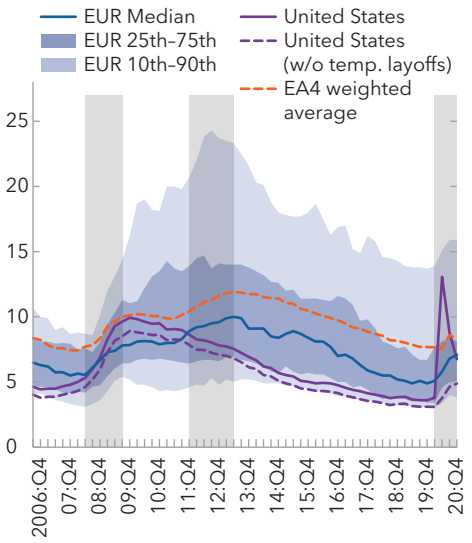
Sources: Centre for Economic Policy Research; Eurostat; and IMF staff calculations.
Note: Gray-shaded areas correspond to CEPR-based recessions for euro area business cycles.

The unemployment spike was largely driven by temporarily laid off workers. In 2020Q2, workers that were temporarily laid off accounted for more than 70 percent of the new unemployed in the United States, while Europe's recourse to job retention schemes substantially limited the increase in the unemployment rate. The number of temporary layoffs started falling in 2020Q3, similar to the decline in the use of STW schemes across Europe. When temporary layoffs are excluded, the increase in the US unemployment rate in 2020 was slightly more moderate than the median unemployment response in the EU. Looking at broader measures of unemployment, involuntary part-time workers were the second-largest contributor to the increase in labor market slack in the United States while, in the EU, it was mostly driven by marginally attached workers.

As in European countries, the COVID-19 crisis had more adverse impacts on young, part-time, and lower- skilled workers in the United States. In 2020 youth employment fell by 11 percent on average, double the fall seen among older workers, while the unemployment rate of young workers increased

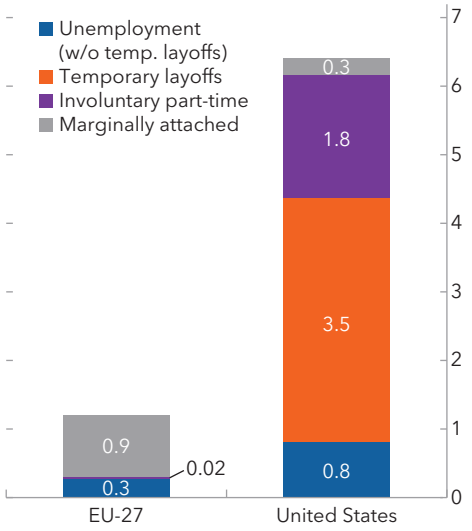
Box 1. A Comparison of Dynamics in Advanced Europe versus the United States
(continued)

Box Figure 1.3. Unemployment Rate
(Percent)



Sources: Centre for Economic Policy Research; Eurostat; and IMF staff calculations.
Note: Gray-shaded areas correspond to CEPR-based recessions for euro area business cycles.

Box Figure 1.4. Changes in Labor Market Slack in 2020
(Percentage points of extended labor force, relative to 2019)



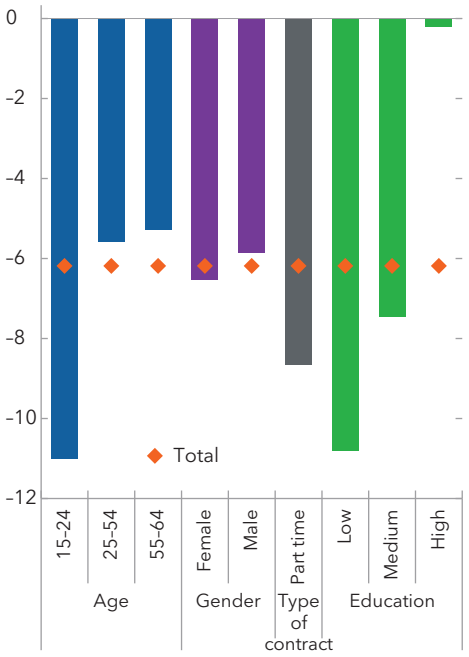
Sources: Eurostat; Federal Reserve Economic Data (FRED); and IMF staff calculations.

by almost 7 percentage points, compared to an average increase of about 4 percentage points among those aged 25 and older. Employment of part-time workers and those with a low level of educational attainment also fell much more than overall employment. In contrast to Europe, the number of low-skilled unemployed soared so that the increase in the corresponding unemployment rate was larger than among workers with higher levels of education. In the United States, women were also more negatively affected by the pandemic on average, although the differences across gender are not as pronounced as across age and skill groups.

The difference in employment dynamics on both sides of the Atlantic is largely due to the different policy responses and possibly to structural differences, including institutions. As discussed in detail in Chapter 6, European countries mainly responded to the temporary nature of the shock with policies that encourage labor hoarding. JRSs subsidized existing jobs, with replacement rates that could be significantly higher than those of standard unemployment benefits (Italy is an exception). For instance, in the Czech Republic, Denmark, Lithuania, and The Netherlands, the replacement rates under the JRSs reached 100 percent when working time was fully reduced (OECD 2021). These policies encouraged adjustment through reduced working hours rather than employment, unlike in the United States where policymakers mainly resorted to the expansion of unemployment benefits programs and direct income support. The United States did introduce a limited job retention scheme—the Paycheck Protection Program—that provided small firms with loans to cover the labor cost of their employees, forgivable if the payroll level was maintained. According to preliminary estimates, PPP saved about 3¼ million jobs, equivalent to 2 percent of total employment (Autor and others 2020).

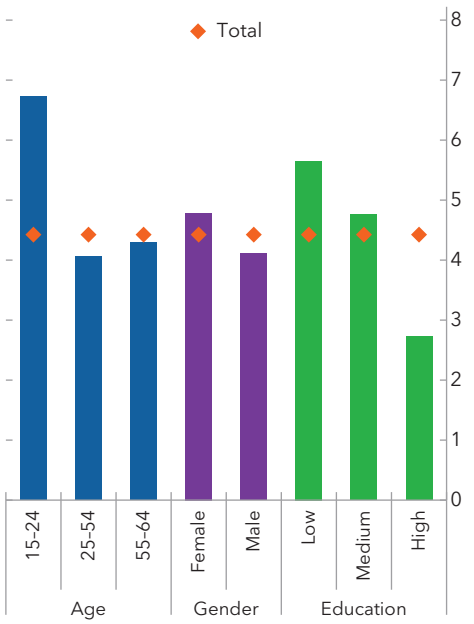
Box 1. A Comparison of Dynamics in Advanced Europe versus the United States
(continued)

Box Figure 1.5. United States: Employment Growth, 2020
(Percentage points, relative to 2019)



Sources: Bureau of Labor Statistics; Haver Analytics; and IMF staff calculations.
Note: Data on temporary employment are not available.

Box Figure 1.6. United States: Change in Unemployment Rate, 2020
(Percentage points, relative to 2019)



Sources: Bureau of Labor Statistics; Haver Analytics; and IMF staff calculations.

The JRSs implemented in Europe protected existing stable jobs but temporary employees and the young, who relied more than other age groups on nonstandard forms of work, were often not eligible to the JRSs and experienced the strongest decline in employment (see Box 3).

selected countries, which adds full-time equivalent STW participants to the unemployed, suggests that unemployment rates in Europe at the peak of the crisis in 2020Q2 could have been significantly higher if STW participants would have been dismissed (Annex 2).[3,4] To alleviate the impact of rising unemployment, some countries also eased the eligibility criteria and increased the generosity of their unemployment benefits or provided hiring subsidies.

[3] Other policies aiming at reducing firms' liquidity constraints, such as capital injections and loan guarantees also limited the employment impact of the crisis by increasing the survival probability of firms.

[4] Absent STWs, unemployment rate in second quarter of 2020 would have increased on average by about 5.0 percentage points in Germany, 5.4 percentage points in Italy, 8.0 percentage points in Spain, 8.6 percentage points in France and 19.0 percentage points in the United Kingdom.

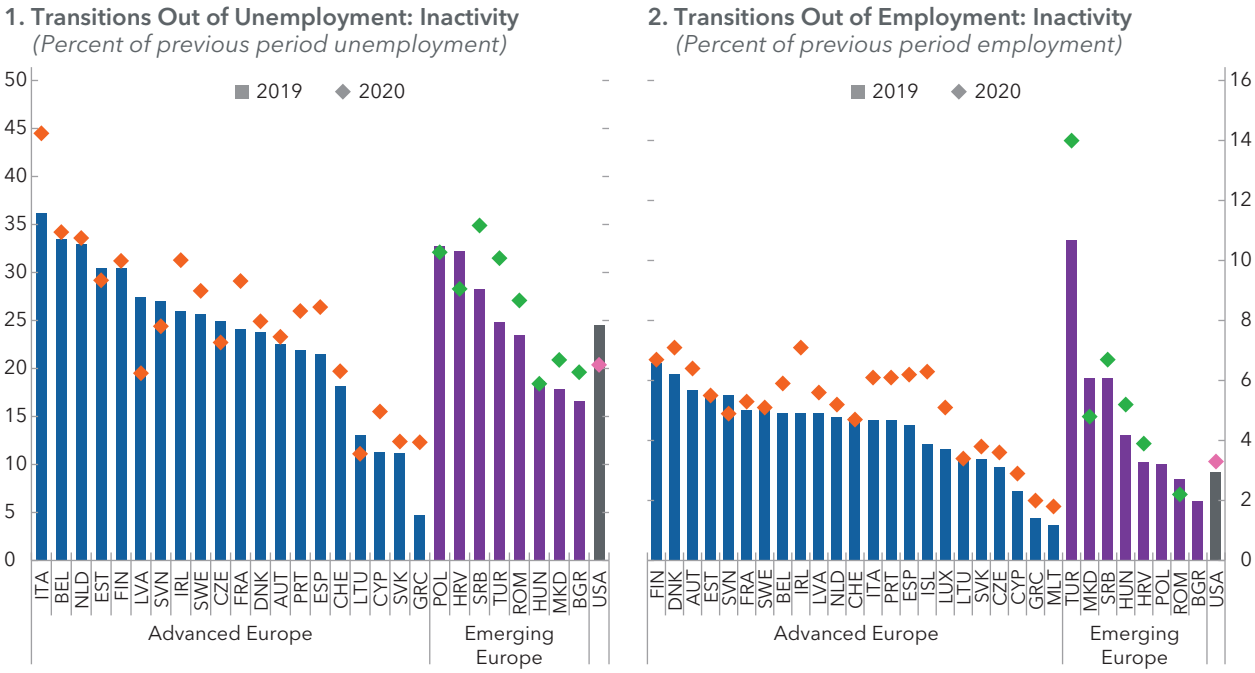
Box 2. Taxonomy of Labor Market Policies

- Job Retention Schemes (JRSs) – Set of instruments aimed at preserving jobs at firms that experience a shock affecting business activity that is expected to revert in the near term. The different instruments aim at temporarily reducing the labor costs faced by employers and at supporting income of workers when hours worked are cut.
  - Short-Time Work Schemes (STWs) – These schemes provide a subsidy (only) for unworked hours. STWs differ on the amount of hours reduction permitted: some are unrestricted, some limit the reduction in hours, while others (furlough schemes) do not allow partial reduction in hours. Employees receive partial compensation for hours not worked, with replacement rates typically in line with those of regular unemployment benefits though during the COVID-19 pandemic they tended to be higher. Employers get reimbursed partly or fully for the labor cost of reduced hours. The reimbursement to firms may be a lump sum per hour unworked or a fraction of the labor cost of those hours. Workers maintain their contract while placed under STWs.
  - Wage Subsidies (WSs) – Employers receive a subsidy covering part of the labor cost of their employees (a lump-sum subsidy or a fraction of the employees' compensation, sometimes including employers' social contributions). Access to WS is sometimes targeted to certain firms (for example, based on thresholds on wage bill on number of workers) or type of workers. Some WS are also conditional on a reduction in activity (for example turnover losses). Differently to STWs, the subsidy is provided regardless of whether hours are reduced or not.
- Hiring Subsidies (HSs) – Employers receive a compensation when they hire new workers during a certain period of time. The subsidy can be a lump sum per worker hired or a fraction of the labor cost from the new hire (with or without a cap), sometimes disbursed gradually and conditional on the worker remaining hired. Eligibility for HS is sometimes targeted to certain firms (for example, by size) or to certain workers (for example, youth or low-wage workers).
- Wage-loss insurance – Employees receive a compensation, typically for a fixed period of time, to compensate, partially or fully, the loss in earnings from switching to a lower-paying job. While, in principle, wage-loss insurance schemes would consist in pre-existing funded programs, paid for by an insurance premium levied on employers or employees, they have generally been introduced as non-funded schemes, financed via other sources.

A decline in labor force participation also curbed the increase in unemployment rates. Measures to contain the spread of the virus, including travel restrictions and border closures, contributed to the contraction of the labor force at the onset of the pandemic.[5] Moreover, there was also a marked increase of inactivity in some countries (Figure 6). The transitions from unemployment and employment to inactivity went up in 2020 relative to 2019, as lockdowns and other containment measures suppressed labor demand and discouraged job search. The largest impact occurred in 2020Q2, with transitions into inactivity more than doubling in some countries. If the individuals who exited the labor force had remained unemployed in 2020Q2, the unemployment rate would have been 1.6 percentage points higher on average, though with a high degree of heterogeneity across countries. For example, in Ireland and Spain, the unemployment rate would have been about 3½ percentage points higher.

[5] First residence permits issued in the EU declined from 3 million in 2019 to 1.9 million in 2020. Work-related permits were particularly affected: their share of total permits decreased by 12 percentage points to 29 percent in 2020. Irregular border crossings, which declined by 12 percent, reached a 7-year low in 2020 (European Commission).

Figure 6. Transitions Out of Employment and Unemployment to Inactivity



Sources: Eurostat; and IMF staff calculations.

B. Pandemic's Impact across Sectors and Population Groups

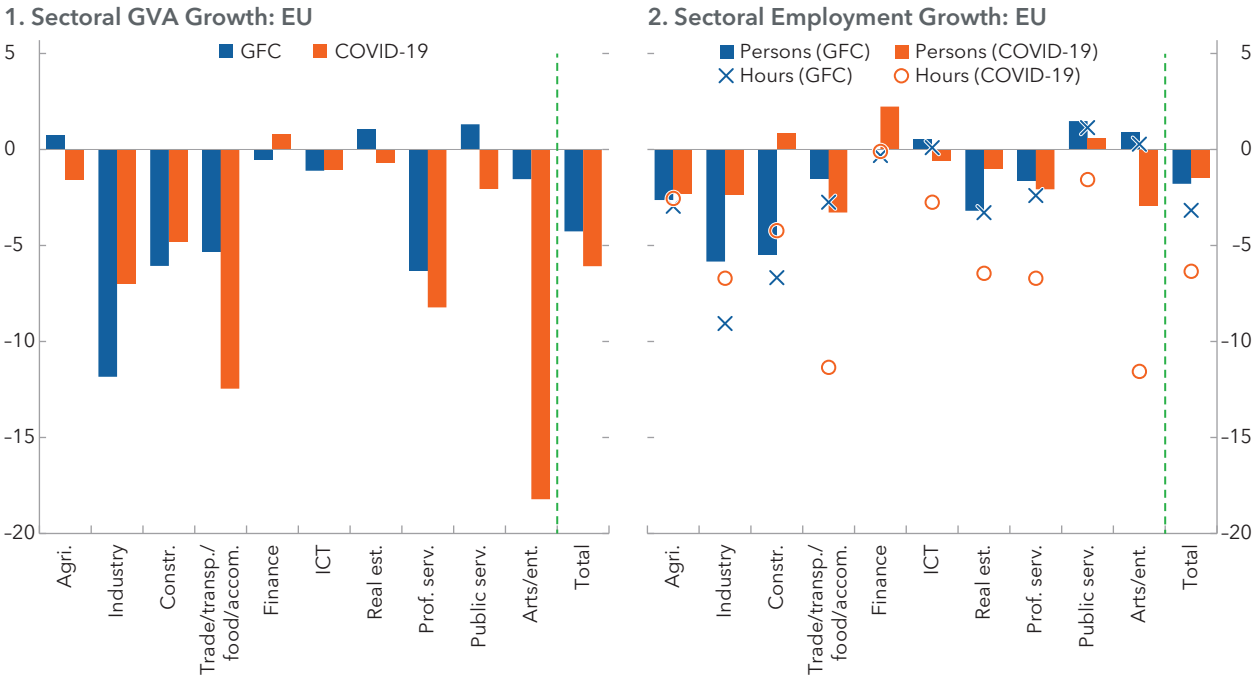
The pandemic-induced shocks were highly asymmetric, with contact-intensive activities registering substantial drops in output and hours worked. Output losses were the largest in trade, transportation, and hospitality sectors. Nonetheless, the decline in the number of employed persons was relatively modest, as adjustments took place mainly through hours worked (Figure 7). Sectors, such as industry, construction, as well as information, communication, and technology (ICT), however, were much less affected in terms of both output and employment. These sectors also experienced a solid rebound after the recession trough, partly reflecting better adaptation to the pandemic environment.

Nonetheless, the passthrough to workers' compensation was modest for nearly all sectors owing to the role of JRSs. Even in severely affected contact-intensive services, adjustments to workers' incomes were only about one-third of the sectoral output loss, on average, with the rest absorbed by a reduction in business incomes (Figure 8).[6] As a result, the decline in average labor earnings was much smaller than during the GFC. In fact, the average hourly wages and hourly productivity (output per hour) did not decline in 2020, partially driven by the stronger impact of the pandemic on less productive sectors.

As expected, severely affected sectors used STWs relatively more, especially at the onset of the crisis. The STW incidence, defined as the STW take-up in each sector normalized by the sector's employment share, was higher for sectors that were more severely hit by the pandemic. As the economies started to recover and businesses and workers adapted to social distancing and remote working practices, the demand for STWs declined across most sectors, resulting in a weaker link between STW incidence and economic activity.

[6] The change in total GVA is decomposed into sectoral contributions from their businesses' and workers' incomes. See Technical Appendix 1 for more details on sectoral decomposition exercises, as well as country-specific results.

Figure 7. Sectoral Gross Value Added and Employment Growth, GFC versus COVID-19 Crisis
(Percent, year-over-year)



Sources: Eurostat; and IMF staff calculations.
Note: Weighted average annual growth in 2009 for GFC and 2020 for COVID-19. GFC = global financial crisis; GVA = gross value added.

While the sizable policy support limited the increase in overall unemployment rates, the pandemic's impact across population groups has varied significantly. The youth, temporary and part-time workers, as well as those with low levels of education, were disproportionately affected by the crisis, reflecting their large share in contact-intensive sectors (Box 3). Foreign-born workers were also significantly impacted. They tend to be low-skilled, have temporary or nonstandard contracts, and work in the hardest-hit sectors.[7] As such, they faced a higher likelihood of losing their jobs in the wake of the pandemic.[8,9]

C. Recovery So Far

The strong economic rebound in 2021 was accompanied by an even more rapid recovery of labor markets, but slack remained significant in some AEs and in certain population segments (Figure 9). The EU unemployment rate declined to a historical low of 6.4 percent in December 2021 and the employment rate (age 20-64) continued to recover, reaching its pre-crisis level of 73½ percent in 2021Q3. Total hours worked have significantly increased since mid-2020, but they remained 1 percent below precrisis levels in 2021Q3, largely reflecting a slower recovery of some contact-intensive sectors and to a lesser extent manufacturing (EC 2022). The recovery has also led to higher hours per worker, but with different dynamics across regions: while in EEs hours per worker have already surpassed precrisis levels, they are lagging in AEs (3 percent below the end-2019 level). As the economic recovery progresses and JRSs continue to unwind, particularly in AEs, it is likely that hours will continue to increase. There will also be room for further employment gains,

[7] In the EU, on average 13 percent of essential workers are immigrants but this share can be as high as one-third for cleaners and helpers, or one-quarter of workers in mining and construction (EC JRC 2020, Fasani and Mazza 2020).

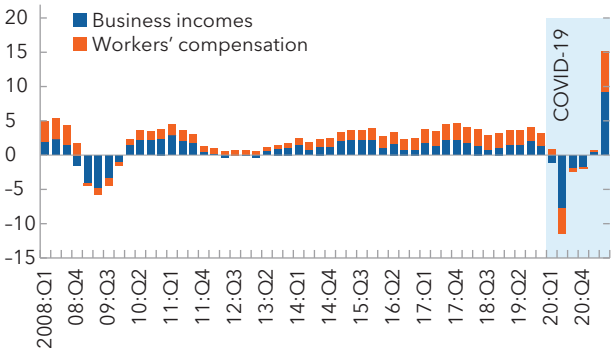
[8] Fasani and Mazza (2020) estimate that almost one-third of the foreign-born workers in the EU14+United Kingdom were at risk of becoming unemployed (one-third of them being from other EU countries and the remainder from outside of the EU).

[9] Lariau and Liu (2022) find that young, less-educated, low-skilled and immigrant workers and women were the most affected by the COVID-19 shock in Spain in terms of their probability of being unemployed, even after controlling for sectoral characteristics.

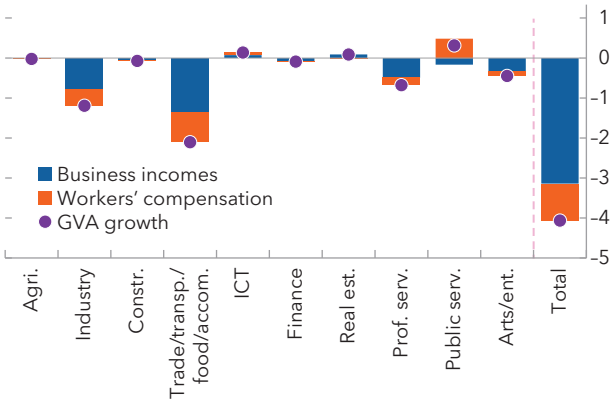
Figure 8. Adjustments to Workers and Sectoral STWs Take-Up during the COVID-19 Crisis
(Percent, year-over-year)

The COVID-19 crisis has taken a heavy toll on business incomes, including in the severely affected contact-intensive sectors ...

1. Decomposition of GVA Growth: EU, 2008–present

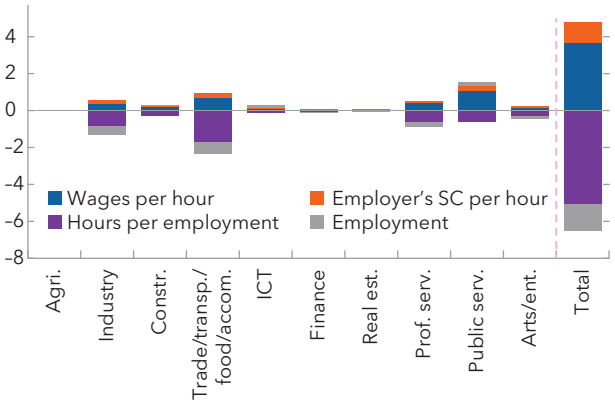


2. Decomposition of GVA Growth: EU, 2020 (COVID-19)

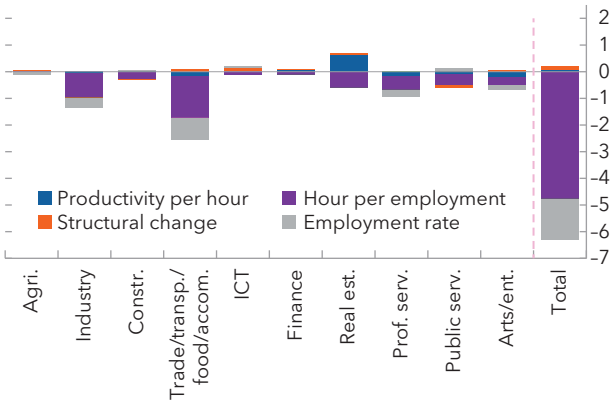


... while average hourly wage increased slightly, real hourly productivity remained almost unchanged ...

3. Decomposition of Employees' Compensation Growth: EU, 2020 (COVID-19)

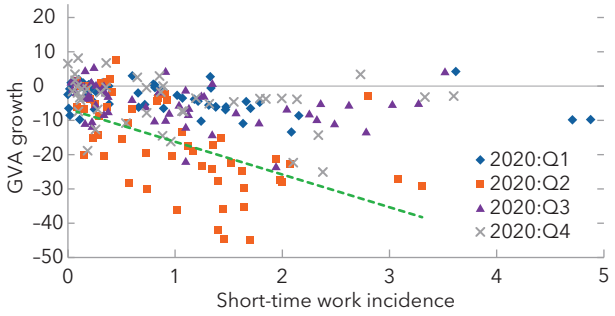


4. Decomposition of per Capita GVA Growth: EU, 2020 (COVID-19)

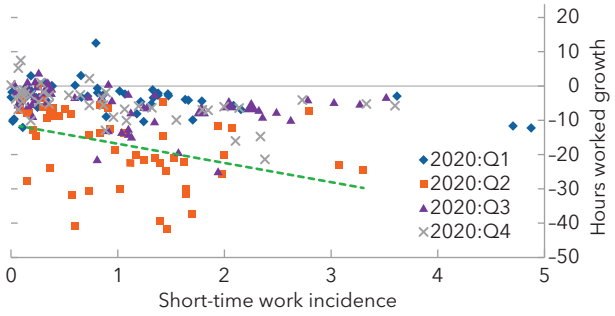


... potentially due to ample policy support, particularly the short-time work schemes, for the most hit activities.

5. Sectoral GVA Growth and STW: EA4 + UK

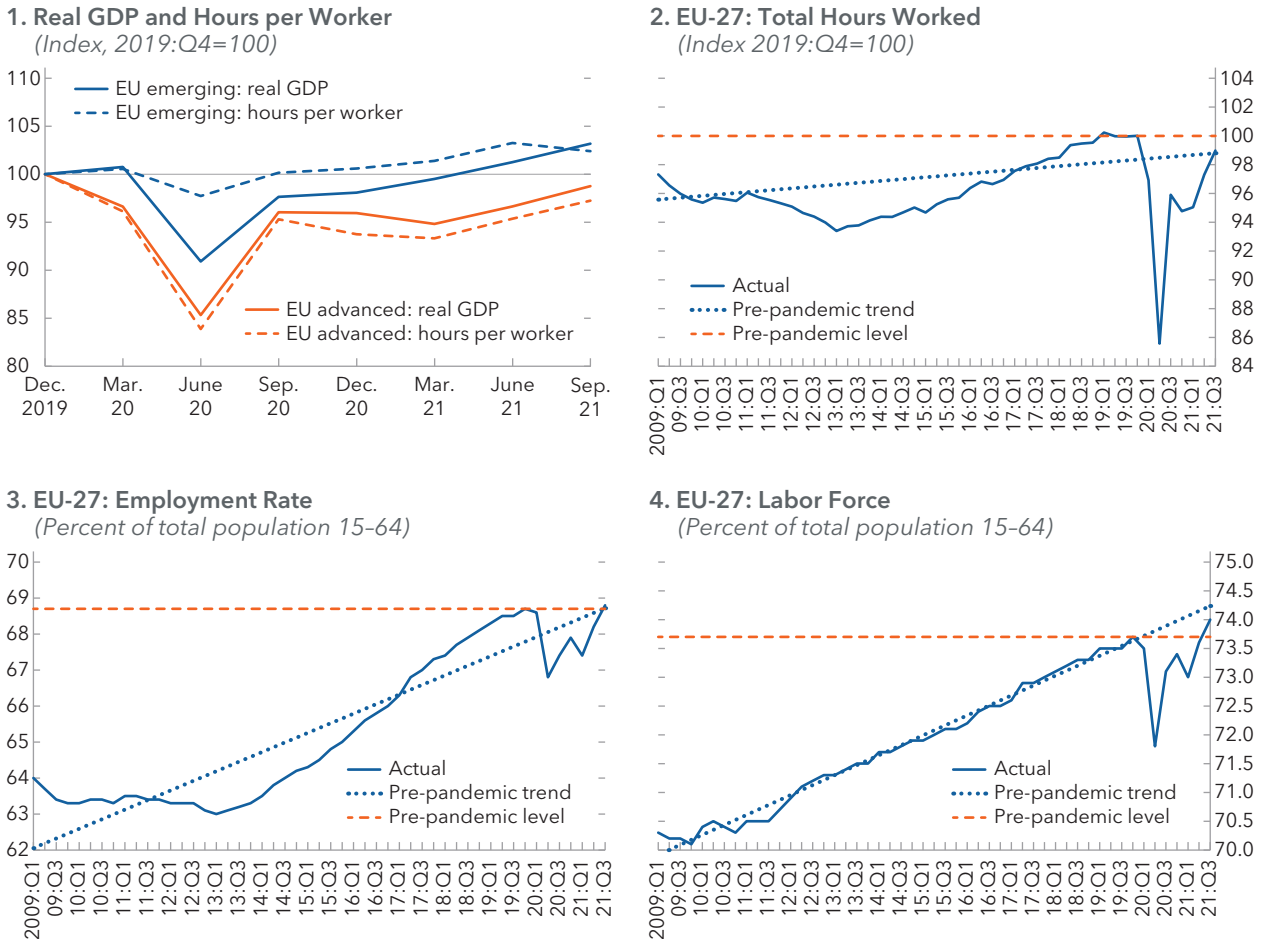


6. Sectoral Employment Growth and STW: EA4 + UK



Sources: Eurostat; National authorities; and IMF staff calculations.
Note: In panels 1 and 2, GVA is current price. For panel 3, compensation of employees is current price. For panel 4, GVA is chain-linked volumes. Structural change represents the compositional effect of the change in sectoral employment share, see Technical Appendix 1 for details. For panels 5 and 6, STW incidence is defined as the sectoral share in total STW divided by the sectoral share in total employment. GVA = gross value added; SC = social contributions; STW = short-time work schemes.

Figure 9. Real GDP, Hours Worked, Employment, and Labor Force



Sources: Eurostat; and IMF staff calculations.

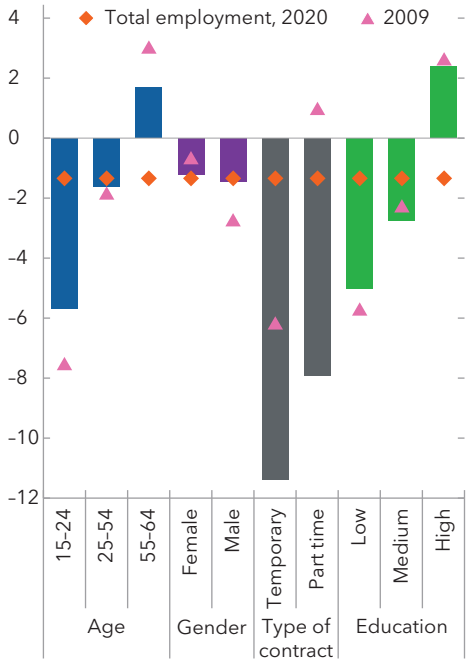
especially if labor force participation reverts to precrisis trends. In 2021, there were also important differences in the recovery across population groups in EU-27: while the employment rate of older workers was more than 1 percentage point above precrisis levels in 2021Q3 (different from what has been observed in the United States), youth employment remained nearly ¼ percentage point below the end-2019 level. Similarly, the employment rates of low-skilled workers remained 1¼ percentage points below precrisis levels, while those of high-skilled workers was already ¼ percentage point above the end-2019 rate. Women were doing better than men, with their employment rates more than ¼ percentage point above end-2019 rates, while those for men remained ¼ percentage point below the precrisis rate. Underemployment was still high in many countries, especially in Southern Europe. In Italy and Spain, the underemployment rate surpassed 20 percent in 2021Q3 and was still about 1 percentage point above from the precrisis rate. A large share of the underemployed corresponded to individuals available to work but not seeking a job, especially in Italy, though involuntary part-time employment also played a role.

Participation rates have largely recovered as economies reopened, with sharp corrections in some countries. Overall, while the EU-27 aggregate labor force participation rate has reached a record-high level (Figure 9), it is still ¼ percentage point lower than the precrisis trend, with the gap relative to the trend more pronounced for women and for individuals in the 55–64 age group. This could be partly explained by factors that are temporary and that should recede as the economies recover and the health risks diminish, including unwillingness to work in certain sectors due to health concerns, limited availability of childcare, and restrictions

Box 3. The Pandemic's Impact Across Population Groups

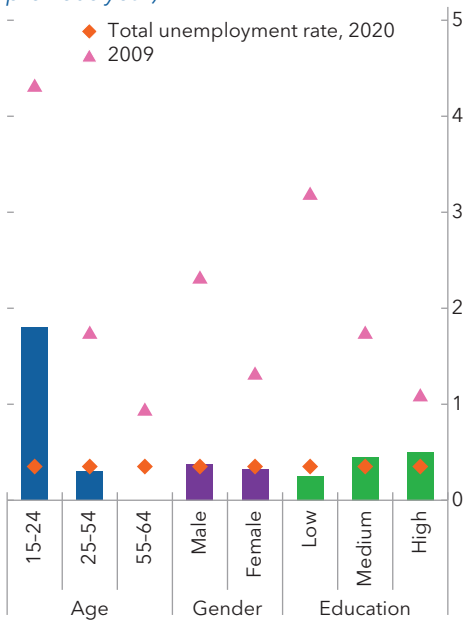
The pandemic disproportionately affected the youth, temporary and part-time workers, and those with low levels of education. In 2020, youth employment fell on average by almost 6 percent, compared to a 1.3 percent decline in total employment, while employment of older workers actually went up. The fall in employment was the most dramatic for temporary and part-time workers, with about 10 percent of these workers losing their jobs. Employment also declined significantly for workers with low levels of education, while it increased for high-skilled workers. During the GFC, employment of young and low-skilled workers also contracted the most, while the decline in temporary employment was only half of that observed in 2020. The dynamics of the labor force across demographic groups show a similar pattern, with the labor force contracting the most for young and low-skilled workers. Young workers also experienced the largest increase in the average unemployment rate between 2019 and 2020, 1.8 percentage points compared to a mere 0.3 percentage point increase in the overall unemployment rate. The limited increase in unemployment rate of low-skilled workers is driven by the fact that many of them stopped searching for jobs and left the labor force, as opposed to the GFC when the low-skilled unemployment rate increased much more than for workers with higher levels of education.

Box Figure 3.1. EU-27: Employment Growth, 2020
(Percent, relative to the previous year)



Sources: Eurostat; and IMF staff calculations.

Box Figure 3.2. EU-27: Change in Unemployment Rate, 2020
(Percentage points, relative to the previous year)



Sources: Eurostat; and IMF staff calculations.

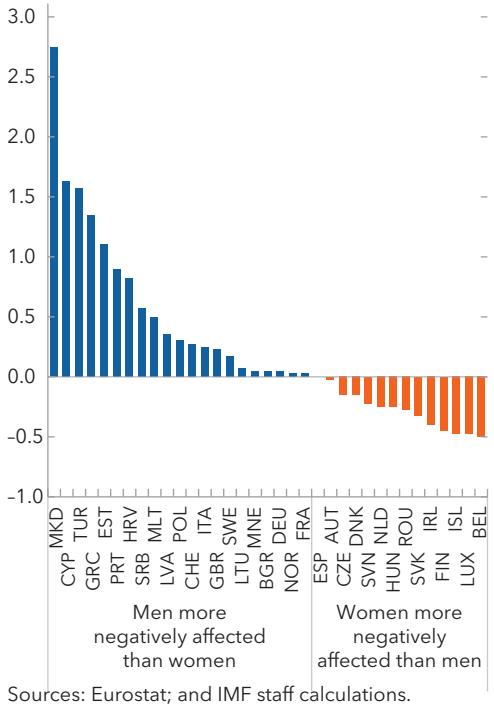
While there were no major gender differences in labor market developments in 2020 in the EU-27 on aggregate, there was a high degree of heterogeneity across countries. In contrast to the GFC, in which men were disproportionately affected, the average fall in EU-27 employment (and labor force) in 2020 was only marginally higher for men than for women, while the average unemployment rate was broadly the same. However, this masks significant differences across countries. In Germany, Portugal, and the United Kingdom, men experienced both larger declines in employment and larger

Box 3. The Pandemic's Impact Across Population Groups *(continued)*

increases in the unemployment rate. In contrast, in Finland, Hungary, Iceland, and Romania, women were more negatively affected than men in both labor market outcomes. Lithuania was the country with the largest contraction in female employment compared to male employment, while in Belgium the female unemployment rate increased the most relative to men. According to Bluedorn and others (2021), some of these cross-country differences could be attributed to structural factors, such as the gender composition of sectoral employment, the availability of affordable childcare alternatives, and employment regulations with differential impacts by gender.

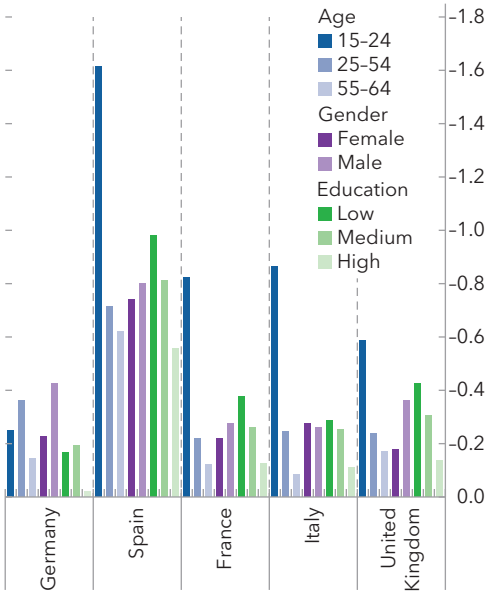
The disproportionate impact of the crisis on vulnerable groups was partly driven by a higher sensitivity of their labor market outcomes to output fluctuations. Estimates by population groups for EA4 and the United Kingdom show that economic growth tends to have a higher effect on unemployment for young, male and low-skilled individuals (that is, higher estimated Okun's law coefficients). This is consistent with the findings by Butkus and others (2020). These estimates, however, do not capture the fact that crises may differ in their sectoral impact, and thus affect population groups differently depending on the sectoral composition of employment.

Box Figure 3.3. Difference in the Unemployment Rate Change for Men and Women in 2020 Relative to 2019
(Percentage points)



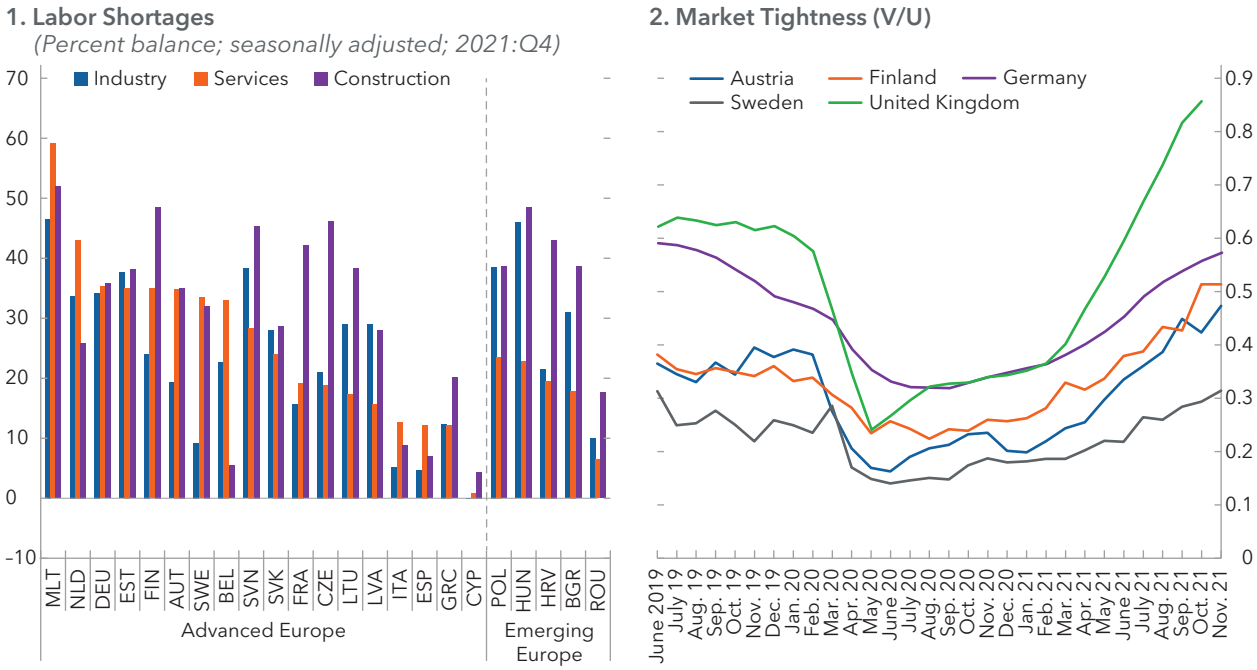
Sources: Eurostat; and IMF staff calculations.
Note: "Men more negatively affected than women" means that the increase in the unemployment rate in 2020, relative to 2019, was larger for men than for women, and thus the difference is positive.

Box Figure 3.4. EA4 + UK: Okun's Law Dynamics Betas in the 18 Years Preceding the COVID-19 Crisis



Source: IMF staff calculations based on Eurostat data.
Note: The dynamic beta measures the long-term impact of output fluctuations on unemployment rate dynamics.

Figure 10. Labor Shortages and Labor Market Tightness



Sources: European Commission Business and Consumer Survey; Eurostat; Haver Analytics; OECD; and IMF staff calculations.
Note: In panel 1, percent balance corresponds to the percent of respondents claiming that labor is a factor limiting production/business minus the percent of respondents reporting that it is not. For panel 2, market tightness is computed as the ratio of the stock of unfilled vacancies over the stock of unemployed as reported in the Labour Force Survey.

to mobility and migration across borders. However, there are other factors, more structural in nature, that may be permanent and lead to a slower recovery in participation in some countries. These include early retirement of older workers and shifts in work-leisure preferences and skill mismatches, which may be aggravated by the sectoral reallocation triggered by the pandemic. Nevertheless, some countries have already experienced sharp increases in labor force participation from the troughs of 2020Q2 through 2021Q3. This is the case of Ireland and Greece, where the participation rate increased more than 6 percentage points; Luxembourg, The Netherlands, and Spain with increases of about 4 percentage points; and France and Portugal, with increases ranging between 3 and 3.5 percentage points.

Job vacancies have risen markedly but filling them has become increasingly difficult (Figure 10). As activity picks up, more firms are facing labor shortages, reversing the decline in labor shortages that occurred in 2020. Job vacancy rates had recovered by 2021Q3 and were above pre-pandemic levels in some countries (such as Belgium, France, Italy, and The Netherlands), while the unemployment rates declined, albeit at different speeds across countries (Annex 1). Labor shortages, which were high pre-pandemic, have recently reached record highs, likely reflecting significant skill mismatches (EC 2022). This already posed a constraint on filling vacancies before the pandemic, and it has likely been aggravated due to further sectoral reallocation needs. In addition, the gradual recovery of the labor force in some countries—including due to the slow return of migrants who traveled to their countries of origin during the pandemic and changing job preferences among workers (Duval and others, 2022)—may be limiting the available pool of candidates, particularly among low-skilled, younger, and male workers. Accumulated excess savings during the pandemic, which have enabled the unemployed more time to seek a job, may have also contributed to the slow job matching process. Data suggest that labor shortages vary significantly across countries and economic sectors. In EEs, shortages are higher in industry and construction, while in AEs it has become more difficult to fill jobs in services, particularly hospitality.

4. Drivers of Cross-Country Variation in Labor Market Outcomes

This chapter aims to identify the drivers of cross-country variation in labor market outcomes using an Okun's law framework. Specifically, the analysis looks at (1) differences in the growth-change in unemployment relationship across countries in the precrisis period; (2) to what extent the differences can be explained by institutional factors; and (3) how the sensitivity of unemployment dynamics to growth has changed during the pandemic compared to past recession episodes.

A. Okun's Law Framework

A dynamic version of Okun's law is estimated for a sample of OECD countries during a near 20-year period preceding the COVID-19 crisis. The general form of the estimated equation is the following:

$$\Delta u_t = \alpha + \sum_{i=0}^{p} \beta_i \Delta y_{t-i} + \sum_{i=1}^{q} \gamma_i \Delta u_{t-i} + \sum_{i=0}^{p} \delta_i D^R \Delta y_{t-i} + \epsilon_t,$$

where Δu and Δy are the change in the unemployment rate and the level of output growth respectively, and D^R is a dummy variable indicating if the economy is in a state of recession; the recession dummy is interacted with output growth as a third regressor in the above equation. The sample comprises 32 European countries and the United States during the 18-year period before the COVID-19 crisis (72 quarterly observations from 2002Q1 to 2019Q4).[10]

The average dynamic beta was found to be relatively stable in the precrisis period, although with large cross-country variation. With the estimated Okun's law coefficients, we compute the dynamic betas as follows:

$$DB = \frac{\sum_{i=0}^{p} \beta_i + \sum_{j=0}^{p} \delta_j}{1 - \sum_{k=1}^{q} \gamma_k}$$

At –0.36, the average dynamic beta is close to previous estimates done for OECD countries during the GFC using the same methodology (see IMF 2010). However, there is significant variation across countries (Figure 11).[11] For instance, Greece, Ireland, Portugal, and Spain exhibit the largest average responses of the unemployment rate to changes in output, with dynamic betas above 0.7. For some other countries, including the big European economies (France, Germany, Italy, and the United Kingdom), the dynamic betas range between 0.25 and 0.45, that is, around the average for the region. At the other end of the distribution, the Scandinavian countries (with the exception of Denmark) and other smaller AEs have very low dynamic betas, indicating that unemployment rates in these countries are not very responsive to fluctuations in output. The dynamic betas are also estimated for each country and for each quarter prior to the pandemic, using 18-year rolling windows; the median dynamic beta remains relatively stable over time (Figure 11).

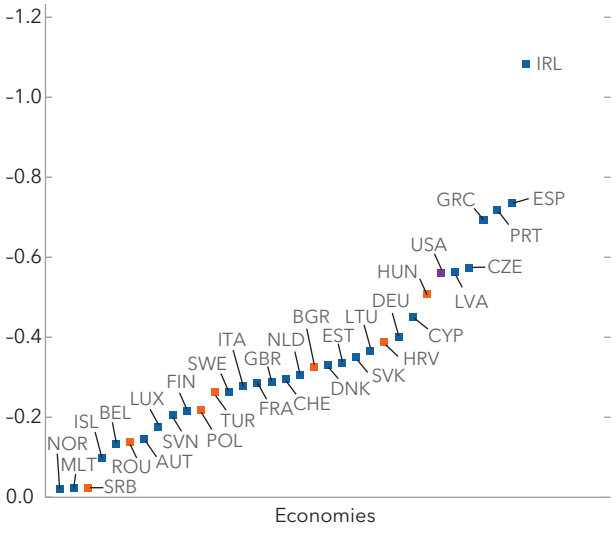
Labor market institutions play a role in explaining the cross-country variation (Table 1). The results suggest that a higher share of temporary workers leads to a higher dynamic beta, reflecting countries such as Spain that has one of the highest dynamic betas in the sample and is the European country with the highest share of temporary workers. Specifically, the results show that an increase in the share of temporary workers by

[10] The number of lags and the inclusion of the interaction term are determined for each country based on the Bayesian Information Criterion (see Technical Appendix 2 for further details of the data and methodology).

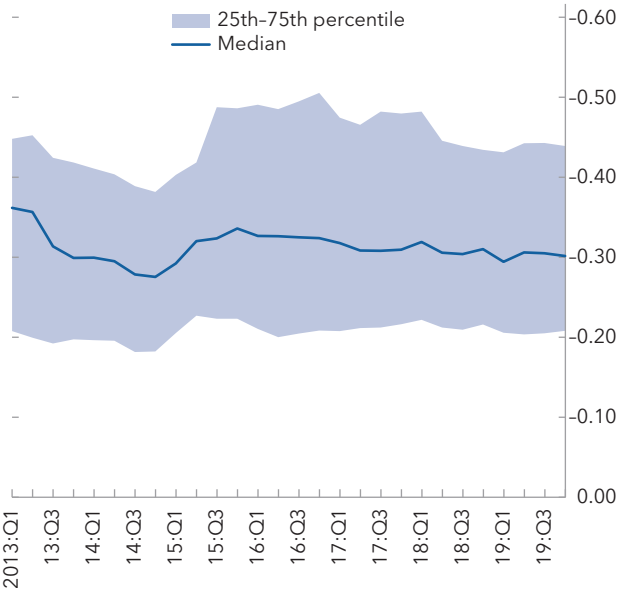
[11] The dynamic beta is negative for all countries. However, to facilitate the reading and to focus on the magnitudes, we will hereafter just refer to the absolute value when presenting the estimation results.

Figure 11. Estimation Results: Dynamic Betas

1. Dynamics Betas during the 18 Years Preceding the COVID-19 Crisis



2. Dynamic Betas over Time



Source: IMF staff calculations based on Eurostat data.
Note: In panel 1, blue boxes correspond to advanced European economies and orange boxes to emerging and developing European economies. The dynamic beta measures the long-term impact of output fluctuations on unemployment rate dynamics.

Table 1. Institutional Factors Influencing the Responsiveness of Changes in Unemployment to Changes in Output

	(1)	(2)	(3)	(4)	(5)	(6)
EPL	–0.035 (0.052)	–0.237 (0.171)			–0.145** (0.071)	–1.197*** (0.369)
EPL (squared)		0.057 (0.046)				0.236*** (0.082)
Unemployment Benefits			–0.003 (0.002)		–0.007*** (0.002)	–0.007*** (0.002)
Temporary Workers				0.015** (0.006)	0.028*** (0.007)	0.030*** (0.007)
Constant	0.416*** (0.110)	0.559*** (0.160)	0.506*** (0.112)	0.150* (0.078)	0.697*** (0.187)	1.791*** (0.415)
Observations	50	50	47	53	40	40
R^2	0.009	0.040	0.041	0.115	0.346	0.472

Source: IMF staff calculations.

Note: The dependent variable is the dynamic beta of the Okun's law, estimated over the 18 years preceding each recessionary episode in 1960–2019 in Europe and the United States, with reverse sign for easier interpretation. The EPL is OECD's index of strictness of employment protection legislation on regular contracts. The unemployment benefits correspond to the simple average of gross income replacement rates during the first and second year for a single worker without children. Temporary workers are the share of workers with temporary contracts in total employment.

Standard errors in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

10 percentage points—which is close to the difference between Germany and Spain—would increase the dynamic beta by 0.3 percentage points. Stricter employment protection legislation (EPL) is associated with a weaker responsiveness of unemployment to fluctuations in output, as it limits adjustments via the extensive margin. However, the relationship is nonlinear: in those countries where the EPL is already very strict, further tightening of the EPL would be too costly for the firms, forcing them to terminate those working relationships. The estimated effect of the generosity of unemployment benefits on the dynamic beta is negative, implying that the search and job creation effects outweigh the job destruction effect of unemployment benefits.[12]

B. Forecast Errors and Episodic Factors

The response of the unemployment rate to the output drop during the pandemic was more muted than the historical relation would have suggested. We use the Okun's law estimates to produce quarterly out-of-sample forecasts for changes in the unemployment rate during the COVID-19 crisis. The difference between the actual change in unemployment (Δu_t) and its predicted value ($\Delta \hat{u}_t$) is defined as the unemployment forecast error. The results show that, for many countries (18 out of 32), the predicted change is larger than the actual change. The most obvious cases are Portugal and Spain, but some other large economies (for example, Germany and the United Kingdom) display a similar pattern. In France, Greece, Italy, and Turkey, predicted change is not only larger, but also goes in the opposite direction: while the Okun's law predicts an increase in unemployment, due to depressed activity, the actual unemployment rate decreased during that period. Conversely, the predicted change tends to be smaller than the actual change in the unemployment rate in the United States; in some Scandinavian countries (Finland, Iceland, and Norway); and in the Baltic states.

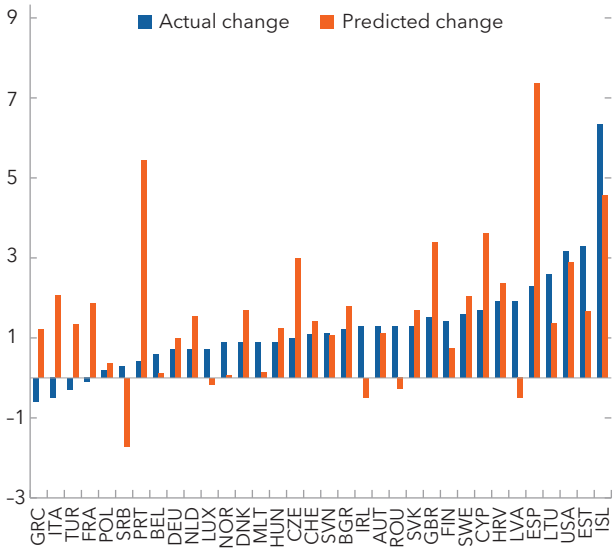
The lower-than-predicted response of unemployment is partly explained by the expansion of STWs.[13] The decomposition of the change in unemployment, shown in Figure 12, is conducted only for a selected group of countries for which data on full-time employment (FTE) STW participants are available. The underlying assumption behind the contribution of STW programs is that the FTE workers under these programs would have otherwise been laid off. While the change of the unemployment rate predicted by the Okun's law exceeds that of the actual unemployment rate, the unprecedented expansion of STWs in 2020 more than compensates for this difference, suggesting that other factors—besides the contraction in output—may have affected unemployment. Apart from Spain, these factors put upward pressure on the unemployment rate. Examples of these factors could be high uncertainty surrounding the health situation and the economic recovery and sectoral shocks.

[12] A more generous unemployment insurance lowers job search intensity, thus reducing job creation during recoveries, dampening the response of unemployment to economic upswings. On the other hand, higher unemployment benefits lead to more inflexible wages (RES-EUR SDN No. 19/05) and to lower profits from filled jobs, resulting in more job destruction, which makes unemployment more responsive to negative shocks. The overall effect of the generosity of unemployment benefits on the betas will depend on the relative strength of these two channels. The results shown in Table 1 suggest that the job creation effect prevails.

[13] This result is supported by Beveridge curve analysis in Annex 1.

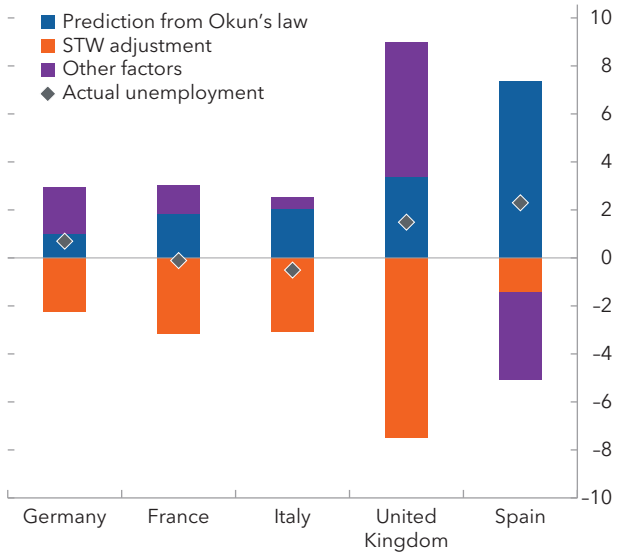
Figure 12. Estimation Results: Dynamic Betas
(Percentage point change between 2019:Q4 and 2020:Q4)

1. Actual and Predicted Change in the Unemployment Rate during the COVID-19 Crisis



Source: Eurostat; and IMF staff calculations.

2. Decomposition of the Change in the Unemployment Rate during the COVID-19 Crisis



Sources: Bundesagentür für Arbeit (Germany); Direction de l'Animation de la Recherche, des Études et des Statistiques (France); Eurostat; Haver Analytics; HMRC Coronavirus Job Retention Scheme statistics (UK); Istituto Nazionale di Statistica (Italy); Ministerio de Trabajo y Economia Social (Spain); and IMF staff calculations.

5. Understanding Sectoral Dynamics and Contributions to Aggregate Labor Market Outcomes

Estimating Okun's law-type relationships at the sectoral level provides important insights given that labor intensive sectors have been hit particularly hard by the pandemic. More broadly, there could also be factors influencing sectors to behave differently over economic cycles, such as differences in production functions, skill composition, institutional factors, and policy support (Goto and Bürgi 2021). Thus, by allowing Okun's relationships to vary across sectors, the analysis illustrates how adjustments in aggregate labor market outcomes across countries would depend not only on the varying sectoral composition but also on the heterogeneity in these sectoral relationships.

A. Sectoral Analysis of Okun's Law and Its Drivers

We estimate the following link between sectoral GVA and employment. Using data from the 20-year period prior to the COVID-19 crisis, the following dynamic empirical specification is estimated within a specific country-sector pair, and also by pooling together data (for the same sector) from different countries (in line with IMF 2010)[14]:

$$\log\widetilde{E_{q,s,c}} = \alpha_{sc} + \sum_{j=q-2}^{q} \beta_{j,sc} \log\widetilde{V_{J,s,c}} + \sum_{j=q-2}^{q-1} \gamma_{j,sc} \log\widetilde{E_{J,s,c}} + \eta_{q,sc}$$

where $E_{q,s,c}$ is an employment measure (persons employed, and total hours worked); and $V_{q,s,c}$ is gross value added (GVA) at quarter q, in sector s, and in country c. $\log\widetilde{X}$ is the cyclical component of the HP-filtered logarithm of X. The dynamic betas are calculated as in Chapter 4.

The estimated dynamic betas vary significantly across sectors and countries, and they are larger in labor-intensive sectors and when hours worked are used as a measure of employment. For AEs, the elasticities of sectoral employment (measured as the number of employed persons) with respect to sectoral GVA are estimated to be about 20 to 30 percent on average, with the largest elasticities in construction and industry followed by hard-hit contact-intensive services, which are also more labor-intensive (Figure 13). The hours worked elasticities are found to be larger on average at about 30 to 50 percent, and largest in the service sector. However, the relationships are inconclusive for most sectors in EEs. These sectoral results are also confirmed by the country-specific estimates, with some variation across countries. For example, the estimated elasticities are especially large in France, Norway, and Spain. At the country level, total hours worked, on average, are significantly more responsive to changes in sectoral output than employed persons, especially for contact-intensive sectors.[15]

Differences in Okun's relationship across sectors are correlated with labor market characteristics and other structural factors. Consistent with the macro evidence, employment in sectors that have a larger share of temporary workers tends to be more responsive to output shocks, as is the response of hours worked. Conversely, a larger share of full-time employment together with digitalization is associated with lower responses in hours worked.

[14] As sectoral unemployment is not available, we estimate the elasticity of sectoral employment to its GVA.

[15] See additional (static and country-specific) results and robustness checks in Technical Appendix 3.

Figure 13. Sectoral Okun's Law, Drivers, and Divergence during the COVID-19 Crisis

Source: IMF staff calculations.
Note: Pooled AEs and EEs. Dynamic model over 1999–2019. Error bars represent a 90-percent confidence interval. AEs = advanced economies; EEs = emerging economies. Forecast errors = actual minus projected sectoral employment growth.

B. Is the COVID-19 Crisis Different?

Different from previous downturns, labor market adjustments during the COVID-19 were more apparent in movements of hours worked than in employment changes. In 2020, the decline in the number of employed persons was slightly less than what is predicted by the sectoral Okun's relationship estimated using the pre-pandemic sample (and, hence, positive forecast errors for the growth of employed persons). In contrast, the fall in total hours worked was much greater than that predicted by the model, particularly in hardest hit sectors such as trade, transportation, and hospitality (and, hence, negative forecast errors for the growth of hours worked). These unusual labor market dynamics are likely linked to the unprecedent policy support adopted by European countries, especially the expanded use of STWs in AEs, which allowed firms to preserve employment links while adjusting working hours.[16]

[16] The size of the forecast errors on hours worked have been highly correlated with economic conditions during the pandemic and associated STW usage, that is, forecast errors on hours worked were largest in the second quarter of 2020 and went down, albeit remaining significant, over subsequent quarters.

6. The Role of JRSs during the Pandemic

The previous chapters point to an important role of JRSs in explaining the dynamics of unemployment, employment, and total hours worked during the pandemic. Given this, in this chapter the authors document the JRS implemented during the pandemic, including the differences between AEs and EEs.

JRSs were the preferred tool to respond to the labor market impact of the pandemic. European countries implemented various labor policies early in the crisis to prevent a surge in unemployment. Some countries imposed a ban on economic layoffs (for example, Greece, Italy, Spain, Turkey), or adjusted their unemployment benefit system (for example, Belgium, Bulgaria, Ireland, Sweden), but most countries relied on policies reducing labor costs to encourage labor hoarding, by reducing, suspending or deferring social security contributions (for example, Russia, Turkey, Ukraine) or by using JRS. Virtually all European countries deployed a JRS early in the crisis (Table 2), with AEs largely opting for STWs while most EEs favored WSs, reflecting the fact that STW in place when the crisis started were all in AEs (with the exception of Turkey).[17] For countries that had to introduce a new JRS rapidly, setting up a temporary WS was perceived as administratively easier than establishing an STW scheme. Another reason for EEs to favor WSs is that dismissal costs are relatively low, reducing the attractiveness of STWs, which usually involve procedural costs, reporting requirements (for example, hours worked), and, in some cases, a financial contribution by employers (OECD 2020a, Anderton and others 2020).

Easier access to support schemes was employed to ensure a large take up. Given the magnitude of the shock and the importance of rapidly providing support, European countries that had pre-existing STWs simplified and expedited access (for example, by waiving or simplifying requirements to provide an economic justification when applying). Eligibility criteria were also relaxed to cover more workers (for example, by relaxing requirements on the type of contracts or the requirement for minimum social contribution), more firms (relaxing the firm size threshold), and more sectors (as some of the worst hit sectors during the pandemic were not eligible for some of the pre-existing STWs). Some countries that introduced a new JRS also subsequently simplified the scheme. For example, the eligibility criteria and sectoral restrictions associated with the WS introduced at the onset of the crisis in Bulgaria were significantly relaxed during the summer of 2020 (Box 4). The generosity of JRSs was also significantly increased. Pre-existing STWs were adjusted to be more generous, notably by reducing cost-sharing for employers. For example, in the five largest euro area countries and in the United Kingdom, the cost of unworked hours faced by firms was set at zero (Table 3).[18] Workers usually bore a larger share of the cost of reduced working hours than firms, even if the replacement rate in most countries was significantly higher than that of standard unemployment benefits (OECD 2021).[19]

The use of JRSs was unprecedented although with notable differences across sectors. The introduction of new JRSs and the increase in coverage and generosity of pre-existing ones led to a historically high take-up.[20] At its peak, the take-up rate was about 10 times larger than during the GFC in OECD countries (OECD 2020a), about 25 times larger in France, and almost five times larger in Germany. The use of JRSs varied significantly across sectors, reflecting differences in the impact of the pandemic on sectoral activity and the design of the schemes (Figure 14). Over time, the use of JRSs remained relatively high in industry; increased in contact-intensive sectors that were persistently affected by containment measures (for example, hospitality, arts, and entertainment); and decreased substantially for construction.

[17] As WSs are temporary by design, pre-existing JRSs were all STWs.

[18] See Dias da Silva and others (2020).

[19] Moreover, the employee replacement rates tended to be higher for low-wage workers as a result of compensation floors (OECD 2020a and 2021).

[20] Estimates of the take-up of JRS vary but are all large. See Dias da Silva and others (2020), OECD (2021), or Utermöhl, Ozyurt, and Subran (2020).

Table 2. JRS in Europe in the Initial Phase of the Crisis[1]

	Pre-existing STW[2]	JRS in place in March–June 2020	
		STW	WS
Albania			•
Austria	•	•	
Belgium	•	•	
Bosnia and Herzegovina			•
Bulgaria			•
Croatia[3]			•
Czech Republic	•	•	
Cyprus			•
Denmark[4]		•	•
Estonia			•
Finland	•	•	
France	•	•	
Germany	•	•	
Greece		•	
Hungary		•	
Iceland	•	•	
Ireland[4]	•	•	•
Italy	•	•	
Kosovo			•
Latvia[4]		•	•
Lithuania[4]		•	•
Luxembourg	•	•	
Malta			•
Moldova			•
Montenegro, Rep. of			•
The Netherlands[5]	•		•
North Macedonia			•
Norway	•	•	
Poland			•
Portugal	•	•	
Romania		•	
Russia			•

Table 2. JRS in Europe in the Initial Phase of the Crisis *(continued)*

	Pre-existing STW[2]	JRS in place in March–June 2020	
		STW	WS
Serbia			•
Slovakia[4]		•	•
Slovenia		•	
Spain	•	•	
Sweden	•	•	
Switzerland	•	•	
Turkey[4]	•	•	•
Ukraine		•	
United Kingdom		•	

Sources: EC (2020); European Parliament (2020); OECD (2020a, 2021); and IMF staff.

Note: SSC = social security contributions; STW = short-time work schemes; WS = wage subsidies.

[1]Advanced economies are bolded.

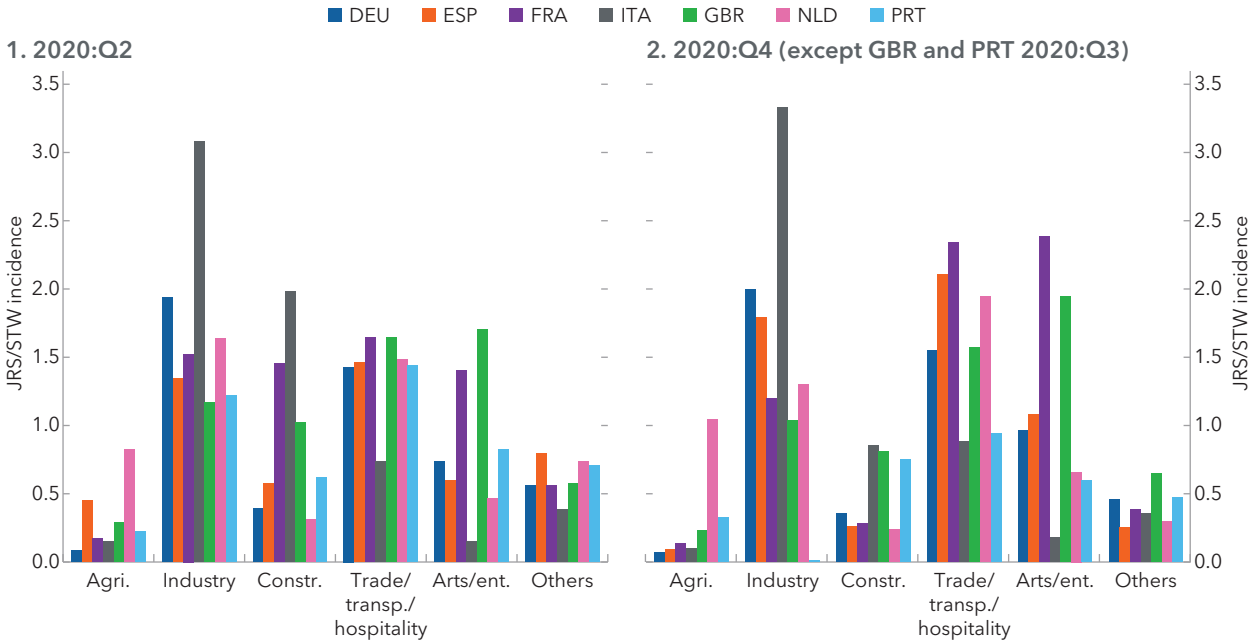
[2]There was no pre-existing WSs. All WSs introduced during the pandemic are temporary.

[3]Croatia subsequently replaced its WS with a STW.

[4]Denmark and Ireland complemented the pre-existing STW with a wage subsidy. Slovakia had a hybrid system. Latvia had a wage subsidy for tourism and export industry complementing a STW scheme. Turkey had a wage subsidy for minimum wage. Lithuania complemented in May 2020 its STW scheme introduced in March 2020 with a wage subsidy.

[5]The STW scheme was suspended, and a WS that is proportional to the reduction in sales was introduced.

Figure 14. Distribution of JRS Use across Sectors in Selected Countries[1]



Sources: Bundesagentur für Arbeit (Germany); Istituto Nazionale della Previdenza Sociale (Italy); Ministry of Labor (France, Spain, and Portugal); Uitvoeringsinstituut Werknemersverzekeringen (The Netherlands); and Revenue and Customs Department (United Kingdom).

[1]The measure is the share of JRSs in each sector as a share of total JRSs, divided by employment in each sector as a share of total employees in 2019. JRS measures vary by country. For Italy: Communication sector is included in trade, transport, and hospitality. JRS = job retention scheme; STW = short-time work scheme.

Table 3. Short-Time Work Schemes in Selected European Countries at the Height of the Pandemic

	FRANCE				GERMANY		SPAIN		ITALY		UK
	Pre-COVID	COVID			Pre-COVID	COVID	Pre-COVID	COVID	Pre-COVID	COVID	COVID
Name of program	*Activité partielle*	*Activité partielle*	*Activité partielle–droit commun*	*Activité partielle–longue durée*	*Kurzarbeit*		*ERTE*		*Cassa Integrazione Guadagni (CIGO and CIGS programs)*		*Job Retention Scheme*
Period		Mar–Dec 2020	From Jan 2021	From Jul 2020				Mar 2020–Jan 2021			March–December 2020
Replacement rate for worker	70% of gross (84% net), with floor at min wage		60% of gross (71% net), with floor at 90% of min wage	70% of gross (84% net), with floor at 90% of min wage	60% net (67% with children)	Increase to 70% (77%) from 4th month; 80% (87%) from 7th month (if 50%+ cut in hours)	70% of gross wage, 50% after 180 days		80 percent of gross foregone earnings	80 percent of gross foregone earnings	80% of gross salary of furloughed hours (partial hours allowed since July)
Cap on worker compensation	No	No	No	€4,606 (net)	No		€ 1,412		€1,199 gross if monthly salary higher than €2,159 (€998 otherwise)		No
Replacement rate for firms (share of cost covered by State)	Fixed amount per hour (about 90% of min wage)	100% before June and 85% since June; 100% for selected sectors until Jan 2021	60%; 100% for selected sectors until Jan 2021	85%	100% but employers pay 80% of SSC (about 27% of compensation at avg. salary)	100%	100%		100% but employers required to pay additional SSC	Additional SSC waived for 27 weeks; no previous contribution required	100% (Mar–Aug); 87.5% (Sept); 75% (Oct)
Cap on firm compensation	N/A	€30.3/hour or €4,608 at monthly basis (84% of net wage at 4½ times the minimum wage)			No		N/A		N/A		£2,500 (Mar–Aug); £2,187 (Sept); £1,875 (Oct)
Max duration	6 months	12 months	6 months	24 months (within 36 months)	6 months	Exceptional until end 2021	120–720 days (depending on contribution period)	No expiration during special ERTE measures	13 continuous weeks	42 weeks (to use up to Jan 2021)	8 months

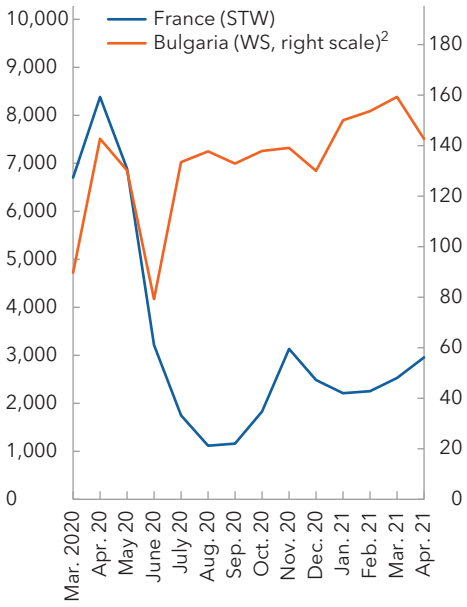
Sectors/firms eligible	All	All	All	All	All	All	Firms with at least 10 employees.		Medium and large size firms, mostly in manuf. and construction	All businesses (max of 36 weeks)	All
Work contracts eligible		No condition on type of contract, part or full time, seniority			Permanent or fixed-term contracts and paying SSC	Expanded to temporary workers			N/A	All employees eligible (except newly hired executives)	Any contract but must have been on payroll on 3/19/2020
Other conditions and additional support	N/A	State covers 100% training cost	State covers 70% training cost. SSC waived.	Collective agreement needed; reduction in hours cannot exceed 40% of regular hours. State covers 80% training cost	Min 1/3 of workforce subject to reduced hours of 10% or more; draw down working time account balances and exhaust leave balances before applying	Min 10% of workforce subject to reduced hours of 10% or more; requirement to draw down balances waived. Employer SSC waived until June 30, only 50% SSC until end 2021	Min 10% of firms' workforce is subject to reduced hours	Eligibility conditions eased as COVID-19 considered force majeure. No requirement for prior min. contrib. or reduction of accumulated entitlement.	Case-by-case authorization; consultation with unions required; agreement required only for some programs	Simplified access. Eased eligibility depends on turnover loss and need agreement with union (if 5+ employees). Prohibition of dismissal in some programs	There are rules on what the employee can do while on furlough. SSC waived over Mar–Jul. Job Retention Bonus of £1,000/ employee brought back from furlough and kept continuously employed during Nov 2020–Jan 2021 and paid on average £520 per month.

Source: IMF (2021a).
Note: SSC = social security contributions.

Box 4. JRS Use Over Time: Contrasting France with Bulgaria

In most European countries, the use of STWs declined when the containment restrictions were lifted. France's experience illustrates this pattern: the number of employees benefiting from the STWs declined rapidly when the initial containment measures were lifted. This trend was reinforced by a reduction in the replacement rate for some firms. The usage of STWs temporarily picked up in the fall when containment measures were reintroduced.

Box Figure 4.1. Number of Employees Benefiting from the JRS[1]
(Thousands of employees)



Sources: Direction de l'Animation de la Recherche, des Études et des Statistiques (France); and National Social Security Institute (Bulgaria).
[1]JRS = job retention schemes; STW = short-time work schemes; WS = wage subsidies.
[2]Data are still preliminary as some applications remain to be processed.

In Bulgaria, the adjustment in the design of the JRS led to a different time profile. Unlike in most European countries, the WS introduced in Bulgaria at the onset of the crisis was not designed to maximize take-up. Eligibility criteria were relatively strict and sectoral coverage narrow. Combined with some implementation delays (IMF 2021b), this led to low usage by EU standards. Nonetheless, as in France, when the initial containment measures were lifted, the number of employees benefitting from WS declined. This decline was rapidly reversed because the JRS was redesigned to increase the take-up (unlike in France). Eligibility criteria were relaxed, and the sectoral coverage was extended. Notably, the tourism sector, which faced a dramatic drop in international tourist arrivals, became eligible and even received a larger subsidy rate than other sectors (80 percent of the wage and employer social contributions instead of 60 percent).

The massive use of JRSs helps explain the much larger contraction in hours worked than in employment in European countries during the pandemic. The impact of JRSs on employment is difficult to estimate (OECD 2021) as it depends on their design[21] and implementation,[22] and because JRSs were often complemented by other policy measures that affect employment and increase the survival rate of firms (for example, borrower support measures and suspension of insolvency proceedings).[23] However, available evidence suggests that JRSs played a key role in explaining the dynamics of hours worked and employment across Europe during the pandemic, as highlighted in Chapters 4 and 5 (see Annex 3 for some econometric analysis supporting this). A recent analysis exploiting state-level high-frequency variation in STW take-up in Germany suggests that the expansion of the program during the pandemic prevented an increase in the unemployment rate of almost 3 percentage points (Aiyar and Dao 2021). The massive use of JRSs also helps explain the wage

[21] The design of STWs and WSs is not uniform across countries (OECD 2021, Table 3, and Annex 6.1), contributing to difference in their usage and overall impact.

[22] For example, past evidence shows that the impact of a STWs is larger when provided to firms that are credit constrained (Cahuc and others 2018).

[23] For the positive impact of STWs on firm survival in the past, see Giupponi and Landais (2020) for Italy, Cahuc and others (2018) for France, and Kopp and Siegenthaler (2019) for Switzerland.

dynamics during the pandemic—compensation per employee declined significantly although compensation per hour increased slightly (Anderton and others 2020, Giani and others 2020, OECD 2021, Romei and Arnold 2021).

The share of workers covered by JRSs declined in most countries as containment measures were gradually lifted. The support provided by JRSs was meant to be temporary to offset the impact of containment measures. Therefore, when containment measures were lifted and the need for support declined, some countries phased out their JRSs (for example, Albania, Russia) or started reducing their generosity. As a result, with a few exceptions (Box 4), the number of employees protected by JRSs fell rapidly in most countries (OECD 2021, Romei and Arnold 2021) but increased again when new containment measures were reintroduced toward the end of 2020 or in early 2021.

Given the severity of the shock, governments focused on providing massive support rapidly without worrying about side effects of JRSs. As JRSs were expected to be used only for a short period of time, their fiscal impact (Annex 3)[24] and the trade-off between preserving job matches in the short term and promoting efficient resource allocation over the medium term were overlooked or perceived as acceptable. For the same reason, the strategy regarding when, how, and how fast to phase out the JRSs was often left to be decided later. To inform the discussion on how labor policies should evolve (Chapter 8), it is important to stress that:

- A prolonged use of JRS may slow down the necessary reallocation across sectors by subsidizing unviable jobs and disincentivizing job search (Basso and others 2020, Blanchard, Philippon, and Pisani-Ferry 2020, Anderton and others 2020, Giani and others 2020). Moreover, support measures (including JRSs) contributed to a drop in bankruptcies in 2020 (for example, Cœuré 2021, IMF 2021d). Therefore, the withdrawal of support measures may trigger an increase in bankruptcies and in unemployment. As this impact is likely to be uneven across sectors, the associated sectoral reallocation could result in skill and occupational mismatches (see Box 5).

- The policy response to the pandemic may end up exacerbating labor market duality and inequality across generations. In Europe, temporary and part-time workers, young workers, workers with low levels of education, and those working in the informal economy, experienced the strongest decline in employment (Box 3, Anderton and others 2020, OECD 2021, and IMF 2021c).[25] This largely reflects that nonstandard workers account, on average, for about 40 percent of the employment in the sectors most affected by the pandemic (OECD 2020b).[26] However, nonstandard workers, who are often less protected by work-related benefits, were typically not eligible for JRSs—although some countries tried to fill that gap for at least some forms on nonstandard work (OECD 2020b, 2021). As a result, the pandemic and the policy response may have worsened the distributional impact of labor market duality, increased informal employment (Dewan and Ernst 2020, Anderton and others 2020, Dolado, Felgueroso, and Jimeno 2021), and—as the young rely more than other age groups on nonstandard forms of work—further increased inequality across generations (Chen and others 2018).

[24] STWs are more costly than unemployment benefits because of higher replacement rates and moral hazard but are less costly than WSs due to better targeting (Basso and others 2020, Cahuc and others 2021, OECD 2021).

[25] This is consistent with evidence from the GFC showing that JRSs mainly benefit permanent workers (Hijzen and Venn 2011, Boeri and Bruecker, 2011), while the burden of the adjustment falls on temporary workers and other nonstandard and vulnerable workers. As mentioned in Chapter 3, immigrants were also particularly vulnerable.

[26] Nonstandard jobs include such as self-employment, temporary job, and work through temporary agencies.

7. Labor Market Recovery Prospects

Given the uncharted waters of this pandemic, this chapter uses a multipronged approach to analyze recovery prospects. Drawing lessons from previous pandemic episodes is not straightforward as COVID-19 is significantly more global than most recent pandemics. The only exception perhaps is the Spanish Flu (1918), which was more virulent than COVID-19. The United Kingdom did suffer a decade of employment losses following the Spanish flu (the only country for which labor market data that far back are available, see Annex 4). But this period also captures the ending of World War I, which likely had significant effects on the UK labor market. Thus, in this chapter, we complement the case studies with a "macro" approach that looks at near-term unemployment prospects and a sectoral one that estimates potential reallocative needs over a longer horizon.

A. Near-Term Unemployment Prospects: What Does a Macro Okun's Law Approach Suggest?

Aggregate unemployment forecasts are based on a "shadow unemployment" approach.[27] This approach combines Okun's law predictions with projections of the usage of STWs and labor force participation to produce unemployment forecasts. The basic equation, shown below, establishes that the gap between the shadow unemployment, which is simply the unemployment implied by the Okun's law (Chapter 4), and the actual unemployment is explained by the usage of STWs, and other factors—such as those discussed in Chapter 4—represented by the parameter α (see Annex 4 for further details).

$$u_t = \frac{Unemployed_t^{shadow} - ShortTimeWorkers_t - \alpha_t}{ParticipationRate_t \times WorkingAgePopulation_t} \times 100.$$

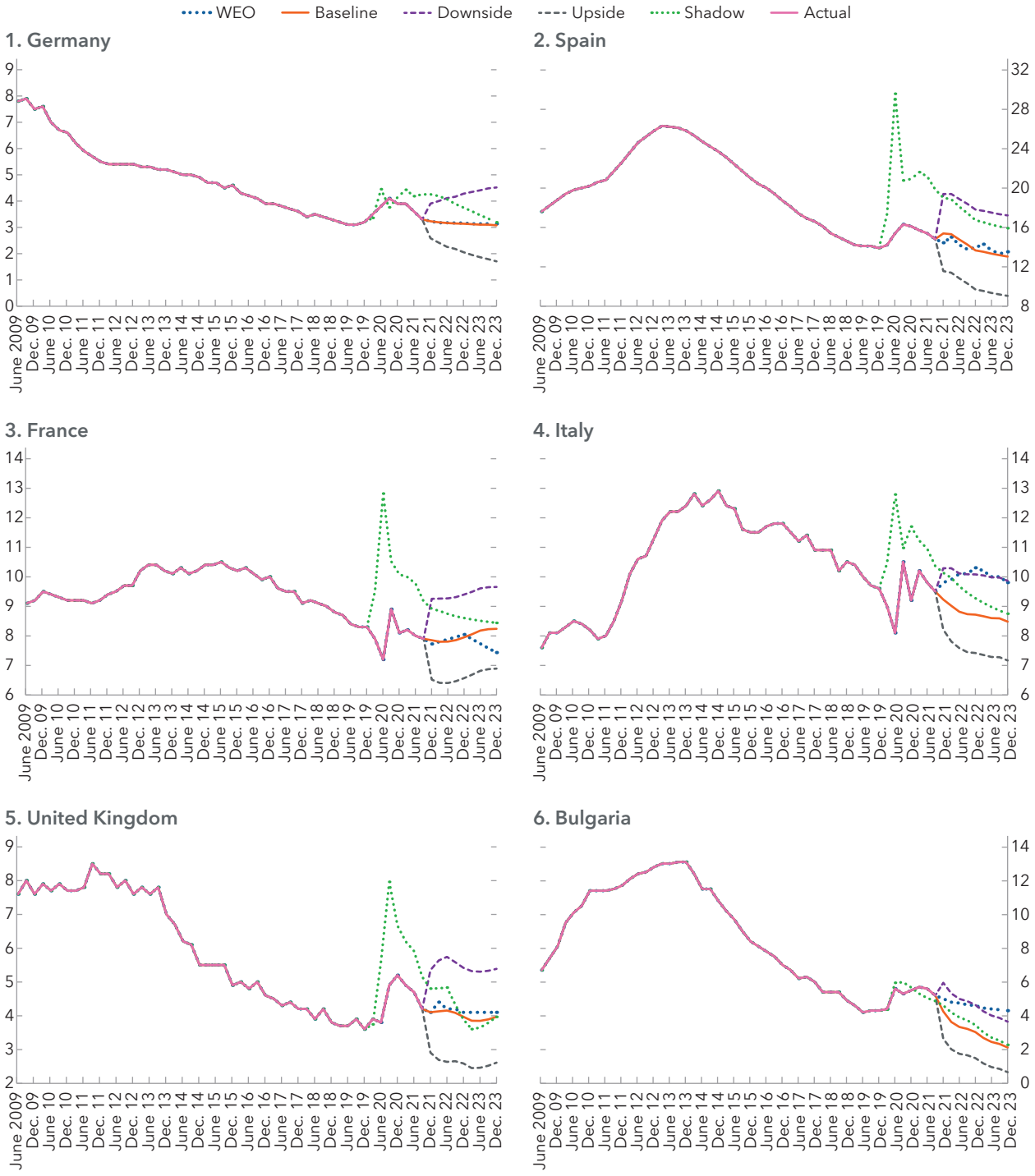
This approach requires producing forecasts for each of the components of the above equation. We first estimate the shadow unemployment rate, using historical unemployment data up to 2019Q4 combined with the estimated Okun's law coefficients, as well as the actual and projected GDP growth from the January 2022 *World Economic Outlook*. Then we project participation in STWs assuming that the reduction in the usage of the scheme is tied to the recovery of GDP. The labor force participation rate is assumed to recover to pre-pandemic trends, with the speed of recovery varying by country, and the projected working age population is taken from Eurostat. The parameter α is set so that the equation holds for the historical data, and it is assumed to converge to zero in the medium term. We look at scenarios which allow for growth disappointing or exceeding current expectations,[28] labor force dynamics to vary, and different values of α.

Under the baseline, unemployment rates are projected to decline, with only limited near-term upward pressures in some countries, although alternative scenarios could be less benign. The methodology is used to produce unemployment forecasts for the EA4 countries, plus the United Kingdom and Bulgaria. The selection of these countries aims at having a representative sample given data availability on STW participants. The results, which are reported in Figure 15, show that, in most countries, the shadow unemployment increased dramatically in 2020, reflecting the evolution of economic activity, while the changes in actual unemployment were more moderate. Focusing on the baseline, following a reduction in the first three quarters of 2021, the unemployment rate is projected to remain broadly stable (Germany and the United Kingdom) or decline further (Italy, Bulgaria, Spain), with some countries experiencing limited

[27] Broadly based on Stehn and others (2021).

[28] Effectively the downside growth scenario has most countries still below their pre-pandemic level of GDP by 2022Q4 whereas an upside scenario has all countries reaching their pre-pandemic levels of GDP by 2021Q4.

Figure 15. Unemployment Rate Forecasts Based on the "Shadow Unemployment" Approach
(Percent)



Sources: Eurostat; WEO database; and IMF staff calculations.

near-term upward pressures resulting from a reduction in STW usage and a further rebound in labor force participation. The projected continuing improvement in the labor market is consistent with recent developments in countries such as the United Kingdom, where the unwinding of JRS has not translated into a higher unemployment rate so far due to both strong labor demand, transitions into inactivity and potential

lags given notice periods. By end-2023, the unemployment rates in most countries are expected to be close to pre-pandemic levels. The path of unemployment could be significantly worse, however, in a downside growth scenario that leads to higher shadow unemployment or if the strong recovery of labor force participation persists.

B. Using a Sectoral Approach to Illustrate Potential Reallocation Needs over a Longer Horizon

Regardless of how and when the pandemic will be resolved, its highly uneven impact could lead to significant structural transformation in the long term. While some contact-intensive sectors have struggled to navigate the pandemic, others such as health services and ICT have thrived. The expansion of the latter sectors has been supported by the acceleration of automation and other technological advances, and changes in consumers' and workers' preferences from in-person towards online and/or at-home activities. Some of these shifts could become permanent, leading to structural economic transformation beyond that implied by pre-pandemic trends, both in terms of activity and employment.

The long-term potential reallocation effects are analyzed through ten-year scenario simulations using large euro area countries as examples. The simulations demonstrate how changes in the final demand for a particular good and service affect sectoral output and employment under two scenarios—"moderate impact" and "strong impact"—which differ in the extent of (long-term) structural changes resulting from the pandemic.[29] In both scenarios, increased telework and a preference for social distancing are the primary forces of economic change, resulting in lower demand (relative to pre-pandemic trends) for activities with high contact-intensity, business travel, and non-residential construction. Demand for better healthcare and virtual services, however, is expected to increase, with positive effects on health and ICT-related industries. The pandemic-induced effects are simulated as deviations from a pre-pandemic baseline—obtained from the European Centre for the Development of Vocational Training's (CEDEFOP) sectoral employment projections—which consider key long-term factors such as aging, globalization, and increasing automation.[30]

The simulation results confirm a sizeable shift in sectoral employment composition, from contact-intensive toward other service activities. Several sectors are expected to benefit from pandemic-induced structural changes in the long term, both in terms of output and employment. In particular, ICT and public and professional services are expected to see stronger growth in employment (relative to the baseline trends), in part due to higher demands for virtual activities and health services, respectively. In contrast, construction and certain contact-intensive sectors, such as trade, transportation, and hospitality, will see the largest declines in their employment shares (Figure 16). These results are broadly consistent with IMF (2021d), which measures reallocation through dispersion of sectoral stock returns. Although country-specific results are broadly consistent in terms of sectoral reallocation patterns, the magnitudes differ across the large euro area countries, potentially reflecting differences in economic structures and labor market institutions.[31] For instance, the expected decline in the employment share in trade, transportation, and hospitality is the largest for Spain, followed by Italy—the two countries with a relatively large service sector, as well as high shares of temporary and seasonal workers who likely have low labor market attachment. The long-term

[29] The scenario simulations closely follow the strategy and assumptions outlined in Ice, Rieley, and Rinde (2021). For further details, see Technical Appendix 5.

[30] Under this pre-pandemic baseline, the service sector is expected to expand its employment and significantly gains employment share over the next 10 years. Industrial and agricultural employment will continue to shrink, both in levels and in their contributions to total employment. For further details, see Technical Appendix 5.

[31] See Technical Appendix 5 for further details on country-specific results.

Figure 16. Potential Labor Reallocation by Sector and Occupation in the Long Term
(Percentage points)

Sources: Ice, Rieley, and Rinde (2021); Eurostat; CEDEFOP (2020); and IMF staff calculations.
Note: Simple average of Germany, Spain, France, and Italy. Baseline long-term employment is based on CEDEFOP (2020) Skills Forecast data. EA4 = Germany, Spain, France, and Italy.

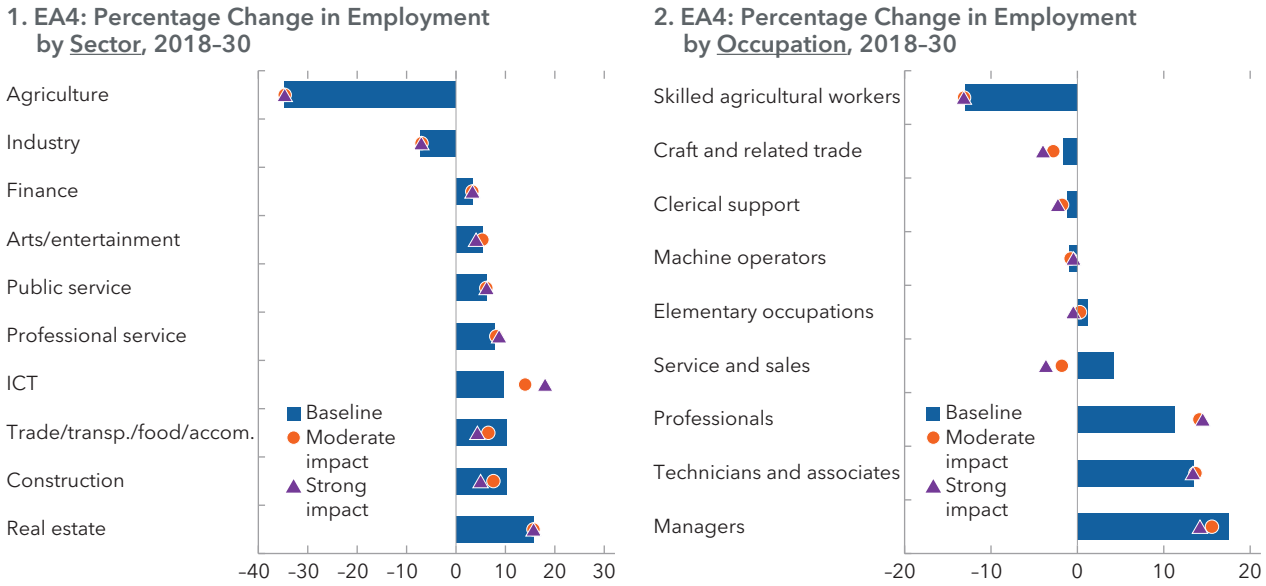
simulations are broadly consistent with the findings from alternative studies that focus on cross-sector reallocation in the near and medium term, although the magnitudes are smaller as the temporary crisis impact is expected to somewhat dissipate in the long term.[32]

The pandemic-induced sectoral reallocation will also lead to shifts in occupational staffing patterns. In line with lower demand for in-person services, the employment share of sales and service workers is set to decline the most (relative to the baseline trends) in the large four euro area countries. As for expanding occupations, all countries will see the largest increase in the employment share of professionals, particularly information and communication technology professionals, reflecting the shift toward teleworking and virtual services. These simulations highlight the need for policies to ensure a smooth labor market reallocation by supporting the match of occupational skills between expanding and contracting sectors (Box 5).

Pre-pandemic trends already implied significant reallocation needs, to which the pandemic is generally adding a small, but not insignificant amount, on top (Figure 17). Most of the sectors that were adversely impacted by the pandemic, for example, construction, trade, transportation, and hospitality, were set to grow strongly in the pre-pandemic baseline, with net job gains in the large four euro area countries projected at about 3½ million over the next 10 years. The pandemic, however, is estimated to result in job losses of 1¼

[32] See IMF (2021d) for the estimated potential sectoral reallocation for the European-wide region in the medium term.

Figure 17. Sectoral and Occupational Labor Reallocation: Baseline versus Post-Pandemic Projections
(Percent)



Sources: Eurostat; Ice, Rieley, and Rinde (2021); CEDEFOP (2020); and IMF staff calculations.
Note: Simple average of Germany, Spain, France, and Italy. Baseline long-term employment is based on CEDEFOP (2020) Skills Forecast data. EA4 = Germany, Spain, France, and Italy.

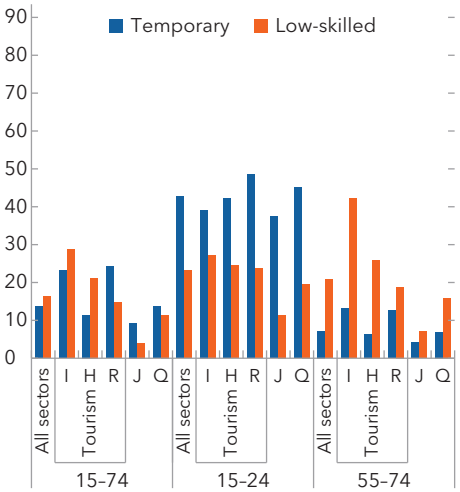
to 2 million (relative to the pre-pandemic baseline) in these sectors. In contrast, the job gains (relative to the baseline trends) in the expanding sectors are only about 250,000–500,000. As a result, the pandemic will likely result in a reduction of about 1 to 1½ million jobs from the net job gains foreseen under the pre-pandemic baseline (about 5 million over the 10-year period estimated by CEDEFOP). Across occupations, the estimated sizeable contraction in the demand for service and sales workers could potentially reverse the pre-pandemic trend, resulting in a loss of up to ½ million jobs in the large four euro area countries relative to the 2018 level.

The estimated long-term labor market changes are subject to a high degree of uncertainty. While the scenarios aim to capture the key structural transformations induced by the pandemic, other forces may exist that shape future employment trajectories beyond the implications of final demand changes considered here. For example, a similar analysis published by McKinsey Global Institute (Lund and others 2021) considers the potential long-term acceleration in the adoption of automation and artificial intelligence after the pandemic, in addition to the trends of rising remote work and e-commerce. Their analysis suggests that a total of more than 1 million workers in France, Germany, and Spain may need to switch occupations over the next 10 years as a result of the pandemic-induced staffing pattern changes. Similar to the findings of this paper, the expected reallocation largely involves transitions of low- and middle-skilled workers toward high-skilled professions, which highlights the challenge of managing labor market reallocation in the post-pandemic world.

Box 5. Skill and Occupational Mismatches and Unemployment Risk

The sectors set to be most affected in the long term by the pandemic tend to have a relatively higher share of lower-skilled workers, with many working under temporary contracts. The share of lower-skilled workers is particularly high in contact-intensive service sectors, which are expected to contract the most in the post-pandemic scenarios. On average in EU, almost three quarters of the workforce in accommodation and services (I) are in occupations with a higher share of lower-skilled workers. In transportation (H), more than 40 percent of the workers are in plant and machine operators, which are also low-skilled. These sectors also tend to rely more on temporary contracts, especially for younger workers, putting this group at a high risk of facing long unemployment spells.

Box Figure 5.1. Workers' Characteristics by Age Groups, EU28, 2019
(Percent of employees)

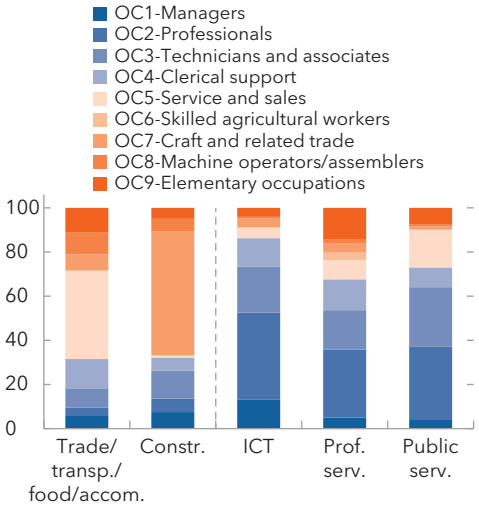


Sources: Eurostat; and IMF calculations.
Note: H = transportation and storage; I = accommodation and food service activities; J = information and communication; Q = human health and social work activities; R = arts, entertainment, and recreation.

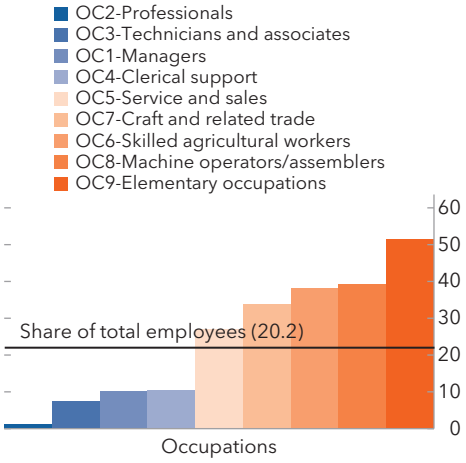
The expanding sectors may be able to absorb some of the displaced workers, but mostly the higher-skilled ones. The sectors that are expected to see the largest employment growth, such as ICT (J) and health services (Q), tend to employ more high-skilled workers: the prevalent occupations in those sectors are professionals and technicians and associate professionals (which accounts for 75 percent and 60 percent of sectoral employment, respectively). Health services (Q) has a quarter of workforce in the service and sales occupation, suggesting that it may be able to absorb some of workers from hospitality sectors.

Box Figure 5.2. EA4
(Percent of employees)

1. Occupational Compositions in Selected Sectors, 2018



2. Share of Low-Skilled Workers by Occupations, 2018[1]



Sources: Eurostat; and IMF staff calculations.
Note: EA4 = Germany, Spain, France, and Italy.
[1]Share of workers with at most a secondary education.

8. Designing Labor Market Policies amid High Uncertainty

The design of labor market policies to deal with the consequences of the COVID-19 crisis is subject to exceptional uncertainty. The development of effective vaccines against COVID-19 was remarkably fast. But the uneven deployment across countries and the emergence of new and more virulent variants of the virus engenders uncertainty as to when the pandemic will be finally contained. Moreover, as the macroeconomic, sectoral, and occupational forecasts in Chapter 7 show, the medium-term implications for the economy and the labor market are still highly uncertain. To guide the discussion of policy priorities going forward, it is useful to break down the uncertainty in two dimensions, capturing how the new normal will look like and how long it may take to get there.

The first dimension that will affect policy design is how the post-pandemic economic landscape will look like. The pandemic may trigger additional labor reallocation needs across sectors and occupations, and in the skills set required within occupations, from a combination of factors (for example, Barrero, Bloom, and Davis 2020, Bloom and Prettner 2020). First, the pandemic may lead to a permanent shift in preferences that would trigger a reallocation of production—and labor demand—across sectors. Second, some of the adjustments that firms had to undertake to operate during the pandemic (for example, broader use of remote work and virtual interactions, and accelerated deployment of AI and automation) may lead to permanent changes in their business practices. Chapter 7, Section B lays out two such scenarios: "moderate" and "strong." Alternatively, it is possible that consumer preferences and work organization practices will converge to their precrisis trends once the pandemic is resolved and social-distancing practices are abandoned. Also, as shown in Chapter 7, Section B, this would still imply large reallocative needs over the medium term given the transitions that were already in motion before the pandemic.[33]

The second dimension that will affect policy design is the length of the transition to the post-pandemic new normal. There is a high degree of uncertainty about when the pandemic will be resolved, as illustrated by the emergence of the Omicron variant in late-2021. Some countries may be able to bring the risk of resurgence in infections, or at least in severe infections, down to a manageable level in a relatively short timeline. Other countries may still face more disruptive waves of infections (due to slow vaccination progress, vaccine hesitancy, or poor effectiveness of vaccines against new variants) that require the reintroduction of containment measures for a protracted period.

A. Adjusting Job Retention Schemes

While JRSs have helped to preserve work relationships, how they should be adjusted for the recovery remains a key question. As shown in previous sections, JRS have played a critical role in this pandemic. And as Chapter 7 foreshadows, the pace of their unwinding will also matter for unemployment dynamics going forward, including importantly for the ease of reallocating workers between nonviable to viable jobs. Indeed, maintaining the generosity and extended coverage of some JRSs could hinder reallocation (especially via lower incentives for workers to search for new jobs in expanding sectors), while scaling back JRS too early could lead to inefficient bankruptcies and job losses.

[33] See, for instance, Lund and others (2021) and Lindsey, Rieley, and Rinde (2021).

As the recovery advances, the guiding principle should be to continue scaling back JRSs toward precrisis standards. Evidence during the GFC suggests that STWs are effective in preserving employment by firms that face severe temporary revenue losses and liquidity constraints, and the cost per saved job is lower than that of other employment policies (for example, Cahuc, Kramarz, and Nevoux, 2018 and 2021).[34] The pandemic induced a temporary—albeit prolonged and differentiated—shock to firms' revenue that justified the increase in the generosity and sectoral coverage of existing JRS and the introduction of new schemes (Chapter 6). As the direct effect of the pandemic and containment measures on economic activity fades, countries should normalize the generosity (for example, replacement rates and duration) of STWs to precrisis standards and phase out WSs, with remaining sector-specific support determined by health-related indicators and restrictions. Continued eligibility to generous STW conditions (for example, large or full share of the cost of unworked hours paid by the government) and access to WS support should be increasingly restricted to sectors that are still facing temporary and significant revenue losses as a direct consequence of ongoing sanitary restrictions.[35] Support through JRS should become time-limited in all circumstances, with clear maximum duration limits linked to the normalization of the sanitary situation. Once the crisis is over and working hours normalize, countries that intend to maintain STWs as part of their regulars policy toolkit should consider adopting experience rating schemes to avoid excessive use in some sectors (for example, related to seasonal work) and associated cross-subsidies (Burdett 1989, Cahuc and Nevoux 2017).

If recurrent waves require the reintroduction of containment measures, JRS may need to be selectively scaled up again. Simply extending the JRS conditions introduced at the height of the pandemic would be suboptimal and costly. While some scale up of JRS may be warranted, the schemes would need to be more targeted than in earlier waves and adjusted to encourage a swift resumption in working hours, including by:

- **Complementing STWs with targeted WSs to incentivize the normalization of working hours**. STWs helped firms absorb the revenue shock by providing a subsidy for unworked hours. However, these schemes are less suited to helping firms resume activity when they are still facing additional costs—or reduced labor productivity—related to sanitary restrictions and social distancing (for example, capacity limits in restaurants and retail stores). Introducing temporary and targeted WS, while gradually reducing the subsidy for unworked hours, would encourage the resumption of viable but still-unprofitable activity while some restrictions persist amid recurrent waves.[36] Given that a generalized WS would be too costly and inefficient, the subsidies can be targeted to certain workers (for example, those that were initially placed under reduced hours) or to specific sectors (for example, those that are more likely to face temporarily higher costs).[37]

- **Facilitating temporary work and encourage job search**. Some activities (for example, tourism, air transport, etc.) could face recurrent periods of subdued activity while the pandemic is not fully resolved, but others could face increased demand (for example, health care, online retail, delivery services, etc.). JRS should thus allow and encourage workers that face a significant reduction in working hours to temporarily take another job or become self-employed in sectors that may be more dynamic (with a correspondent adjustment in JRS subsidies), while maintaining their original contract. A broader review of social protection may be needed in some countries to avoid disincentives from losing access to other benefits if a temporary job is taken while the worker is registered in a JRS. To maximize the chances of job-to-job transitions if the

[34] For other assessments of STW schemes during the GFC, see Cahuc and Carcillo (2011), Hijzen and Venn 2011, Cooper, Meyer, and Schott (2017), Giupponi and Landais (2018), and Kopp and Siegenthaler (2019).

[35] Cahuc, Kramarz, and Nevoux (2021) find that STWs led to a reduction in working hours but did not necessarily preserve employment in firms with more limited revenue losses, reducing their overall efficiency. Given that WSs can subsidize hours worked, employers have incentives to claim support for all employees, regardless of the need to cut on working hours, reducing the efficiency of the subsidies.

[36] Even if the marginal profit of resumed hours (before subsidies) is negative, increasing working hours can be socially desirable and thus worth subsidizing (Blanchard and others 2020).

[37] Targeted wage subsidies can be easily implemented as temporary reductions in social security contributions, but the amount may be insufficient or its implementation not possible for other institutional constraints (for example, contributions earmarked to finance some programs).

initial work relationship eventually becomes inviable, JRS benefits need to be incentive-compatible with the job search (for example, by reducing the STWs replacement rates for workers, aligning them with that under regular unemployment).

The need to further adjust JRSs would be reinforced if pandemic-induced reallocation needs are large. If the crisis is deemed to have significantly accentuated pre-pandemic reallocation needs, JRSs would need to be increasingly targeted at supporting jobs that are likely to survive.[38] For STWs specifically, firms would have to absorb an increasing part of the labor costs of reduced hours so that the support gets directed to jobs that are deemed viable. To avoid hurting firms' liquidity, the additional costs faced by employers do not need to be paid upfront (that is, it can be done through delayed payments or financed with zero-interest loans). Incentivizing training while registered at STWs would be even more important in a scenario of sizable pandemic-induced reallocation needs—although the experience with training requirements and incentives has been disappointing in the past, underscoring the challenge in successfully doing this (Hijzen and Venn 2011, Mosley 2020).[39]

B. Facilitating Reallocation

As significant reallocation over the medium term was already expected before the pandemic, facilitating job-to-job transitions is a key policy priority. As discussed in Chapter 7, precrisis trends (including from digitalization, automation, and climate change policies) were already expected to result in significant reallocation of workers across sectors and occupations. While uncertainty remains high, the pandemic is likely to have further accentuated those reallocation needs. Past experiences suggest that a critical element for successful labor reallocation following large shocks is to minimize transitions through spells of unemployment or inactivity, especially for lower-skilled workers (Annex 2). Hence there will need to be a gradual transition from protecting jobs to supporting workers in shrinking industries move to firms with post-crisis viability.

Pursuing reforms to increase the flexibility of labor and product markets and facilitating the movement of capital will be important to the reallocative process. The rewards of increasing product and labor market flexibility can be significant, especially if pandemic-induced reallocation needs are large. Easing regulation and entry barriers where they are still pervasive would facilitate the movement of factors across sectors, although the benefits would only be seen over the medium term. Past evidence from large macroeconomic shocks also suggests that higher labor market flexibility can facilitate job-to-job flows (Annex 2). Labor market reforms identified before the pandemic as critical for microeconomic flexibility—notably on job protection regulation, collective bargaining, minimum wages, unemployment insurance, and active labor market policies (ALMPs) (Aiyar and others 2019)—should be pursued as soon as possible. Moreover, while not within the domain of labor market policies, measures to ensure rapid and efficient bankruptcy procedures would help release and redirect resources toward growing sectors, supporting hiring. Incentives to create a new firms and start-ups should be reinforced, as job creation rates are higher in youngest companies (Haltiwanger, Jarmin, and Miranda 2013). Some countries introduced programs targeted at self-employed (Lithuania and The Netherlands) or unemployed (Belgium and Estonia) that wanted to start their own businesses (OECD 2021).

[38] There is some evidence that prolonged reliance on short-time work schemes can be associated with insufficient job creation and reallocation (Cahuc and Carcillo 2011; Cooper and others 2017).

[39] During the COVID-19 crisis, many countries encouraged training for workers registered in STW schemes by providing financial incentives to firms and workers. The experience in France was quite successful, with about 20 percent of workers on STW participating in training. One reason for the high enrollment rate is that it largely relied on existing programs for adult learning (FNE Formation) and the training expenses were fully reimbursed to employers, while employees registered in training were paid 100 percent of their usual wage (OECD 2021).

Temporary, targeted, and well-designed hiring subsidies can facilitate job creation and the needed reallocation of workers while alleviating the burden of the crisis on the most vulnerable. Evidence from the GFC suggests that temporary hiring subsidies can be effective in boosting job creation amid subdued labor demand, especially if they are targeted (Farooq and Kugler 2015, Neumark and Grijalva 2017, and Cahuc, Carcillo, and Le Barbanchon 2019). They can also be more effective than public training or works programs in bringing targeted workers into employment and keeping them attached to the workforce over the longer run (Diez and others 2020). Their use can be thus justified where firms with positive business prospects remain reluctant to hire new workers amid still-high uncertainty related to the pandemic and its repercussions, especially in countries with high hiring and firing costs. Hiring subsidies can also facilitate reallocation by helping firms cope with the cost of reskilling workers who switch sectors or occupations, thus providing a valuable tool to limit scarring effects on some segments of the workforce. To ensure they are effective and efficient, hiring subsidies should be temporary and targeted at those that would face more severe long-lasting consequences if not supported. This includes, notably, unemployed workers (especially low-skilled ones, Box 5), those who left the labor force during the pandemic, and first-time entrants to the labor market.[40] But there may also be a case to target certain employed workers at clear high risk of losing their job, such as those on STW with persistently reduced hours. The subsidies could also be made conditional on positive net job creation, to prevent substitution between existing workers with subsidized new hires.

Temporary wage-loss insurance schemes and geographical mobility subsidies can be considered to incentivize workers that need to switch sectors or occupations, and to address regional reallocation needs. Displaced workers may be hesitant to consider jobs in other sectors or occupations, especially if the move implies a drop in earnings (IMF 2021c) or other costs (for example, a geographical move). Temporary subsides (wage-loss insurance) can incentivize workers to accept lower paying offers in other firms, avoiding detrimental transitions through unemployment spells (Basso and others 2020). Subsidies can also be used to incentivize workers to move to other areas with better labor prospects, addressing a well-documented information failure (Aiyar and others 2019). As the subsidy would be temporary, the program should be targeted at job matches where wages can be expected to grow in line with productivity gains (for example, from the acquisition of new skills). Otherwise, the worker could end up in a low-wage trap, return to unemployment, or drop out from the labor force when the subsidy expires. Indeed, the limited evidence from past experiences suggests that complementing wage-loss insurance with training is key for its success (Robins, Michalopoulos, and Foley 2008; Cahuc 2018).

Policies to address the likely rising skill-mismatch problems by ensuring efficient reskilling and upskilling of the workforce would be critical, including a focus on digital skills. Previous evidence suggests that recessions tend to accelerate the adoption of automation technologies (Hershbein and Kahn 2018; Jaimovich and Siu 2020). Some countries were facing significant skill-mismatches, especially among lower-skilled workers, even before the pandemic erupted (Adalet McGowan and Andrews, 2015, OECD 2016, Miyamoto and Suphaphiphat 2020) and recent studies suggest that COVID-19-induced automation may be particularly harmful for some demographic groups, such as women with low education levels (Chernoff and Warman 2020) and low-skilled older workers. As workers with larger training needs may be financially constrained and expanding firms would still face significant uncertainty, public support for training programs would help narrow this training gap.[41] This should notably include financial support for general (as opposed to job-specific) training, which firms have little incentives to provide. Countries with mandatory individual training accounts may consider boosting the eligibility and funding of those programs. To ensure the supply of available general training is aligned with market needs, especially as knowledge of which skills will be more

[40] Several of the hiring subsidy schemes expanded or introduced in European countries during the pandemic were targeted at youth (France, Greece, Hungary, Ireland, Luxembourg, Portugal, Romania, and the United Kingdom) while a few (Portugal and Romania) targeted older workers (OECD 2021).

[41] The social return from subsidizing training can be larger than the return on their education (from higher productivity and likelihood of matching with job seekers) as better trained workers make other workers more productive as well (Kolesnikova 2010, Moretti 2004, Acemoglu and Angrist 2000).

demanded in a context of significant reallocation (Dolado, Felgueroso, and Jimeno 2021), involving the private sector will be important. In countries where general training programs are underdeveloped, there may be a case for training subsidies to help firms cope with initially low productivity of workers that are switching sectors or need to get up to speed with the use of new technologies and digitalization.[42] They should nonetheless be temporary, targeted to smaller firms (which invest proportionally less in training, OECD 2019) and lower-skilled workers (OECD 2019; Coueffe 2021). A deep reform of curricula in schools and vocational training centers, and incentivizing the hiring of apprentices by firms, can also help in acquiring the relevant skills. Particular attention will be needed to narrow the still-large digital skill gap in many EU countries (Miyamoto and Suphaphiphat 2020). In this regard, the Next Generation EU, which allocates significant resources to facilitate the digital transition, could play an important role in providing needed educational and physical infrastructure.[43]

C. Minimizing Workforce Scars and Protecting the Vulnerable

Maintaining adequate income support for workers not covered by JRSs until the sanitary crisis is fully resolved and hiring resumes should be a key policy priority. As discussed in Chapter 6 and similar to previous crises, the consequences of the pandemic have been worse for workers that are typically excluded from JRSs. It is therefore important that the duration of regular unemployment benefits (UB) and other social transfers do not expire too soon—including coverage for nonstandard workers that was granted during the crisis in some countries. In countries where the UB replacement rates are low, temporary top-ups for low-wage workers may be needed to avoid further increases in poverty and inequality.

A policy effort will be needed to support first-time entrants to the labor market, the long-term unemployed, and those who left the labor market during the pandemic. Most countries had already experienced a prolonged period of severely depressed economic activity, which adversely affected a generation of youth entering the labor market during this period.[44] In addition, ALMPs that were discontinued during the pandemic due to containment measures should be reinstated (IMF 2020d) and a specific battery of ALMPs and employment incentives should be deployed to support targeted groups such as first-time entrants to the labor market.[45] Providing job-search support should help but will likely not be enough in this context. Dedicated ALMPs and incentives will also be needed to help those who were already unemployed when the crisis erupted and those who were forced to leave the labor market due to the pandemic (for example, to be caregivers of family members who needed to isolate themselves).[46]

The general nature, coverage, and characteristics of the safety net and social protection institutions will need a rethink once the pandemic is in the rear-view mirror. In line with recent trends, many of the jobs created during the pandemic were provided by gig or independent workers (for example, on e-commerce, development of digital platforms, delivery riders, etc.; Dewan and Ernst 2020), who are often excluded from work-related benefits and safety nets available for standard workers. As it is likely that this reflects a more persistent change in the structure of employment,[47] safety nets will need to be adjusted. Indeed,

[42] Some European countries already have policies in this direction. For example, the Swedish government cooperates closely with industries and businesses to identify present and future needs in digital skills and develop policies to promote training in required digital competencies. Luxembourg offered one-on-one and group training sessions at affordable prices to low-income individuals and elderly (Miyamoto and Suphaphiphat 2020).

[43] Improving high-speed internet access would help increase teleworkability, potentially easing the reallocation of labor across occupations and industries.

[44] There is ample evidence that young people who reach the labor market in recessions tend to face negative long-term implications (Schwandt and von Wachter 2019, Choi, Choi, and Son 2020).

[45] ALMPs may also help address the geographic employment mismatch that may accompany sectoral reallocation, facilitating labor reallocation (Aiyar and others 2019).

[46] Baylis and others (2020), Caselli and others (2021), Su and Russell (2021), Dolado and others (2021).

[47] Gaps in worker coverage already contributed to rising inequality across generations in the aftermath of the GFC (Chen and others 2018).

making sure the social safety nets and social protection institutions cover the vulnerable—young, temporary, low-skilled, and gig/independent workers—is critical. Introducing or making permanent the increased social protection coverage introduced during the pandemic in some countries (for example, extension of unemployment benefits to self-employed or temporary workers) can provide timely support during future shocks (IMF 2020d). However, the increase in replacement rates and extensions of duration introduced during the pandemic should be eventually reversed—except in countries where they were particularly low before the crisis.

9. Concluding Considerations

Extraordinary policy support has been very effective in preventing a massive increase in unemployment, despite the sharp contraction in economic activity in 2020. However, labor market outcomes have varied significantly across countries and sectors, reflecting structural differences, policy design, and initial conditions. Moreover, some segments of workers—especially the young, low skilled, and those with temporary work arrangements—have been more susceptible to job loss given their disproportionate share in hard-hit contact-intensive services.

More recently, as demonstrated by the EU unemployment rate declining to a record-low level in 2021Q4, labor markets have recovered even more rapidly than economic activity, but significant policy challenges remain. The use of JRSs—although having declined rapidly—remains material and total hours worked are still below precrisis levels in some countries. Moreover, there is a high degree of heterogeneity across sectors, as some have recovered strongly, but others—mostly contact-intensive services—are still lagging behind. This suggests potential for some modest upward pressures on unemployment once policy support is withdrawn and inactivity declines further, while underemployment remains elevated in some countries. The composition and trajectory of employment is also highly uncertain as it depends on the extent of pandemic-induced structural transformation. In particular, persistent changes in consumer and business preferences towards social distancing and telework would shift final demand away from some contact-intensive services and non-residential construction towards sectors that are likely to benefit from accelerated automation and digitalization.

Precrisis trends already suggested significant reallocation needs and the pandemic is expected to reinforce some of them. For example, sectors such as ICT and professional services, which were expected to grow strongly under the pre-pandemic baseline, are likely to expand further due to accelerated automation and digitalization. At the same time, the health crisis is likely to slow down employment growth of sectors that were adversely impacted by the pandemic, such as construction, trade, transportation, and hospitality, even though these sectors are still expected to grow rapidly in the long term. In addition, the pandemic could lead to shifts in occupational staffing patterns with employment shares of technicians and professionals likely to increase while those of services, sales and trade likely to decline.

Sizable reallocation needs underscore the importance of a policy focus on facilitating job-to-job transitions to prevent large flows into unemployment and inactivity. Remaining JRSs will need to be phased out carefully and adjusted to incentivize training, on-the-job search, and facilitate additional temporary employment when hours worked remain well below normal levels. Labor and product market flexibility will undoubtedly be essential to smoothly facilitate the necessary transitions. More broadly, a host of policy measures will be needed to enhance job search, incentivize hiring, and promote training and reskilling, including to narrow the large digital-skill gap. ALMPs and employment incentives should be deployed to support first-time entrants, the long-term unemployed, and inactive individuals that were forced to leave the labor market when the pandemic erupted.

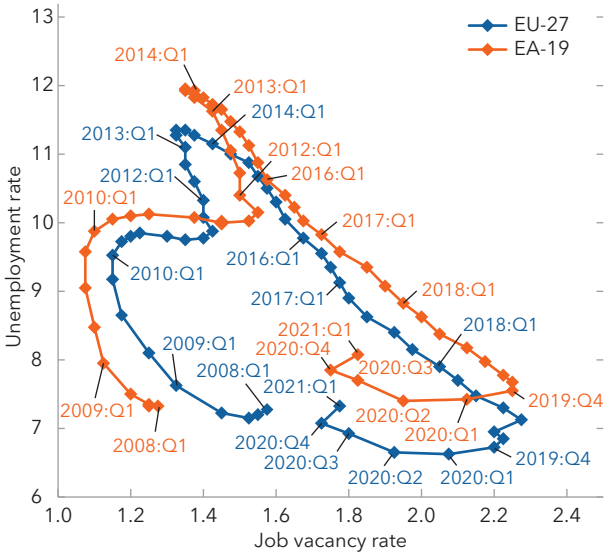
The general nature, coverage, and characteristics of the safety net and social protection institutions will need a rethink once the pandemic is in the rear-view mirror. Many of the jobs created during the pandemic were provided by gig or independent workers, who are often excluded from work-related benefits and safety nets available for standard workers. The extent to which this reflects a more persistent change in the structure of employment, safety nets will need to be adjusted accordingly. Indeed, making sure the social safety nets and social protection institutions cover the vulnerable—young, temporary, low-skilled, and gig/independent workers—is critical to making sure nobody is left behind.

Annex 1. Beveridge Curve during the COVID-19 Pandemic

Between 2013 and 2019, the European labor market has been steadily tightening with falling unemployment rates and rising job vacancy rates. The vacancies-to-unemployment ratio, an indicator of labor market tightness, has been increasing as the EU economy was moving down along the Beveridge curve.[1] In 2019, the labor market began showing signs of slowing down as both the vacancy and unemployment rates levelled out.

During the pandemic, there was a sharp decline in the job vacancy rate and just a slight uptick in the unemployment rate, resulting in an inward shift in the EU Beveridge curve. The inward shift was driven by a combination of the widespread use of JRSs, which have kept the unemployment rate low, and strict lockdowns accompanied by unprecedented uncertainty that led to a drop in the vacancy rate. During the GFC, the fall in the vacancy rate was of the same magnitude, while the unemployment rate reacted much more strongly, increasing by 2.5 percentage points compared to just 0.4 percentage points during 2020.

Annex Figure 1.1. Europe: Beveridge Curve
(Percent)



Sources: Eurostat; and IMF staff calculations.
Note: Job vacancy rate is the share of total job posts (occupied and vacant) that are vacant. Both rates are four-quarter averages.

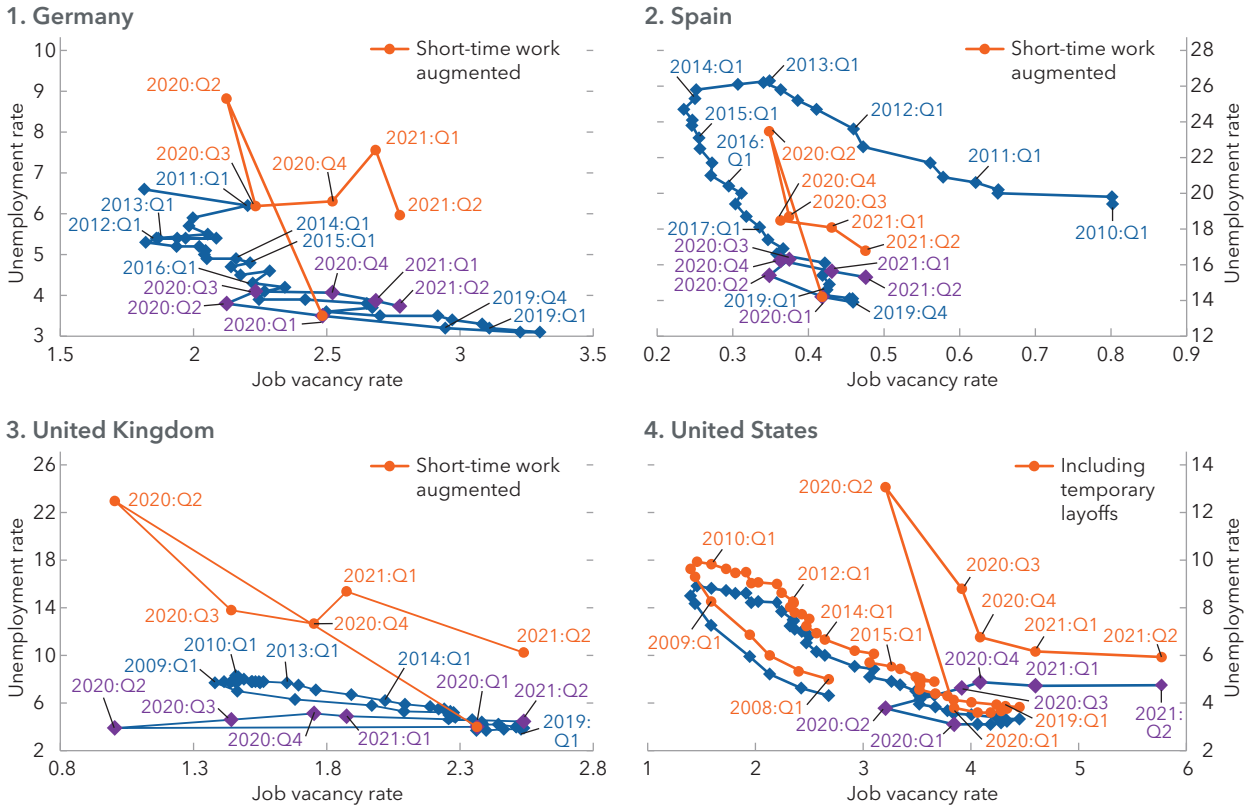
There was considerable heterogeneity in the dynamics of the Beveridge curve across countries in 2020 (Annex Figures 1.1 and 1.2). In both Germany and Spain, there was an upward movement along the Beveridge curve, except for a slight inward deviation from the curve in 2020Q2 in the case of Spain. The Beveridge curve for the United Kingdom seems to have shifted inward. In 2020Q2, the vacancy rate dropped far below the levels observed during the global financial crisis while the unemployment rate barely moved, mostly due to the introduction of the job retention scheme in March 2020. It was followed by a partial rebound in the vacancy rate and a slight increase in the unemployment rate. In the United States, the vacancy rate fell in 2020Q2 but fully recovered in the subsequent quarters, while the unemployment rate (excluding temporary layoffs[2]) kept rising steadily. By end-2020, the US Beveridge curve started showing the first signs of an outward shift.

After accounting for workers covered by short-time work schemes, Beveridge curves of Germany, Spain and the United Kingdom all displayed an outward shift in 2020Q2. When augmented by the full-time equivalent number of workers covered by short-time work programs—assuming that those workers would have

[1] Beveridge curve captures the empirical inverse relationship between the unemployment rate and the vacancy rate (Blanchard and Diamond 1989). Movements along the curve are typically occur over the business cycle, while shifts are associated with structural changes, such as changes in labor market matching efficiency. An outward shift indicates a decline in matching efficiency, that is, higher unemployment rate at a given vacancy rate. However, shifts can also be temporary and driven by changes in worker search intensity and labor force participation (Diamond 2013).

[2] To ensure cross-country comparability, workers on temporary layoffs, counted as unemployed by the US Bureau of Labor Statistics, are excluded.

Annex Figure 1.2. Beveridge Curves
(Percent)



Sources: Sources: Eurostat; Bureau of Labor Statistics (United States); Office for National Statistics and HMRC Coronavirus Job Retention Scheme statistics (United Kingdom); Bundesagentür für Arbeit (Germany); Ministerio de Trabajo y Economia Social (Spain); Haver Analytics; and IMF staff calculations.
Note: Job vacancy rate is the share of total job openings in the labor force.

been otherwise laid off—the unemployment rates at the peak of the pandemic climbed much higher. In the United Kingdom, the augmented unemployment rate in 2020Q2 was almost 24 percent, 20 percentage points above the standard unemployment rate level. Germany's unemployment rate more than doubled, from 4.2 to 9.5 percent. In the case of Spain, the augmented unemployment rate in 2020Q2 stood at almost 23 percent, a third of which corresponded to workers on short-time work. Similarly, the US Beveridge curve shifted outward in 2020Q2 as the unemployment rate soared to 13 percent, with temporarily laid-off workers accounting for almost 70 percent of all unemployed. By mid-2021, job vacancy rates had bounced back and rose above the pre-pandemic levels in all four countries, while the decline in the unemployment rate was only marginal, which could be indicative of worsening skill and occupational mismatches (Box 5).

We estimate pre-COVID Beveridge curves for European countries and the United States to produce out-of-sample forecasts for the unemployment rate during the pandemic. The sample includes 26 European countries and the United States over the period between 2001Q1 and 2019Q4 (or the earliest available). For each country, we estimate the following equation:

$$log(u_t) = \alpha + \beta log(v_t) + \sum_s \gamma_s D_s + \sum_s \gamma_s D_s \times log(v_t) + \epsilon_t,$$

Annex Table 1.1. Regression Results for Selected Countries

Dependent variable: log (Unemployment rate)				
	DEU	ESP	GBR	USA
log(Vacancy rate)	–1.055*** (0.0387)	–0.361*** (0.0223)	–1.230*** (0.0452)	–0.990*** (0.0450)
D x log(Vacancy rate)		–0.521*** (0.0399)		–0.132** (0.0656)
D	–0.172*** (0.0372)	–0.926*** (0.0399)		0.435*** (0.0700)
Constant	2.521*** (0.0361)	2.868*** (0.0178)	2.551*** (0.0305)	2.554*** (0.0418)
Observations	37	40	75	76
R^2	0.938	0.977	0.893	0.965
Shift date	2012Q1	2013Q4		2010Q1

Sources: Eurostat; Bureau of Labor Statistics (United States); and IMF staff calculations.
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

where $log(u_t)$ is the log of the unemployment rate, $log(v_t)$ is the log of vacancy rate (defined as a ratio of vacancies[3] to labor force), D_s is a shift dummy variable, and $\beta + \sum_s \gamma_s D_s$ is the elasticity of the unemployment rate with respect to the vacancy rate. Similar to Bova, Tovar Jalles, and Kolerus (2018), we apply Gregory and Hansen (1996) procedure to detect the presence of shifts in the Beveridge curve. Out of 27 countries, 14 exhibit a shift of their respective Beveridge curve. In particular, Germany and Spain display inward shifts (in 2012Q1 and 2013Q4, respectively), while in the United States there was an outward shift in 2010Q1. No shift is detected in the case of the United Kingdom. The estimated elasticities vary significantly across countries (Annex Table 1.1). The unemployment rate is the most responsive to changes in the vacancy rate in the United Kingdom (an elasticity of 1.2 in absolute value), followed by Germany and the United States, with elasticities of about 1.1 in absolute value. In Spain, the elasticity is the lowest out of the four countries, yet significantly higher than prior to the 2013Q4.

The country-by-country estimates are used to generate out-of-sample forecasts for the unemployment rate in 2020Q1–2020Q4. The estimation indicates that the predicted response of the unemployment rate in Europe was on average larger than the actual in 2020Q2, with significant heterogeneity across countries (Annex Figure 1.3). Lower-than-predicted response of the unemployment rate can be explained by the unprecedented expansion of STWs, in particular, in Poland, Portugal, Spain, and the United Kingdom. In Germany, the predicted change in the unemployment rate was in line with the actual change.[4] As for the United States, the actual change in the unemployment rate (excluding temporary layoffs) was slightly lower than the predicted in 2020Q2. By the end of 2020, the positive gap between predicted and actual changes narrowed and even turned negative for some countries (Denmark, Norway).

When augmented by the short-time work schemes, unemployment rates were generally higher than predicted by the Beveridge curve. In Germany and the United Kingdom, the augmented unemployment rates in 2020Q2 were about two times higher than what vacancy-unemployment relationship would

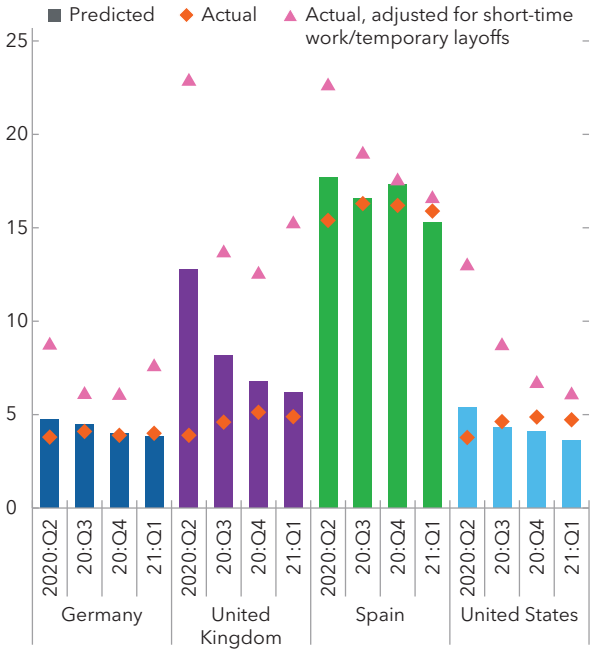
[3] Job vacancies data for European countries cover industry, construction, and services except activities of households as employers and extra-territorial organizations and bodies, and all private job openings for the United States.

[4] Radde and Saxena (2020) find that large gaps have opened up between the "shadow" unemployment rates and the actual unemployment in France, Italy, and Spain, but not in Germany.

Annex Figure 1.3. Changes in Unemployment Rate
(Percentage points; relative to 2019 average)

Sources: Eurostat; Bureau of Labor Statistics (United States); Office for National Statistics (United Kingdom); and IMF staff calculations.
Note: United States: actual is the BLS unemployment rate excluding temporary layoffs.

Annex Figure 1.4. Unemployment Rate
(Percent of labor force)



Sources: Eurostat; Bureau of Labor Statistics (United States); Office for National Statistics and HMRC Coronavirus Job Retention Scheme statistics (United Kingdom); Bundesagentür für Arbeit (Germany); Ministerio de Trabajo y Economia Social (Spain); Haver Analytics; and IMF staff calculations.
Note: United States: actual is the BLS unemployment rate excluding temporary layoffs.

predict. In Spain, the predicted unemployment rate in 2020Q2 was 18 percent, 5 percentage points below the actual augmented unemployment rate. Such higher-than-predicted response of the augmented unemployment rate could reflect the over-use STWs due to lockdowns. The gap between the augmented and predicted unemployment rates began to shrink in 2020Q3 as the take up of short-time work schemes started to decline (Annex Figure 1.4).

Annex 2. Labor Reallocation: What Can We Learn from Past Experience?

This annex discusses several large labor reallocation episodes following sizable macroeconomic shocks. Although the "success element" of these episodes is often elusive and varies significantly across countries, the evidence suggests that higher labor and product market flexibility; and sound macroeconomic policies that support job creation, enhance skills, and improve the business environment are important. This is because such policies help facilitate job-to-job flows, especially to sectors where high degrees of regular job churn allow the reallocation of workers with limited disruption. At the same time, even with highly flexible labor markets, reallocation appears to be less successful among the low-skilled (for example, construction workers) in the absence of enhanced training and reskilling programs, especially during episodes of sizable shocks and severe balance sheet distress.

Finland

Trigger/reallocative shock: Following a period of a strong economic boom, Finland entered a prolonged recession in 1991–1993 due to a combination of large macroeconomic shocks—the collapse of the Soviet Union, decreasing terms of trade, and rising European interest rates.

Outcome: In the initial phase of the shock, unemployment increased sharply from 3 percent in the early 1990s to 18 percent in four years with some 450,000 jobs destroyed. The construction industry was severely hit, shedding about 50 percent of jobs (a net loss of 40,000 jobs) between 1990 and 1994. There were also sizeable employment declines in manufacturing, retail trade, hotels and restaurants, and financial services. Although employment increased rapidly during the recovery after 1994, the increase in employment occurred in different sectors than the ones from which jobs had been destroyed (Kilponen and others 2010). In this regard, employment increased the most in business services and in the manufacturing of equipment, particularly in the electronics industry. On the other hand, less than half of the employment decline in construction and only a third of the employment decline in retail trade were eventually recovered after 1994.

While resources were reallocated toward more productive firms and sectors—along the lines of a "creative destruction" process, the rapid structural change in employment also created a skill mismatch problem in the labor market. In this regard, youth unemployment increased and some of the low-skilled unemployed, including in construction, were poorly equipped to find jobs in the growing sectors and left the labor force. Uneven regional development also contributed to the mismatch problem.

Policies: The reallocation of labor to high-productivity sectors, which persisted for several years, was helped by a subsequent rapid increase in the quality of labor input during the 1990s owing in part to improvements in Finnish education system. For instance, the proportion of workers with education beyond the compulsory level rose from about two-thirds in 1990 to above 80 percent by 2003.[1] In 2000, the fraction of engineering graduates in tertiary education in Finland was one of the highest among OECD countries. Moreover, high competition in product markets and high R&D spending—both by businesses and government—also supported job creation and reallocation.

[1] Finnish students were among the top performers in the 2000 PISA (Programme for International Student Assessment).

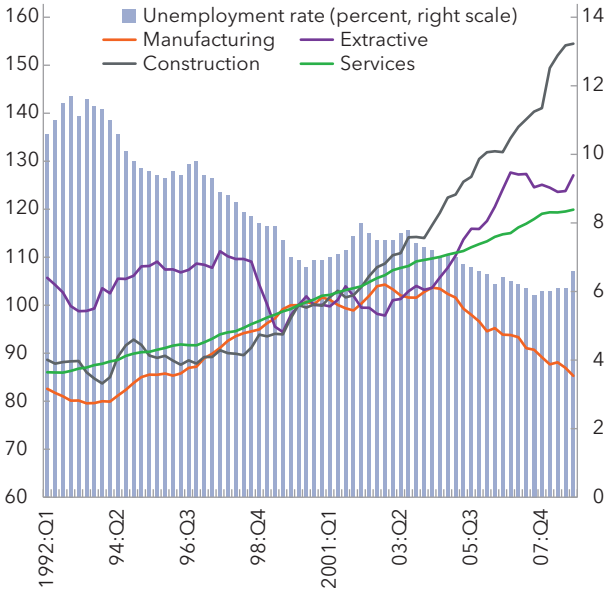
Canada

Trigger/reallocative shock: Soaring commodity prices and the sharp appreciation of the Canadian dollar in the mid-2000s increased foreign competition and costs for the manufacturing sector.

Outcome: Canada experienced a large transfer of capital and labor from the manufacturing-based central provinces to natural resource-based western provinces and non-tradable sectors, including construction. With the manufacturing sector losing price competitiveness, the sector's share in total GVA declined by about 2 percentage points in 2004–08 while its employment loss amounted to 16 percent in the same period. However, significant employment gains in extractive industries, construction, and services, kept unemployment rates on a downward path across all provinces.

Policies: The adjustment process appeared to have been much smoother than previous commodity-price cycles owing to pro-competition regulation, a reform of the employment insurance regime, improved labor market information, and easier access to foreign goods, services, and workers, which increased product and labor markets flexibility and resulted in job-to-job transitions without significant disruptions (Dupuis and Marcil 2008). Overall, implied job flows resulting from reallocation ended up being much lower than regular job churn in individual sectors, suggesting that–while not as dynamic as the United States–Canada had sufficiently flexible labor markets to absorb significant sectoral shocks without creating a high level of frictional unemployment (Balakrishnan 2008) (Annex Figure 2.1). Strong macroeconomic policies, which defused potential pressures on costs and prices by anchoring inflation expectations and making the public sector a net saver rather than a net spender, also supported the reallocation.

Annex Figure 2.1. Canada: Sectoral Employment and Unemployment Rate
(2000:Q1=100)



Sources: Haver Analytics; and IMF staff calculations.

Estonia

Trigger/reallocative shock: Transition from a planned to market-based economy following the collapse of the Soviet Union.

Outcome: The relatively fast restructuring of the economy in the aftermath of the disintegration of Soviet Union was accompanied by rapid job destruction rates in old privatized or state-owned firms and increasing job creation rates in new small private firms. In the early transition years, job destruction, which peaked in 1992, dominated job creation and resulted in an increase in the unemployment rate to double-digit levels. By 1995, the share of employed in old privatized or state-owned firms declined from about 70 percent in 1990 to 40 percent, and the share of workers in new private firms increased from less than 5 percent to about 30 percent (Jurajda and Terrel 2008). Occupational mobility was also high, with reportedly 35 to 50 percent of workers having changed occupation (Masso and others 2005).

In late 1990s, job destruction and creation were approximately equal but remained high compared to other European countries (Haltiwanger, Jarmin, and Miranda 2013; Masso and others 2005). Using firm-level data, Masso and others (2005) show that the labor reallocation in 1995–2001 was characterized by relatively high inter-sectoral mobility, reflecting in part transitions from agriculture and construction to business services. Better educated and skilled individuals benefited more from the transition (Vodopivec 2000).

Policies: Estonia's pro-market policies in labor and product markets centered on more flexible labor market policies with low layoff costs and relatively low payroll taxation and encouraging foreign trade and investment. These policies, combined with low start-up costs for firms, stronger rule of law, and a lower regulatory burden provided a favorable environment for firm creation and destruction and produced labor market turnover that was only slightly below levels in mature market economies (Vodopivec 2000).

Czech Republic

Trigger/reallocative shock: The collapse of the Soviet Union in 1989 triggered massive job reallocation and economic transformation.

Outcome: Large conglomerations in manufacturing and agriculture and the public sector were the largest employers during the Soviet era. Nevertheless, massive reallocation was achieved with a low unemployment rate (known as "Czech's employment miracle"). The unemployment rate peaked at 4.1 in 1991 and stabilized at about 3 percent until 1996. Most transitions were job-to-job without going through an unemployment period. The share of services' employment increased by 12 percent in 1989–98 while those of industry and agriculture declined by about 6 percent. Jobs in small firms increased to 47 percent in 1996 (even higher than the United States at the time), and non-agricultural self-employment, which did not exist prior to the collapse of the Soviet Union, reached 13 percent in 1998 (Boeri and Terrell 2002).

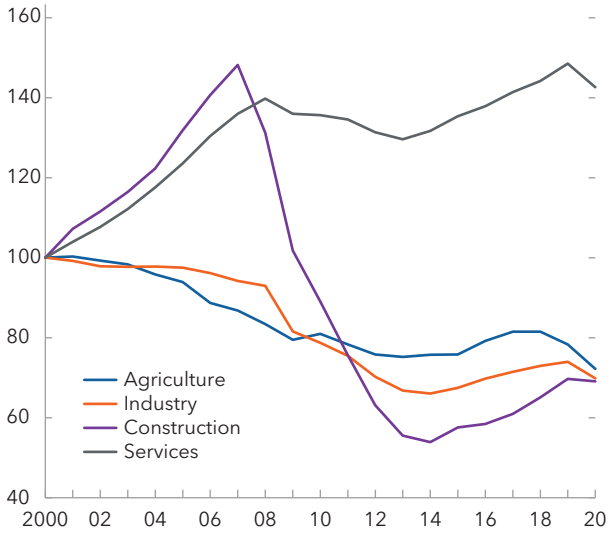
Policies: A large number of small-scale privatizations of productive enterprises facilitated entrepreneurship and job creation (Hazlett 1995), while lower real wages in the old sectors (by deliberately keeping nominal wage increases below inflation) provided workers with the incentive to search for jobs in the newly expanded sectors such as the automotive industry (Jurajda and Terrell 2008, Debiec 2019). ALMPs facilitated the reallocation by helping the new sectors search for workers and providing investment incentives conditional on employment, which served as another source of financing. State-owned banks were instructed to provide credit to both old and new sectors to mitigate abrupt employment losses and support the creation of the new sectors. Policies to restructure the traditional sectors, however, were delayed, slowing down job destruction. Eventually, the bankruptcy of firms in the old sectors resulted in a recession in 1996-98, with the unemployment rate increasing to 9.4 percent in 1998 (Vecernik 2001, Jurajda and Terrell 2008).

Some Less Successful Cases

The recovery from the global financial crisis was generally characterized by limited reallocation of labor, reflecting in part the severe impact on low-skilled workers in the construction sector. They found it more difficult to switch occupations, especially in the context of the long-lasting effects of balance sheet distress, which hindered job creation in the broader economy. In particular:

United States. Following the housing bust in 2007–08, employment in the construction sector fell by almost 25 percent (2.5 million jobs, equivalent to half of the total job loss in the United States; Paciorek 2015). Even though the postcrisis rebound in employment was much slower and smaller in the construction sector than in other sectors, reallocation to other industries was limited and slow, as with insufficient reskilling programs to address the skills mismatch a significant fraction of construction workers that lost their job eventually exited the labor force (nearly 1 million per year at the peak in 2010). Only about 40 percent of fired workers

Annex Figure 2.2. Spain: Total Employment by Sectors
(Index, 2000=100)



Sources: Eurostat; Haver Analytics; and IMF staff calculations.

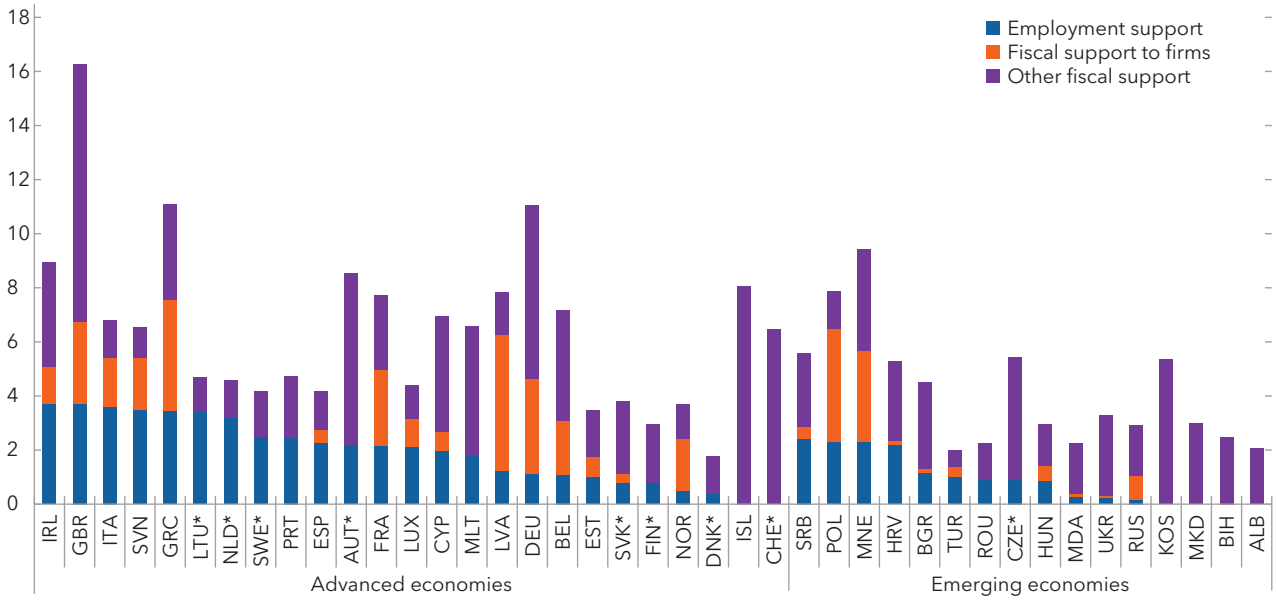
were eventually rehired or found a job in another construction firm, while only a third of displaced workers moved to other industries, typically after a gap of more than a year (Janicki and Mcentarfer 2015).

Spain. The bursting of the Spanish housing market bubble in 2008 led to a collapse in construction employment, which declined by nearly two-thirds between 2007 and 2013. While the labor market turned around eventually in early 2014, led by a strong rebound in services particularly in tourism-related activities, there was limited evidence of labor reallocation between sectors (Annex Figure 2.2). For example, Jansen and others (2016) found that only 47 percent of the workers who were employed in the construction sector at the start of the crisis were working in 2014Q4, out of which about half remained in the construction sector and 40 percent relocated to the services sectors. While the 2012 labor market reforms improved market flexibility, the low efficacy of Spain's ALMPs—particularly insufficient targeting at the low-skilled and long-term unemployed workers—limited the scope of these programs in supporting reallocation of construction workers, many of whom were high school dropouts with no relevant skills or work experience in other sectors (Dolado, Felgueroso, and Jimeno 2021; IMF 2017).

Annex 3. Take-Up of Job Retention Schemes and Their Fiscal Cost

The fiscal cost of programs aimed at preserving employment in Europe was sizeable (Annex Figure 3.1). The average cost of employment support in EU was 1.9 percent of GDP (0.9 percent in non-EU economies) and employment support accounted for a sizable share of overall fiscal response to the pandemic. Availability of EC loans (SURE) helped cope with the fiscal cost of the JRS. It accounted on average for 1.8 percent of 2020 GDP, ranging from 0.4 percent for Hungary to more than 3 percent for Portugal.

Annex Figure 3.1. Fiscal Cost of Support Measures
(Percent of 2020 GDP)

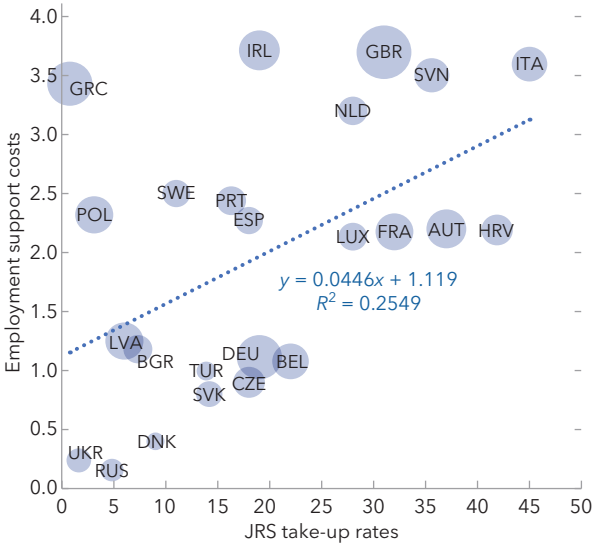


Sources: European Independent Fiscal Institutions; and IMF, SPR survey.
*Fiscal costs of employment support are not available in the SPR survey, data are from EU IFIS.
**Other fiscal costs for Iceland include support to firms and employment.

While quantifying the employment impact of JRSs is challenging, some evidence suggests that STW schemes were more effective in preserving jobs. A simple comparison of labor market outcomes for European countries that relied on STW versus those that relied on WS suggests that countries with STW experienced better employment outcomes, despite similar or larger output contractions (Annex Table 3.1). Annex Figure 3.2 also indicates a stronger relationship between output contractions and employment for countries with WS, compared to countries with STW. This may be partly due to the delays in providing support under newly created JRSs, which were mostly WSs. The increase in unemployment rates was similar across countries that used STW or WSs, although was larger in advanced than in emerging economies.

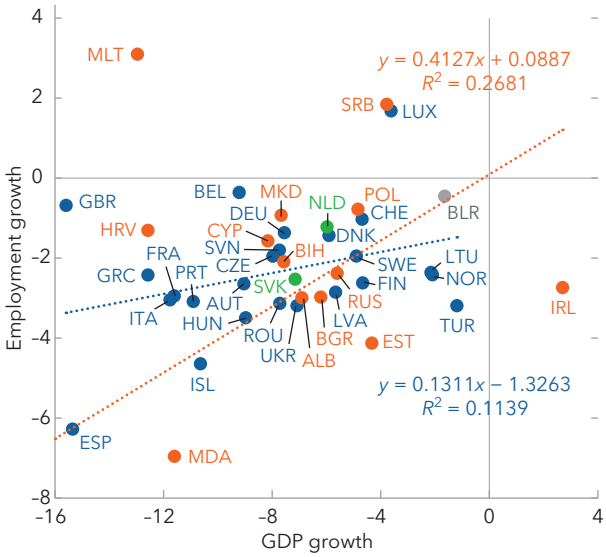
Cross-country differences in the use of JRS can explain the heterogenous evolution of employment and working hours (Annex Table 3.2). Regression analysis using a sample of 35 European countries during 2020Q2–2020Q3 suggests that JRS take-up rates and the fiscal cost of employment support are statistically significant in explaining: (1) difference between employment and GDP contractions and (2) difference in growth rates between employment and hours worked. The results are robust to controlling for the stringency of containment measures, the intensity of the pandemic, the shares of temporary workers and of low-skilled workers.

Annex Figure 3.2. Job Retention Schemes Take-Up Rates and Fiscal Costs of Employment Support
(Percent of GDP; percent of employment)



Sources: European Trade Union Confederation; European Indipendent Fiscal Institutions; Organisation for Economic Co-operation and Development; and IMF staff calculations.
Note: The size corresponds to total fiscal measures in percent of GDP (reported in the SPR survey). JRS = job retention schemes.

Annex Figure 3.3. Employment and GDP Growth over 2020:Q2-2020:Q3 Period
(Year-over-year)



Sources: Eurostat; Haver Analytics; Organisation for Economic Co-operation and Development; and IMF staff calculations.
Note: Blue color corresponds to STW, orange to WS, green to mixture of the two, gray to no JRS/no information. JRS = job retention schemes; STW = short-time work schemes; WS = wage subsidies.

Annex Table 3.1. Contraction in Employment vs. Hours Worked for Advanced and Emerging Market Economies[1]

	No. of countries	GDP growth (year over year)	Employment growth (year over year)	Hours worked (year over year)	Unemployment rate change	Employment support	Firms' support	Overall fiscal support
		2020Q2–2020Q3				% 2020 GDP		
All countries	42	–7.7	–2.6	–6.1	0.8	1.5	1.0	5.5
w/ STW	24	–7.9	–2.4	–8.1	0.9	1.7	1.2	6.0
w/ WS	14	–8.3	–3.7	–3.1	1.0	1.2	0.8	5.1
w/ STW&WS	2	–6.6	–1.9	–8.6	0.9	2.0	0.2	4.2
AE	25	–7.7	–2.1	–8.5	1.0	2.0	1.2	6.5
AE w/ STW	19	–8.2	–2.2	–8.4	0.9	1.9	1.5	6.7
AE w/ WS	4	–5.7	–1.3	–8.5	1.4	2.1	0.7	6.5
AE w/ STW&WS	2	–6.6	–1.9	–8.6	0.9	2.0	0.2	4.2
EE	17	–7.7	–3.5	–2.5	0.6	0.9	0.6	3.9
EE w/ STW	5	–6.6	–3.0	–6.9	0.7	0.8	0.2	3.2
EE w/ WS	10	–9.3	–4.6	–0.9	0.8	0.8	0.9	4.5
United States & Canada	2	–6.8	–9.2		6.6	4.6	1.6	15.7

Sources: Eurostat; Haver Analytics; and IMF staff calculations.

[1]The sample includes 42 European countries divided in the following groups: *AEs with STW*: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Latvia, Lithuania, Luxembourg, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, and United Kingdom; *AEs with WS*: Estonia, Ireland, and Malta; *EEs with STW*: Czech Republic, Hungary, Romania, Turkey, and Ukraine; *EEs with WS*: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Moldova, Montenegro, North Macedonia, Poland, Russia; and two countries with a hybrid STW and WS: The Netherlands and Slovakia.

AEs = advanced economies; EEs = emerging market economies; STW = short-time work schemes; WS = wage subsidies.

Annex Table 3.2. Cross-Country Regression Results[1]

	Δ (Employment growth, GDP growth)			Δ (Employment growth, hours worked growth)		Resid (Employment growth, GDP growth)			
	(year over year, 2020Q2–Q3)			(year over year, 2020Q2–Q3)		(year over year, 2020Q2–Q3)			
JRS take-up rates	0.106*					0.032**			
interacted with dummy for STW		0.111**					0.0357**		
Fiscal support for employment (% GDP)				1.763***				0.800**	
interacted with dummy for STW					2.392***				0.689**
Fiscal support total (% GDP)			0.661***						
Stringency index (2020Q2-Q3 average)	0.070***							-0.021*	-0.011
Share of low-skilled workers (%, 2019)			0.097**	0.192***	0.173***				
Observations	31	31	35	20	20	25	25	25	25
R^2	0.156	0.168	0.243	0.567	0.700	0.120	0.111	0.186	0.179
Adj R^2	0.127	0.139	0.220	0.543	0.683	0.120	0.111	0.150	0.143
*** p<0.01, ** p<0.05, * p<0.1									

Source: IMF staff calculations.

[1]The sample includes 42 European countries divided in the following groups: *AEs with STW*: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Latvia, Lithuania, Luxembourg, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, and United Kingdom; *AEs with WS*: Estonia, Ireland, and Malta; *EEs with STW*: Czech Republic, Hungary, Romania, Turkey, and Ukraine; *EEs with WS*: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Moldova, Montenegro, North Macedonia, Poland, Russia; and two countries with a hybrid STW and WS: THe Netherlands and Slovakia.

AEs = advanced economies; EEs = emerging market economies; STW = short-time work schemes; WS = wage subsidies.

Annex 4. Experience from Past Pandemics

Only a handful of pandemic episodes over the past century are comparable to the COVID-19 in scale and severity. Since the current pandemic began, the virus has spread across all countries, resulting in about to 5¾ million deaths globally. The previous pandemic with death estimates of more than 1 million occurred about half a century ago (Annex Table 4.1). The Spanish flu took 100 million lives worldwide, significantly more than the COVID-19 to date.

Annex Table 4.1. Experience from Past Pandemics

Events	Global Death	Countries Studied
COVID-19 (2019–2021)[1]	5,767,246	
SARS (2003Q1)	916	Hong Kong, Singapore
Hong Kong flu (1968–69)	1,000,000	France, Germany, Japan, Singapore, United Kingdom, United States
Asian flu (1957–58)	2,000,000	United Kingdom, United States
Spanish flu (1918–20)	100,000,000	United Kingdom

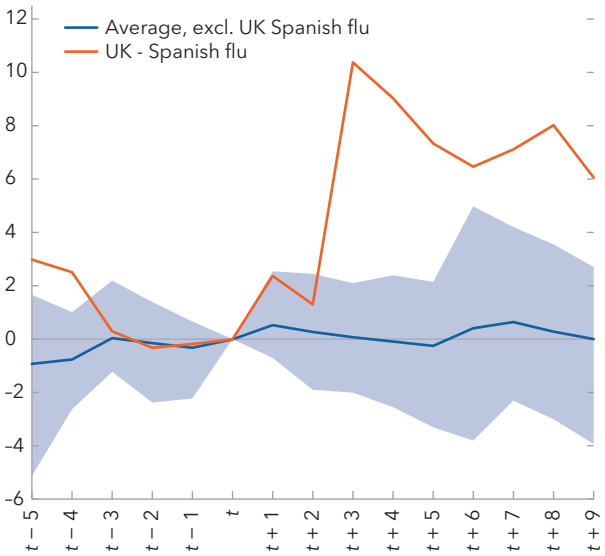
Sources: Johns Hopkins Coronavirus Resource Center; Jordà and others (2020); World Health Organization.

[1]Data as of December 31, 2021.

In most of the events studied, the impact on the labor market from the pandemic crises appears relatively mild on average. During the more recent SARS episode, unemployment rates increased by about 1 percentage point within the first two quarters in Hong Kong and Singapore after the virus hit in early 2003. Employment declined by about 1 percent in the two regions during the same time. However, labor markets bounced back quickly, and the impact went away after one year. In the episodes of the Hong Kong flu and the Asian flu, the impact on the labor market in countries including Germany, Japan, the United Kingdom, and the United States also appeared rather marginal (Annex Figures 4.1 and 4.2).

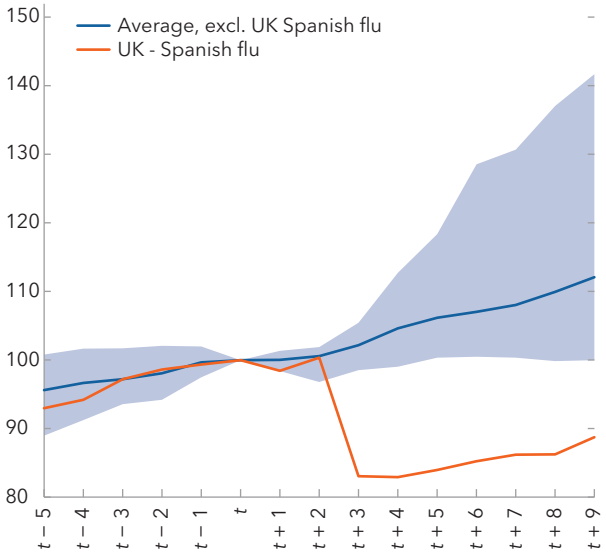
One notable exception is the Spanish flu, with a seemingly large and persistent impact for the United Kingdom. Following the first record of the flu in May 1918 in the United Kingdom, the virus spread widely in October of the same year. By the end of summer 1919, a quarter of the British population was affected, and 228,000 people died. Output collapsed, accompanied by a decline in working

Annex Figure 4.1. Unemployment Rate Dynamics
(t = 0, percentage point, annual frequency)



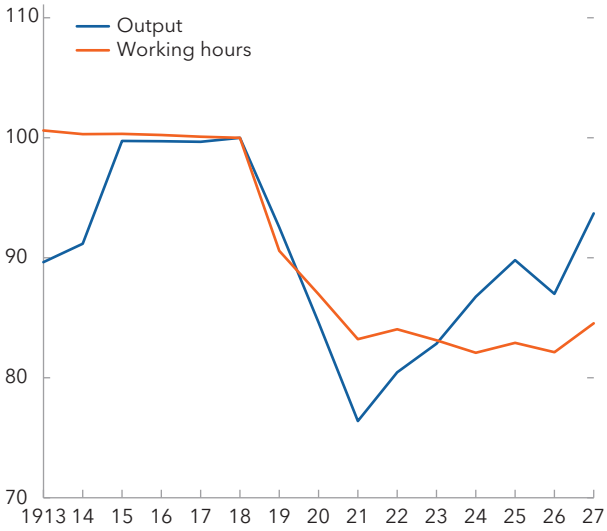
Sources: Bank of England; Haver Analytics; and IMF staff calculations.
Note: Past pandemics include HK and Singapore during SARS (2003:Q1); Germany, Japan, Singapore, UK, US during HK flu (1968–69); UK and US during Asian flu (1957–58); and UK during Spanish flu (1918–20). Shaded area indicates max-min range of the studied events excluding UK during the Spanish flu.

Annex Figure 4.2. Employment Dynamics
(t = 100, annual frequency)



Sources: Bank of England; Haver Analytics; and IMF staff calculations.
Note: Past pandemics include HK and Singapore during SARS (2003:Q1); Germany, Japan, Singapore, UK, US during HK flu (1968–69); UK and US during Asian flu (1957–58); and UK during Spanish flu (1918–20). Shaded area indicates max-min range of the studied events excluding UK during the Spanish flu.

Annex Figure 4.3. UK during the Spanish Flu
(1918 = 100, annual frequency)



Sources: Bank of England; and IMF staff calculations.
Note: The values for 1918 are normalized to 100 when the pandemic hit the UK.

hours. The unemployment rate and employment responded with a lag of a couple of years (Annex Figure 4.3). A decade after the Spanish flu hit the country, output was still close to 7 percentage points lower, the unemployment rate was up by more than 6 percentage points, employment had declined by about 11 percent, and working hours had dropped by over 15 percent, compared to the precrisis levels. It is worth noting that the Spanish flu occurred near the end of World War I, which makes it difficult to disentangle the impact from the two events.

Technical Appendix 1. Sectoral Decomposition Analysis and Selected Country-Specific Results

This technical appendix describes the data and methodology used in the decomposition analysis of Figure 6, Chapter 3. It also presents the results for a selected number of countries to highlight the heterogeneity of labor market adjustment.

Data Description

Quarterly (non-seasonally adjusted) and yearly gross value added (GVA), employment, and population data from 2007Q1 to 2021Q2 are obtained from Eurostat.[1] The GVA and employment data are available for ten Nomenclature of Economic Activities (NACE Rev.2) sectors, namely agriculture (A); industry (B, C, D, E); construction (F); trade, transportation, food and accommodation (G, H, I); information and communication (J); finance and insurance (K); real estate (L); professionals and administrative supports (M, N); public services (O, P, Q); and arts, entertainment and other services (R, S, T, U).

Methodology

The GVA growth can be decomposed into the sectoral contribution from compensation of employees and the rest. The rest is succinctly labeled as "business incomes," although it also contains the income of self-employed.

$$\begin{aligned} V_t - V_{t-k} &= V_t - W_t - (V_{t-k} - W_{t-k}) + W_t - W_{t-k} \\ &= \sum_s \left\{ \underbrace{V_{s,t} - W_{s,t} - (V_{s,t-k} - W_{s,t-k})}_{business} + \underbrace{W_{s,t} - W_{s,t-k}}_{worker} \right\}, \end{aligned}$$

where $V_{s,t}$ and $W_{s,t}$ are GVA and compensation of employees of sector s at time t. They sum up to V_t and W_t, respectively.

This decomposition shows how much pass-through the decline in output has on the workers' primary income. Note that the compensation of employees does not include secondary income such as the transfer through social insurance. However, it includes wage subsidies when they are considered subsidies for production.
The growth of real GVA per capita can be decomposed into sectoral contributions from (1) the growth of productivity per hours worked, (2) the growth of hours worked per employment, (3) the change in sectoral labor share, which is often called structural change in the literature, and (4) the growth of employment rate.

$$\begin{aligned} \frac{V_t}{Pop_t} - \frac{V_{t-k}}{Pop_{t-k}} = \sum_s \Bigg\{ & \underbrace{\omega_{s,VH}\left(\frac{V_{s,t}}{H_{s,t}} - \frac{V_{s,t-k}}{H_{s,t-k}}\right)}_{productivity\ per\ hour} + \underbrace{\omega_{s,HN}\left(\frac{H_{s,t}}{N_{s,t}} - \frac{H_{s,t-k}}{N_{s,t-k}}\right)}_{hour\ per\ empoyment} \\ & \underbrace{+ \omega_{VN}\left(\frac{V_{s,t-k}}{N_{s,t-k}} - \frac{V_{t-k}}{N_{t-k}}\right)\left(\frac{N_{s,t}}{N_t} - \frac{N_{s,t-k}}{N_{t-k}}\right)}_{structural\ change} + \underbrace{\omega_{NPop}\left(\frac{N_{s,t}}{Pop_t} - \frac{N_{s,t-k}}{Pop_{t-k}}\right)}_{employment\ rate} \Bigg\}, \end{aligned}$$

[1] The database codes are nama_10_a10, namq_10_a10, nama10_a_10_e, namq10_a_10_e, nama_10_pe, and namq_10_pe.

where $V_{s,t}$ is GVA, $H_{s,t}$ is the hours worked, $N_{s,t}$ is the number of workers in sector s at time t, V_t is the sum of sectoral GVA over all sectors, and Pop_t is the population at time t. The weights ($\omega_{s,VH}$, $\omega_{s,HN}$, ω_{VN}, ω_{NPop}) are time-dependent, but the subscript is dropped for simplicity.

$$\omega_{VN} = \frac{1}{2}\left(\frac{N_t}{Pop_t} + \frac{N_{t-k}}{Pop_{t-k}}\right), \omega_{NPop} = \frac{1}{2}\left(\frac{V_t}{N_t} + \frac{V_{t-k}}{N_{t-k}}\right)$$

$$\omega_{s,VH} = \frac{\omega_{VN}}{2}\frac{N_{s,t}}{N_t}\left(\frac{H_{s,t}}{N_{s,t}} + \frac{H_{s,t-k}}{N_{s,t-k}}\right), \omega_{s,HN} = \frac{\omega_{VN}}{2}\frac{N_{s,t}}{N_t}\left(\frac{V_{s,t}}{H_{s,t}} + \frac{V_{s,t-k}}{H_{s,t-k}}\right).$$

This decomposition shows how different types of labor input contributed to the growth of real GVA per capita, which is a proxy for real GDP per capita. Note that the sign of the structural change for sector s is positive if the sector s has higher productivity than the aggregate productivity and increases employment share.

$$\frac{V_{s,t-k}}{N_{s,t-k}} > \frac{V_{t-k}}{N_{t-k}}, \frac{N_{s,t}}{N_t} > \frac{N_{s,t-k}}{N_{t-k}}.$$

In contrast, if sector s has lower productivity than the aggregate productivity, an increase in employment share is counted as a negative structural change. This method has been used in Ando and Noumon (2021).

Finally, the growth of the compensation of employees can be decomposed into the sectoral contribution from the growth of (1) wage and salary per hour, (2) employer's social contribution per hour, (3) hour per employment, and (4) employment.

$$\begin{aligned} W_t - W_{t-k} &= \sum_s \left\{ \frac{H_{s,t} + H_{s,t-k}}{2}(w_{s,t} - w_{s,t-k}) + \frac{w_{s,t} + w_{s,t-k}}{2}(H_{s,t} - H_{s,t-k}) \right\} \\ &= \sum_s \left\{ \underbrace{\frac{H_{s,t} + H_{s,t-k}}{2}(ws_{s,t} - ws_{s,t-k})}_{\text{wage \& salary/hour}} + \underbrace{\frac{H_{s,t} + H_{s,t-k}}{2}(esc_{s,t} - esc_{s,t-k})}_{\text{employer's social contribution/hour}} \right. \\ &\quad \left. + \underbrace{\frac{w_{s,t} + w_{s,t-k}}{2}\frac{h_{s,t} + h_{s,t-k}}{2}(N_{s,t} - N_{s,t-k})}_{\text{employment}} + \underbrace{\frac{w_{s,t} + w_{s,t-k}}{2}\frac{N_{s,t} + N_{s,t-k}}{2}(h_{s,t} - h_{s,t-k})}_{\text{hour/employment}} \right\} \end{aligned}$$

where W_t is compensation of employees at t and $\{H_{s,t}, N_{s,t}, w_{s,t}, esc_{s,t}, h_{s,t}\}$ are hours worked, employment, wage per hour, employer's social contribution per hour, and hour per employment of sector s at time t.

The decomposition describes the factors behind the evolution of the compensation of employees. Note that the employment includes both employees and employers, so the decomposition should be interpreted as approximating the employees to the total employment.

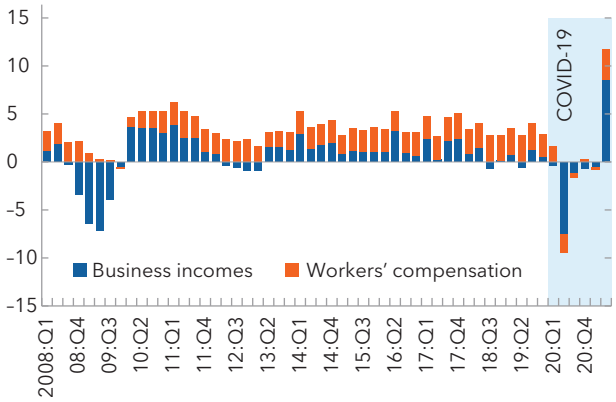
Country-Specific Results

Results for four large euro area countries, namely Germany, France, Italy, and Spain, are shown in Technical Appendix Figures 1.1, 1.2, 1.2 and 1.4.

Technical Appendix Figure 1.1. Germany: Adjustments to Workers during the COVID-19 Crisis
(Percent, year-over-year)

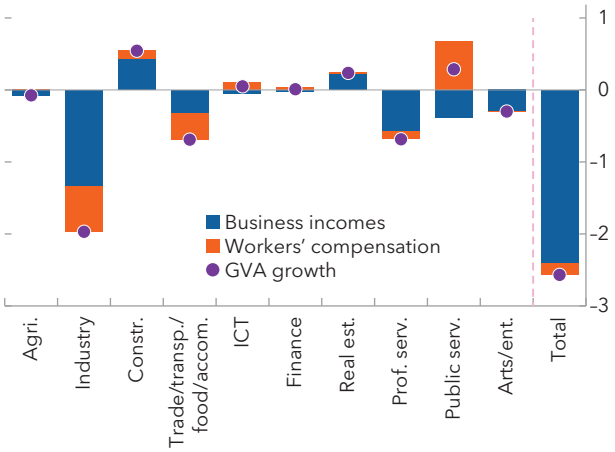
Unlike GFC, workers' income contributed negatively in COVID-19 ...

1. Decomposition of GVA Growth: Germany, 2008–Present



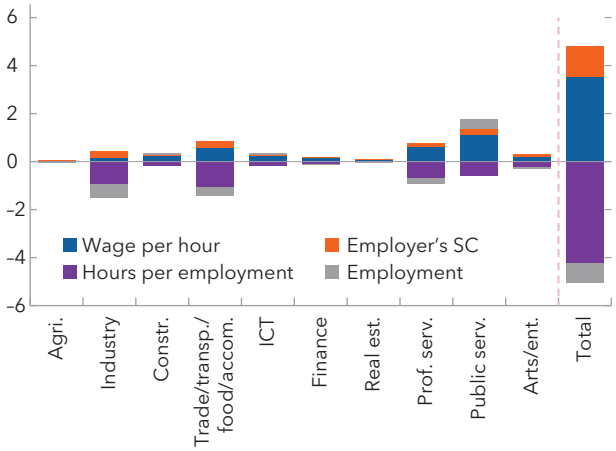
The biggest contributor was industry ...

2. Decomposition of GVA Growth: Germany, 2020 (COVID-19)



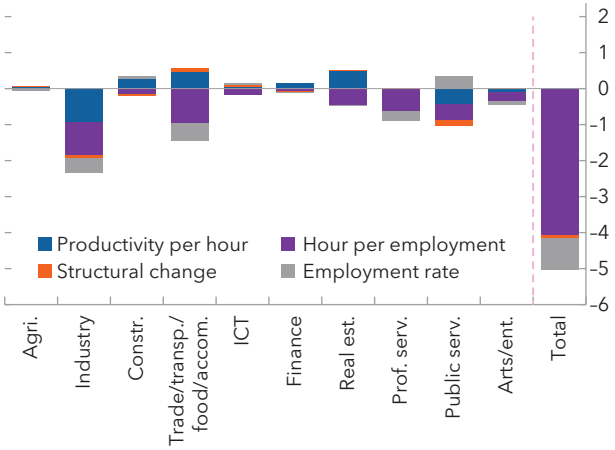
Wage per hour increased, potentially reflecting the disproportionate impact on the lower-paid ...

3. Decomposition of Employees' Compensation Growth: Germany, 2020 (COVID-19)



Real productivity per hour remained almost constant in total and declined in some sectors including industry ...

4. Decomposition of per Capita GVA Growth: Germany, 2020 (COVID-19)

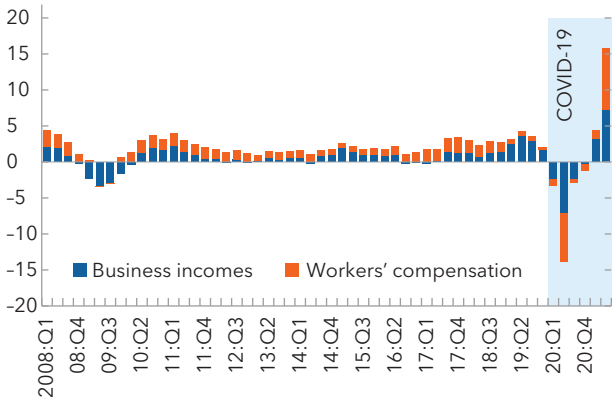


Sources: Eurostat; and IMF staff calculations.
Note: In panels 1 and 2, GVA is current price. For panel 3, compensation of employees is current price. For panel 4, GVA is chain-linked volumes. GVA = gross value added; SC = social contributions.

Technical Appendix Figure 1.2. France: Adjustments to Workers during the COVID-19 Crisis
(Percent, year-over-year)

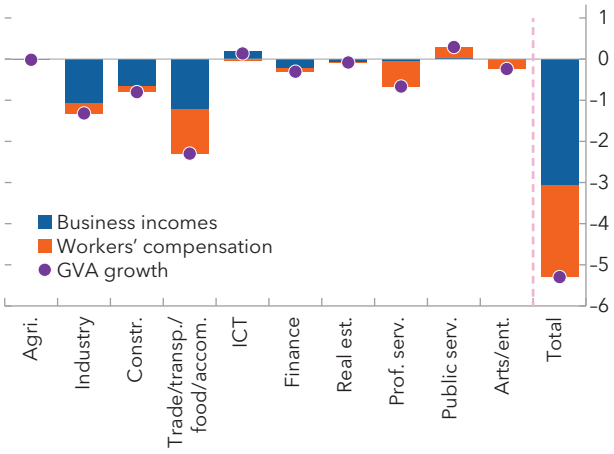
Both the overall impact and the contribution from workers were larger in COVID-19 than in GFC ...

1. Decomposition of GVA Growth: France, 2008–Present



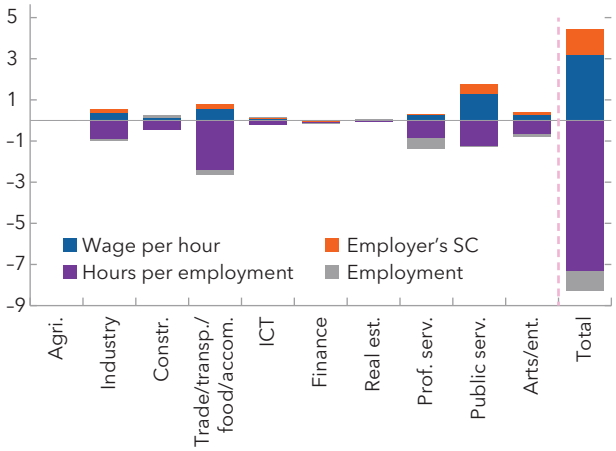
Most sectors recorded negative contributions ...

2. Decomposition of GVA Growth: France, 2020 (COVID-19)



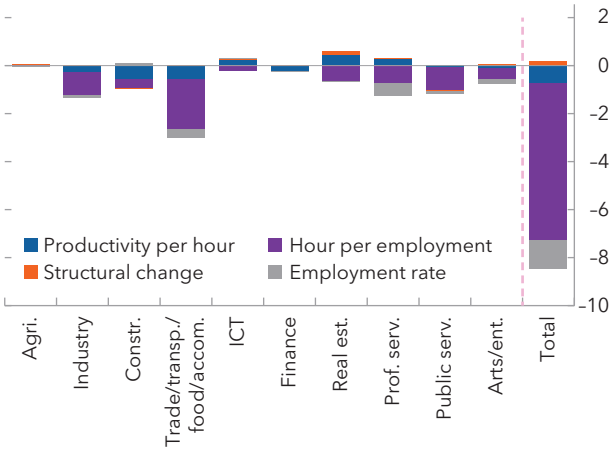
Hourly wage growth was positive, potentially reflecting disproportionate impact on lower-paid ...

3. Decomposition of Employees' Compensation Growth: France, 2020 (COVID-19)



Real hourly productivity grew negatively ...

4. Decomposition of per Capita GVA Growth: France, 2020 (COVID-19)

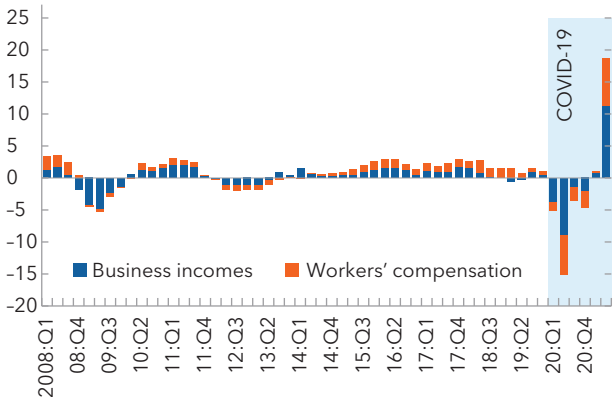


Sources: Eurostat; and IMF staff calculations.
Note: In panels 1 and 2, GVA is current price. For panel 3, compensation of employees is current price. For panel 4, GVA is chain-linked volumes. GVA = gross value added; SC = social contributions.

Technical Appendix FIgure 1.3. Italy: Adjustments to Workers during the COVID-19 Crisis
(Percent, year-over-year)

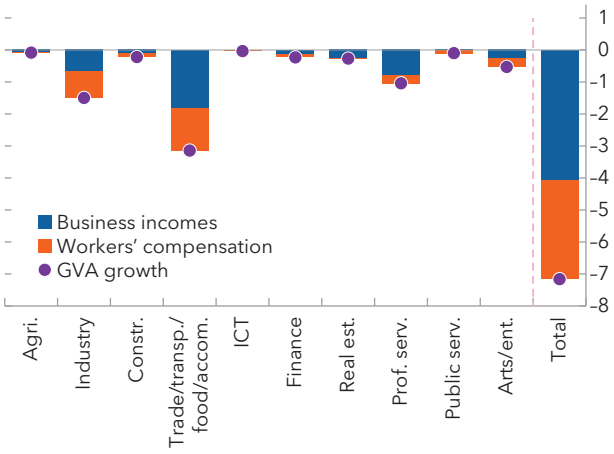
Both the overall impact and the contribution from workers were larger in COVID-19 than in GFC ...

1. Decomposition of GVA Growth: Italy, 2008–Present



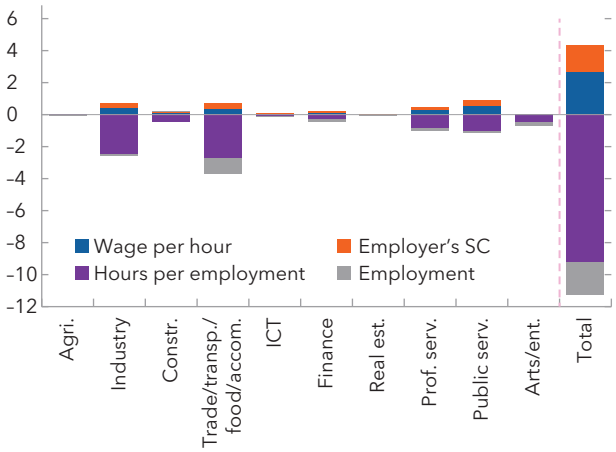
All sectors recorded negative growth ...

2. Decomposition of GVA Growth: Italy, 2020 (COVID-19)



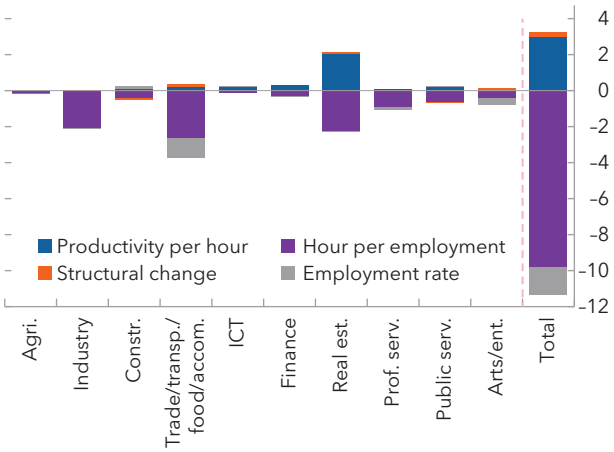
Hourly wage growth was positive, potentially reflecting disproportionate impact on the lower-paid ...

3. Decomposition of Employees' Compensation Growth: Italy, 2020 (COVID-19)



Real hourly productivity grew positively but was driven by real estate sector ...

4. Decomposition of per Capita GVA Growth: Italy, 2020 (COVID-19)

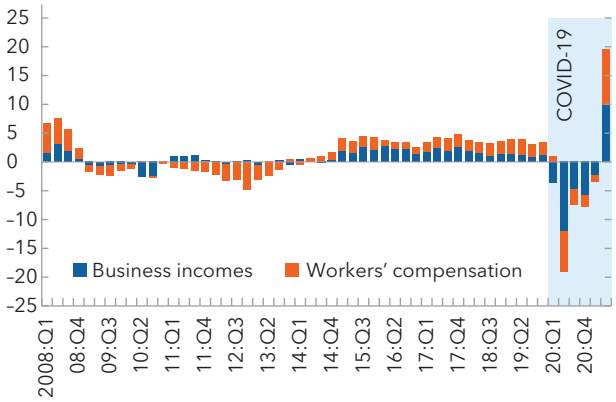


Sources: Eurostat; and IMF staff calculations.
Note: In panels 1 and 2, GVA is current price. For panel 3, compensation of employees is current price. For panel 4, GVA is chain-linked volumes. GFC = global financial crisis; GVA = gross value added; SC = social contributions.

Technical Appendix Figure 1.4. Spain: Adjustments to Workers during the COVID-19 Crisis
(Percent, year-over-year)

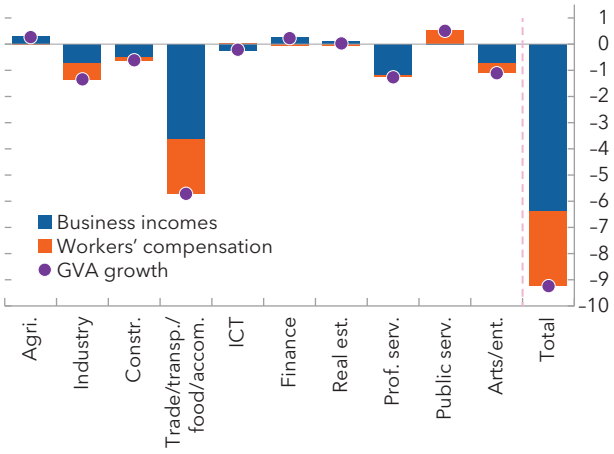
Both the overall impact and the pass-through to business were larger in COVID-19 than in GFC ...

1. Decomposition of GVA Growth: Spain, 2008–Present



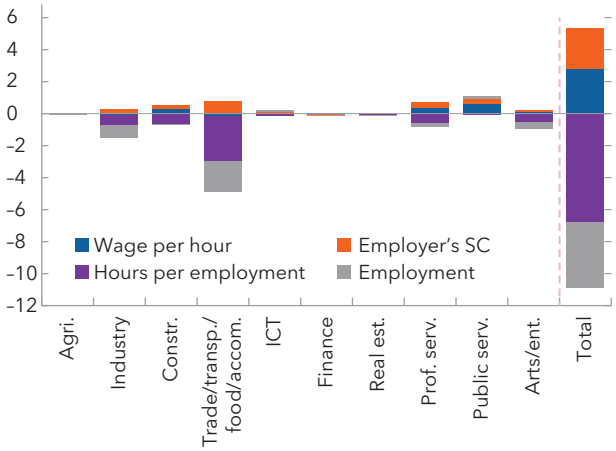
High-touch sector's contribution was largest ...

2. Decomposition of GVA Growth: Spain, 2020 (COVID-19)



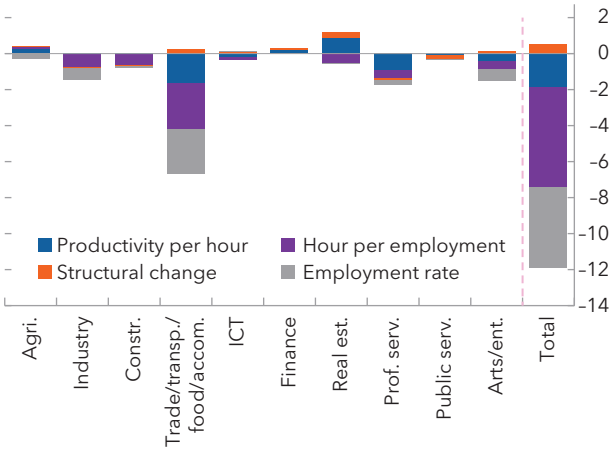
Hourly wage growth was positive, potentially reflecting disproportionate impact on the lower-paid ...

3. Decomposition of Employees' Compensation Growth: Spain, 2020 (COVID-19)



But real hourly productivity declined ...

4. Decomposition of per Capita GVA Growth: Spain, 2020 (COVID-19)



Sources: Eurostat; and IMF staff calculations.
Note: In panels 1 and 2, GVA is current price. For panel 3, compensation of employees is current price. For panel 4, GVA is chain-linked volumes. GFC = global financial crisis; GVA = gross value added; SC = social contributions.

Technical Appendix 2. Okun's Law Estimation

This technical appendix goes through the details of the data and procedures used to estimate the Okun's law equation, construct the forecast errors and calculate the dynamic betas, which are discussed in Chapter 4. The methodology broadly follows Chapter 3 of the April 2010 World Economic Outlook.

Data

The authors estimate the Okun's law equation using quarterly, seasonally adjusted series of real GDP growth and unemployment rate. The dataset comprises 33 European countries[1] and the United States over the period 1947Q1–2019Q4, though with data gaps as the series are not available for the entire period for all countries. The data sources are Eurostat and Haver Analytics in the case of European countries and FRED in the case of the United States

Dating of Business Cycle Peaks and Throughs

To identify recessionary periods, we employ a "classical" approach to dating business cycles by focusing on turning points in the level of output rather than deviations from a trend. The procedure—based on Harding and Pagan (2002)—uses a set of statistical criteria to determine: (1) the window over which an observation is classified as a local peak or through, (2) the minimum duration of a complete cycle, and (3) the minimum duration of a phase of a business cycle. The observation window is set at two quarters, the minimum duration at five quarters, and the minimum phase at two quarters. Although the criteria for the minimum duration of a cycle and a phase are occasionally binding, the procedure generally dates the start of a recession as the quarter during which output is higher than the two quarters preceding and following it. This implies that a period of two quarters of negative growth is a sufficient, but not necessary, condition for a recession. Likewise, the end of a recession is generally marked as the quarter during which output is lower than the two quarter before and after it. With these criteria in place, local peaks and throughs are identified, which define recessionary and expansionary phases of the business cycle.

Dynamic Okun's Law Equation

For each recessionary episode in a particular country, a dynamic version of Okun's law is estimated for the 18-year period leading up to the peak in output just before the start of the recession. As an example, consider the COVID-19 crisis for any given country. The window over which the Okun's law equation is estimated for this episode was 72 quarters, ranging from the first quarter of 2002 to the fourth quarter of 2019, though the start date may vary from country to country depending on the lag structure of each country, as explained below.

The general form of the estimated equation is as follows:

$$\Delta u_t = \alpha + \sum_{i=0}^{p} \beta_i \Delta y_{t-i} + \sum_{i=1}^{q} \gamma_i \Delta u_{t-i} + \sum_{i=0}^{p} \delta_i D^R \Delta y_{t-i} + \epsilon_t,$$

[1] The European countries included in the analysis are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

where Δu and Δy are the change in the unemployment rate and the level of output growth respectively, and D^R is a dummy variable indicating if the economy is in a state of recession; the recession dummy is interacted with output growth as a third regressor in the above equation. The use of the dummy variable allows the coefficients related to the responsiveness of changes in the unemployment rate to output growth to take on different magnitudes depending on the state of the business cycle.

We allow for different dynamics across countries. The lag lengths (p and q in the specification above) are chosen using a Bayesian information criterion for each country, with the maximum number of lags set at 4. Technical Appendix Table 2.1 lists the choice of lag lengths for each country corresponding to the most recent recessionary episode, that is, the COVID-19 crisis.

Forecast Errors

The authors use the Okun's law estimates to produce quarterly out-of-sample forecasts for changes in the unemployment rate. The difference between the actual change in unemployment (Δu_t) and its predicted value using the Okun's law estimates ($\Delta \hat{u}_t$) produces what we call the unemployment forecast error:

$$\text{Unemployment forecast error} = \Delta u_t - \Delta \hat{u}_t.$$

The presence of forecast errors signifies that episodic factors could help explain unemployment dynamics, beyond those attributable to fluctuations in output. There are a variety of episodic factors that could be at play. In the case of the COVID-19 crisis, the job retention schemes had an important role in limiting layoffs (see discussion in Chapter 4). But there are other factors that altered the relationship between unemployment and output in previous recessions, such as financial crises, uncertainty and sectoral shocks. See Chapter 3 of the *April 2010 World Economic Outlook* for a detailed discussion.

Dynamic Betas

This section derives the equation for the dynamic beta multiplier, *DB*, which captures the long-term impact of changes in output on changes in the unemployment rate.

We will start by deriving the equation for the case in which there is one lag of output and one lag of unemployment. The Okun's law equation in this case is as follows:

$$\Delta u_t = \alpha + \beta_0 \Delta y_t + \beta_1 \Delta y_{t-1} + \gamma_1 \Delta u_{t-1} + \epsilon_t.$$

The dynamic beta measures the impact of a one-unit change in Δy on $\sum_{s=0}^{\infty} u_{t+s}$. To avoid an explosive path for Δu, the absolute value of γ_1 is less than one. Using the specification above, we can write the dynamic beta as follows:

$$DB = \sum_{s=0}^{\infty} \Delta u_{t+s} = \sum_{s=0}^{\infty} [\beta_0 \Delta y_{t+s} + \beta_1 \Delta y_{t+s-1} + \gamma_1 \Delta u_{t+s-1}].$$

When there is a one-unit change to growth, $\Delta y=1$ during period t and zero everywhere else. Then, we can rewrite the equation above as

$$DB = \beta_0 + \beta_1 + \gamma_1 \sum_{s=0}^{\infty} \Delta u_{t+s-1}.$$

We can write the summation in the last term as

Technical Appendix Table 2.1. Okun's Law Lag Lengths (COVID-19 Crisis)

Country	Output	Unemployment	Recession Dummy
Austria	0	0	No
Belgium	1	1	No
Bulgaria	0	1	No
Croatia	1	3	No
Cyprus	1	1	No
Czech Republic	0	1	Yes
Denmark	2	0	No
Estonia	1	0	No
Finland	3	1	No
France	0	1	No
Germany	0	3	No
Greece	0	4	Yes
Hungary	0	3	Yes
Iceland	1	1	Yes
Ireland	2	2	Yes
Italy	0	2	No
Latvia	0	0	Yes
Lithuania	0	1	No
Luxembourg	0	1	Yes
Malta	1	2	No
The Netherlands	1	1	No
Norway	0	0	No
Poland	0	1	No
Portugal	0	1	Yes
Romania	0	0	Yes
Serbia	0	4	No
Slovak Republic	0	1	No
Slovenia	1	0	No
Spain	1	1	No
Sweden	2	0	No
Switzerland	1	2	No
Turkey	2	0	No
United Kingdom	1	1	No
United States	1	1	No

Source: IMF staff calculations.

$$\sum_{s=0}^{\infty} \Delta u_{t+s-1} = \Delta u_{t-1} + \sum_{s=0}^{\infty} \Delta u_{t+s} = \Delta u_{t-1} + DB$$

Assuming that the "initial condition" is such that $\Delta u_{t-1} = 0$, we have

$$DB = \beta_0 + \beta_i + \gamma_1 DB$$

which leads to the equation for the dynamic beta:

$$DB = \frac{\beta_0 + \beta_i}{1 - \gamma_1}$$

The derivation for the more general case follows the steps above in an analogous manner. The resulting specification is as follows:

$$DB = \frac{\sum_{i=0}^{p} \beta_i + \sum_{j=0}^{p} \delta_j}{1 - \sum_{k=1}^{q} \gamma_k}$$

Institutional Factors Influencing the Dynamic Betas

To assess the role of institutions in driving the variation in dynamic betas across countries, we run regressions of the estimated dynamic betas on various indicators of labor market institutions. The dependent variable is the dynamic beta estimated for each recession episode in the sample. The regressors include (1) employment protection legislation strictness index; (2) unemployment benefit generosity, measured by the income replacement rates in the first two years; and (3) share of temporary contracts in total dependent employment. Technical Appendix Table 2.2 provides a summary of the data sources and availability.

Technical Appendix Table 2.2. Data Sources

Descriptor	Availability	Source
Employment Protection Legislation[1]	1985–2019	OECD[3] Employment Protection Legislation Database, 2020 ed.
Unemployment Benefits[2]	2001–20	European Commission, Tax and Benefits Indicators Database
Share of Temporary Contracts	1990–2019	OECD and Eurostat for selected European countries

Source: Organisation for Economic Co-operation and Development; European Commission; and Eurostat.
[1]Index of strictness of employment protection legislation on regular contracts.
[2]Simple average of the net replacement rate during the first and second year for a single worker without children.
[3]OECD = Organisation for Economic Co-operation and Development.

Technical Appendix 3. Sectoral Okun's Law Estimations—Data, Empirical Specifications, and Additional Results

This technical appendix describes the data used for assessing how employment may respond to output differently across sectors (as discussed in Chapter 4) and provides additional robustness checks and selected country-specific results.

Data Description

Quarterly (seasonally adjusted) sectoral GVA and employment (both employed persons and hours worked) data from 1999Q1 to 2019Q4 are obtained from Eurostat.[1,2] These data are available for 10 or 11 Nomenclature of Economic Activities (NACE Rev.2) sectors, namely agriculture (A); mining, utility, and energy (B, D, E); manufacturing (C); construction (F); trade, transportation, food and accommodation (G, H, I); information and communication (J); finance and insurance (K); real estate (L); professionals and administrative supports (M, N); public services (O, P, Q); and arts, entertainment and other services (R, S, T, U).[3]

The countries included in the analysis are AUT, BEL, BGR, CHE, CYP, CZE, DEU, DNK, ESP, EST, FIN, FRA, GRC, HRV, HUN, IRE, ITA, LTU, LVA, LUX, MLT, NLD, NOR, POL, PRT, ROU, SWE, SVN, SVK, and GBR.

Estimation Specifications and Additional Results

The sectoral Okun's relationship is estimated for the above-mentioned 10 NACE sectors at a country-specific level, as well as a pooled-country level. Two main specifications are the static and dynamic empirical specifications as described in Chapter 4.

Static Sectoral Okun's Relationship: Pooled Country Samples

For the pooled country samples (for example, AEs and EEs), there are some differences in estimated sectoral employment responses between the static and models, likely reflecting potential lagged effects on the dependent variable (Technical Appendix Figure 3.1). However, results are broadly robust in terms of cross-sector relativity, with larger responses from hours worked than employed persons and largest responses among construction, industry, and severely affected contact-intensive services. The results for EEs remain positively significant only for construction and contact-intensive services.

[1] To avoid any temporarily changes in labor market dynamic during the pandemic (as a result of the unprecedented magnitude of shock and resulting policy support), the sectoral Okun's relationship is estimated over the 20-year period prior to the COVID-19 crisis (that is, 1999–2019).

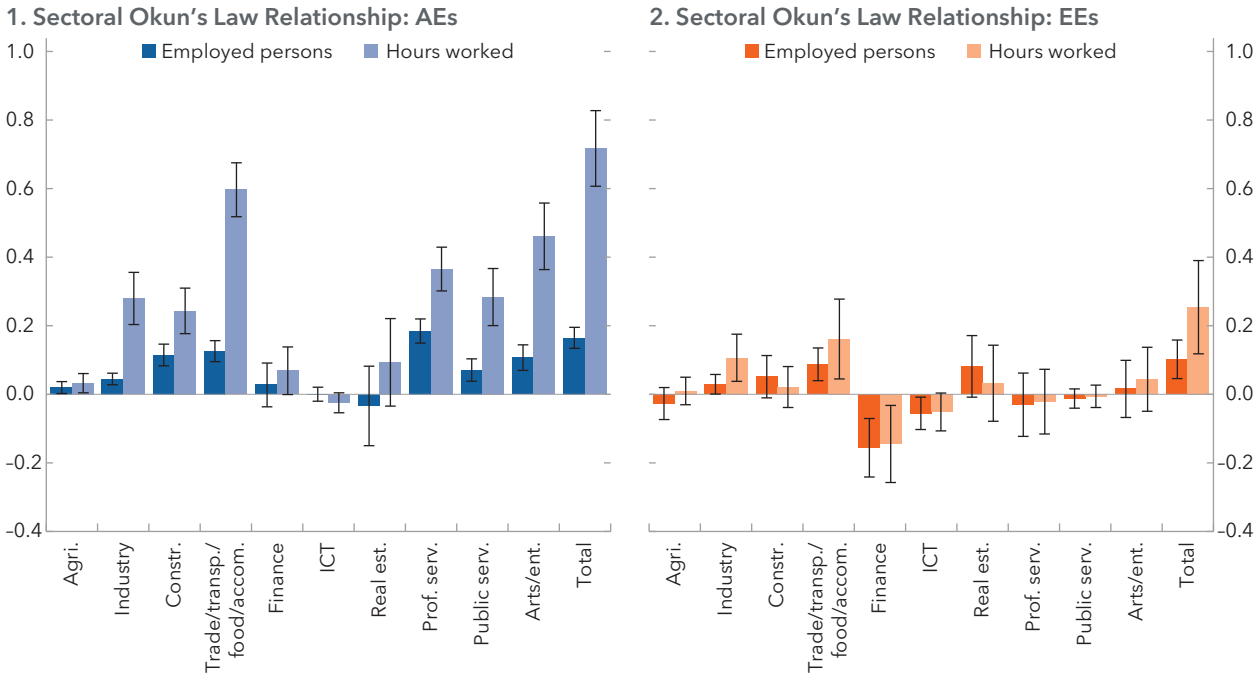
[2] The database codes are namq_10_a10 and namaq10_a_10_e.

[3] Sectoral Okun's relationships, of industry activities, are estimated for overall industry including manufacturing (that is, NACE sectors B, C, D, and E); industry excluding manufacturing (that is, NACE sectors B, D, E); and manufacturing (that is, NACE sectors C). Results are broadly similar for manufacturing and industry excluding manufacturing, and hence the overall industrial activities.

Dynamic Sectoral Okun's Relationship: Country-Specific Results

Similar to the pooled country samples, at the country level, sectoral (total) hours worked are relatively more responsive to changes in sectoral output than sectoral employed persons (Technical Appendix Figure 3.2). Despite heterogeneity in sectoral employment responses across countries, the cross-sector relative size of the estimated elasticities is broadly comparable. The positive relationship holds for most countries (except for a few EEs, including Bulgaria and Romania), and are stronger in industry, construction, trade, transportation, and hospitality, as well as professional and administrative services. The less responsive sectors include agriculture, where there are a large number of self-employed and/or owned-account workers, and other less labor-intensive sectors, such as finance, ICT, and real estate.

Technical Appendix Figure 3.1. Sectoral Okun's Law Relationship, Static Specification
(Static specification)



Source: IMF staff calculations.
Note: Pooled AEs and EEs, static model over 1999–2019. Error bars represent a 90-percent confidence interval. AEs = advanced economies; EEs = emerging economies.

Technical Appendix Figure 3.2. Country-Specific Sectoral Okun's Estimates, Dynamic Specification

1. Employment Response: Employed Persons

	Agri.	Industry	Constr.	Trade/ transp./ food/ accom.	Finance	ICT	Real est.	Prof. serv.	Public serv.	Arts/ent.	Total
AUT	0.06	0.31	0.19	0.16	0.17	0.02	0.40	0.56	0.33	0.02	0.27
BEL	-0.01	0.36	0.22	0.13	0.25	0.02	-0.30	0.43	0.33	0.10	0.50
BGR	0.01	-0.05	0.31	0.15	-0.09	-0.11	0.09	-0.06	-0.01	0.12	0.32
CHE	-0.04	0.37	0.31	0.14	0.49	-0.07	0.10	0.25	0.07	0.06	0.38
CYP	0.34	0.52	0.62	0.44	0.14	0.17	0.51	0.34	0.35	0.61	0.69
CZE	0.09	0.30	0.32	0.09	0.42	0.08	-0.23	0.36	0.16	0.03	0.39
DEU	0.01	0.54	0.50	0.08	0.20	0.08	0.43	0.27	0.40	0.30	0.28
DNK	0.02	0.42	0.25	0.34	0.18	0.19	-0.07	0.10	0.34	-0.20	0.53
EST	-0.09	0.40	0.52	0.17	0.19	-0.03	0.07	0.17	1.07	0.54	0.52
GRC	0.08	-0.11	0.08	0.16	-0.02	0.15	0.10	-0.01	0.08	0.39	0.33
ESP	0.17	0.87	0.99	1.23	0.62	0.25	-0.37	0.98	0.84	0.51	1.23
EU28	-0.11	0.60	0.81	0.40	0.44	0.22	0.58	0.58	0.57	0.23	0.54
FIN	0.05	0.22	0.39	0.17	0.11	-0.07	-0.09	0.36	0.07	0.01	0.35
FRA	0.02	0.50	0.69	0.30	0.29	0.02	0.27	0.60	0.32	0.45	0.50
HRV	0.05	0.37	0.35	0.09	0.02	0.07	0.29	0.03	-0.06	0.14	0.35
HUN	-0.07	0.35	0.07	0.14	-0.12	0.02	0.38	-0.24	0.72	0.22	0.32
IRL	0.04	0.04	0.94	0.45	0.07	0.17	0.43	0.31	0.63	0.87	0.25
ITA	0.05	0.28	0.46	0.31	0.28	0.14	0.89	0.46	0.37	-0.21	0.35
LTU	0.27	0.35	0.49	0.31	0.24	0.08	0.57	0.10	0.04	0.13	0.35
LUX	-0.01	0.02	0.11	0.11	-0.03	-0.04	-0.14	0.14	0.30	0.13	0.30
LVA	0.02	0.55	0.52	0.43	0.03	0.06	-0.06	0.26	0.26	0.23	0.62
MLT	0.01	0.18	0.10	0.21	0.12	0.10	-0.47	0.25	0.42	-0.01	0.43
NLD	0.15	0.69	0.46	0.43	0.62	0.43	-0.55	0.54	0.70	0.37	0.66
NOR	0.04	-0.12	0.60	0.24	0.27	0.04	1.55	0.43	0.00	0.22	0.15
POL	-0.03	0.76	0.79	-0.04	-0.06	0.06	0.02	0.10	0.00	0.04	0.55
PRT	-0.35	0.46	0.97	0.59	0.12	0.05	1.88	0.57	0.56	0.46	0.85
ROU	-0.08	0.07	0.12	0.09	0.13	-0.05	0.00	0.08	0.03	0.01	0.09
SWE	0.04	0.30	0.28	0.20	0.13	0.16	0.20	0.56	0.42	-0.39	0.57
SVN	-0.01	0.58	0.68	0.16	0.05	0.11	1.55	0.52	0.37	0.84	0.57
SVK	0.03	0.35	0.17	0.17	-0.12	-0.05	0.08	-0.07	0.07	-0.18	0.42
GBR	0.23	0.59	0.26	0.20	0.02	-0.02	0.05	0.35	0.56	0.12	0.31

2. Employment Responses: Hours Worked

	Agri.	Industry	Constr.	Trade/ transp./ food/ accom.	Finance	ICT	Real est.	Prof. serv.	Public serv.	Arts/ent.	Total
AUT	0.13	0.41	0.39	0.17	0.16	0.06	0.55	0.80	0.49	0.83	0.46
BEL											
BGR	0.02	0.23	0.12	0.14	-0.08	-0.06	0.11	-0.06	-0.03	0.04	0.26
CHE											
CYP	0.49	0.46	0.76	0.43	0.12	0.16	0.47	0.48	0.28	0.75	0.74
CZE	0.01	0.33	0.22	-0.02	0.36	0.05	-0.13	0.36	0.28	0.08	0.29
DEU	0.01	0.49	0.52	0.19	0.15	0.04	0.20	0.57	0.23	0.45	0.47
DNK	0.03	0.43	0.27	0.26	0.22	0.11	-0.19	0.11	0.24	-0.14	0.41
EST	-0.19	0.60	0.64	0.29	0.25	-0.13	-0.10	0.10	2.13	0.55	0.84
GRC	0.22	-0.03	0.12	0.14	0.01	0.09	0.01	-0.03	0.31	0.35	0.30
ESP	0.10	0.95	1.06	1.13	0.49	0.29	-0.48	0.95	0.69	0.52	1.28
EU28	-0.03	0.69	0.93	0.49	0.42	0.22	0.26	0.66	0.25	0.38	0.61
FIN	0.05	0.28	0.43	0.24	0.13	0.00	-0.52	0.27	0.10	0.00	0.34
FRA	0.00	0.58	0.64	0.35	0.32	0.07	0.05	0.52	0.23	0.50	0.49
HRV	0.01	0.32	0.37	0.11	-0.03	0.08	0.01	0.04	-0.20	0.11	0.36
HUN	-0.03	0.43	-0.01	0.19	-0.07	0.05	0.34	-0.19	0.69	0.10	0.31
IRL	0.05	0.05	1.01	0.45	0.15	0.11	0.41	0.29	0.61	0.67	0.31
ITA	0.10	0.58	0.63	0.38	0.29	0.12	1.11	0.49	0.42	-0.20	0.57
LTU	0.21	0.54	0.54	0.44	0.27	-0.03	1.05	0.06	0.09	0.08	0.49
LUX	0.13	0.11	0.27	0.11	-0.04	0.14	-0.24	0.15	0.50	0.14	0.41
LVA	-0.05	0.52	0.56	0.38	-0.01	-0.01	-0.05	0.70	0.39	0.27	0.66
MLT											
NLD	0.47	0.22	0.47	0.33	0.62	0.52	-0.48	0.67	0.88	0.28	0.56
NOR	0.01	-0.12	0.63	0.36	0.37	0.10	1.76	0.56	0.31	-0.12	0.24
POL	-0.08	0.37	0.54	0.44	-0.11	0.09	0.02	0.20	-0.25	0.02	0.49
PRT	-0.28	0.54	1.14	0.67	0.18	0.00	2.00	0.50	0.64	0.32	0.96
ROU	-0.05	0.12	0.12	0.06	0.10	-0.04	0.01	0.09	0.07	-0.01	0.11
SWE	0.06	0.37	0.26	0.28	0.34	0.20	0.19	0.72	0.38	-0.68	0.44
SVN	0.01	0.51	0.49	0.09	0.06	0.05	1.08	0.31	0.10	0.69	0.32
SVK	0.00	0.36	0.18	0.13	-0.14	-0.06	0.10	-0.05	0.29	-0.15	0.35
GBR	0.10	0.78	0.25	0.28	0.03	0.03	0.09	0.47	0.52	0.16	0.42

Neg. $p<10\%$ Neg. $p>10\%$ Pos. $p<10\%$ Pos. $p>10\%$

Source: IMF staff calculations.

Technical Appendix 4. Labor Market Recovery Prospects

This appendix goes through the details of the "shadow unemployment" approach used to predict the trajectory of the unemployment rate in the upcoming years for selected European countries, as discussed in Chapter 7. The analysis broadly follows the approach used in Stehn and others (2021).

The "shadow unemployment" approach combines the Okun's law predictions, with projections of STW usage and labor force participation, to produce unemployment forecasts. The basic equation, shown below, establishes that the gap between the shadow unemployment, which is simply the unemployment implied by the Okun's law (see Chapter 4), and the actual unemployment is explained by the usage of STW, as well as other factors captured by the parameter alpha.

$$u_t = \frac{Unemployed_t^{shadow} - ShortTimeWorkers_t - \alpha_t}{ParticipationRate_t \times WorkingAgePopulation_t} \times 100\%.$$

To obtain unemployment forecasts, we build projections for each component in the above formula.

"Shadow Unemployment"

The shadow unemployment is the unemployment implied by the Okun's law equation, estimated with historical, pre-pandemic data up to 2019Q4 (see Chapter 4 and Technical Appendix 2 for details). For the period 2020–23, the authors produce quarterly out-of-sample projections of the unemployment rate using actual data of real GDP for 2020Q1-2021Q3 and projected real GDP from the *World Economic Outlook* for 2021Q4–2023Q4.

Short-Time Work Participants

Due to limited availability of data on participation in STW schemes, we restrict the analysis only to France, Germany, Italy, Spain, the United Kingdom, as well Bulgaria, as an example of emerging market economy. We use data on STW participation up to 2021Q3 and then project it assuming that the rebound in activity goes hand-in-hand with a reduction in STW usage (except in the case of the United Kingdom, where the scheme expired in September 2021). The projected participation in STW schemes for each country under study is shown in Technical Appendix Figure 4.1.

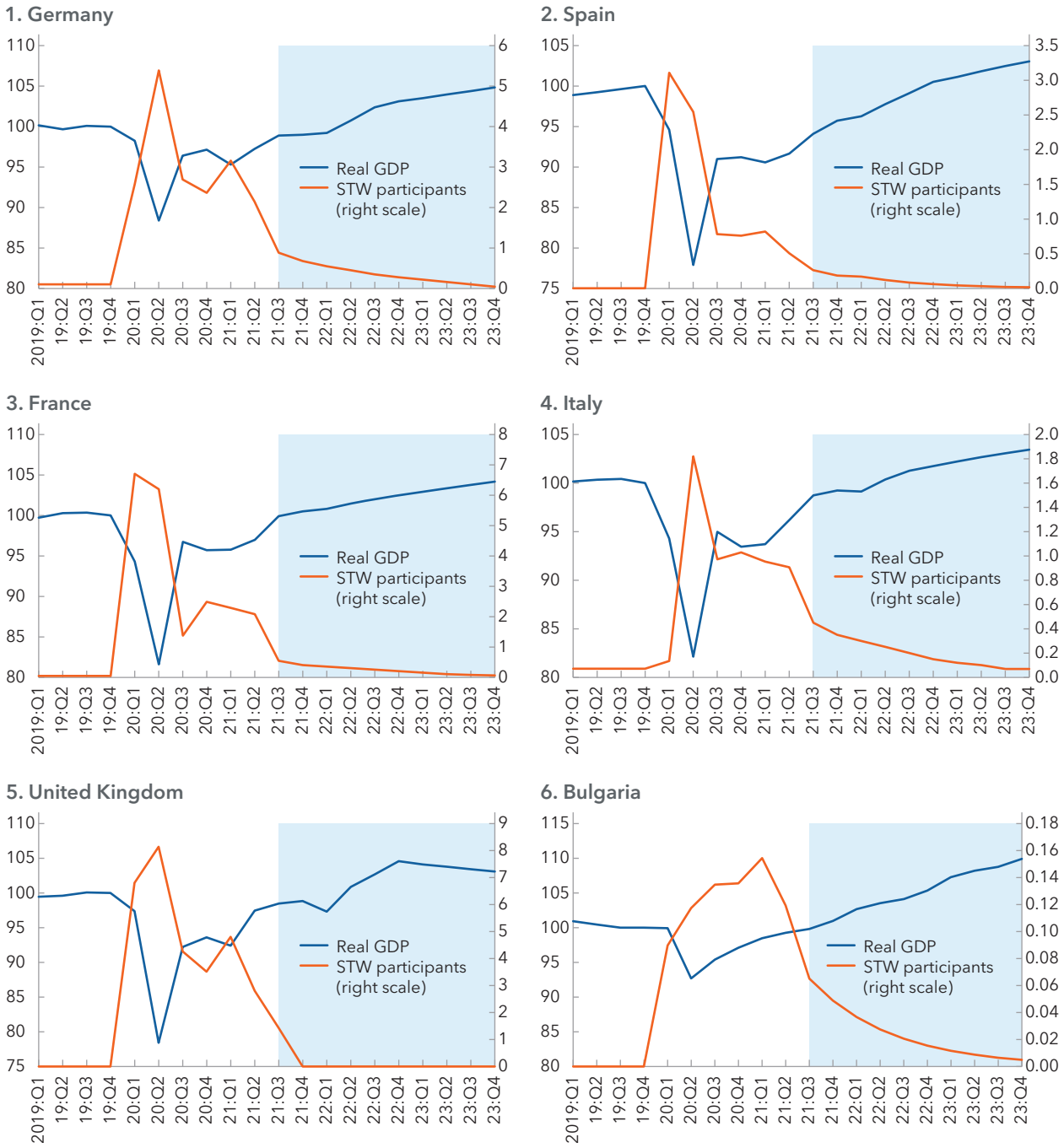
Labor Force Participation Rate

Following the decline in 2020 due to the COVID-19 pandemic—particularly in 2020Q2—the labor force participation rate is assumed to go back to precrisis trends as economies recover. The precrisis trends are assumed to be linear and computed using data up to 2019Q4.

The speed of recovery varies by country:

- In Spain and France, the labor force participation rate had already reached the pre-crisis trend in 2021Q3, so it is assumed to remain on trend throughout the projection period.

Technical Appendix Figure 4.1. Short-Time Work Scheme Participants
(Index 2019:Q4=100; million euros)



Sources: Bulgarian authorities; Bundesagentür für Arbeit (Germany); Direction de l'Animation de la Recherche, des Études et des Statistiques (France); Eurostat; Haver Analytics; HMRC Coronavirus Job Retention Scheme statistics (United Kingdom); Istituto Nazionale di Statistica (Italy); Ministerio de Trabajo y Economia Social (Spain); IMF, *World Economic Outlook*; and IMF staff calculations.
Note: For Italy, numbers correspond to authorized (not actual) STW hours. Official statistics on FTE participation and on average hours' reduction are not available for Italy, Spain, and the United Kingdom. For Italy, FTE is calculated as the ratio of authorized STW hours divided by FTE total hours worked in the economy. For Spain, the reduction of hours for workers under temporary suspension of contracts is set at 100 percent and for workers under reduction of workday it is assumed to be the mid-point of the hour-reduction limits (10–70 percent). For the United Kingdom, the reduction of hours for workers under full furlough it is set at 100 percent and for workers under partial furlough is assumed to be about 60 percent (equal to the gap in actual weekly hours worked of part-time and full-time workers). FTE = full-time equivalent; STW = short-time work schemes.

- In Germany, the labor force participation rate rebounded strongly in 2021Q2 and 2021Q3, and it is assumed to continue on this path, reaching the pre-crisis trend by end-2022.
- In Bulgaria, the decline of the labor force participation rate early in the pandemic was largely corrected in the second half of 2020, and the small remaining gap with respect of the pre-crisis trend is assumed to be closed by end-2022.
- In the UK, the recovery of the labor force participation rate since March 2021 has been slow, and the projections assume that it will remain 0.5 percentage points below the pre-crisis trend by end-2023. There are two reasons for this. First, the COVID-driven decline in labor force participation was largely driven by older workers who have opted for early retirement and will likely not return. Second, the pandemic seems to have exacerbated the decline in net migration associated with Brexit, with a significant and disproportionate decline in EU workers who are not expected to return.
- In Italy, while there was a significant recovery of the labor force participation rate in 2021Q3, the gap relative to the pre-crisis trend is still large and it is assumed that only by end-2023 will the labor force participation rate reach the pre-crisis trend.

The projected trajectory for labor force participation rate for each country under study is shown in Technical Appendix Figure 4.2.

Working-Age Population

The projections for the working-age population are obtained directly from the population projections produced and reported by Eurostat.

Scaling Factor α

The difference between the shadow and the actual unemployment is not only explained by STW, but there could be other factors at play (as discussed in Chapter 4). These factors are captured by the coefficient α_t, which is time-varying and can take positive or negative values. Its value is set so that the above equation holds for the historical data, up to 2021Q3. Throughout the projection period, α_t is assumed to gradually converge to zero as the economies recover.

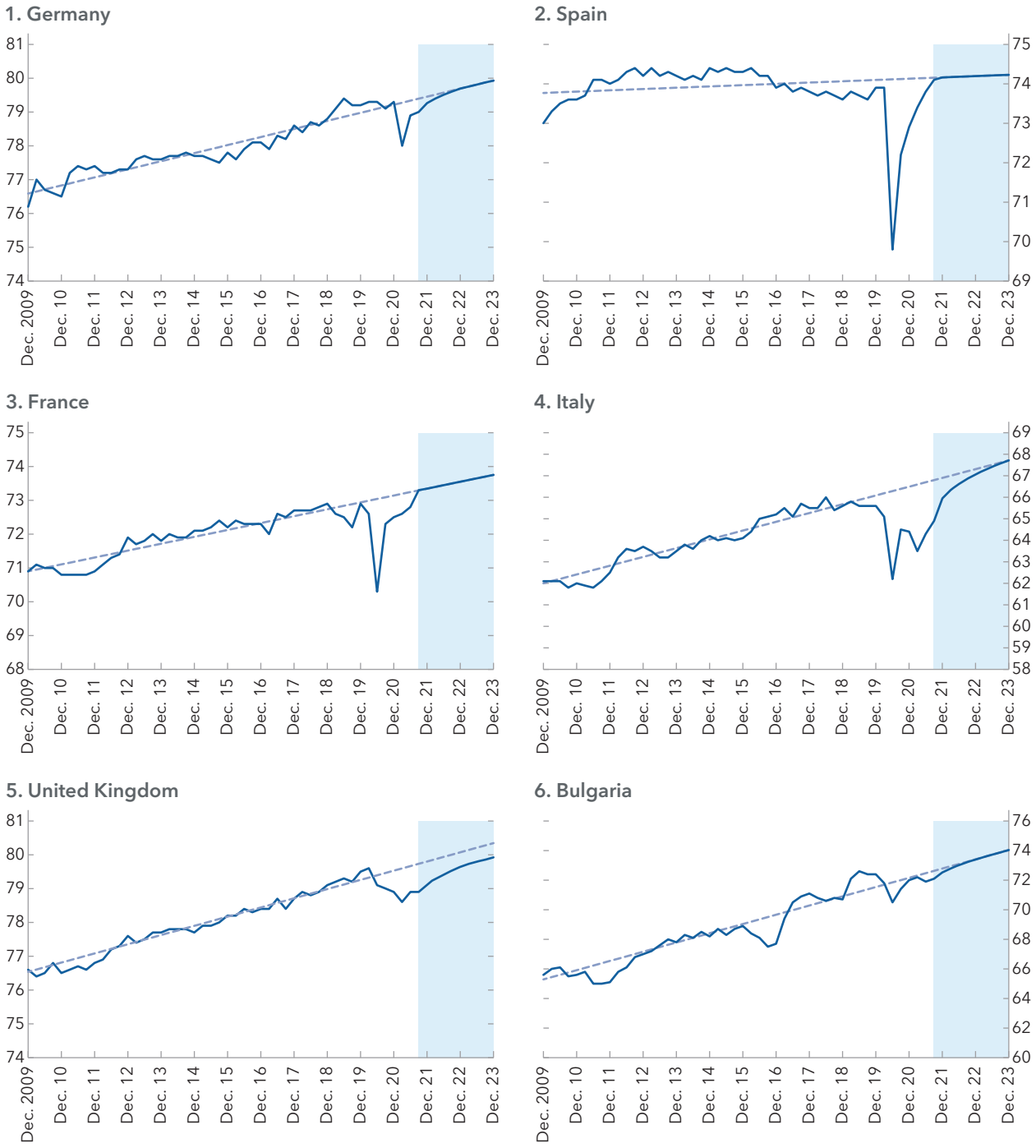
Upside and Downside Scenarios

After computing the baseline, we also compute upside and downside scenarios.

The upside (downside) scenario assumes that the participation rate will be 1 percentage points lower (higher) and that α will be 20 percent higher (lower). In the case of the labor force participation shock, we assume that the share of transitions from inactivity to unemployment (as percent of the total transitions from inactivity to an active state) is the same as in 2019.

Furthermore, the scenarios feature alternative paths for the shadow unemployment, which are based on upside/downside GDP growth scenarios that are fed through the Okun's law equation. The GDP growth scenarios are such that, in the upside scenario, all countries are back to precrisis GDP levels by end-2021. This scenario would be consistent with a prompt resolution of the health crisis, with widespread and effective vaccination, further relaxation of containment measures, and a strong rebound in activity. Alternatively, in the downside scenario, most countries would not have reached precrisis GDP levels by end-2022. Such scenario could be associated with a resurgence of the virus, forcing the reinstatement of containment measures, which would negatively affect economic activity and produce more scarring.

Technical Appendix Figure 4.2. Labor Force Participation
(Percent of working age population)



Sources: Eurostat; IMF, World Economic Outlook database; and IMF staff calculations.

Technical Appendix 5. Methodology to Assess the COVID-19 Induced Reallocation

This technical appendix describes the data and methodology behind the scenario analysis of the pandemic's potential effects on labor market reallocation (presented in Chapter 7). It also reports country-specific simulation results for France, Germany, Italy, and Spain.

Data Description

The simulation is based on employment data at NACE 2-digit sector level and ISCO 2-digit occupation level, which is obtained from European Centre for the Development of Vocational Training (CEDEFOP) 2020 Skills Forecast data set. The latest historical data available are from 2018.[1] The pre-pandemic baseline forecast covers the period up to 2030 and takes account of global economic developments up to May 2019. The input-output matrix data are obtained from Eurostat "supply input-output tables—ESA 2010—current prices."

Methodology

The scenario analysis follows the strategy and assumptions outlined in the Monthly Labor Review paper by the US Bureau of Labor Statistics (BLS) (Ice and others 2021). It simulates how pandemic-induced changes in final demand affect output and employment in the long run. Technical Appendix Table 5.1 presents the assumptions on changes in final demand for certain good and services in two scenarios—moderate impact and strong impact—which differ in the extent of pandemic-induced structural changes.

The simulation follows the specific steps below.

(1) Calculate the share of each type of goods and services produced in each sector using the input-output table data from 2018.

(2) Translate the assumptions on changes in final demand in Technical Appendix Table 5.1 to changes in sectoral output using the good and service share matrix derived in (1).[2]

(3) Compute the implied employment changes in each sector from changes in sectoral output, by assuming constant labor productivity (that is, output per worker) between the baseline and post-pandemic scenarios multiplying the changes in sectoral output derived in (2) with the country-sector-specific Okun's coefficients (that is, employment to output elasticities) estimated in Chapter 5.[3]

(4) Calculate the implied employment changes in each occupation by combining the results of sectoral employment shift obtained in (3) with the forecast of occupation share in each sector, as well as the additional assumption on pandemic-induced changes in staffing patterns.

[1] The data are consistent with the employment data published by Eurostat.

[2] This effectively assumes that the production process in terms of input-output table will remain unchanged between 2018 and 2030.

[3] The assumption essentially implies constant elasticity of employment with respect to output. For robustness, a simulation of employment changes was also conducted using the country-sector-specific Okun's coefficients (steady-state dynamic beta) estimated in Chapter 5 as employment to output elasticities. The patterns of labor reallocation across sectors and occupations remain broadly the same, although the magnitudes are somewhat smaller.

Technical Appendix Table 5.1. Assumptions on Percent Change in Final Demand from Baseline in 2030

Product code	Product label	Moderate impact	Strong impact
CPA_C21	Basic pharmaceutical products and pharmaceutical preparations	5	5
CPA_C26	Computer, electronic, and optical products	5	5
CPA_C30	Other transport equipment	–5	–10
CPA_C31_32	Furniture and other manufactured goods	5	5
CPA_F	Constructions and construction works	–2.5	–5
CPA_G47	Retail trade services, except of motor vehicles and motorcycles	–5	–10
CPA_H49	Land transport services and transport services via pipelines	–5	–3
CPA_H50	Water transport services	–5	–10
CPA_H51	Air transport services	–5	–10
CPA_H53	Postal and courier services	13	30
CPA_I	Accomodation and food services	–7	–12
CPA_J58	Publishing services	3	5
CPA_J61	Telecommunications services	5	8
	Computer programming, consultancy and related services;		
CPA_J62_63	Information services	5	10
CPA_M72	Scientific research and development services	5	10
CPA_N78	Employment services		3
CPA_N79	Travel agency, tour operator and other reservation services and related services		–15
CPA_Q86	Human health services		1
CPA_R90_92	Creative, arts, entertainment, library, archive, museum, other cultural services; gambling, and betting services		–9
CPA_R93	Sporting services and amusement and recreation services		–7
CPA_S96	Other personal services		–10

Source: Ice and others (2021); and IMF staff assumptions.

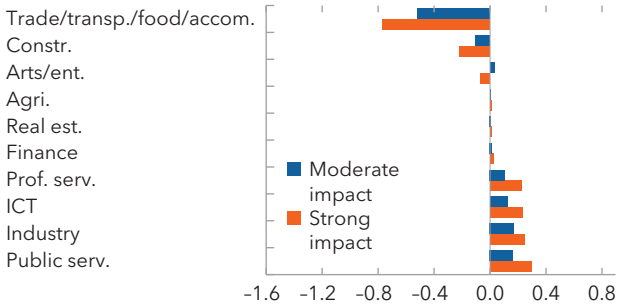
Country-Specific Simulation Results

Technical Appendix Figure 5.1 presents the estimated potential changes in employment across sectors between baseline trends and the post-pandemic scenarios for the large four euro area countries. In most countries, employment in ICT and professional service sectors is expected to increase (relative to the baseline trends) as a result of pandemic-induced structural changes, whereas construction and contact intensive sectors such as trade, food and accommodation are set to see the largest decline in employment shares. In terms of magnitude, labor market adjustment is expected to be larger in Spain and Italy than in Germany and France, reflecting the relatively large share of labor-intensive sector and greater sensitivity of employment changes in response to output shocks.

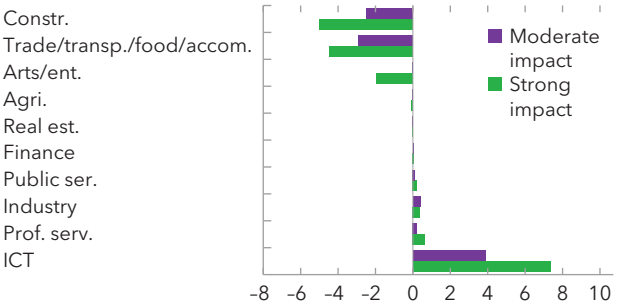
Technical Appendix Figure 5.2 shows the potential labor reallocation across occupations for the large four euro area countries. All countries will see the largest decline (relative to the baseline trends) in employment share of service and sales workers. As for expanding occupations, employment share of professionals, particularly ICT professionals, is set to expand in all four countries. In line with sectoral reallocation results, the size of the potential shifts in occupational staffing patterns is expected to be the largest in Spain.

Technical Appendix Figure 5.1. Country-Specific Potential Labor Reallocation by Sector
(Percentage points)

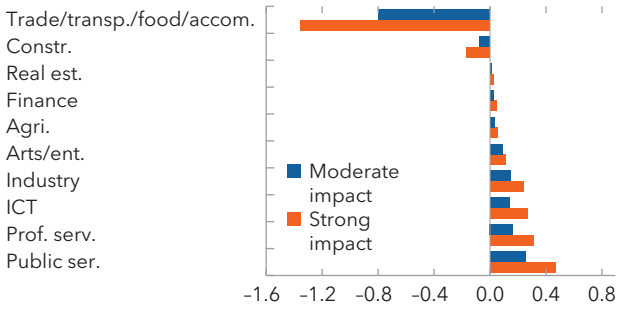
1. DEU: Difference in Employment *Share* by Sector 2030 Baseline vs. Post-Pandemic



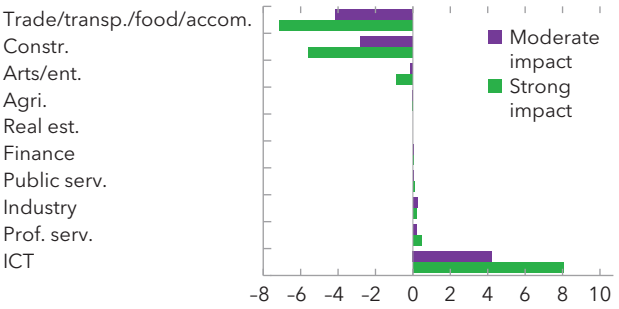
2. DEU: Difference in Employment *Growth* by Sector 2018–30 Baseline vs. Post-Pandemic



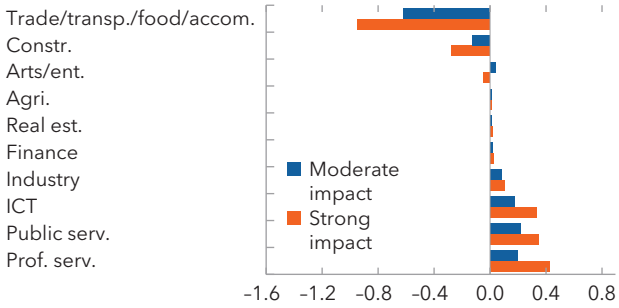
3. ESP: Difference in Employment *Share* by Sector 2030 Baseline vs. Post-Pandemic



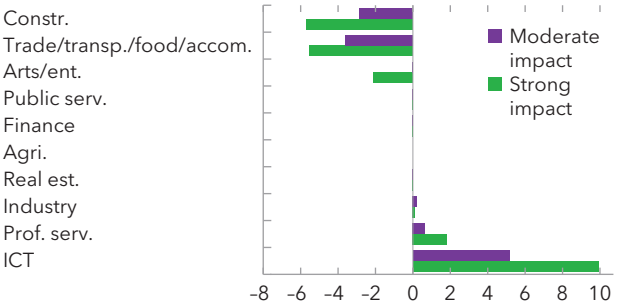
4. ESP: Difference in Employment *Growth* by Sector 2018–30 Baseline vs. Post-Pandemic



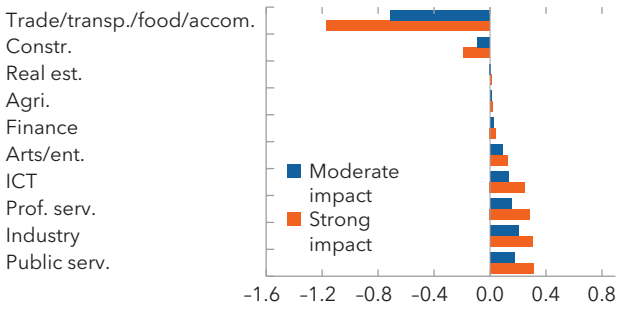
5. FRA: Difference in Employment *Share* by Sector 2030 Baseline vs. Post-Pandemic



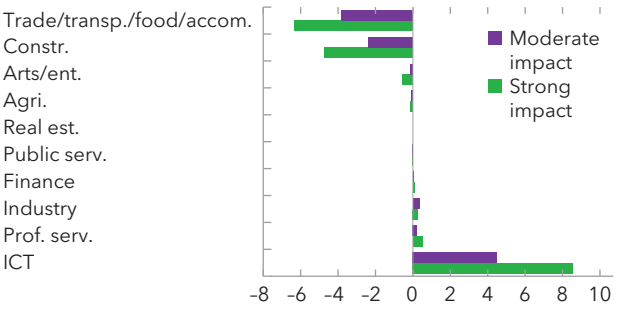
6. FRA: Difference in Employment *Growth* by Sector 2018–30 Baseline vs. Post-Pandemic



7. ITA: Difference in Employment *Share* by Sector 2030 Baseline vs. Post-Pandemic



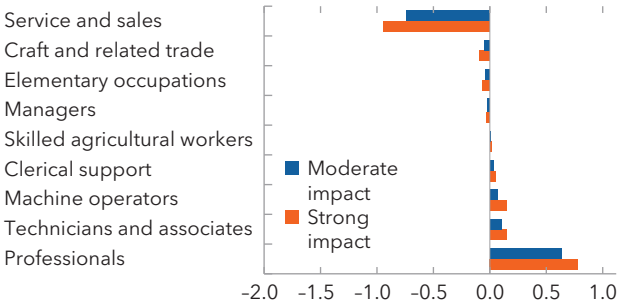
8. ITA: Difference in Employment *Growth* by Sector 2018–30 Baseline vs. Post-Pandemic



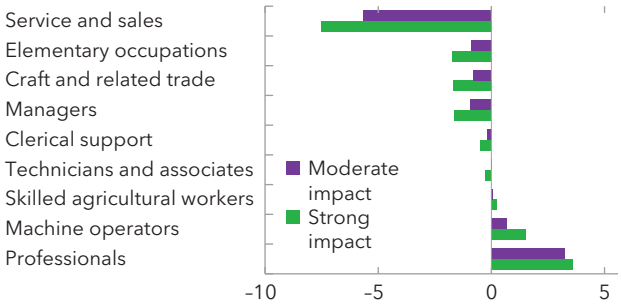
Sources: Ice, Rieley, and Rinde (2021); CEDEFOP (2020); and IMF staff calculations.
Note: Baseline long-term employment is based on CEDEFOP (2020) Skills Forecast data. DEU = Germany; ESP = Spain; FRA = France; ITA = Italy.

Technical Appendix Figure 5.2. Country-Specific Potential Labor Reallocation by Occupation
(Percentage points)

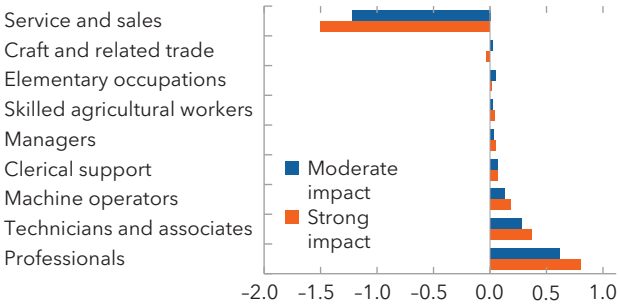
1. DEU: Difference in Employment *Share* by Occupation 2030 Baseline vs. Post-Pandemic



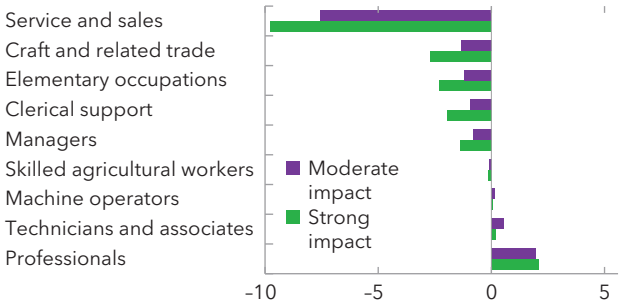
2. DEU: Difference in Employment *Growth* by Occupation 2018–30 Baseline vs. Post-Pandemic



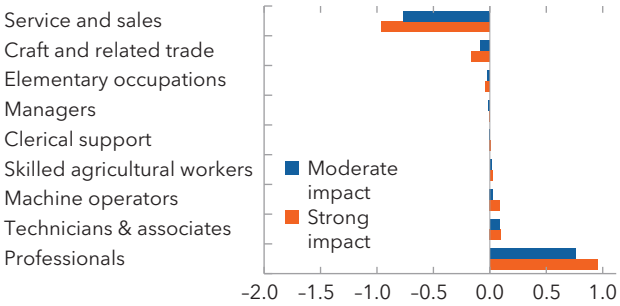
3. ESP: Difference in Employment *Share* by Occupation 2030 Baseline vs. Post-Pandemic



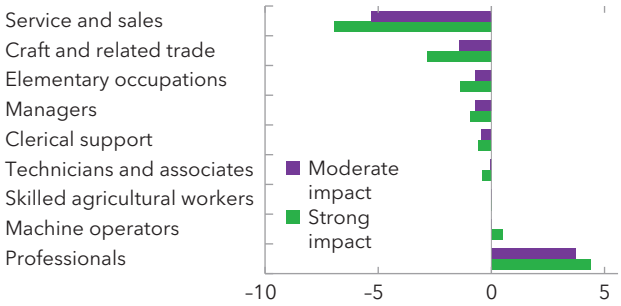
4. ESP: Difference in Employment *Growth* by Occupation 2018–30 Baseline vs. Post-Pandemic



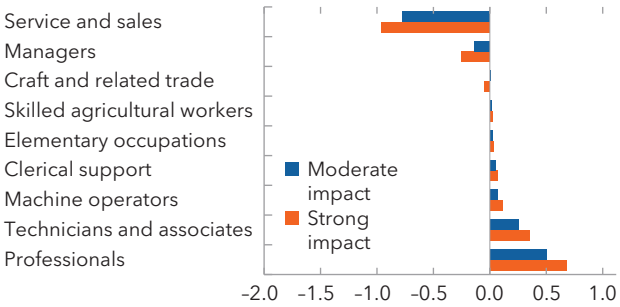
5. FRA: Difference in Employment *Share* by Occupation 2030 Baseline vs. Post-Pandemic



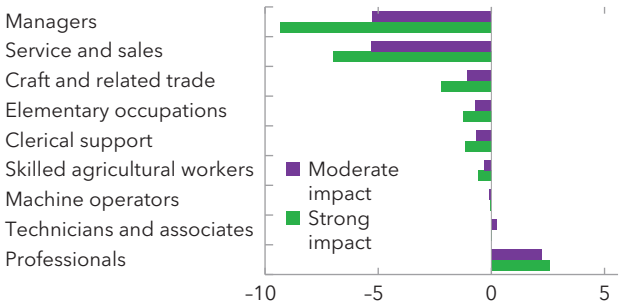
6. FRA: Difference in Employment *Growth* by Occupation 2018–30 Baseline vs. Post-Pandemic



7. ITA: Difference in Employment *Share* by Occupation 2030 Baseline vs. Post-Pandemic



8. ITA: Difference in Employment *Growth* by Occupation 2018–30 Baseline vs. Post-Pandemic



Sources: Ice, Rieley, and Rinde (2021); Eurostat; CEDEFOP (2020); and IMF staff calculations.
Note: Baseline long-term employment is based on CEDEFOP (2020) Skills Forecast data. DEU = Germany; ESP = Spain; FRA = France; ITA = Italy.

References

Acemoglu, Daron, and Joshua Angrist. 2000. "How Large are Human-Capital Externalities? Evidence from Compulsory Schooling Law." *NBER Macroeconomics Annual* 15: 9–59.

Adalet McGowan, Müge, and Dan Andrews. 2015. "Labour Market Mismatch and Labour Ductivity: Evidence from PIAAC Data." Economics Department Working Papers 1209, Organisation for Economic Co-operation and Development, Paris.

Aiyar, Shekhar, and Mai Chi Dao. 2021. "The Effectiveness of Job-Retention Schemes: COVID-19 Evidence From the German States." IMF Working Paper 21/242, International Monetary Fund, Washington, DC.

Aiyar, Shekhar, and others. 2019. "Strengthening the Euro Area: The Role of National Structural Reforms in Building Resilience." Staff Discussion Note 19/05, International Monetary Fund, Washington, DC.

Anderton, Robert, Vasco Botelho, Agostino Consolo, António Diasda Silva, Claudia Foroni, Matthias Mohr, and Lara Vivian. 2020. "The Impact of the COVID-19 Pandemic on the Euro Area Labour Market." *ECB Economic Bulletin Issue* 8/2020.

Ando, Sakai, and Neree Noumon. 2021. "Risks of Labor Market Scarring in Estonia." Selected Issues, IMF Country Report No. 21/161, International Monetary Fund, Washington, DC.

Autor, David, and others. 2020. "An Evaluation of the Paycheck Protection Program Using Administrative Payroll Microdata." MIT Working Paper, Massachusetts Institute of Technology, Cambridge, MA.

Balakrishnan, Ravi. 2008. "Canadian Firm and Job Dynamics." IMF Working Paper 08/31, International Monetary Fund, Washington, DC.

Barrero, Jose Maria, Nick Bloom, and Steven J. Davis. 2020. "COVID-19 is Also a Reallocation Shock." *Brookings Papers on Economic Activity* (2): 329–83.

Basso, Gaetano, Tito Boeri, Alessandro Caiumi, and Marco Paccagnella. 2020. "The New Hazardous Jobs and Worker Reallocation." CEPR Discussion Paper 15100, Center for Economic and Policy Research, London.

Blanchard, Oliver, and Peter Diamond. 1989. "The Beveridge Curve." *Brookings Papers on Economic Activity* 1: 1–76.

Blanchard, Olivier, Thomas Philippon, and Jean Pisani-Ferry. 2020. "A New Policy Toolkit Is Needed as Country Exit COVID-19 Lockdowns." Policy Brief 20-8, Peterson Institute For International Economics, Washington DC.

Bloom, David, and Klaus Prettner. 2020. "COVID-19 and the Macroeconomic Effects of Automation." VoxEU.org.

Boeri, Tito, Katherine Terrell. 2002. "Institutional Determinants of Labor Reallocation in Transition." *The Journal of Economic Perspectives* (16) 1.

Boeri, Tito, and Herbert Bruecker. 2011. "Short-time Work Benefits Revisited: Some Lessons From The Great Recession." *Economic Policy* 26 (68): 697–765.

Bova, Elva, Joao Tovar Jalles, and Christina Kolerus. 2018. "Shifting the Beveridge Curve: What Affects Labor Market Matching?" *International Labor Review* (157) 2.

Burdett, Kenneth and Randall Wright. 1989, "Unemployment Insurance and Short-Time Compensation: The Effects on Layoffs, Hours per Worker, and Wages." *Journal of Political Economy* 97(6): 275-87.

Butkus, Mindaugas, Kristina Matuzeviciute, Dovile Rupliene, and Janina Seputiene. 2020. "Does Unemployment Responsiveness to Output Change Depend on Age, Gender, Education, and the Phase of the Business Cycle?" *Economies* 8 (4): 1–29.

Cahuc, Pierre. 2018. "Wage Insurance, Part-Time Unemployment Insurance and Short-Time Work in the XXI Century." Discussion Papers 12045. IZA Institute of Labour Economics, Bonn.

Cahuc, Pierre, and Stéphane Carcillo. 2011. "Is Short-time Work a Good Method to Keep Unemployment Down?" CEPR Discussion Paper 8214, Center for Economic and Policy Research, London.

Cahuc, Pierre, Stéphane Carcillo, and Thomas Le Barbanchon. 2019. "The Effectiveness of Hiring Credits." *Review of Economic Studies* 862: 593–626.

Cahuc, Pierre, Francis Kramarz, and Sandra Nevoux. 2018. "When Short-Time Work Works." CEPR Discussion Paper 13041, Center for Economic and Policy Research, London.

Cahuc, Pierre, Francis Kramarz, and Sandra Nevoux. 2021. "The Heterogeneous Impact of Short-Time Work: From Saved Jobs to Windfall Effects." CEPR Discussion Paper 16168, Center for Economic and Policy Research, London.

Cahuc, Pierre, and Sandra Nevoux. 2017. "Inefficient Short-Time Work." CEPR Discussion Paper 12269, Center for Economic and Policy Research, London.

Chen, Tingyun, and others. 2018. "Inequality and Poverty Across Generations in the European Union." IMF Staff Discussion Note 18/01, International Monetary Fund Washington, DC.

Chernoff, Alex W., and Casey Warman. 2020. "COVID-19 and Implications for Automation." NBER Working Paper 27249, National Bureau of Economic Research, Cambridge, MA.

Choi, Eleanor Jawon, Jaewoo Choi, and Hyelim Son. 2020. The Long-Term Effects of Labor Market Entry in a Recession: Evidence from the Asian Financial Crisis." *Labour Economics* 67 (C).

Cœuré, Benoît. 2021. "What 3.5 Million French Firms Can Tell Us About the Efficiency of COVID-19 Support Measures." VoxEU, September 8.

Cooper, Russell, Moritz Meyer, and Immo Schott. 2017. "The Employment and Output Effects of Short-Time Work in Germany." NBER Working Papers 23688, National Bureau of Economic Research, Cambridge, MA.

Coueffe, Mélanie. 2021. "Skills and Intersectoral Reallocation of Jobs after the Crisis." *Tresor-Economics*, June 24.

Debiec, Krysztof. 2019. "A Country with Non-existent Unemployment: the Special Characteristics of the Czech Labor Market." OSW Report.

Dewan, Sabina, and Ekkehard Ernst. 2020. "Rethinking the World of Work." *Finance & Development* 57 (4): 22–25.

Diamond, Peter. 2013. "Cyclical Unemployment, Structural Unemployment." *IMF Economic Review* 61 (3): 410–55.

Dias da Silva, António, Maarten Dossche, Ferdinand Dreher, Claudia Foroni, and Gerrit Koester. 2020. "Short-time Work Schemes and their Effects on Wages and Disposable Income." *ECB Economic Bulletin Issue* 4/2020.

Diez, Federico, Romain Duval, Chiara Maggi, and Jiayue Fan. 2020. "Options to Support Incomes and Formal Employment During COVID-19." IMF Special Series on COVID-19, International Monetary Fund, Washington, DC.

Dolado, Juan J., Florentino Felgueroso, and Juan F. Jimeno. 2021. "Past, Present and Future of the Spanish Labour Market: When the Pandemic Meets the Megatrends." *Applied Economic Analysis* 29 (85): 21–41.

Dupuis, David, and Philippe Marcil. 2008. "The Effects of Recent Relative Price Movements on the Canadian Economy." Bank of Canada Review.

Duval, Romain, Yi Ji, Myrto Oikonomou, Carlo Pizzinelli, Ippei Shibata, Alessandra Sozzi, and Marina M. Tavares. 2022. "Labor Market Tightness in Advanced Economies." IMF Staff Discussion Note, International Monetary Fund, Washington, DC.

European Center for the Development of Vocational Training (CEDEFOP). 2020. "Skill Forecast Data." Thessaloniki, Greece.

European Commission (EC). 2020. SURE legal documents. Brussels.

European Commission (EC). 2022. "Winter 2022 Economic Forecast: Growth Expected to Regain Traction after Winter Slowdown." European Economy Institutional Paper 169, February. Brussels.

European Commission Joint Research Centre (EC JRC). 2020. "Immigrant Key Workers: Their Contribution to Europe's COVID-19 Response." Ispra, Italy.

European Parliament. 2020. "EU-27 Support for National Short-Time Schemes." Brussels.

Eurostat. Eurostat Database. Luxembourg.

Farooq, Ammar, and Adriana Kugler. 2015. "What Factors Contributed to Changes in Employment During and After the Great Recession?" *IZA Journal of Labor Policy* 4 (1): 1–28.

Fasani, Francesco, and Jacopo Mazza. 2020. "Being on the Frontline? Immigrant Workers in Europe and the COVID-19 Pandemic." CEPR Discussion Paper 15590, Center for Economic and Policy Research, London.

Galant, Jessica, Kory Kroft, Fabian Lange, and Matthew Notowidigdo. 2020. "Temporary Unemployment and Labor Market Dynamics during the COVID-19 Recession." NBER Working Paper 27924. National Bureau of Economic Research, Cambridge, MA.

Giani, Giada, Tiia A Lehti, Benjamin Nabarro, Guillaume Menuet, Christian Schulz, and Ann O'Kelly. 2020. "COVID Impact on Labour Markets: Is That It?" *European Economic Weekly* 14: 9.

Giupponi, Giulia, and Camille Landais. 2018. "Subsidizing Labor Hoarding in Recessions: The Employment and Welfare Effects of Short-Time Work." CEPR Discussion Paper 13310, Center for Economic and Policy Research, London.

Goto, Eiji, and Constantin Bürgi. 2021. "Sectoral Okun's Law and Cross-Country Cyclical Differences." *Economic Modelling* 94: 91–103.

Gregory, Allan, and Bruce Hansen.1996. "Residual-based Tests for Cointegration in Models with Regime Shifts." *Journal of Econometrics* 70 (1).

Haltiwanger, John, Hartmut Lehmann, Katherine Terrell. 2003. "Job Creation and Job Destruction in Transition Countries." *Economics of Transition and Institutional Change* 11 (2).

Haltiwanger, John, Ron S. Jarmin, and Javier Miranda. 2013. "Who Creates Jobs? Small versus Large versus Young." *The Review of Economics and Statistics* 95 (52): 347–61.

Harding, Don, and Adrian Pagan. 2002. "Dissecting the Cycle: a Methodological Investigation." *Journal of Monetary Economics* 49 (2): 365–81.

Hazlett, Thomas. 1995. "The Czech Miracle, Why Privatization Went Right in the Czech Republic." Reason.

Hershbein, Brad, and Lisa B. Kahn. 2018. "Do Recessions Accelerate Routine-Biased Technological Change? Evidence from Vacancy Postings." *American Economic Review* 108 (7): 1737–72.

Hijzen, A., and D. Venn. 2011. "The Role Of Short-Time Work Schemes during the 2008-09 Recession." Social, Employment and Migration Working Papers no. 115. Paris: Organisation for Economic Co-operation and Development.

Hill, Steven. 2021. "The Rise of the Distributariat." Project Syndicate, July 16.

Ice, Lindsey, Michael J. Rieley, and Samuel Rinde. 2021. "Employment Projections in a Pandemic Environment." *Monthly Labor Review*. US Bureau of Labor Statistics, February.

Jordà, Òscar, Sanjay R. Singh, and Alan M. Taylor. (2022). "Longer-Run Economic Consequences of Pandemics." *The Review of Economics and Statistics* 104 (1): 166–75.

International Monetary Fund (IMF). 2010. *World Economic Outlook*. Washington, DC, April.

International Monetary Fund (IMF). 2017. "Spain : 2017 Article IV Consultation-Press Release, Staff Report and Statement by the Executive Director for Spain." IMF Country Report No. 17/319, Washington, DC.

International Monetary Fund (IMF). 2018. *World Economic Outlook*. Washington, DC, April.

International Monetary Fund (IMF). 2020a. *World Economic Outlook*. Washington, DC, April.

International Monetary Fund (IMF). 2020b. *World Economic Outlook*. Washington, DC, October.

International Monetary Fund (IMF). 2020c. *Fiscal Monitor*. Washington, DC, October.

International Monetary Fund (IMF). 2020d. "Expenditure Policies in Support of Firms and Households." Special Series on Fiscal Policies to Respond to COVID-19, Washington DC, April.

International Monetary Fund (IMF). 2021a. "France: 2020 Article IV Consultation-Press Release; Staff Report and Statement by the Executive Director for France." IMF Country Report No. 21/15, Washington, DC.

International Monetary Fund (IMF). 2021b. "Bulgaria: 2020 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Bulgaria." IMF Country Report No. 21/27, Washington, DC.

International Monetary Fund (IMF). 2021c. *World Economic Outlook*. Washington, DC, April.

International Monetary Fund (IMF). 2021d. *Regional Economic Outlook: Europe*. Washington DC, October.

Jaimovich, Nir, and Henry E. Siu. 2020. "Job Polarization and Jobless Recoveries." *The Review of Economics and Statistics* 1021: 129–47.

Janicki, Hubert, and Erika Mcentarfer. 2015. "Where Did All the Construction Workers Go?" United States Census Bureau.

Jansen, Marcel, Sergi Jimenez-Martin, and Lucia Gorjon. 2016." The Legacy of the Crisis: The Spanish Labour Market in the Aftermath of the Great Recession." *Studies on the Spanish Economy* eee2016-10, FEDEA.

Jurajda, Stepan, and Katherine Terrel. 2008. "Job Reallocation in Two Cases of Massive Adjustment in Eastern Europe." *World Development* 36 (11).

Kilponen, Juha, David Lodge, Rolf Strauch, and Juuso Vanhala. 2010. "Labour Markets during Recessions – Evidence on the Role of Wage Rigidity and Hysteresis." https://www.banque-france.fr/sites/default/files/s2-6-vanhala_0.pdf.

Kolesnikova, Natalia. 2010. "The Return to Education Isn't Calculated Easily." *The Regional Economist* (January) 12–13.

Kopp, Daniel, and Michael Siegenthaler. 2019. "Short-Time Work and Unemployment In and After the Great Recession." KOF Working Paper 462, KOF Swiss Economic Institute, Zurich.

Lariau, Ana, and Lucy Liu. 2022. "Inequality in the Spanish Labor Market During the COVID-19 Crisis." IMF Working Paper 22/18, International Monetary Fund, Washington, DC.

Lund, Susan, Anu Madgavkar, James Manyika, Sven Smit, Kweilin Ellingrud, Mary Meaney, and Olivia Robinson. 2021. "The Future of Work after COVID-19." McKinsey Global Institute.

Martin, Philippe, and Roland Rathelot. 2021. "Evaluation of Assistance in Hiring Young People Based On Declarations Prior to Hiring." Economic Analysis Council, Focus No. 060-2021.

Masso, Juaan, Paul Eamets, and Kaia Philips. 2005. "Job creation and job destruction in Estonia; Labor Reallocation and Structural Changes. IZA Discussion Papers (1707). Institution for the Study of Labor (IZA), Bonn.

Moretti, Enrico. 2004. "Workers' Education, Spillovers and Productivity: Evidence from Plant-Level Production Functions." *The American Economic Review* 94 (3): 656–90.

Mosley, Hugh. 2020. "Short-time Work Schemes in the EU." Study Report, European Commission, Brussels.

Miyamoto, Hiroaki, and Nujin Suphaphiphat. 2020. "Mitigating Long-Term Unemployment in Europe." Working Paper 20/168, International Monetary Fund, Washington, DC.

Neumark, David, and Diego Grijalva. 2015. "The Employment Effects of State Hiring Credits." IZA Discussion Papers 9146, Institute of Labor Economics IZA, Bonn.

Organisation for Economic Co-operation and Development (OECD). 2016. "Skills Matter: Further Results from the Survey of Adult Skills." OECD Skills Studies, Paris.

Organisation for Economic Co-operation and Development (OECD). 2020a. "Job Retention Schemes during the COVID-19 Lockdown and Beyond." Paris.

Organisation for Economic Co-operation and Development (OECD). 2020b. "Distributional Risks Associated With Non-Standard Work: Stylised Facts and Policy Consideration." Tackling Coronavirus Series, Paris.

Organisation for Economic Co-operation and Development (OECD). 2021. "OECD Employment Outlook 2021 – Navigating the COVID-19 Crisis and Recovery." Paris.

Paciorek, Andrew. 2015. "Where Are the Construction Workers?" FEDS Notes. Washington, DC: Board of Governors of the Federal Reserve System.

Radde, S., and K. Saxena. 2020. "Unemployment—Lurking in the Shadows." European Economics Analyst, Goldman Sachs.

Robins, Philip K., Charles Michalopoulos, and Kelly Foley. 2008. "Are Two Carrots Better than One? The Effects of Adding Employment Services to Financial Incentive Programs for Welfare Recipients." *Industrial and Labor Relations Review* 61 (3): 410–23.

Romei, Valentina, and Martin Arnold. 2021. European Workers' Reliance on Furlough Fuels Call for Retraining." *Financial Times*, February 17.

Scarpetta, Stefano, Monika Queisser, Andrea Garnero, and Sebastian Königs. 2020. "Supporting People and Companies to Deal with COVID-19: Options for an Immediate Employment and Social Policy Response." VoxEU, April 12.

Schwandt, Hannes, and Till von Wachter. 2019. "Unlucky Cohorts: Estimating the Long-Term Effects of Entering the Labor Market in a Recession in Large Cross-sectional Data Sets." *Journal of Labor Economics* 37 (S1): S161–98.

Stehn and others. 2021. "Some Pleasant Labour Arithmetic." European Economics Analyst, Goldman Sachs. July 19.

Utermöhl, Katharina, Selin Ozyurt, and Ludovic Subran. 2020. "The Risk of 9 Million Zombie Jobs in Europe." Allianz, Munich.

Vecernik, Jiri. 2001. "Earnings Disparities in the Czech Republic: Evidence of the Past Decade and Cross-national Comparison." *Prague Economic Papers* 10 (3).

Vodopivec, Milan. 2000. "Worker Reallocation during Estonia's Transition to Market: How Efficient and How Equitable?" Social Protection Discussion Paper (0018), World Bank, Washington, DC.

PUBLICATIONS

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