

## 2. Wage Dynamics in Europe: Are Labor Markets Heralding More Inflation?<sup>1</sup>

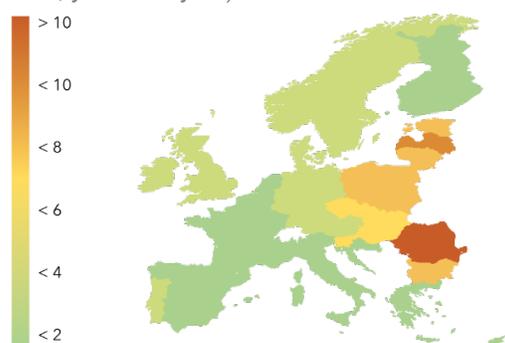
Following two years of double-digit growth rates, inflation is finally receding. Nominal wages have not kept pace, and workers' real wage loss has been substantial. Despite ongoing monetary tightening, labor market softening has been mild, and unemployment rates are close to record lows. This chapter evaluates the state of the labor market, wage dynamics, and the transmission to inflation. Recent wage growth appears driven by income catch-up, especially in advanced economies, and a response to second-round effects of cost shocks. Wage formation is more backward-looking in Central, Eastern, and Southeastern Europe (CESEE) countries than in advanced Europe (AE), which could lead to sustained high wage growth in these countries. On balance, risks remain skewed toward more persistent inflation. Under adverse assumptions, this could delay reaching inflation targets to 2026, about one year later than in the baseline. Given these inflation risks, monetary and fiscal policies should be tight. Structural policies should focus on increasing labor productivity and labor supply.

### Wage growth has picked up following the massive and rapid price shock.

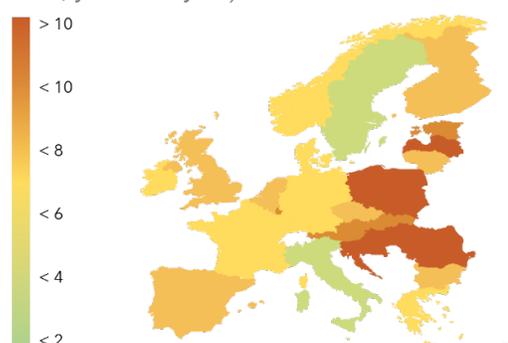
Nominal wage growth started to gain pace in recent quarters (Figure 2.1). In AE (excluding CESEE countries),<sup>2</sup> wage growth started to accelerate in 2021 after increased volatility during the pandemic and reached 5 percent by mid-2023, compared to 1 to 3 percent from 2015 to 2019.<sup>3</sup> In CESEE, wage growth has climbed to above 10 percent in 2023. In comparison, wage growth between 2015 and 2019 has been in the 5 to 8 percent range.

Figure 2.1. Nominal Wage Growth

1. Nominal Wage Growth, 2015–19 Average  
(Percent, year-over-year)



2. Nominal Wage Growth, 2023Q2  
(Percent, year-over-year)



Sources: Haver Analytics and IMF staff calculations.

Note: Nominal wage is calculated as compensation per hour.

However, nominal wages have mostly fallen behind price increases (Figure 2.2.1). The effects of the COVID-19 crisis and Russia's war in Ukraine raised consumer prices in the last two years by more than they had risen in the 10 years following the global financial crisis (Figure 2.2.2). The erosion in workers' purchasing power was substantial across Europe, but especially large in advanced economies, where wage contracts are often set for

<sup>1</sup> This chapter was prepared by Chikako Baba (lead), Ting Lan, and Ippei Shibata, under the guidance of Sebastian Weber and under the supervision of Stephan Danninger and Helge Berger. Ben Park provided outstanding research assistance. Agnesa Zalezakova provided administrative support.

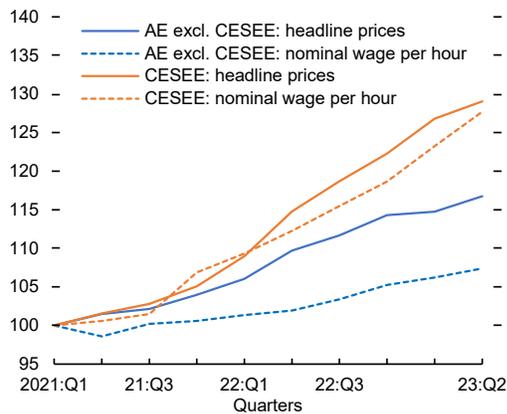
<sup>2</sup> In this chapter, AEs refer to advanced European countries excluding CESEE countries. CESEE countries cover both advanced and emerging market European economies, but excludes Belarus, Russia, Ukraine, and Türkiye.

<sup>3</sup> Wages in this chapter are measured by compensation per hour worked. Different measures of wages evolve similarly in recent quarters, while there was wide divergence during the pandemic in 2020 and 2021. See Online Annex for divergence among different wage measures in Europe during the pandemic.

multi-year periods. As employment contracts are renewed and inflation is receding, workers have begun to negotiate for large wage increases. These adjustments come at a time when labor markets are tight and unemployment rates are around record lows.

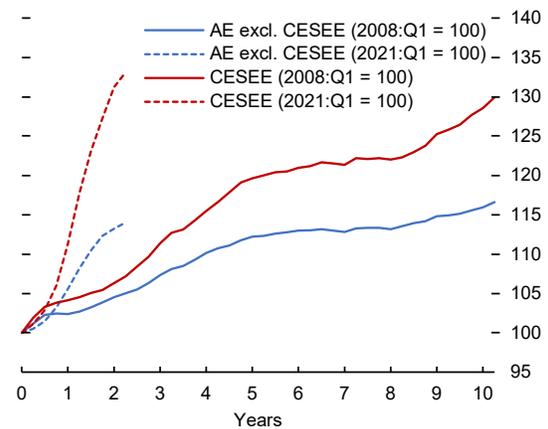
**Figure 2.2. Wage and Price Developments**  
**1. Wage and Price Developments**

(Index, 2021:Q1=100)



**2. Price Developments**

(Index, 2008:Q1=100 and 2021:Q1=100)



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

Notes: Panel 1 reports PPP-GDP weighted average across countries. Panel 2 reports unweighted average across countries. AEs (excl. CESEE) includes AUT, BEL, DNK, FIN, FRA, DEU, GRC, IRL, ITA, NLD, NOR, PRT, ESP, SWE, and GBR. CESEE includes BGR, CZE, EST, HRV, HUN, LTU, LVA, POL, ROU, SVK, and SVN. Country abbreviations are International Organization for Standardization country codes. AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe; PPP = purchasing power parity

Rising wage pressures can have important implications for restoring price stability. The chapter asks two questions: should we expect a sustained rise in wages, and will wage growth lead to persistent above-target inflation? To answer these questions, this chapter empirically models wage dynamics in Europe, assesses determinants of wage growth, and presents a framework to assess the impact on inflation going forward. In a first step, the chapter estimates key contributors of wage growth using a wage-Phillips curve augmented with an error correction term to capture the speed of adjustment of wages to their gaps from long-term trends. It then analyses labor market trends to form a view on the factors that could shape the future wage dynamics. Finally, it combines assumptions on labor market dynamics, wage-Phillips curve estimates, and passthrough estimates from wages to inflation to project the future path of wages and inflation under baseline and plausible alternative scenarios.

Key takeaways from this chapter's analyses are: First, wage growth reflects conventional wage drivers, such as inflation expectations and slack in the economy, and recently wage catch-up and second-round effects of cost-push shocks. As of mid-2023, there is still a substantial real wage gap in AEs, while real wages have almost fully recovered to the long-run levels in CESEE. Second, an important driver of the duration of wage growth at the current conjuncture is whether wage setting is *backward-looking*—driven by recent inflation experiences—or *forward-looking*—driven by inflation expectations. The chapter finds that wage formation is more backward-looking in CESEE, posing greater risks of feeding into sustained inflation. Third, a substantial part of wage growth in CESEE in 2022-23 cannot be explained by conventional wage drivers, suggesting that they are the result of positive wage shocks—potentially reflecting higher sensitivity of wage setters to recent price developments in a high inflation environment. Fourth, slack in the labor market may be overstated due to structural shifts—including a continued decline in productivity (see Chapter 1). Fifth, using analytical results to project wage growth and inflation over the near term, the model predicts wage growth to remain elevated through 2024 under the October 2023 *World Economic Outlook* baseline assumptions for global commodity prices. Sixth, in an adverse scenario incorporating tighter labor markets and more backward-looking wage setting, wage growth can be even faster, delaying the achievement of inflation targets by about one year compared to the current baseline.

An appropriate macroeconomic policy setting will help restore households' purchasing power without unduly delaying a return of inflation to target and weakening growth prospects. First and foremost, this requires a monetary policy stance that reverts the monetary impetus provided to the economy during the crises years and ensures inflation is reduced in a timely manner. Second, fiscal policy needs to turn contractionary, especially where monetary policy is constrained, and debt is elevated. Third, supply-side policies should focus on facilitating worker relocation and boosting productivity. Fourth, better incentives to increase effective labor force participation are needed.

## Real wage gaps are closed already in some countries.

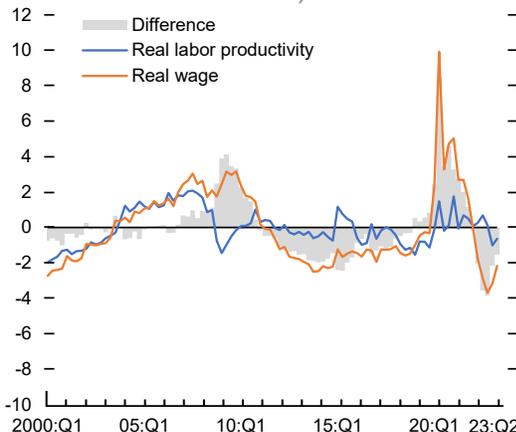
Real wages have declined sharply post-COVID-19 as inflation outpaced nominal wage growth (Figure 2.3). In CESEE, real wages fell by about 5 percent and in AEs by 8 percent since their peak in the fourth quarter of 2020. The decline in both country groups is larger than the adjustment post-global financial crisis, which was driven by nominal wage moderation and which may have contributed to low inflation rates at the time.

**Figure 2.3. Real Wage and Productivity**

**1. Real Wage and Productivity:**

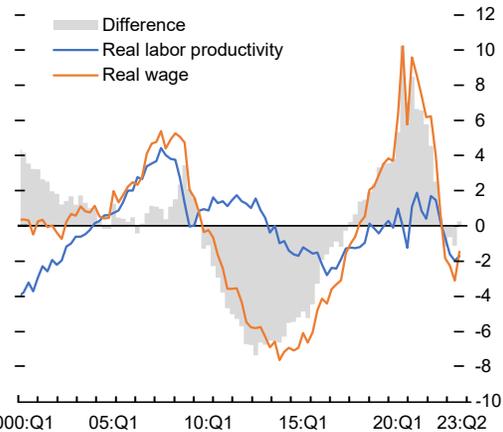
**AE (excl. CESEE)**

(Deviations from linear trend)



**2. Real Wage and Productivity: CESEE**

(Deviations from linear trend)



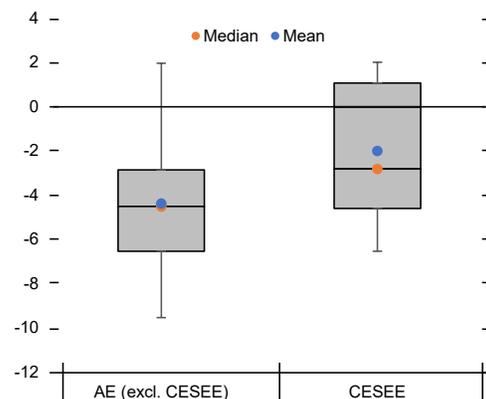
Sources: Eurostat, Haver Analytics, and IMF staff calculations.

Notes: Linear trend is removed from the 2019Q4 = 100 indexed values. AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe.

Real wage levels are well below their long-term trends, especially in AEs. Based on an estimated long-term relationship between nominal wages, prices, and labor productivity, the productivity adjusted real wage gap is estimated to average about 4½ percent in AEs (excl. CESEE) and is about 2 percent for CESEE as of mid-2023 (Figure 2.4). While CESEE experienced higher inflation, they registered a more instantaneous increase of nominal wages, and a larger decline of productivity below trend compared to AEs.

**Figure 2.4 Real Wage Gap, 2023Q2**

(Percent deviation of real wage from long-term trend)



Sources: Eurostat, Haver Analytics, and IMF staff calculations.  
Note: AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe.

## Wage growth driven by conventional factors and gradual reversal of shocks.

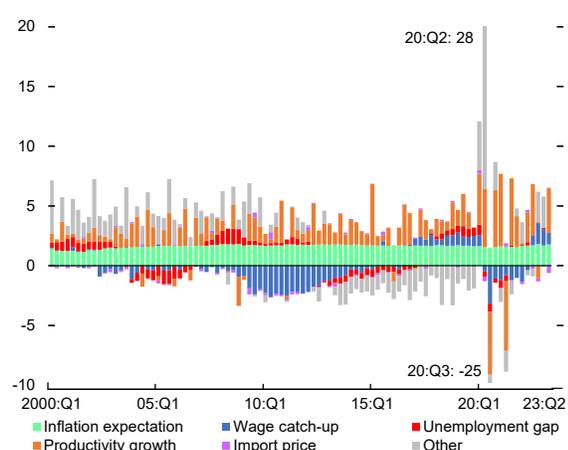
To analyze the wage dynamics and its main drivers in more depth, a hybrid wage-Phillips curve is estimated, augmented with an error correction term to reflect wage gaps from long-term trends. Following the literature,<sup>4</sup> the model relates wage inflation to explanatory variables, such as domestic slack (proxied by the unemployment gap), wage expectations (proxied by inflation expectation), cost-push shocks (proxied by import prices), real wage gaps from trend productivity, and lagged wage growth to capture the persistence unrelated to the wage gaps. The model is estimated for each of the 15 AEs and 11 CESEEs in our sample with available data from the first quarter of 1991 to the second quarter of 2023.<sup>5</sup> The country-specific coefficients are then used to calculate each driver's contribution in a dynamic simulation. Average coefficient estimates have the expected signs, and values are broadly aligned with the literature (see Online Annex for details on the specification and the regression results). They also suggest that wage formation in CESEE is more backward-looking, causing past wage shocks to have a more persistent impact.

**Figure 2.5. Decomposition of Nominal Wage Growth**

### 1. Nominal Wage Growth in AE

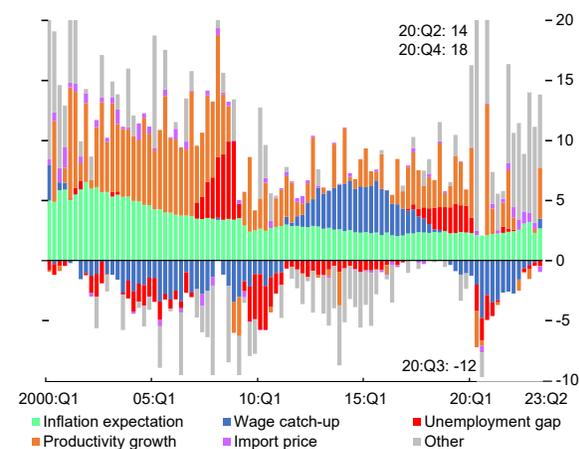
(excl. CESEE)

(Percentage point; quarter-over-quarter growth annualized)



### 2. Nominal Wage Growth in CESEE

(Percentage point; quarter-over-quarter growth annualized)



Sources: Haver Analytics; Consensus Forecast; IMF staff calculations.

Note: The bars represent average contribution of each factor across countries in AE and CESEE. Contributions are calculated based on the dynamic simulation of country-by-country wage Phillips curve regressions. The quoted numbers in the figure represent cumulative sum of the stacked bars. "Other" includes residuals and deterministic components. AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe; PPP = purchasing power parity.

Inflation expectations and productivity growth make up for the bulk of wage growth across countries since 2000 according to the estimation results. Figure 2.5 decomposes contributions to quarterly wage growth into various factors. Conventional drivers of wage inflation comprise the unemployment gap—a measure of the tightness of the labor market defined as the difference between the actual and natural unemployment rate<sup>6</sup>—productivity growth, and inflation expectations. Import prices capture the effects of changes to cost-of-living from abroad via energy and commodities prices while wage catch-up is defined as adjustments to real wage deviations from long-term co-movement with productivity trends.

<sup>4</sup> See, among others, Chapter 2 of the October 2022 *World Economic Outlook*, and Chapter 2 of the 2018 *Regional Economic Outlook: Europe*.

<sup>5</sup> The benchmark results used in this section and in a later section on projections are estimated with pre-pandemic data to avoid the impacts of large spikes in wage series in 2020-21. The sample of countries is determined by data availability. It covers 94 percent of GDP of AEs and 91 percent of GDP of CESEE excluding Belarus, Russia, Türkiye, and Ukraine.

<sup>6</sup> The natural unemployment rate in the analysis is derived from the Hodrick-Prescott filtered unemployment rate.

- Inflation expectations have consistently contributed about 1½ percentage points to nominal wage growth in AEs, while in CESEE, the contribution has dropped from almost 6 percent on average in the early 2000s to about 2½ percent pre-COVID-19 thanks to the successful disinflation period in the late 1990s and early 2000s.
- Productivity growth added another 1 percent, on average, in AE. In CESEE, productivity growth contributed another 5 percent up until the global financial crisis, but the impact halved post-global financial crisis. The unemployment gap and wage catch-up had cyclical effects, leading to higher wage growth pre-global financial crisis and pre-COVID-19, and lower wage growth in the post-global financial crisis adjustment episode. Wage levels exceeded the long-run productivity trends prior to the global financial crisis in CESEE and post-global financial crisis in AE, causing the wage catch-up term to reduce nominal wage growth. With productivity growth recovering more quickly, wage catch-up started to be the main driver of wages between 2012 and 2016 in CESEE. The wage gaps turned broadly neutral in both country groups before the COVID-19 crisis.

Looking at the most recent period, wage growth in AEs and CESEE have been mainly driven by wage catch-up and second round effects from cost-push shocks. But in contrast to AE, wages in CESEE grew well beyond the model implied value (other factors). And there are also differences between AE and CESEE among the conventional drivers: wage catch-up—the reversal of gaps—has been behind an acceleration in wage growth between the first quarter of 2021 and the first quarter of 2023. However, it positively contributes to nominal wage growth by 1 percent in AEs, while it returned to neutral in CESEE, where nominal wages kept up better with prices, creating a feedback loop that contributed to higher inflation rates in CESEE compared to AEs (Figure 2.2). Expectations have helped anchor wages well, while some uptick is notable for CESEE. Second round effects from cost-push shocks have contributed to higher wage inflation with greater impacts observed in CESEE. Their contribution can be greater in the recent period, reflecting their high passthrough during high inflation periods (see Baba and Lee 2022). Finally, wages in selected CESEE have grown faster than implied by the model's conventional factors. A possible explanation of this unexplained component could be a change in how wage expectations are formed, including for example, a higher sensitivity to price developments in a high inflation environment, which could have led to more backward-looking and persistent wage growth.<sup>7</sup> Intuitively one could think of a shift in wage growth expectations triggered by the sustained and large price increases that may be perceived as having a long-lasting component.

## Tight labor markets pose upside risk to wages.

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Whether real wages will continue to adjust through lower inflation or through faster wage growth hinges on the underlying conditions in the labor market and their prospects. Empirically, tight labor market conditions are closely associated with higher wage growth (Duval and others 2022). Indicators of labor market tightness, decomposition of labor market flows, and their behavior compared to trends are instructive in this regard and suggest that labor markets may be tighter than implied by the Hodrick-Prescott -filter-based unemployment gap estimates, which are mostly close to zero.

Despite recent softening, multiple indicators point to a continued tight labor market. Demand for labor is high relative to supply, as indicated by still high vacancy-to-unemployment (VU) ratios and close to record-low unemployment rates (Figure 2.6). In AEs, the VU ratio reached its highest point in the second quarter of 2022 and remains more than 50 percent above the pre-COVID-19 level. Meanwhile, in CESEE, the VU ratio remains higher than the historical average, even though it has seen a decline in recent quarters. This tightness is further supported by a historically low slack in labor supply, which is measured by the share of available workers in both country groups.

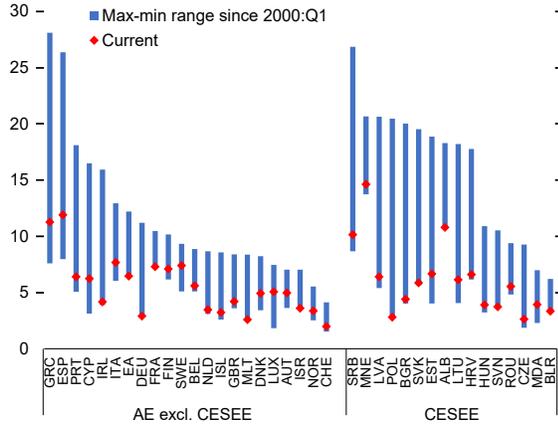
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<sup>7</sup> This refers to the lagged wage term in the hybrid Phillips curve for CESEE. Comparing pre-Covid (panel) estimates to estimates including the most recent period (but excluding few quarters during the height of COVID-19 when hourly wages were very volatile), increases the coefficient estimate on the backward-looking term and the wage catch-up term. Separate panel estimates for CESEE and AE suggest also that the backward-looking term in the hybrid Phillips curve is larger for CESEE. This is consistent with the findings in Chapter 2 of the October 2023 *World Economic Outlook*.

**Figure 2.6. Labor Market Trends**

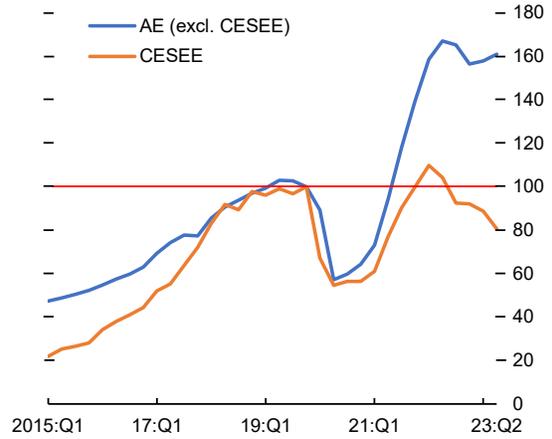
**1. Unemployment Rate**

(Percent)



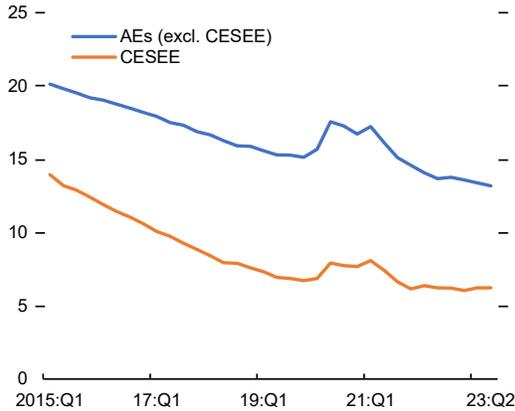
**2. Vacancy-to-Unemployment Ratio**

(Index, 2019:Q4 = 100)



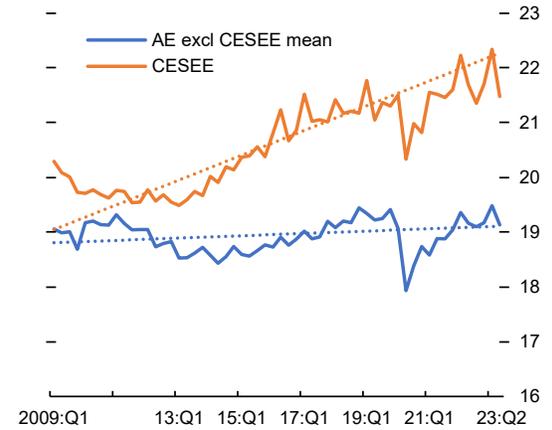
**3. Labor Market Slack**

(Percent of extended labor force)



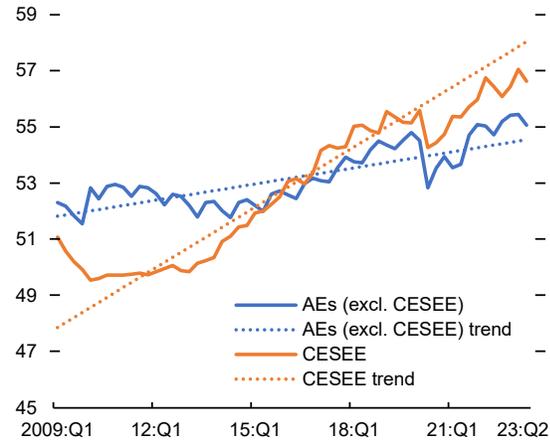
**4. Total Actual Hours Worked**

(Weekly hours per population age 15 years and older)



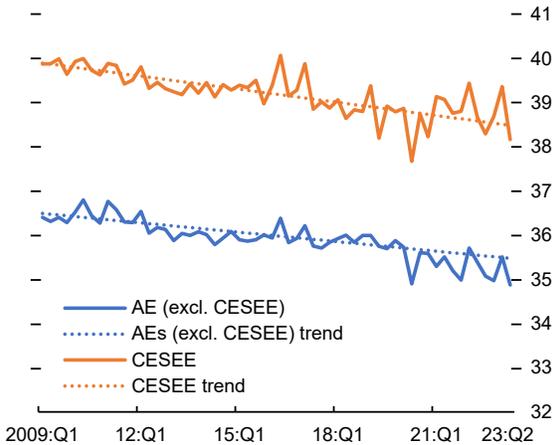
**5. Employment-to-Population Ratio**

(Percent of population age 15 years and older)



**6. Average Hours Worked**

(Hours per week, population age 15 years and older)

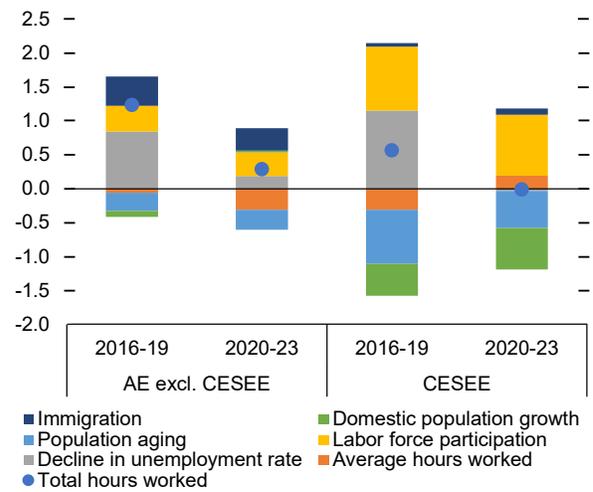


Sources: Haver Analytics; Eurostat; Organization for Economic Co-operation and Development; and IMF staff calculations.

Note: Panels 2-6 report weighted averages across countries. Labor market slack in panel 3 is defined as the sum of unemployed people, part-time workers who want to work more, people who are available to work but do not look for work, and people who are looking for work but are not immediately available. Country abbreviations are International Organization for Standardization country codes. AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe.

There is no clear evidence of scarring in European labor markets, despite concerns about long-term repercussions for workers' health and productivity from COVID-19. Labor markets have proven to be resilient in the face of successive shocks, including those stemming from COVID-19, energy-price increases, and monetary policy tightening. In part, this reflects large-scale fiscal support and the use of short-time work schemes (Ando and others 2022). By 2023, the total hours worked have not only recovered to pre-pandemic trends but have surpassed them in both AEs and CESEE (Figure 2.6). In AEs, the labor market recovery to pre-COVID-19 trend is primarily driven by increased employment (extensive margin). In CESEE, the recovery is attributed to the average hours worked (intensive margin) relative to its previous declining trend. This corroborates the picture that labor markets emerged as tight, or even tighter than before the COVID-19 crises.

**Figure 2.7. Total Hours Decomposition**  
(Annualized growth, weighted average)

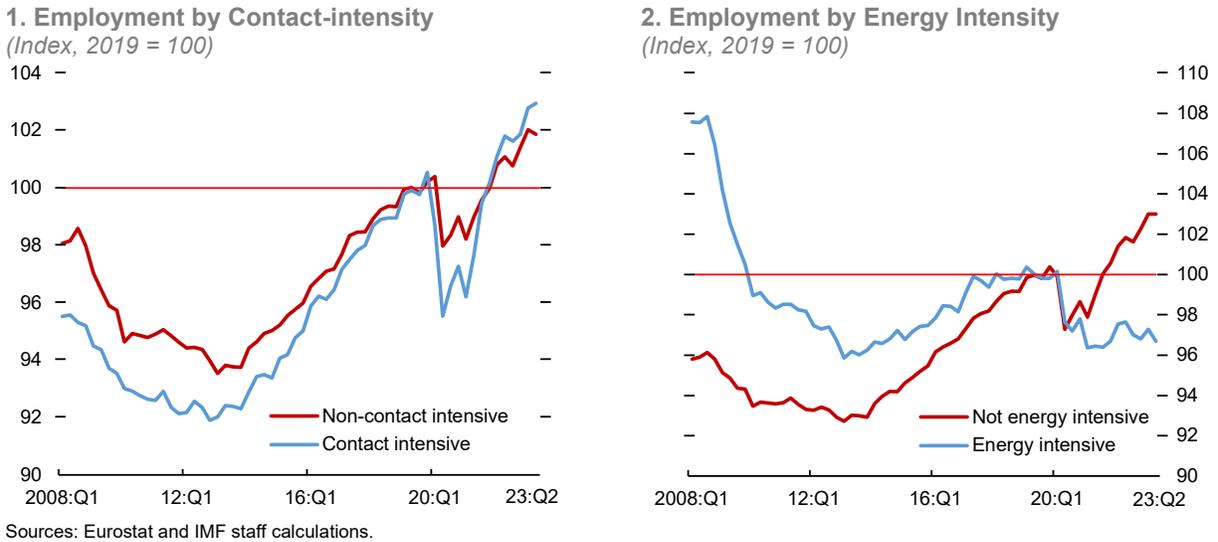


Sources: Eurostat, Haver Analytics, and IMF staff calculations.  
Note: AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe

Labor market tightness is also a result of a trend decline in labor supply, pre-dating the COVID-19 shock. Both AE and CESEE workers have supplied fewer average hours worked per week (intensive margin of labor supply). The trend decline in the intensive margin is observed across different demographic groups, however more pronounced among young workers, male workers, and workers with children, possibly reflecting preference shifts (Arce and others 2023; Astinova and others forthcoming). Further constraining factors on the extensive margin stem from population aging and ongoing, or impending population decline (Figure 2.7). These declines are compensated for by the growth trend in the extensive margin: Immigration inflows and increasing labor force participation, particularly among older workers who are affected by pension reforms, including extensions of minimum retirement ages, which are playing a crucial role in supporting labor market expansion. Going forward, some of these factors may reach their limits, making effective labor supply (measured in total hours of work) increasingly scarce. In part, this may have already been a contributing factor to the tighter labor markets, with labor hoarding currently depressing labor productivity (See Figure 2.3).

Shifts towards less automatable, greener, and more digital jobs persist beneath the overarching labor market recovery and contribute to further tightening amid labor relocation needs (Figure 2.8). Contact-intensive sectors, which were significantly impacted at the onset of the pandemic, experienced a stronger rebound in employment compared to non-contact intensive sectors (Box 2.1). Additionally, digital employment that requires knowledge of computers, which largely comprises “teleworkable” jobs, has not only recovered but also surpassed its pre-COVID-19 level. This trend partly reflects the growing preference for flexibility among workers. However, employment in sectors that are more vulnerable to automation and those that are energy-intensive continues to decline. These shifts could imply a need for increased labor relocation across sectors, which could shift out the Beveridge curve and imply a possibly higher natural unemployment rate. Furthermore, the shift to a more service sector-based economy would potentially increase the sensitivity of prices to wages, given the higher labor cost in the total cost of production (See also Box 2.2)

**Figure 2.8. Sectoral Reallocation of Employments**



Taken together, labor market trends suggest that there are risks that slack in the labor market—as measured by the unemployment gap—may be overestimated, posing upside risk to wages. The average unemployment gap was estimated at 0.5 percent and 0.2 percent in the second quarter of 2023 in CESEE and AEs, respectively. But uncertainty around those estimates is large. Empirical estimates suggest that actual gaps could be much smaller than these estimates: First, there is a general tendency to overestimate economic slack in real time (Kangur and others 2018, Li and Di Bella forthcoming). Second, unemployment is now well below pre-crises levels and for many countries at an all-time low, putting in doubt positive unemployment gap estimates. Third, structural shifts affecting the natural unemployment rate are more likely to point to a higher natural unemployment rate than what is currently implied by estimates. For instance, a shift of labor demand to less energy intensive sectors would likely imply an increase in the natural unemployment rate as sectoral reallocation reduces matching efficiency (See Ball and Mankiw 2002). The secular decline in productivity that is widely projected to continue—see November 2023 *Regional Economic Outlook: Europe* (See also Chapter 2 of the April 2023 *World Economic Outlook*)—could be another factor shifting up the natural unemployment rate. Aging could be an offsetting factor and implies a fall in the natural unemployment rate. In addition, policies to expand the labor force through migration or longer working hours or tenures would also raise the natural unemployment rate. If the former factors dominate, slack in the labor market as measured by the unemployment gap may be overstated.

### **Passthrough to prices could be high across countries.**

To gauge what these labor market dynamics imply for inflation, price growth is related to wage growth and a set of control variables. The approach is similar to Bernanke and Blanchard (2023) and estimates an equation relating inflation to its lagged values, current and past values of wage growth, import price inflation and domestic slack (see Online Annex for details). The analysis provides short- and long-term elasticity estimates from wage growth to price inflation. The specification extends a Phillips curve for inflation (see Chapter 2 of the 2022 *Regional Economic Outlook: Europe*) by explicitly including wages as a cost factor.

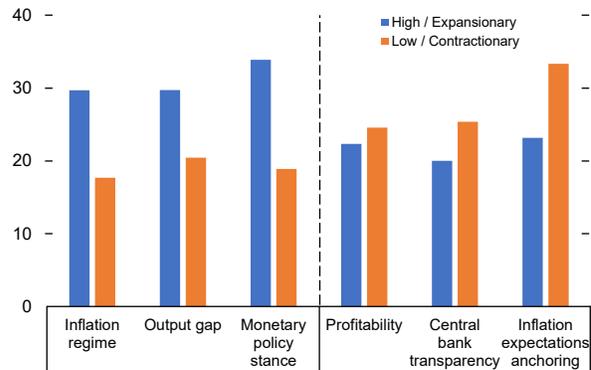
The estimation results suggest that passthrough from wage growth to inflation is modest in size but larger in CESEE compared to AE. Across countries, in response to a 1 percent wage increase, price inflation increases on average by 0.05 percent in the short run, and 0.12 percent in the long run. The panel estimation indicates stronger average passthrough impacts for CESEE, with short-term elasticity estimates of 0.03 and 0.07 and long-term elasticity estimates of 0.05 and 0.15 percent in AE and CESEE, respectively. Using sectoral data for Romania, Box

2.2 broadly confirms this passthrough and that it is higher for firms in the service sector where the labor share tends to be higher.

Furthermore, to explore the reasons for the cross-country heterogeneity of passthrough from wages to inflation, the chapter estimates an interacted panel VAR (IPVAR). The specification draws on earlier work in Chapter 2 of the 2019 *Regional Economic Outlook: Europe*. It estimates a four variable VAR, comprising import price inflation, nominal wage growth adjusted for trend productivity growth, core inflation, and unemployment gap.<sup>8</sup>

The IPVAR results imply that the strength of passthrough of wages to prices varies with cyclical and structural conditions (Figure 2.9). Specifically, inflation responds more to wage growth when inflation is high (see also BIS 2022), firms' profits are low, macroeconomic policy is expansionary, and policy frameworks and targets are less-well anchored. Expansionary policies are associated with higher passthrough as firms can use the opportunity to bolster profits amid more robust demand. In turn, higher pre-existing profits make it possible for firms to absorb higher input costs from wages and therefore can limit passthrough—as can better monetary policy framework. These results broadly confirm relationships identified by previous work in Chapter 2 of the 2019 *Regional Economic Outlook: Europe*.

**Figure 2.9. Passthrough of a Wage Shock to Inflation (Percent)**



Sources: Eurostat, Haver Analytics, and IMF staff calculations. Note: Estimates for a sample of 29 European countries over the first quarter of 1991 to the first quarter of 2023. Each panel shows passthrough ratios of a wage shock to core inflation in three years. The following variables are used to define regimes: (1) inflation relative to country-specific average inflation (one quarter lagged); (2) output gaps (two quarter lagged); (3) changes in real interests (two quarter lagged); (4) profit per unit of output (two quarter lagged); (5) central bank transparency; and (6) inflation expectation anchoring. Values outside of cross-country inter-quartile ranges are used to define high and low regimes.

## Risks of wage-growth driven inflation high until 2024.

Building on the estimates in the previous sections, wage and price growths are projected in a top-down exercise, using the system of equations defined by wage Phillip's curve equation, inflation-wage growth equation, and long-term co-integrating relationship for real wages and labor productivity. Projections use the October 2023 *World Economic Outlook* forecasts for import prices and labor productivity, assume the unemployment gaps will close over the projection horizon by 2026, and the residual in the wage equation ("other" factor in Figure 2.5) decline gradually.

Using the wage Phillip's curve equation, inflation-wage growth equation, and long-term co-integrating relationship, nominal wage growth is expected to remain high amid catch-up with past price inflation in AEs and persistence in CESEE. On average, wages are expected to grow by 5, 4½, and 3½ percent in 2023, 2024, and 2025 (corresponding weighted averages are 4, 3¾, and 3½ percent), respectively, in AEs. Average wage growth in CESEE is about 3 to 4 percentage points higher at 9, 7, and 5½ percent in 2023, 2024, and 2025 (corresponding weighted averages are 11, 7, and 5½ percent), respectively. Inflation expectations contribute broadly constant 1¾ and 2½ percentage points in AEs and CESEE. Wage catch-up contributes positively up to 1 percentage point in the near future in AE until the wage gap is closed in 2025. This effect is less pronounced in CESEE where the wage gap is smaller (Figure 2.4). Wage growth in CESEE, however, remains more persistently above inflation expectations, reflecting its more backward-looking wage formation. Over the medium-term, the higher nominal

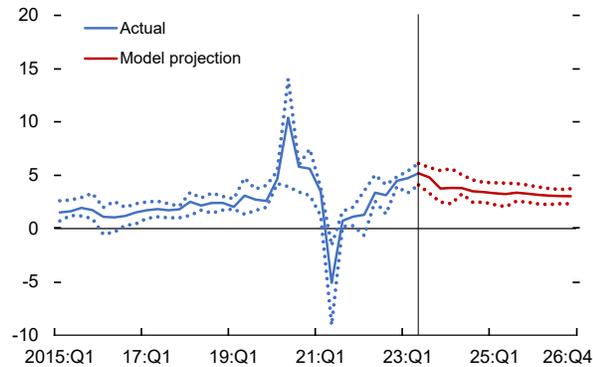
<sup>8</sup> The estimation is modified from the 2019 *Regional Economic Outlook: Europe* to take care of large spikes in a few data series reflecting distortions from short-time work schemes (among other reasons) during the pandemic. For details see the Online Annex.

wage growth in CESEE compared to AE is explained by higher trend productivity growth, consistent with gradual income catch-up to AEs.

**Figure 2.10. Wage Growth Projections**

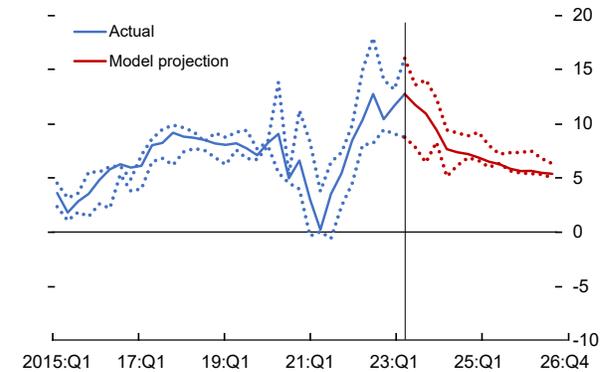
**1. Projected Wage Growth in AEs (excl. CESEE)**

(Percentage points, year-over-year log difference)



**2. Projected Wage Growth in CESEE**

(Percentage points, year-over-year log difference)



Sources: IMF staff calculations.

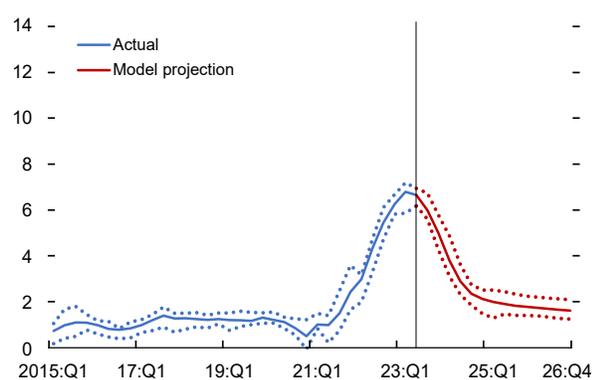
Note: The solid lines report the purchasing-power-parity GDP-weighted average of observed and projected wage growth across countries. The dashed lines report inter-quartile ranges. AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe.

This wage growth is expected to contribute about ½ and 1 percentage point to (core) inflation over the projected horizon in AE and in CESEE, respectively. These contributions are higher than historical average wage contributions to inflation rates of ¼ and ½ percentage points in AE and CESEE, respectively, from 2005 to 2019. Overall inflation is projected to decline from 5½ and 7½ percent in mid-2023 to around 2 and 2½ percent in AE and CESEE, respectively, by early-2025. The decline is largely driven by the fall in contributions from commodity prices and disappearance of unexplained factors, and broadly confirms the IMF’s October 2023 *World Economic Outlook* bottom-up desk projections.

**Figure 2.11. Inflation Projections**

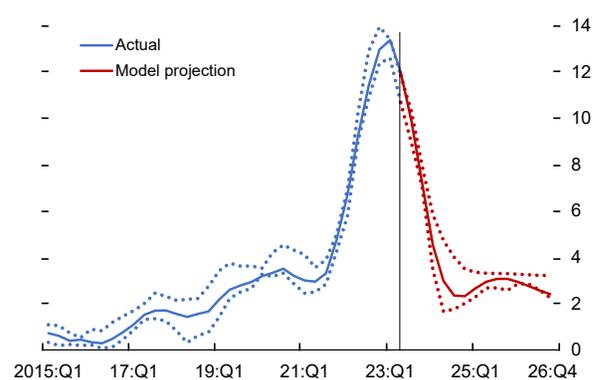
**1. Projected Core Inflation in AEs (excl. CESEE)**

(Percentage points, year-over-year log difference)



**2. Projected Core Inflation in CESEE**

(Percentage points, year-over-year log difference)



Sources: IMF staff calculations.

Note: The solid lines report the purchasing-power-parity GDP-weighted average of observed and projected core inflation across countries. The dashed lines report inter-quartile ranges. AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe.

Wage growth and inflation could surprise on the upside. Drawing on the discussion in the previous section, a plausible adverse scenario is constructed based on two key assumptions:<sup>9</sup>

- Slack in the labor market is calibrated by holding the natural unemployment rate at the fourth quarter of 2019 level (when it was estimated to be at a historic low already), and the unemployment gap is allowed to gradually close by the end of the projection horizon. The scenario reflects a conjecture that, given tight labor markets, domestic slack may be overestimated, and unemployment gaps are likely to be revised upward ex-post. The currently observed cooling would reflect a gradual return of the unemployment rate to its higher than estimated natural rate. Wage pressures would be higher in this scenario compared to the baseline, which is based on a lower unemployment gap.
- Wages are assumed to be more backward-looking. Accordingly, the coefficients on the lagged wages are increased by one standard deviation (and the coefficient on the forward-looking component reduced by the same amount). This reflects the finding that in the current environment of higher inflation wage setting could become more backward-looking and trigger a stronger wage-price feed-back loop, as workers demand higher wages to compensate for their purchasing power loss (Baba and others 2023).

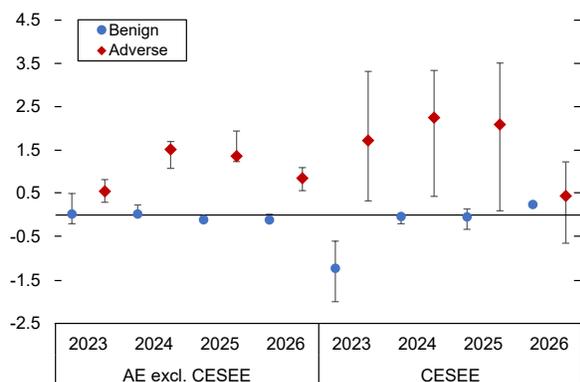
A benign scenario is also considered, in which the residuals from the wage equation are allowed to fall to zero immediately. This could reflect a situation in which the deviation of actual wages from the model determinants is temporary and not explained by more lasting shifts in the wage formation process, which the model failed to capture.

Simulations incorporating the two assumptions under the adverse scenario suggest that wage growth could be 1½ and 2¼ percentage points higher at the peak in AE and CESEE, respectively (Figure 2.12). Inflation could be about ½ and ¾ percentage points higher in AE and CESEE, respectively, contributing to more persistent inflation. Inflation targets would be reached only by early 2026. Simulations under the benign scenario are almost unchanged for AE, given the limited wage equation residual (Figure 2.12). For CESEE near-term wage growth and core inflation would be 1 and ¼ percentage point lower, respectively.

**Figure 2.12. Wage and Inflation under Alternative Scenarios**

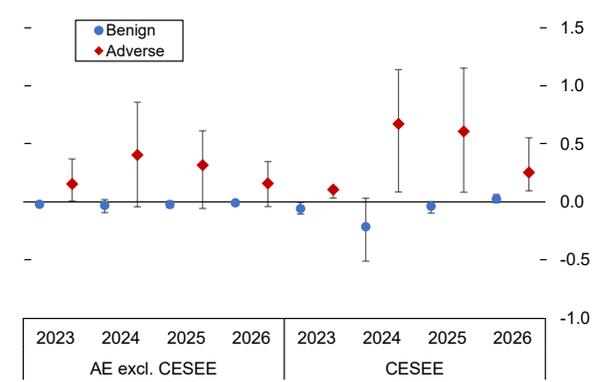
**1. Projected Deviations in Wage growth**

(Percentage points, year-on-year log difference)



**2. Projected Deviations in Core Inflation**

(Percentage points, year-on-year log difference)



Sources: IMF staff calculations.

Note: The dots show PPP-GDP weighted averages of the difference between the alternative and baseline scenarios for wage growth and core inflation. The whiskers represent inter-quartile ranges. AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe.

<sup>9</sup> The focus of the chapter is labor market related risks for inflation. In principle, the framework could also be used to quantify other risk scenarios, such as import price shocks—for instance from renewed energy price spikes—which would feed directly and indirectly (via second round effects) into higher inflation.

## **Policies can help reverse income loss without persistent inflation.**

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Macroeconomic policies can help steer the economy away from adverse outcomes. The first line of defense against risks of wage growth turning into inflationary pressures should be tight monetary and fiscal policies. This helps reduce risk of stickiness and cools down pressures stemming from the labor market. Considering recent low productivity, workers' demand to recover their real wages may result in a wage overhang relative to the productivity trend. The case for tight monetary policy is stronger in countries where core inflation is more responsive to wage developments. Fiscal policy can do its part to limit price pressures, by tightening the stance, especially where monetary policy is constrained (for example, countries with pegs or within the euro area but with significantly higher core inflation rates than other union members). Another important factor is the anchoring of inflation expectations. Improving monetary policy frameworks—particularly those that enhance central bank independence and transparency—and communication strategies can help better anchor inflation expectations and increase the role of the forward-looking component in the wage setting process reducing risks of inflation overshoots.

Structural policies should play a complementary, but increasingly important role, especially where long-term trends contribute to tighter labor markets and real wages risk drifting above productivity. Where stagnant labor productivity and chronic labor shortages contribute to wage pressures, emphasis should be placed on policies to enhance labor productivity and labor supply. Policies could include upskilling the existing labor force to facilitate worker transition from declining to growing sectors. Better integration of immigrants through language training and job search support would help labor supply. Eliminating disincentives for full-time employment, including by lifting tax burdens that discourage individuals from working full time as second earners, would increase the effective labor force participation rate and thereby raise labor supply. The labor supply could be further expanded by promoting higher participation among female workers. This can be achieved through measures that offer flexibility in work arrangements, affordable childcare, and equal opportunities for career advancement. Finally, policies that can help engineer a reversal in the secular decline in productivity growth are needed, which would also help accommodate higher wages without undue pressure on prices.

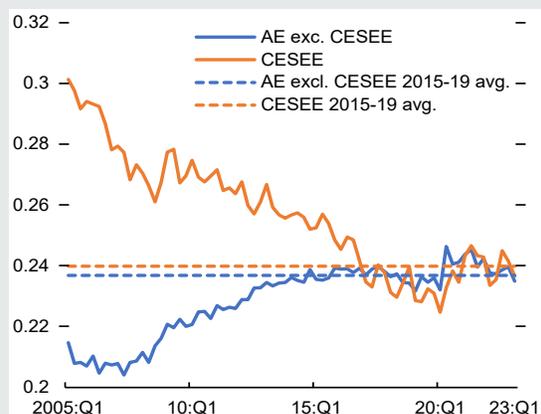
## Box 2.1. Have low-income earners emerged relatively unscathed from the crises?<sup>1</sup>

While low-skilled and low-income workers were hit hardest at the outset of the pandemic, they experienced relative income and employment gains in the post-COVID-19 era. Historically, recessions have disproportionately affected low-income earners, and rising prices have further eroded their income due to less room for product quality substitution and changes in shopping behavior.<sup>2</sup> During the COVID-19 recession, contact-intensive sectors, which employ a larger proportion of low-skilled and low-income workers, were hit hardest as a result of lockdown measures and voluntary social distancing. However, as the economy rebounded strongly, the demand for low-skilled labor surged.

The employment rate of low-skilled workers has made a robust recovery. While the employment-to-population ratio for high-skilled workers has consistently been higher than that for low-skilled workers, the gap of the employment rates between high and low-skilled workers is now slightly narrower than the pre-COVID-19 levels (2015–2019). This trend is observed in both CESEE countries and other European advanced economies, despite some variation among individual countries. During the pre-COVID-19 period, the gap had been increasing in AEs (excl. CESEE) while decreasing in CESEE countries.

Moreover, low-income earners, relative to the average earners, have experienced relative income gains in the post-COVID-19 era. The ratio of the minimum wage to the average wage, measured as compensation per hour, has been on an upward trajectory. The latest data indicates a ratio that is approximately 5 percent higher than the pre-COVID-19 levels (2015–2019) in both AEs (excl. CESEE) and CESEE countries. Among the 20 countries in our sample for which a minimum wage exists and is reported, 15 have seen an increase in this ratio. This relative wage gain—together with government support measures taken in 2022—helped the lower income decile cope with the impact of the cost-of-living crises, associated with the higher food and energy prices in the aftermath of Russia's invasion of Ukraine.

**Box Figure 2.1.1. Employment to Population Ratio Gap between High and Low Skilled Workers (Ratio)**

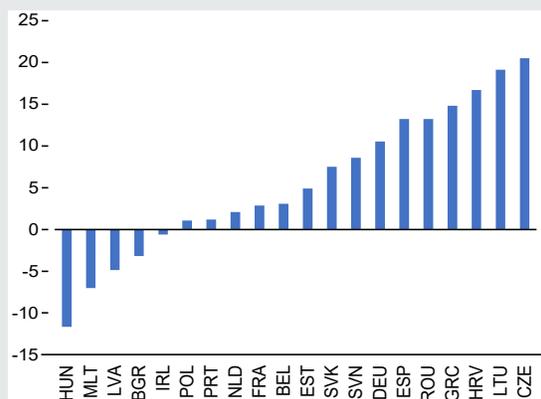


Sources: Eurostat and IMF staff calculations.

Note: Employment-to-population ratio gap is measured as the percentage point difference between the employment-to-population ratio of high skilled and low-skilled workers. The lower value implies less discrepancies in employment rate between the two groups. AE = Advanced Europe; CESEE = Central, Eastern, and Southeastern Europe—

**Box Figure 2.1.2. Change in Minimum to Average Wage Ratio**

(Percent change between 2015-19 and 2023)



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

Note: Average compensation is measured by the total compensations divided by total hours worked. Country abbreviations are International Organization for Standardization country codes.

<sup>1</sup> Prepared by Ipei Shibata.

<sup>2</sup> Argente and Lee, 2021, Shibata 2021, and Chapter 3 of April 2021 World Economic Outlook.

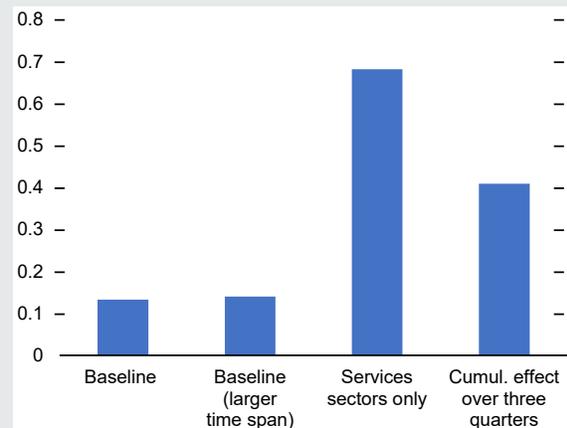
## Box 2.2. Sectoral estimates of passthrough from wages to inflation: the case of Romania<sup>1</sup>

Passthrough from wages to prices is higher in services sectors, where the labor share in the cost of production is higher. Using a sectoral wage and price dataset for Romania, estimates are derived for the sectoral transmission of wage growth to producer price inflation, a central component in passthrough to headline inflation. Wage growth transmits to inflation through (i) the impact of wages on the cost of production, (ii) the passthrough from producer prices to consumer prices, and (iii) the relative weight of different goods and services in the overall consumption basket of households. For the strength of the transmission through the first leg, the share of wage costs in the overall production costs are important. This share can be approximated by the labor cost share in overall turnover, which ranges from approximately 10 to 20 percent in the EU. In a perfectly competitive environment, a one percent increase in wages would thus result in a 0.1 to 0.2 percent increase in producer prices. However, differences in sectoral sensitivities to changes in labor cost and imperfect competition may affect the passthrough of marginal cost to producer prices.

Regression results suggest that on average and across all sectors, a 1 percent wage increase is associated with an increase in PPI inflation by 0.13 percentage points. The effects could be larger, depending on sample selection, sectors, and when taking into account the cumulative effects over several quarters. For instance, passthrough in the service sector is about 5 times higher than for the average sector. Estimates are based on regressing sectoral PPI inflation on sectoral gross wages controlling for a range of unobserved and potentially confounding factors including sector-specific seasonality and annual changes in sector-specific productivity.

### Box 2.2.1. Estimated Effects of Wage Growth in PPI Inflation

(Percentage points; increase in PPI inflation as result of a 1 percent increase in wages)



Sources: National Institute of Statistics; IMF staff estimation.  
Notes: Effects refer to the same quarter, unless otherwise noted.  
Baseline sample covers 2016-23.

1/ Prepared by Florian Misch.

## References

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- Ando, Sakai, 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. 2022. "European Labor Markets and the COVID-19 Pandemic: Fallout and the Path Ahead." IMF Departmental Paper, DP/2022/004.
- Arce, Oscar, Agostino Consolo, António Dias da Silva, Matthias Moh. 2023. "More jobs but fewer working hours", 7 June 2023, the [ECB blog](#).
- Argente, David and Munseob Lee. 2021. "Cost of Living Inequality During the Great Recession", Journal of the European Economic Association, Volume 19, Issue 2, April 2021, Pages 913–952,
- Astinova, Diva, Romain Duval, Niels-Jakob Hansen, Ben Park, Ippei Shibata, and Frederik Toscani. *Forthcoming*. "Dissecting the Decline in Average Hours Worked in Europe." IMF Working Paper.
- Baba, Chikako, Romain Duval, Ting Lan, and Petia Topalova. 2023. "The 2021-22 Inflation Surge in Europe: A Phillips-Curve-Based Dissection." IMF Working Paper 23/030.
- Baba, Chikako and Jaewoo Lee. 2022. "Second-Round Effects of Oil Price Shocks – Implications for Europe's Inflation Outlook." IMF Working Paper 22/173.
- Ball, Laurence, and N. Gregory Mankiw. 2002. "The NAIRU in Theory and Practice." Journal of Economic Perspectives, 16 (4): 115-136.
- Bernanke, Ben, and Olivier Blanchard. 2023. "What Caused the U.S. Pandemic-Era Inflation?", Hutchins Center Working Paper #86.
- Bank for International Settlements. 2022. "Inflation: A Look under the Hood.", BIS Annual Economic Report, 26 June.
- Duval, Romain, Yi Ji, Longji Li, Myrto Oikonomou, Carlo Pizzinelli, Ippei Shibata, Alessandra Sozzi, and Marina M. Tavares. 2022. "IMF Staff Discussion Note 2022/001."
- Kangur, Alvar, Koralai Kirabaeva, Jean-Marc Natal and Simon Voigts. 2019. "How Informative Are Real Time Output Gap Estimates in Europe?", IMF Working Papers 2019/200.
- Li, Grace and Gabriel Di Bella. *Forthcoming*. "Bridging the Gap: Real-time Policy Challenges and Output Gap Uncertainty", IMF Working Paper.
- Shibata, Ippei. 2021. "The Distributional Impact of Recessions: The Global Financial Crisis and the COVID-19 Pandemic Recession", Journal of Economics and Business, Volume 115, 2021.