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AUSTRALIA

SELECTED ISSUES

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SELECTED ISSUES

January 21, 2026

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Asia and Pacific Department

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CONTENTS

AUSTRALIA: UNPACKING LABOR MARKET RESILIENCE

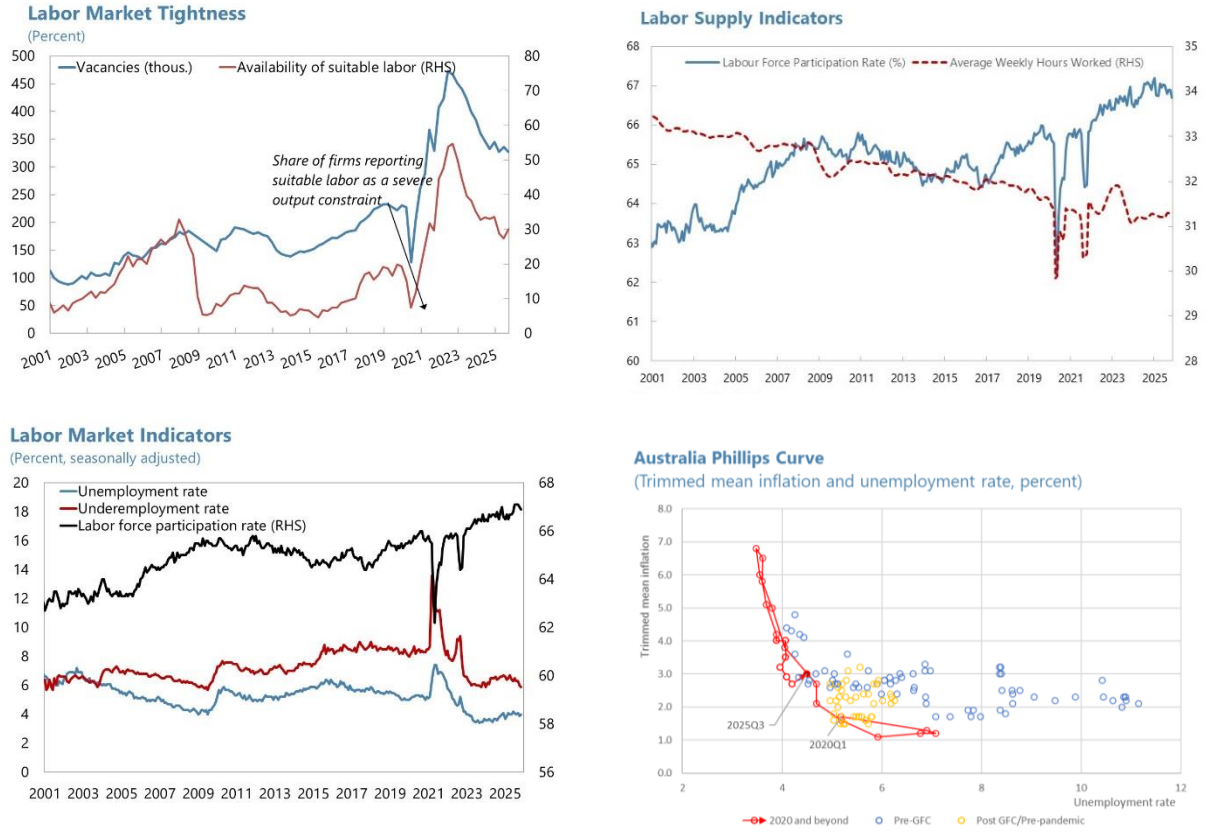
The Australian labor market has displayed remarkable resilience in recent years, even as economic growth slowed. Persistently strong labor demand met rapid growth in labor supply, supporting solid employment gains and keeping unemployment rates contained. At the same time, resilience has not translated into significant wage pressures. This paper explores structural and cyclical factors behind post-pandemic labor market trends, focusing on three dimensions: (i) high labor demand and persistently low unemployment; (ii) elevated labor supply; and (iii) contained wage growth.

This paper finds that significant shifts in cyclical and structural components of labor demand and supply in recent years have temporarily reshaped labor market dynamics, driving headline indicators to overstate cyclical tightness, and may have contributed to a temporarily lower estimate of the NAIRU. First, headline indicators such as vacancies and unemployment rates may have overstated the cyclical strength of the labor market. Headline indicators were also influenced by structural shifts, including a large expansion in the healthcare sector. Second, robust labor supply growth reflected not only structural trends but also cyclical pressures: high cost-of-living and elevated interest rates incentivized some households to increase hours and participation, including through holding multiple jobs. Third, stronger labor supply, together with the concentration of labor demand in select sectors, helped contain wage pressures at low levels of unemployment – a pattern consistent with a temporarily lower estimate of the NAIRU. However, these forces may be reversing, thus potentially leaving the medium-term NAIRU unaffected; carefully monitoring the evolving drivers of labor demand and supply will be crucial to tracking labor market slack and the evolution of the NAIRU, and to forecasting wage and price pressures going forward.

A. A Snapshot of Labor Market Dynamics in Australia

1. Australia's labor market has been remarkably resilient in the post-pandemic period, even when economic growth slowed. Labor demand surged as the economy recovered after pandemic restrictions were lifted in late 2021, with job vacancies reaching record highs in 2022; while declining since, vacancies remain well above historic trends. At the same time, since 2021, strong net migration and rising participation rates have boosted labor supply. Together, robust labor demand and supply supported solid employment growth and helped contain the unemployment rate, even as economic growth softened (Figure 1). At the same time, a low unemployment rate did not translate into significant wage pressures. Wage growth remained contained, considering the historic relationship with the unemployment rate – with the Wage Philips curve appearing to flatten or shift leftward (Figure 1).

Figure 1. Labor Market Conditions in Australia



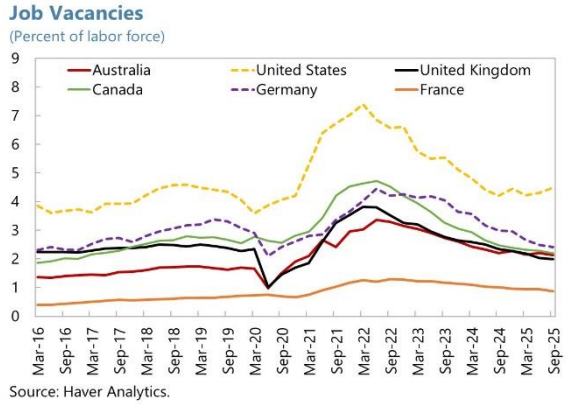
Sources: ABS, Haver Analytics, NBA, RBA, and IMF staff calculations.

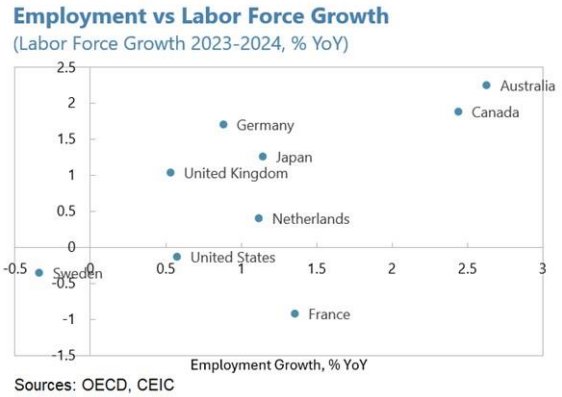
2. Labor market resilience was observed across many advanced economies (AEs) in the post-pandemic period, but it has been especially persistent in Australia.

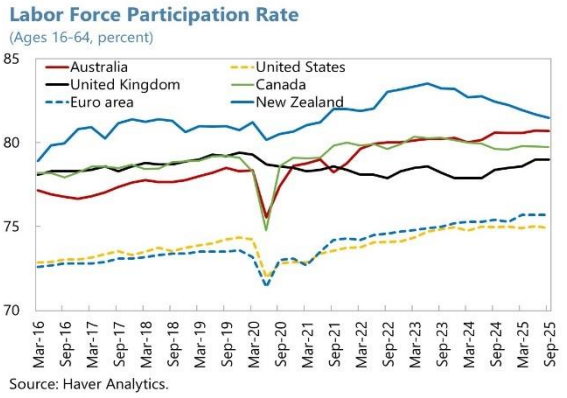
- *Labor markets tightened across AEs in the post-pandemic period, but Australia is among the few where labor demand has remained persistently elevated and unemployment has remained below pre-pandemic averages*. Job vacancies rose rapidly across AEs in 2021-2022, as pandemic-related restrictions eased and economies rebounded, and then declined in subsequent years, as fiscal and monetary policies tightened and growth slowed. However, while in most peer AEs vacancy ratios have broadly returned to pre-pandemic levels, in Australia they have remained above well above pre-pandemic levels (Figure 2). Across AEs, unemployment dropped well below pre-pandemic levels in 2021-2022 and then rose gradually as policies tightened; however, Australia remains one of the few AEs where unemployment rates have yet to rise above pre-pandemic averages. Similarly, the vacancy to unemployment ratio (an alternative measure of labor market tightness) continues to indicate tighter labor markets than pre-pandemic in Australia, unlike in most peers. These trends suggest some labor market gains have been preserved in Australia.

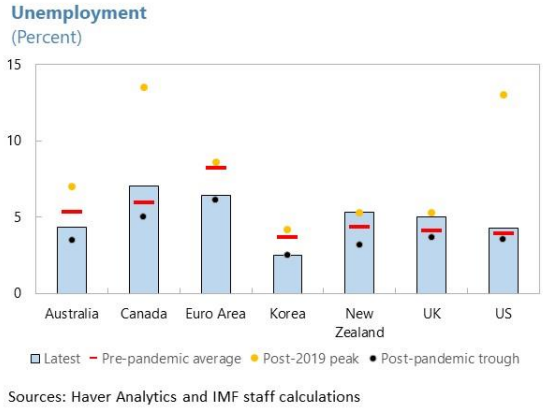
- *Australia experienced stronger labor supply growth than peers, and was one of few AEs that saw a significant rise in labor force participation*. Australia experienced the largest labor force expansion among peers in the post-pandemic period. One driving factor was strong net

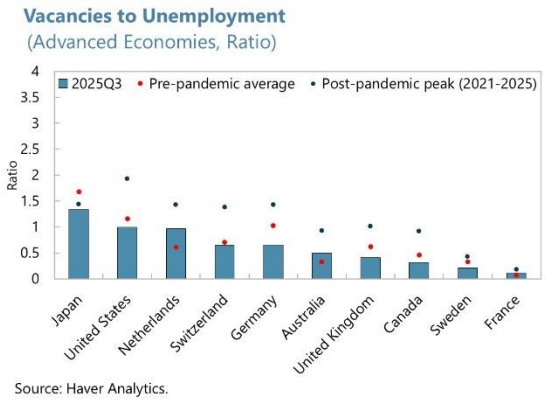
Figure 2. Labor Market Conditions in Peer Economies

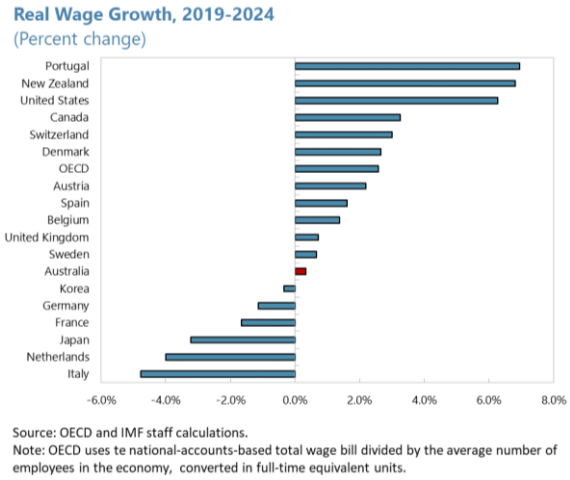












migration after borders reopened, which fed into, but was not the sole driver of, rising labor force participation. Conversely, several peer AEs saw labor force participation decline over the same period, in some cases reflecting early retirement or long-term sickness (Figure 2). Together with resilient demand, the increase in labor supply helped Australia experience the largest growth in employment among peers during the post pandemic period (Figure 2).

- *Despite persistent labor market tightness, wage growth in Australia has been contained relative to peers*. Across AEs, wage growth picked up as labor market tightened in the post-pandemic period, but initially fell short of inflation—with real wages only catching up to pre-pandemic levels in more recent years. In Australia, real wage growth over 2020-2024 was lower than in many peers, and below the OECD average (Figure 2) – despite particularly strong labor markets[1].

3. This selected issues paper (SIP) aims to shed light on both the structural and cyclical factors that drove labor market resilience in Australia in the post-pandemic period. It focuses on three key questions, or "labor market paradoxes," employing varied empirical methods to assess:

a. What explains persistently low unemployment and high job vacancies, even as economic growth cooled? To what extent did structural changes mask underlying cyclical softening?

b. How did structural and cyclical factors contribute to elevated labor force participation (LFP)? What does this imply about labor supply going forward?

c. What cyclical or structural factors explain subdued wage growth in the context of persistently low unemployment? What might these trends imply about the evolution of the NAIRU?

4. This SIP finds that recent cyclical and structural shifts in labor demand and supply components have implications for measuring labor market tightness and for the NAIRU. The key findings of this paper can be summarized as follows:

- *Headline unemployment and vacancy rates likely overstated the tightness of cyclical labor market conditions*. Weaker job finding and retention together with fewer new vacancies indicate cyclical conditions may have eased faster than headline indicators suggest, as the participation margin (flows into and out of the labor force) masked some of the cyclical weakening. Strong labor demand in non-market sectors, and especially in the healthcare sector, which are linked to policy and structural shifts, may have masked softening demand in other sectors.

- *Elevated labor force participation, in part driven by cyclical pressures, helped labor supply keep pace with labor demand*. In addition to underlying structural trends, cyclical drivers – notably an elevated cost of living and high interest rates – have contributed to the recent growth in labor force participation by incentivizing debt-constrained individuals to increase labor supply.

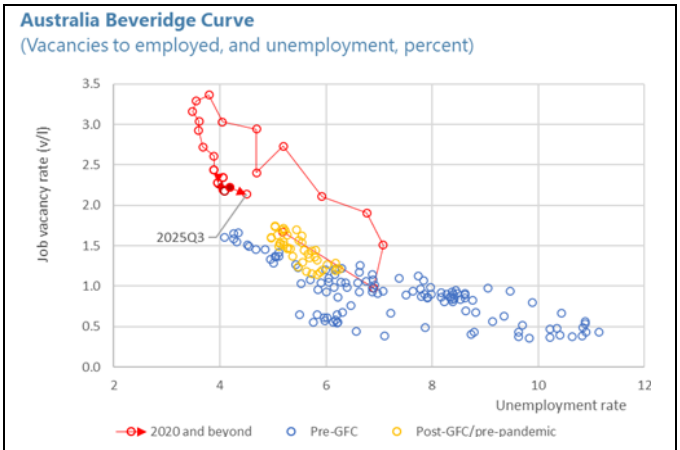
[1] While cross-country data is only available annually through 2024, real wage growth in Australia picked up in late 2024 and the first half of 2025, though may have moderated as inflation surged in the second half of 2025.

- *Robust labor supply together with the concentration of employment growth in non-market sectors – where wages are less sensitive to labor market conditions – reduced wage pressures at low levels of unemployment, which could help explain temporarily lower estimates of the NAIRU.* Tight labor market conditions exerted some upward pressure on wages, but the impact was mitigated by the concentration of employment growth in sectors where wages are less sensitive to unemployment rates (non-market sectors). At the same time, above-trend labor force participation also offset some of the upward pressure on wages. Together, these factors appear to have temporarily flattened and shifted the wage Phillips curve to the left, consistent with a temporarily lower estimate of the NAIRU.

5. Understanding the structural and cyclical drivers behind post-pandemic labor market dynamics in Australia can provide critical insights to inform policy design. A detailed assessment of factors driving low unemployment can support early identification of cyclical weakening. Understanding the cyclical and structural sources of persistently elevated labor demand and supply in recent years can help shape economic forecasts. As economic conditions normalize and private demand picks up, the dynamics keeping wages contained at low levels of unemployment may partly reverse – in this context, understanding how changes in supply and demand are affecting the relationship between wage growth and unemployment is critical for monetary policy decision-making, especially under a dual mandate.

B. Paradox 1: Persistently Low Unemployment Rates and High Job Vacancies Despite a Cooling Economy

6. Unemployment and job vacancy rates in Australia have signaled persistent labor market tightness even as the economy cooled. The unemployment rate reached a record low of 3.4 percent in July 2022 and has gradually risen to 4.5 percent since but remains lower than at any time between 2008 and the COVID-19 pandemic. The job vacancy rate (as a share of the labor force), indicating labor demand, surged from late 2020 to mid-2022; despite a gradual decline since, it remains around half a percentage point higher than the highest levels seen in the pre-pandemic decade. The relationship between vacancies and unemployment, as captured by the Beveridge curve, also suggests that labor market conditions have been persistently tight relative to historic norms. This section aims to shed light on these trends by decomposing unemployment and vacancies into underlying dynamics.



Sources: ABS and IMF staff Calculations

7. The low unemployment rate partly reflects the lingering effects of a high job finding rate and strong job retention during the post-pandemic recovery. Monthly labor market

transition data shows that the job finding rate (transition from unemployment to employment) spiked at end-2021 as the economy rebounded (Figure 3). During the recovery, the job finding rate has remained above pre-pandemic levels, although it has experienced a gradual decline. In the meantime, flows from employment to unemployment (job loss) declined after the initial pandemic-related surge, and have remained persistently lower than pre-pandemic levels. These trends suggest strong job retention in a tight post-pandemic labor market.

8. However, in recent quarters, the low unemployment rate has been increasingly driven by a decline in nonparticipation-to-unemployment flows, masking potential underlying weakness in cyclical labor market components. Given participation trends can lag economic cycles, focusing on labor market churn, i.e., job finding and job loss excluding the participation margin, could flag early signs of easing in labor market conditions (see Eusepi and Sahin (2025)). Although the labor force participation rate has been rising on the back of both cyclical and structural factors (see Paradox 2), both the inflow rate into the labor force (from nonparticipation) and the outflow rate from the labor force (into nonparticipation) have declined in the past two years. Monthly labor force status survey shows that the inflow and outflow rates of the labor force have largely declined since early 2024 to lower than pre-pandemic levels. In particular, the subdued flow rate from nonparticipation to unemployment has put downward pressure on the unemployment rate. Further dissecting the dynamics of transitions across labor market statuses, using a variance decomposition following Shimer (2012), confirms that the low nonparticipation-to-unemployment flow rate is a main contributor among all transition rates in explaining post-2022 unemployment rate movements (see Annex I for methodology). A simulation of the unemployment rate with labor force inflow and outflow rates held fixed at pre-2013 levels, hence removing the participation cycle and teasing out the impacts of job finding and job loss, shows that the counterfactual unemployment rate has edged up to pre-pandemic levels (Figure 3). Thus, shifts in the participation margin have masked weakening in job finding and retention rates.

Figure 3. Labor Market Transitions
Transition Probabilities
(Monthly, seasonally adjustment)

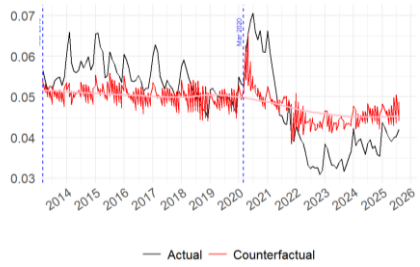
Source: ABS, and IMF staff calculations

Figure 3. Labor Market Transitions (Concluded)
Transition Probabilities
(Monthly, seasonally adjustment)

Ins and Outs of Labor Force
(Monthly transition probabilities, seasonally adjusted)

Sources: ABS and IMF staff calculations.

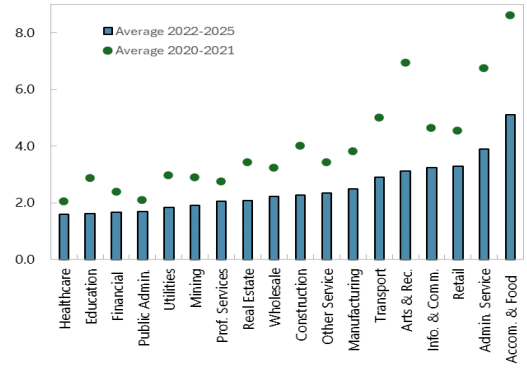
Counterfactual Unemployment Rate
(Percent)



Sources: ABS and IMF staff calculations.

9. Low unemployment in non-market sectors may have masked looser conditions in market sectors. From 2020 to end-2021 (when most pandemic-related restrictions were lifted), unemployment was elevated across most sectors, and highest in contact intensive service sectors, notably accommodation and food, arts and recreation, administrative services, and transport. As the economy reopened and growth picked up, unemployment declined across sectors, although differences between sectors remained. Most notably, unemployment was higher on average in market sectors than in non-market sectors in the post-pandemic period, despite recent trends of labor reallocating towards the non-market sector. The healthcare, education, and public administration sectors (the non-market sectors) saw three of the four lowest average rates of unemployment over 2022Q1-2025Q1. Similar trends were observed in some peer AEs over this period, in part reflecting pressures from COVID on the healthcare sector (high turnover of the existing workforce and a temporary reduction in supply of international workers) and/or fiscal policies. In Australia, healthcare sector labor market tightness was also influenced by the expansion of the National Disability Insurance Scheme (NDIS), and an aging population, which both raised demand for services. A few market sectors also saw low levels of unemployment, notably financial services, mining, and professional services, while unemployment was especially high in retail, administrative services, and accommodation and food services sectors. The variation in unemployment among market sectors remained broadly consistent with pre-pandemic trends, likely also reflecting underlying labor productivity differences across sectors.

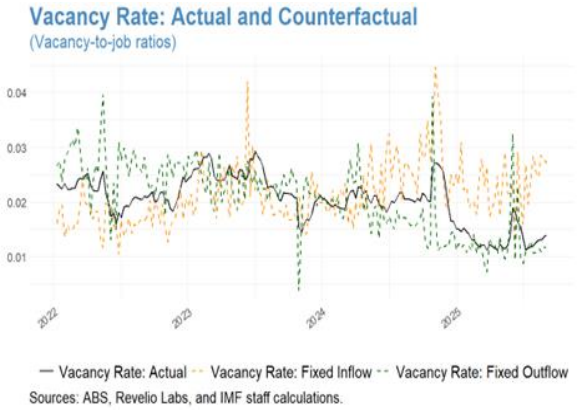
Unemployment by Industry
(Percent)

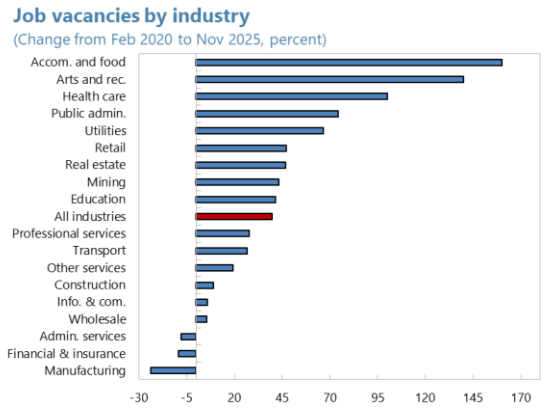


Sources: ABS and IMF staff Calculations

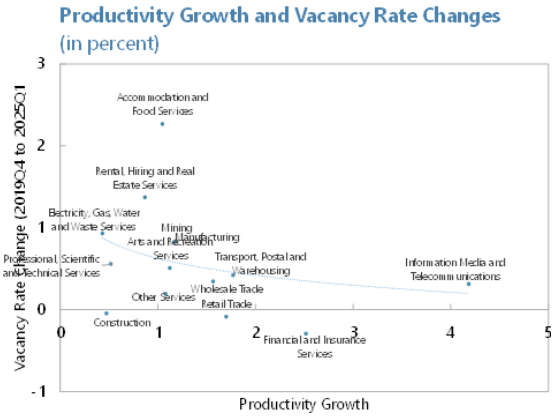
10. The role of new jobs in driving persistently high vacancies has been diminishing. The vacancy rate can be decomposed into (a) what is driven by removed vacancies (by holding inflow rate of new vacancies fixed), and (b) what is driven by new vacancies (by holding outflow rate of old vacancies fixed). Simulating both components, we show that new vacancies have cooled off, while unfilled vacancies have continued to keep upward pressure on vacancy rate (Figure 4). This may reflect the lingering effect of the high labor market churn during early stages of the recovery. It could also signal persistent mismatches between available jobs and worker preferences or qualifications.

Figure 4. Vacancies and Labor Demand in Australia





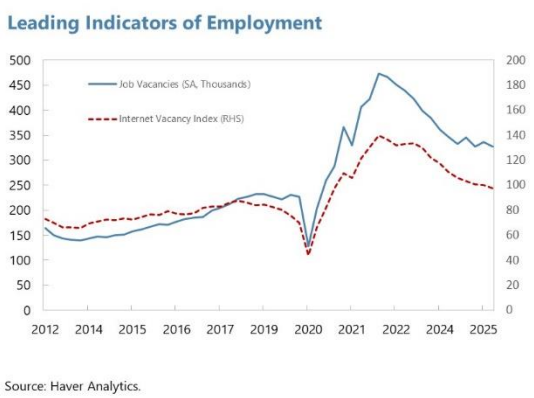
Source: ABS and IMF staff calculations

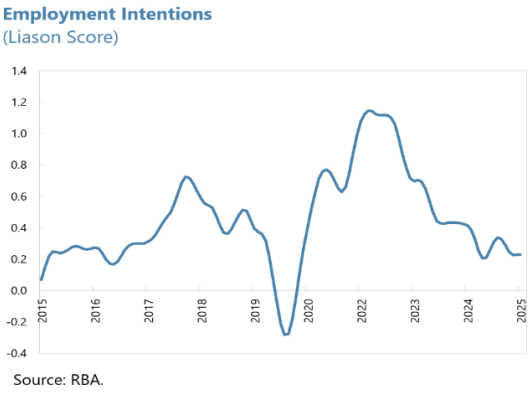


Cross-Industry Correlation between Vacancy Rate and Labor Productivity

	Dependent variable:
	Vacancy Rate
Labor Productivity Growth	−0.021**
	(0.010)
Labor Productivity Growth, Squared	0.003**
	(0.001)
Observations	195
R^2	0.038
Time FE	Yes
Sector FE	Yes
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 4. Vacancies and Labor Demand in Australia (Concluded)





11. Job vacancies have been concentrated in select sectors, reflecting both structural and cyclical drivers (Figure 4). High job vacancies in healthcare and social services are consistent with COVID-related labor supply shortages, as well as the NDIS expansion and an aging population, all driving increased labor demand in recent years. Separately, higher vacancy rates in accommodation and food services and arts and recreation sectors were observed across several AEs in recent years of tight labor market conditions, as lower wages and job quality concerns may have reduced the relative attractiveness of jobs in these sectors.[2] Other sectors which saw persistently high vacancies in Australia have also seen sluggish productivity growth in the post-pandemic period (notably utilities, real estate, and mining). The negative correlation between productivity growth and vacancy rates is robust to controlling for year and sector fixed effects. This correlation can be interpreted in several ways, including that productivity growth may have affected wage growth and thus job desirability (see paradox 3).[3]

12. In conclusion, while unemployment and vacancy rates remain tighter than historical norms, these aggregate indicators may mask underlying deterioration in labor market conditions. Abstracting away from the participation margin, the unemployment rate has edged up to pre-pandemic levels, with unemployment-to-employment flows normalizing. Elevated vacancies no longer reflect a surge in new positions. Moreover, higher-frequency or forward-looking indicators such as the internet vacancy index and employment intentions suggest further loosening of labor market conditions may be underway. Strong demand and tight conditions in non-market sectors may have overshadowed weakness in the market sector. However, strength in non-market sectors is likely to fade as gaps related to COVID and the NDIS expansion are filled and fiscal consolidation continues. Going forward, careful monitoring of an array of labor market metrics is warranted for a timely assessment of economic slack. In addition, structural reforms could support

[2] E.g., contact intense jobs, jobs with limited remote work options.

[3] Other potential explanations include that firm investment can lag recruiting after a positive demand shock whose persistence remains uncertain, lowering capital intensity as well as labor productivity.

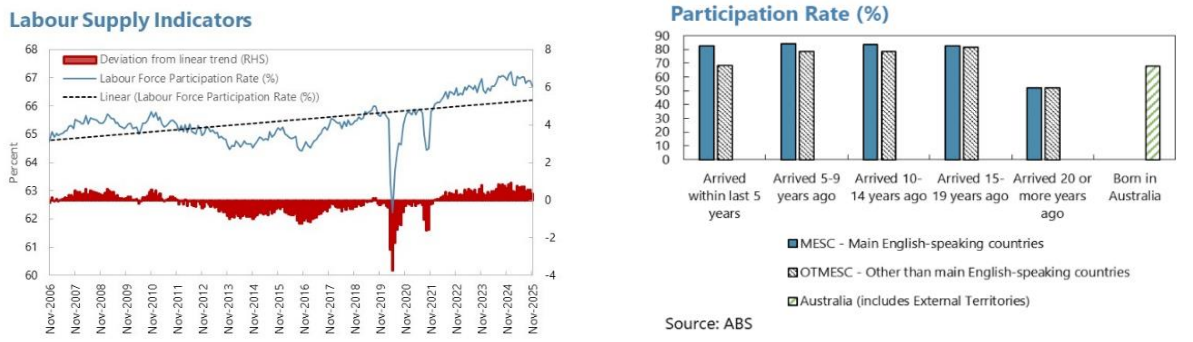
labor market matching and reduce unfilled vacancies, including through facilitating labor mobility and continuing to adjust migration policies in response to labor shortages. In this context, recent changes restricting the use of non-competes for low-skill jobs, and well as prioritization and streamlining for some healthcare workers under immigration policies, are welcome steps.

C. Paradox 2: Persistent Strength of Labor Force Participation Post Pandemic

13. Labor force participation is on a long-run upward trend which has accelerated in recent years, reflecting both structural and cyclical developments. This section highlights underlying structural shifts driving long-term trends in labor force participation (LFP), before elaborating on the potential impact of cyclical conditions —notably elevated cost of living and high interest costs for households– on LFP in recent years.

14. Structural shifts in the economy have supported long-term growth in labor force participation, but some structural trends may have accelerated in recent years (Figure 5). In recent decades, labor force participation has been growing at a rate of 0.1 percentage points per year. Among structural factors, higher female LFP has played a key role in supporting the rise in LFP. Female LFP has been on an upward trend for decades, both in Australia and across peer AEs. However, female LFP in Australia saw a level shift up in the post pandemic period. Within this, LFP for mothers of young children improved sharply by 2023 –which may reflect July 2023 reforms to childcare subsidies, as well as the growing prevalence of flexible work arrangements.[4] At the same time, rising LFP rates of older workers (indicative of an aging population facing longer retirement periods due to rising life expectancy) and of workers with long-term health conditions (potentially benefitting from more flexible working conditions) have also helped boost labor supply over the past decade.

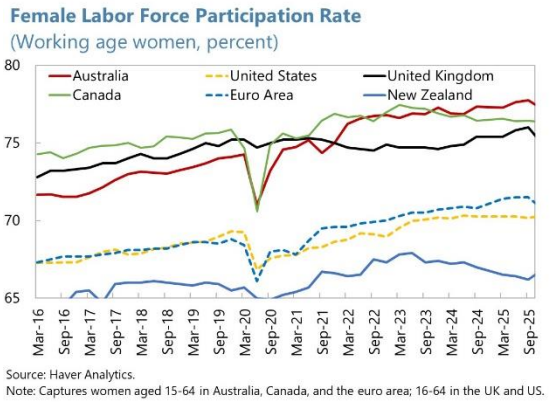
Figure 5. Labor Supply

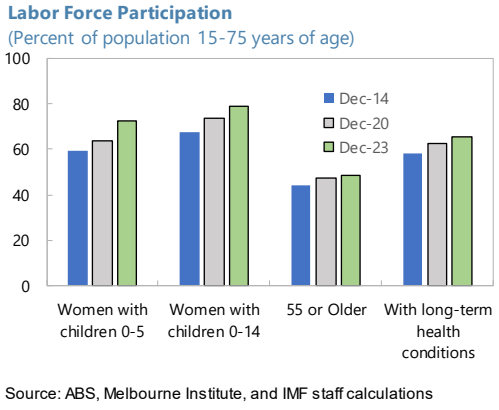


Sources: ABS; RBA

[4] For a discussion of worker preferences around flexible work arrangements, see Australia 2024 Article IV Staff Report, Annex VIII

Figure 5. Labor Supply (Concluded)





15. Migration has been supporting both structural and cyclical changes in LFP. Migrants, on average, have higher labor force participation than domestic citizens, particularly given the structure of the migration system, with a focus on work visas to meet domestic skill shortages. Australia has seen strong inward migration flows over several decades, which supported growth in long-term LFP. In addition, cross-border movement restrictions during the pandemic led to large temporary volatility in net migration figures; the sharp drop in net migration in 2020-2021 contributed to a temporary decline in LFP, while the return of migrant workers after borders reopened contributed to a quick recovery of LFP in 2021-2022. The latter impact subsided as net migration trends normalized.[5]

16. This section next takes a deep dive on the labor supply impact of monetary tightening and the increased cost-of-living in recent years. As shown in Figure 6, Australia entered a tightening cycle in May 2022 as inflation began to rise above the target band. This presented mortgage holders with higher mortgage payments, squeezing household balance sheets. At the same time, households faced higher cost-of-living as inflation rose. As a result, credit-constrained households may have increased their labor supply to afford their mortgage payment and squeezed balance sheets due to higher inflation. [6]

17. Findings from Das et al. (forthcoming) suggest that the most indebted households had a significant relative increase in their labor supply in recent years. As shown in Figure 6, individuals in the most indebted quintile experienced a 1 percentage point rise in their employment probability compared to those in the lowest indebtedness quintile following the onset of monetary tightening (methodology described in Annex II). This effect is statistically significant at the 1 percent

[5] For an in-depth discussion on the impacts of migration on the Australian Economy refer to Australia Selected Issues Paper 2023.

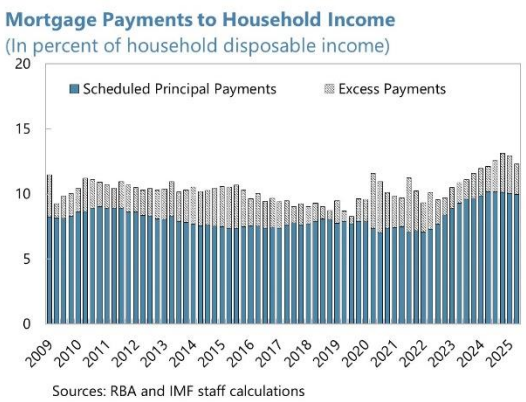
[6] A priori, central banks tend to assume that interest rates have little impact on labor supply. Indeed, the Reserve Bank of Australia commented: "Monetary policy has little direct effect on labour supply or structural features of the job market, and so generally takes the current level of full employment as given." See Statement on Monetary Policy, Section 4.2 "The role of monetary policy in achieving full employment", Feb 2024. The proposed additional channel on LFP through the impact of inflation and interest rates on labor supply is therefore a relatively novel mechanism.

level and remains consistent throughout the sample period. In contrast, quintiles 2 through 4 did not exhibit a similar change. Comparable patterns are observed across other labor supply measures. Specifically, the fifth quintile shows a 1 percentage point rise in the number of jobs they hold and a 3.5 percentage point rise in total labor earnings, indicating that the labor supply expansion occurs along both the intensive and extensive margins. Taken together, this suggests that individuals and households are making decisions to increase their labor supply in response to balance sheet stress.[7]

18. The effect was particularly pronounced for those individuals who had the flexibility to increase their working hours. When the sample is restricted to those who were not full-time workers prior to the onset of monetary tightening, the effect on labor supply roughly doubles. Similarly, individuals who were not primary earners in 2021 (regardless of gender) and those without children exhibited a noticeably larger increase in labor supply compared to their counterparts. This suggests that individuals with the capacity to expand their labor supply (such as by reducing leisure time or taking on a second job) were choosing to do so. In contrast, those constrained by full-time work commitments or childcare responsibilities did not have this option. Following the 2023 increase in the generosity of the government's childcare subsidy, there is evidence that individuals with young children increased their labor supply, nearly catching up with those with older children (Figure 6). This finding indicates that when labor constraints are eased (i.e., the opportunity cost of work decreases due to lower childcare expenses) an observable increase in labor supply occurs.

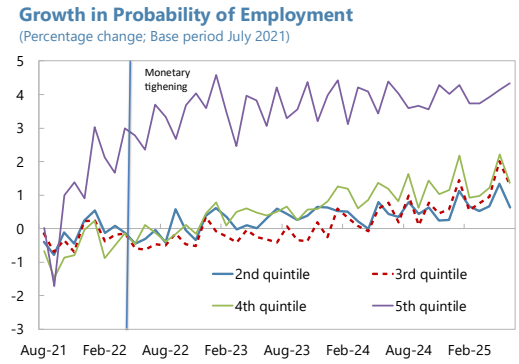
Figure 6. Monetary Tightening and the Cost-of-Living Impacts on Labor Supply

(A) Higher interest rates and inflation squeezed household balance sheets starting in mid 2022.



Sources: RBA and IMF staff calculations

(B) This corresponded to a large and statistically significant increase in the probability of employment for the most indebted individuals.

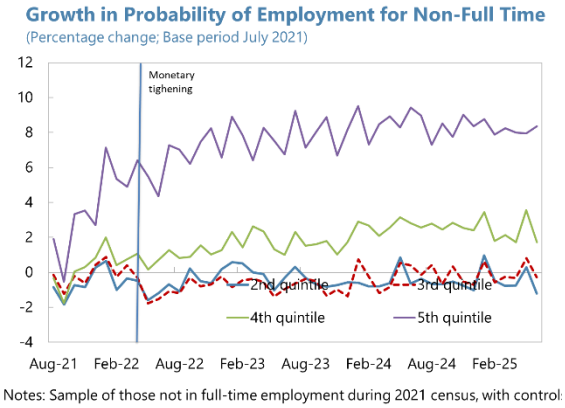


Notes: Full sample, with controls

[7] Note that one would ideally also observe the number of hours worked, although this is not available in tax datasets. Instead, we deduce that hours worked also likely increased for the most indebted households given total labor earnings saw a relative increase and wages are unlikely to have changed differentially.

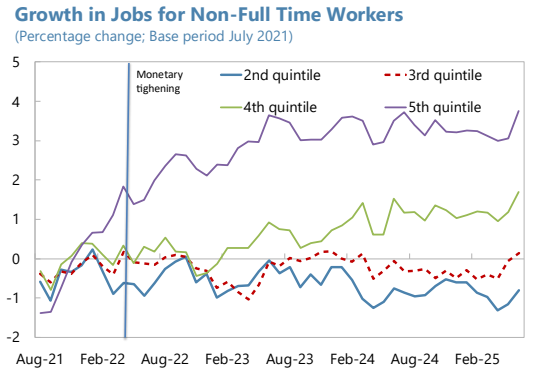
Figure 6. Monetary Tightening and the Cost-of-Living Impacts on Labor Supply (Concluded)

(C) This effect was particularly concentrated in those who were not working full-time prior to the tightening episode.



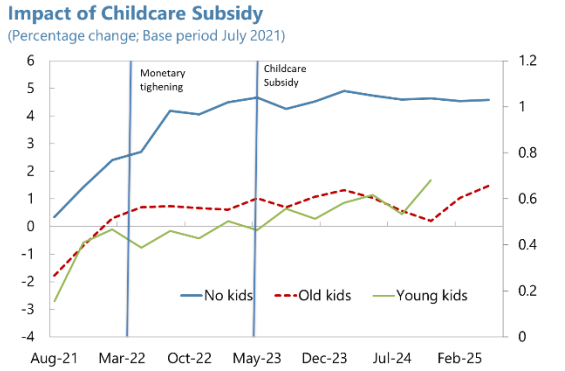
Notes: Sample of those not in full-time employment during 2021 census, with control

(D) The effect is also observable for the growth in the number of jobs held.



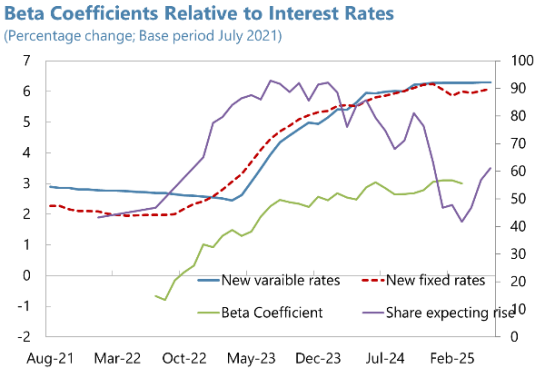
Notes: Sample of those not in full-time employment during 2021 census, with control

(E) The effect was muted for parents of young children, increasing childcare subsidy corresponded with a catch-up



Notes: Sample of those not in full-time employment during 2021 census, with control

(F) The increase in labor supply corresponded with individuals expectations of rate increases.



Notes: Sample of those not in full-time employment during 2021 census, with control

19. The increased cost of living and higher mortgage payments likely both had a meaningful impact on LFP. It remains challenging to definitively allocate the rise in labor supply between the increase in interest rates and the increase in the cost-of-living, given both forces occurred within the same period, and both squeezed household balance sheets. On the one hand, Figure 6 suggests that the pick-up in labor supply corresponds very closely with an increase in mortgage rates.[8] On the other hand, a similar effect can be observed for individuals with a high rent to income burden (and so only indirectly impacted by higher interest rates). Regardless of which mechanism dominates, preliminary calculations indicate that the squeeze on household balance sheets may have contributed between 0.1 and 0.4 percentage points to the approximately 2 percentage point increase in LFP observed since July 2021.[9]

[8] It is shown in Das et al. (forthcoming) through regression analysis that interest rates are much stronger predictor of labor supply in the fifth quintile than inflation.

[9] The lower bound assumes that 50 percent of households are mortgage holders, 1/5th of which see an increase in their labor supply. The upper bound also includes those who are non-mortgage holders.

20. To conclude, rising LFP can be attributed to both structural and cyclical factors, and will remain critical for policy makers to monitor going forward given its key role in determining labor market outcomes. Rising labor supply met strong labor demand (see Paradox 1) in the post-pandemic period, supporting high employment growth. However, going forward, the above findings suggest LFP may decline as disinflation becomes more entrenched and the monetary easing cycle proceeds. Unless met by a similar softening in labor demand, this in turn may increase labor market tightness. Given the dual mandate, it will be important for monetary policy makers to closely monitor developments in participation and implications for labor market outcomes. In the longer term, across major AEs, major structural changes will continue to shape LFP, including aging populations, immigration policies, and the participation of older workers. Structural policies should be calibrated to ensure any labor supply shortages are adequately met, to avoid wage pressures or a negative impact on growth.

D. Paradox 3: Subdued Wage Growth and Tight Labor Market Conditions

21. At first glance, wage growth in recent years appears subdued given tight labor market conditions. Tight labor markets and high inflation in Australia in the post-pandemic period did not put as much pressure on wages (not adjusted for productivity) as might have been previously expected, consistent with trends in other AEs and findings by Bernanke and Blanchard (2024). In 2022 and 2023, vacancies skyrocketed, and businesses reported significant difficulties finding and retaining workers, but real wage growth was negative, at its lowest levels in almost two decades (Figure 7). These trends represent a shift from the positive correlation between labor demand and real wage growth observed in the past. In 2024, real wage growth ticked up only slightly into positive territory, as labor market conditions, while beginning to ease, remained tight by historical norms. Even when accounting for elevated inflation, the wage Phillips curve (WPC) has appeared to shift to the left or flatten since 2021, with unemployment well below levels observed historically, but nominal wage growth no higher than seen in the past (Figure 7).

22. Shifts in structural and cyclical factors may partly explain low wage growth despite tight labor markets conditions. A leftward shift of the WPC could indicate changes in productivity, labor supply, or labor demand composition:

- *Declines in labor productivity may have exerted downward pressure on wages but are unlikely to fully account for the softness in wage growth.* Measured as GDP per hour worked, labor productivity in Australia rose over 2020-early 2022, but declined sharply in the following years, only stabilizing in 2025. Declining labor productivity can generate downward pressure on wages, which could offset upward pressures from tight labor market conditions. The rapid rise in unit labor costs, which capture labor costs after accounting for movement in productivity, in recent years, suggests the impact of labor market conditions on wages may have indeed been offset by waning productivity. However, the decline in unit labor costs in 2022 and early 2023 suggests real wages increased by even less than warranted by productivity dynamics over that period, implying productivity alone may not fully explain muted wage growth in those years (Figure 7).

- *Rapid shifts in labor force participation, explored in depth Paradox 2, may have also contributed to keeping wage growth contained*. An increase in the labor supply can reduce upward pressure on wages at the same level of unemployment (shift the wage Phillips curve to the left). A larger workforce gives employers a larger pool of workers to choose from at the same level of unemployment, and thus reduces the need to raise wages as aggressively to attract employees. The rise in LFP above its long-term trend may have decreased pressure on wages in recent years.

- *Concentration of labor demand in select sectors may also explain softness in wage growth in recent years*. Concentration of labor demand in sectors where wages are less responsive to labor market tightness (potentially non-market sectors or sectors with lower preponderance of individual agreement wages) could flatten the aggregate Wage Phillips curve and contain the impact of tight labor markets on aggregate wage growth. This channel would be stronger with lower substitutability of workers across sectors – although recent RBA work finds strong labor demand in the healthcare sector likely contributed to tightening labor market conditions in other industries, and thus some substitutability was at play.[10] A concentration of employment growth in sectors with lower productivity and slower productivity growth could also contribute to contained wage growth.[11]

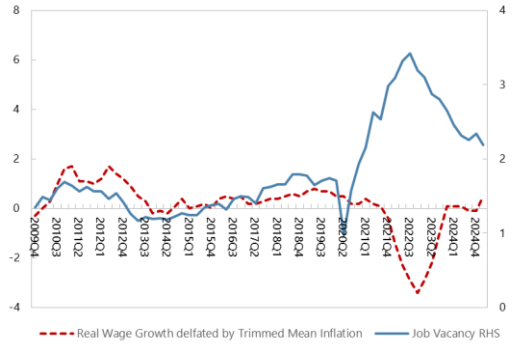
23. This section considers the drivers of wage growth in Australia in recent years to understand the contribution of labor market conditions and of other cyclical, as well as of structural factors. To establish the key drivers of wage growth, a wage Phillips curve augmented with an error correction term for wage deviations from the long-term relationship with productivity is estimated. The estimation is performed in two steps, following Engle and Granger (1987): first, estimating a long-run equation which captures the relationship between real wage growth and productivity; second, estimating a short-run wage equation which captures the impact of cyclical and structural factors on nominal wage growth, and which also includes the residual term from the first step (reflecting catch-up of wages to productivity trends). The methodology is detailed in Annex III and based on Baba et al. (2023). The analysis is performed at both the national and the sector level.

[10] See Box C: Health Care Employment and its Impact on Broader Labour Market Conditions in the February 2025 RBA Monetary Policy Statement.

[11] Wage growth was elevated in several non-market sectors over this period, most notably the healthcare sector, in part linked to policy decisions. Nonetheless, our hypothesis is that this wage growth would have been even higher if the same strong labor demand /employment growth were observed in sectors with wages more responsive to labor market conditions, or if employment had instead shifted to sectors with higher productivity growth.

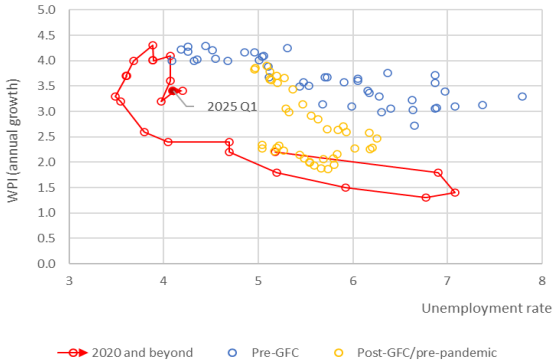
Figure 7. Wages and Drivers

Wage Growth and Job Vacancy: All Industry



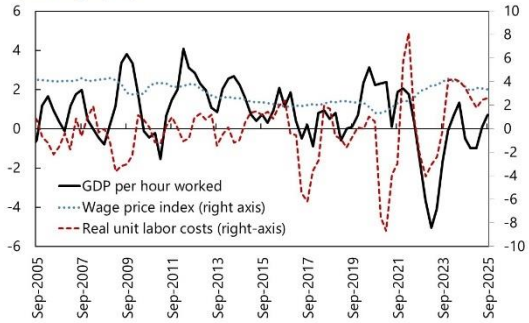
Australia Wage Phillips Curve

(Wage inflation and unemployment rate)

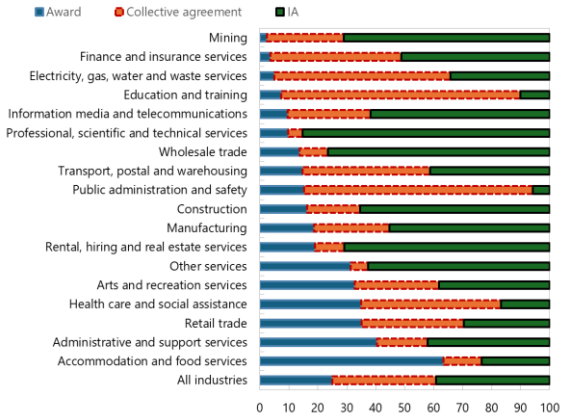


Productivity and Labor Costs

(Year-on-year, SA)

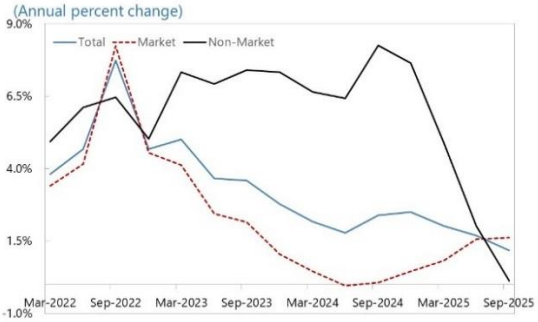


Pay setting methods by industry



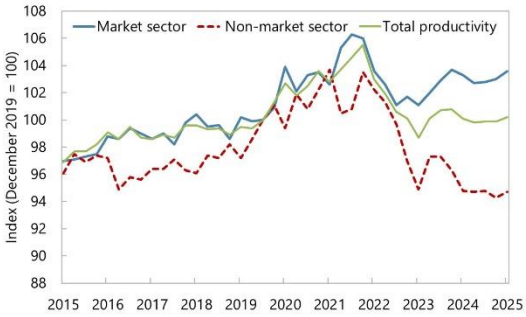
Filled Jobs

(Annual percent change)



Labor Productivity

(Labor productivity in the market and non-market sectors)

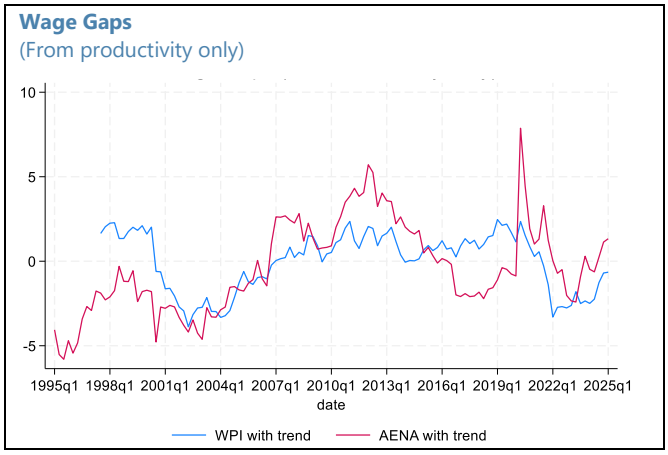


Source: ABS.

Sources: ABS and IMF staff calculations

Results From Aggregate Wage Philips Curve Analysis

24. A negative real wage gap over 2022-2023 suggests soft productivity growth alone cannot account for low wage growth in the post-pandemic period. Wage gaps, defined as the residuals from the long-run relationship between productivity and real wages, signal divergence of wages from the level implied by productivity trends. A negative wage gap over 2022-2023 in Australia suggests real wages during this period were below levels implied by long run productivity trends; thus, soft productivity growth alone could not fully account for soft wage growth over this period. The presence of wage gaps over this period is robust to various specifications and is present regardless of whether the WPI or AENA measures of wages are used. A negative wage gap can result in upward pressure on wages in subsequent periods as wages 'catch up' to long-run productivity trends.



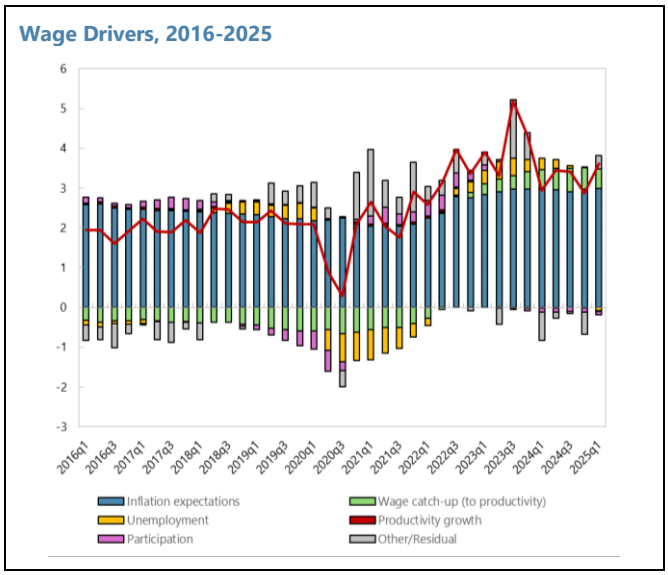
25. The short-run Wage Phillips curve regression indicates that both cyclical and structural factors help shape the evolution of wages since 2020. Regression results from the Wage Phillips curve analysis at the national level are captured in Table 1; these have the expected signs and are broadly consistent with the literature. A WPI measure of wages is used;[12] the sample period extends to 2025Q1, but the pre-pandemic sample is also considered in isolation. Determinants of labor market slack include the unemployment gap (relative to long term trend), and the vacancies to unemployment ratio. The measure of participation captures gaps relative to a long-run trend.

- *Sensitivity to labor market tightness:* On average, a one percentage point decrease in unemployment below its trend is associated with an increase in wage inflation of 0.3-0.4 percentage points (a linear relationship is assumed). Similarly, an increase in the vacancies to unemployment ratio is also associated with upward wage pressures, although results are not statistically significant. The sensitivity of wages to unemployment was stronger in the pre-pandemic period than over the full sample, suggesting a reduced sensitivity of wages to labor market tightness in recent years.

- *Sensitivity to productivity growth*. Wage catchup to the long-term trend implied by productivity is a minor (but statistically significant) contributor to wage growth. For every one percentage point that real wages are below the level implied by productivity, nominal wage inflation is pushed up by just under 0.1 percentage points per quarter.

[12] Regressions using the AENA definition of wages suffered from non-stationarity and autocorrelation and thus are not included.

- *Sensitivity to the participation rate.* As expected, higher labor force participation rates (relative to a long-run trend) are associated with lower wage growth. This is consistent with more available workers reducing wage pressures at the same level of unemployment. For every one percentage point increase in participation above its long-run trend, wage growth is 0.5 percentage points slower. Interestingly, participation is not significant in the pre-2020 sample alone, suggesting the association between wages and participation may have strengthened in recent years.



Beyond the above factors, lagged wage growth and expected inflation are both significant drivers of wage growth. Short-run changes in import price growth and in labor productivity growth (outside the long run catch-up effect) do not have statistically significant effects.

26. Both cyclical and structural factors contributed to the evolution of wages in Australia in recent years. A decomposition of the drivers of wage growth based on the regression results reveals that:

- The unemployment gap contributed positively to wage growth from 2022Q3 through mid-2024, consistent with tight labor market conditions.

- Inflation expectations have historically played a significant role in wage growth formation, but because they remained anchored even as the economy faced significant price pressures, their contribution to wage growth did not increase substantially. However, the positive contribution of the residual term to wage growth in 2021 and early 2022 suggests rising cost of living pressures may have strengthened worker demands for higher wages even as inflation expectations remained anchored.

- Participation (taken as deviation from long term trends, and thus primarily capturing cyclical or short-term components), contributed positively to wage growth early in the decade when labor supply was restricted by border closures; however, once participation began to increase more rapidly above its long-term trend the contribution became negative.

- Gradual wage catch-up to the level implied by productivity trends has also contributed positively to wage growth since 2022. Even though productivity was declining over much of this period, real wages initially dropped even further below levels implied by the long-run co-integrating relationship with productivity.

Table 1. Australia: Wage Phillips Curve Regressions

	(1) ΔWPI	(2) ΔWPI	(3) ΔWPI	(4) ΔWPI	(5) ΔWPI	(6) ΔWPI	(7) ΔWPI	(8) ΔWPI
Lagged wage inflation (sum of coefficients)	0.764*** (0.0547)	0.760*** (0.0547)	0.812*** (0.0525)	0.796*** (0.0628)	0.769*** (0.0573)	0.790*** (0.0548)	0.790*** (0.0605)	0.715*** (0.0791)
Inflation expectations (1 yr-ahead)	0.236*** (0.055)	0.240*** (0.055)	0.188*** (0.052)	0.204*** (0.063)	0.231*** (0.054)	0.210*** (0.055)	0.210*** (0.060)	0.285*** (0.079)
Catch-up to Prod. Trends (ECM term)	-0.089*** (0.025)	-0.088*** (0.025)	-0.080*** (0.026)	-0.066** (0.026)	-0.074*** (0.027)	-0.092*** (0.027)	-0.126*** (0.032)	-0.126*** (0.031)
Unemployment (deviation from trend)	-0.337** (0.138)	-0.357** (0.137)	-0.365*** (0.115)			-0.407** (0.156)	-0.523** (0.201)	
Vacancies to unemployment				0.280 (0.185)		1.269 (3.130)		0.824*** (0.269)
Uneployment gap (from NAIRU estimate)					0.003 (0.002)			
Labor productivity growth	2.863 (2.835)	2.919 (2.862)	0.647 (3.023)	-1.110 (3.619)		-0.065 (0.293)	2.307 (2.995)	-1.787 (3.294)
Import price growth		-0.003 (0.005)						
Participation gap			-0.523* (0.278)	-0.398 (0.266)	-0.002 (0.309)		0.035 (0.259)	0.168 (0.250)
Observations	107	107	107	101	98	99	86	81
Coef. Const.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SE	0.0547	0.0547	0.0525	0.0628	0.0543	0.0548	0.0605	0.0791
t-val	13.98	13.88	15.47	12.68	14.17	14.42	13.07	9.037
Period	Full	Full	Full	Full	Full	Excl. 2020-21	Pre-2020	Pre-2020

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

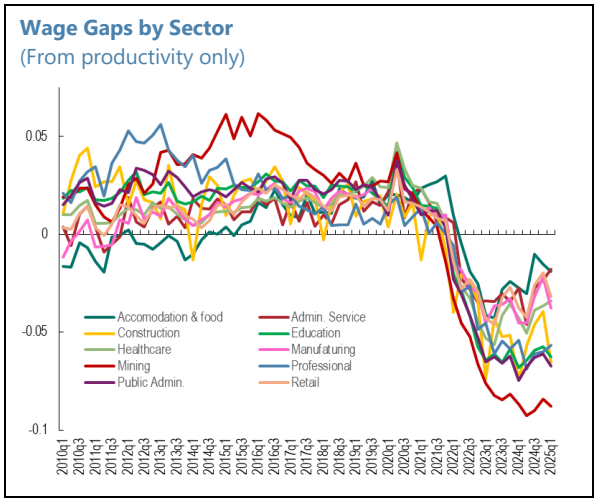
Results From Sector-Level Wage Phillips Curve Analysis

27. Sector level analysis can shed light on whether wage sensitivity to cyclical and structural conditions differs across sectors. Different wage setting methods are more or less common in different sectors in Australia, which could in turn result in different sensitivity of wages to cyclical or structural factors across sectors; for example, individual arrangements are likely to be more sensitive or quick to react to labor market conditions than other wage setting methods (i.e., award wages or collective agreement wages).[13] Other factors such as productivity or inflation expectations may also be passed on differently to real wage growth, depending on the goals inherent in wage setting (e.g., setting award wages often takes into account a variety of additional goals, including socio economic factors). Wage Phillips curves estimated at the sector level can help determine the sensitivity of wages to cyclical and structural factors in each sector.

[13] Given less frequent resets, collective agreement and award wages can react with a lag. Moreover, award wages may also factor in factors other beyond productivity growth.

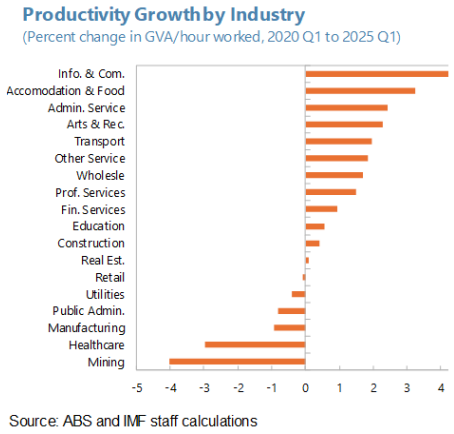
28. With employment growth concentrated in a few sectors in recent years, these sectors may have played an oversized role in determining aggregate wage sensitivity to labor market conditions and other factors. Over Feb 2020- Feb 2025 employment growth was concentrated in the healthcare and social assistance sector, followed at some distance by construction, public administration, education, and professional services.[14] If wages in these sectors are less responsive to labor market conditions, this could in part explain the contained aggregate wage growth in recent years that occurred in spite of tight aggregate labor market conditions. Most of these sectors have a low share of individual agreements and higher use of collective agreements and award wages, which generally do not see as quick a reaction to cyclical conditions. This could help explain a short-term reduction in the NAIRU (with lower unemployment not translating as quickly into higher wages and higher prices), although this reduction would not be expected to persist in the medium term.

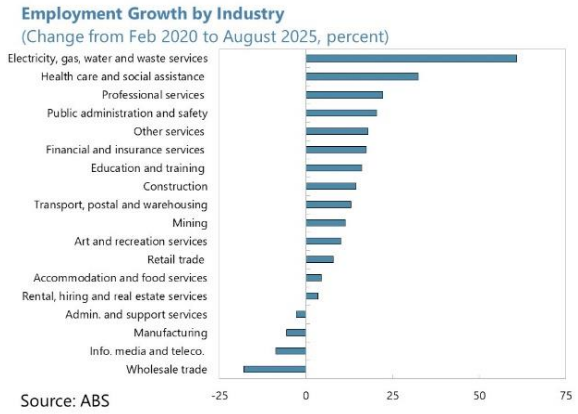
29. While labor productivity has evolved differently across sectors, a wage productivity gap emerged across sectors early in the decade. Productivity growth since 2020 (measured as change in GVA per hours worked) has varied across sectors – with the highest growth in information media and telecommunications, and the sharpest declines in mining and healthcare. While the long-term relationship between wages and productivity can also differ somewhat across sectors, the first step of the error correction Wage Phillips curve regression suggests real wages across sectors fell below levels implied by the long run relationship with productivity early in the decade and have not recovered (Figure 8). Negative real wage gaps opened across sectors, with the largest gap in the mining sector, and the narrowest in accomodation and food services. Moreover, in recent quarters, the wage gap has been narrowing only in a few sectors: the accomodation and food services, healthcare, and retail trade sectors. The aggregate reduction in the real wage gap (seen above) may thus also reflect a shift in employment across sectors (toward those with smaller gaps), rather than just the closing of sector-level gaps.



[14] The concentration of labor demand in some of these sectors in recent years reflects the impact of the pandemic and of policy and structural shifts, as discussed in Paradox 1.

Figure 8. Sector Level Productivity and Wages





30. The impact of labor market conditions on wage growth differs across sectors (Table 2). Sector-level WPCs, corrected for the catch-up with long-term productivity trends, show different sensitivities of wage growth to unemployment gaps. In some sectors, especially those with a moderate or high share of individual agreements, there is a strong and significant negative correlation between unemployment gaps and wage growth (e.g., in the administrative, financial, and professional services sectors, and the retail trade sector). In other sectors, the relationship is not significant or even positive; this may in part be related to the low share of individual agreements in these sectors (e.g., in the education, healthcare, or public administration sectors).

31. The concentration of labor demand in sectors with lower wage sensitivity to labor market conditions can help explain contained aggregate wage growth in the context of tight labor markets in recent years. Among sectors which saw the highest growth in employment in since 2020, the healthcare, construction, public administration, and education sectors all do not see significant relationships between wages and unemployment gaps in the short term, suggesting a flatter WPC. Notably, several of these sectors also saw some of the lowest unemployment levels since 2022 (notably healthcare, education, and public administration). In fact, among sectors with substantial growth in employment in recent years, only the professional services sector saw a significant negative relationship between unemployment gaps and wages. Assuming imperfect labor mobility between sectors, the concentration of labor demand in sectors with flatter WPCs can help explain contained aggregate wage growth.

32. In conclusion, high labor supply, and a concentration of labor demand in sectors with flatter WPCs both contributed to keeping wage pressures contained at low levels of aggregate unemployment, consistent with temporarily lower NAIRU estimates. Since the pandemic, tight labor market conditions and elevated cost of living pressures have exerted upward pressure on wages. This effect was partly offset by labor force participation eventually rising above long-term trends, increasing the supply of available workers at any level of unemployment. At the same time, job growth and labor demand were primarily concentrated in sectors where wages are less sensitive to cyclical labor market trends; this in turn reduced the sensitivity of wages to labor

market tightness in the aggregate. Reduced productivity growth also contributed to containing real wage growth, although primarily early in the decade. Together, these factors are consistent with lower wage pressures at any level of unemployment – a temporary shift in the Wage Phillips curve, and a lower NAIRU estimate in the short run.[15]

33. Going forward, policy makers should carefully monitor labor supply and demand, as trends observed in recent years unwind, while upward pressures on wages could re-emerge. To the extent above-trend labor force participation reflects cost of living pressures and tight monetary policies (see Paradox 2), labor supply could stabilize or decline as economic conditions normalize, which may in turn increase pressure on wages at the same levels of unemployment. Moreover, employment growth is already shifting from non-market sectors to market sectors (see Staff Report, paragraph 4), where wages are more sensitive to labor market conditions, while collective agreement and award wages continue to rise with a lag. Together, the unwind in recent trends suggests the medium-term NAIRU would remain closer to pre-pandemic levels, and wage pressures could re-emerge if the unemployment rate declines toward levels observed in recent years. Carefully tracking labor market conditions and evolving wage pressures, and disentangling cyclical and structural elements of participation, will be critical to setting monetary policy to appropriately target contained price pressures and full employment going forward.

[15] The latest IMF assessment of the NAIRU is at 4.3 percent as of 2025Q3, with a range of 4.1 to 4.5 percent. The output gap and NAIRU are derived jointly from a multivariate filter (see accompanying Staff Report), with a layer of judgement applied based on a production function framework.

Table 2. Australia: Wage Phillips Curves at Sector Level

	Low share of individual agreement			Moderate share of individual agreement					High share of individual agreement					
	Education ΔWPI	Healthcare ΔWPI	Public Admin. ΔWPI	Accomodation & Food ΔWPI	Admin. Services ΔWPI	Arts & Rec. ΔWPI	Retail ΔWPI	Utilities ΔWPI	Construction ΔWPI	Financial ΔWPI	Manu-facturing ΔWPI	Mining ΔWPI	Professional ΔWPI	Wholesale ΔWPI
Lagged wage inflation	0.954***	0.888***	0.910***	0.668***	0.828***	0.861***	0.793***	0.953***	0.950***	0.934***	0.940***	0.941***	0.835***	0.922***
(sum of coefficients)	(0.0485)	(0.0635)	(0.0651)	(0.0764)	(0.0584)	(0.0618)	(0.0767)	(0.0487)	(0.0465)	(0.0427)	(0.0353)	(0.0526)	(0.0589)	(0.0550)
Inflation expectations	0.046	0.112*	0.090	0.332***	0.172***	0.139**	0.207***	0.047	0.050	0.066	0.060*	0.059	0.165***	0.078
(1 yr-ahead)	(0.049)	(0.064)	(0.065)	(0.076)	(0.058)	(0.062)	(0.077)	(0.049)	(0.046)	(0.043)	(0.035)	(0.053)	(0.059)	(0.055)
Catch-up to Prod. Trends	-0.094	-0.163	-0.031	-0.418	-0.224	-0.158*	-0.194	-0.069	-0.063	-0.070	-0.030	-0.044	-0.174**	-0.085
(ECM term)	(0.066)	(0.138)	(0.070)	(0.260)	(0.157)	(0.095)	(0.161)	(0.053)	(0.056)	(0.078)	(0.061)	(0.051)	(0.077)	(0.069)
Unemployment gap	1.319***	-0.970	-0.602	-0.259	-0.466**	-0.229**	-0.679**	0.193	-0.242	-0.527**	-0.382**	-0.149	-1.192**	-0.406
	(0.308)	(0.602)	(0.447)	(0.159)	(0.201)	(0.106)	(0.294)	(0.179)	(0.250)	(0.216)	(0.177)	(0.139)	(0.595)	(0.312)
Labor productivity growth	-0.561	-0.759	-2.255	6.730	-4.352	1.127	8.090	-0.952	-1.546	1.577	4.035	0.655	5.129	0.224
	(5.114)	(6.752)	(3.937)	(5.260)	(5.426)	(2.169)	(7.017)	(3.149)	(2.110)	(2.696)	(3.096)	(2.331)	(5.146)	(3.265)
Observations	107	107	107	107	107	107	107	107	107	107	107	107	107	107
Coef. Const.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
t-val	19.65	13.97	13.97	8.746	14.17	13.94	10.34	19.56	20.44	21.89	26.61	17.88	14.19	16.77
Period	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full

Robust standard errors in parentheses

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

E. Conclusions and Policy Implications

34. Persistently low unemployment and high vacancies may be overstating the labor market's cyclical strength.

- *Cyclical drivers were key to low unemployment in the post-pandemic period but are waning*. The low unemployment rate in recent years partly reflects the lingering effects of a high job finding rate and strong job retention during the post-pandemic recovery period. However, in the past two years, flows to and from the labor force linked to changes in the participation margin have put downward pressure on unemployment; given participation can react with a lag, the counterfactual unemployment rate solely determined by job finding and job loss is an important early indicator of cyclical conditions – and it has edged up to pre-pandemic levels as of late.

- *Structural, rather than cyclical, drivers may be playing a growing role in keeping labor demand elevated*. A declining part of elevated job vacancies is explained by new vacancies; the persistence of older vacancies may indicate some structural skill shortages. Moreover, part of the residual strength in vacancies is driven by structural or policy changes (i.e., expansion in the NDIS and aging population).

- *Policy makers should carefully monitor labor market developments beyond headline figures, to identify potential signs of weakening, and disentangle cyclical and structural elements*. The use of alternative measures of slack—such as adjusted unemployment or vacancies measures, or employment intentions—may help capture changes in labor market conditions in a timelier manner or at higher frequencies. To address persistent unmet labor demand, policy makers could consider further refining migration frameworks or improving labor market mobility; in this context, the recent reforms around non-competes, and efforts to streamline and prioritize migration processes for some healthcare workers, are welcome steps.

35. Structural and cyclical factors both contributed to strong labor supply growth.

- *Structural shifts have contributed to growing labor force participation in recent years*. These include strong net migration flows, higher female labor force participation, and increased participation by older and less healthy workers. Some of these trends accelerated in recent years, in part reflecting policy changes.

- *Cyclical conditions have also boosted labor force participation in recent years*. A combination of higher cost-of-living and elevated interest payments squeezed household balance sheets resulting in debt-constrained households increasing their labor supply by taking on second jobs, increasing labor income, and boosting labor force participation.

- *Policy makers should monitor labor force participation carefully going forward to understand structural and cyclical drivers*. This is especially critical in the coming quarters, as economic conditions normalize; participation from constrained households could unwind, tightening labor supply, with potential implications for overall labor market conditions.

36. Elevated labor supply, together with the concentration of employment growth in sectors with flatter wage Phillips curves, helped keep wage growth contained despite low unemployment, consistent with a temporarily lower estimate of the NAIRU.

- *Low unemployment rates have put upward pressure on wages in recent years*. However, this upward pressure has been in part mitigated by the concentration of employment growth in sectors with flatter wage Phillips curves (lower sensitivity of wages to labor market tightness), specifically non-market sectors. The impact of high cost of living pressures was partly mitigated by contained inflation expectations.

- *Above-trend labor force participation and low productivity growth have helped keep wage growth contained in the post-pandemic period*. While low participation during the pandemic exerted upward pressure on wages, above-trend participation in recent years has exerted downward pressure on wages. Low productivity growth reduced wage pressures early in the decade; however, it played a less significant role as of late, as the sharp initial decline in real wages 'overshot' the long-run relationship with productivity growth.

- *Higher labor force participation rates and the concentration of employment growth in sectors with flat WPCs likely temporarily reduced wage pressures at the same level of unemployment, consistent with a temporarily lower NAIRU—but this is unlikely to persist in the medium term*. Normalizing economic conditions, recovery in market sectors, and collective agreement and award wages rising with a lag, can all result in rising wage pressures at the same level of unemployment. Thus, the medium-term NAIRU is likely to return to previous levels. Consequently, careful monitoring of wages and the link with participation, productivity, and labor demand, are essential for policy makers going forward as they seek to contain price pressures and secure full employment.

Annex I. Counterfactual Unemployment and Vacancy Rates

I.1

1. From ABS monthly labor market transition data, we construct monthly transition probability matrix P_t in seasonally adjusted terms across three states $\{E, N, U\}$, where E corresponds to "employed", U "unemployed", and N "nonparticipating". To enable the analysis of counterfactual transition patterns while respecting the properties of a transition matrix, we consider the transitions as governed by a three-state continuous-time Markov chain. The infinitesimal generator matrix Q_t, whose non-diagonal elements give the instantaneous transition rates across states, is given by the matrix logarithm of P_t.

2. The counterfactual unemployment is derived as follows. We construct a counterfactual generator matrix $\widetilde{Q_t}$, where specific transition rates are held constant at their averages over a certain period and the diagonal elements shift to ensure that all rows sum to zero. The counterfactual instantaneous generator matrix $\widetilde{Q_t}$ gives the counterfactual discrete-time monthly transition matrix $\widetilde{P_t}$, which is the matrix exponential of the former. Starting from a given initial period and its corresponding shares across the three states, the shares are simulated forward with $\widetilde{P_t}$ for each subsequent period t. With these shares, we calculate the counterfactual unemployment rate as unemployed share divided by the sum of unemployed and employed shares.

3. The variance decomposition quantifies the contribution of each cross-state transition rate to unemployment rate. We simulate the counterfactual unemployment rate $\widetilde{u_t}$ holding constant all but one transition rate among $\{E-U,\ E-N,\ N-E, N-U, U-E, U-N\}$. The contribution of the transition rate that is allowed to vary is given by:

$$\frac{Cov(\widetilde{u_t}, u_t)}{Var(u_t)}.$$

This ratio measures the co-movement between the counterfactual unemployment rate and the actual outturns. The table below presents the decomposition of unemployment variation during two periods, 2020-2021 when the labor market underwent drastic disruptions and 2022 onwards when the labor market normalized from the Pandemic. The N-U transition (from "nonparticipating" to "unemployed") gained prominence in the later period, explaining a large share of the variation in unemployment rate during this period of low unemployment.

2020-2021

Transition	Contribution
UE	0.29
EU	0.27
NU	0.20
UN	0.08
NE	0.04
EN	0.01

Since 2022

Transition	Contribution
UE	0.40
NU	0.34
EU	0.26
UN	0.04
NE	-0.02
EN	-0.14

I.2

4. The counterfactual vacancy rates, as defined as the ratio between active vacancies and the number of jobs (sum of employment and active vacancies), are constructed as follows.
Using monthly data from Revelio Labs on removed vacancies and new vacancies, we construct the outflow rate o_t as

$$o_t = \frac{\text{Removed Vacancies}}{\text{Active Vacancies, Lag}},$$

and the inflow rate i_t as

$$i_t = \frac{\text{New Vacancies}}{\text{Employment}}.$$

Using the steady state approximation of vacancy rate, which generally holds well in high-frequency settings, we calculate the counterfactual vacancy rate with outflow rate fixed at its average overtime $\bar{o}$ according to

$$v^i = \frac{i}{i + \bar{o}},$$

and the counterfactual vacancy rate with inflow rate fixed at its average overtime $\bar{\imath}$ according to

$$v^o = \frac{\bar{\imath}}{\bar{\imath} + o}.$$

Annex II. Monetary Policy and Labor Supply

1. In a forthcoming paper, Das, Hambur, Hellwig and Spray investigate household labor market responses to monetary tightening using administrative data from Australia.

2. The paper uses information on household characteristics, including mortgage debt service, from the 2021 Census, matched with monthly administrative data on income and employment, covering all 9.3 million Australian households, including 3.3 million mortgage-holding households. This detailed and large data set allows the quantification of the magnitude of the average household response to the rate hike but also to explore the heterogeneity in responses across households with different characteristics.

3. To study the dynamic response of labor supply by level of indebtedness, the following local regression is estimated in repeated cross sections for individual i in month t:

$$Y_{i,t} - Y_{i,Jul21} = \alpha_{i,t} + \sum_{g} \beta_{g,t} * I(G = g) + X'_{i,t}\gamma_t + u_{i,t}$$

Where $Y_{i,t} - Y_{i,Jul21}$ is the change in outcome of interest since July 2021 ∈ {Labour income, employment (1/0), number of jobs (if >0)}; $I(G = g)$ is an indicator if in DSR group g; $X_{i,t}$ is a vector of controls, including individual and HH income, age, age^2, gender, education. The first (lowest) DSR quintile is omitted and serves as the reference group.

The results are robust to using a large suite of controls, including: household income in 2020 and 2019, detailed geographic location, number of bedrooms and people in the home, number of children, and whether they have been in that home for more than 1 or 5 years. Results are also qualitatively unaffected by dropping States which had longer lockdowns.

Annex III. Estimating the Wage Phillips Curve [1]

1. This Annex outlines the methodology for driving the wage Phillips curve (WPC) in Section D, to decompose the drives of wage growth across cyclical and structural factors. The WPC is augmented with an error correction term for wage deviations from long-term trends to establish the key drivers of wage growth. The system of equations is estimated in two steps, following Engle and Granger (1987), by (1) estimating the long-run equation and (2) using the residuals from the cointegrating regression to estimate the short-run wage equation.

Long Run Wage Equation

2. In the long run, the model assumes that real wages are determined by productivity and a deterministic trend. The link between real wages and labor productivity is well anchored in economic theory and follows the relationship between real wages and marginal product of labor. The baseline specification is written as a cointegrating equation:

$$\log\left(\frac{w_{i,t}}{p_{i,t}}\right) = \gamma_1 + \gamma_2 \log(g_{i,t}) + \gamma_3(\tau_t) + \epsilon_{i,t}$$

where p is price level, g is labor productivity, and τ is a linear time trend, respectively, for sector i and quarter t. The error term ϵitt represents real wage gaps from the productivity trend and is used in the short-run analysis. The linear time trend represents long-term factors that can affect the real wage-productivity relationship, such as long-run demographic trends, which may not be captured precisely within the finite sample.[2] The equation is estimated both the national level and for individual sectors; in the latter, the relationship is estimated at the sector level, to allow heterogeneity in the strength of the wage-productivity relationship in different sectors. Real wages and labor productivity measures are found to be non-stationary. Cointegration tests find that real wages and labor productivity are cointegrated both at the national level and in all sector-panels, if sector-specific cointegrating vectors are allowed. The residuals are labelled as real wage gaps.

Short Run Wage Equation

3. A hybrid wage-Phillips curve augmented with an error correction term is estimated to describe the dynamics of wages by key drivers. Drawing on past studies (including Bernanke and Blanchard, 2023; Chapter 2 of the October 2022 World Economic Outlook; and Chapter 2 of the October 2018 Regional Economic Outlook: Europe among others), the benchmark specification

[1] The methodology is similar to that employed in Baba et al. (2023), and consequently Annex III mirrors online Annex II linked to that paper.

[2] For example, if there is a higher share of old workers, wages would reflect more seniority, creating a positive link between real wages and the work force age. This relationship may not be fully captured by productivity.

relates wage inflation to lagged wage growth, wage expectations, real wage gaps from trend productivity, domestic slack, labor productivity, and cost-push shocks:

$$\Delta w_{i,t} = \alpha_i + \sum_{n=1}^{4} \beta_n \Delta w_{i,t-n} + \beta_5 E_t(\Delta w_{i,t+1}) + \beta_3 EC_{i,t-1} + \beta_4 u_{i,t} + \beta_5 \Delta g_{i,t} + \beta_6 part_{i,t} + e_{i,t}$$

where αi reflects a [sector-specific or aggregate], constant, Δw is the quarter-over-quarter annualized wage growth; E(Δw) is a measure of medium-term wage expectations, proxied by one-year-ahead inflation expectations; EC measures catchup of wages to long-run equilibrium using an error-correction term obtained from the long-run wage equation, u is a measure of labor market slack measured, Δg is labor productivity growth, and Δp refers to deviation of participation from its long term trend, for sector i and quarter t. All growth rates are calculated by log differences. Labor market slack is measured as i) deviation of unemployment from the HP filtered unemployment rate, ii) a measure of vacancies to unemployment, and iii). The benchmark specification includes quarterly lagged wage growth up to four lags. In addition, to introduce forward-looking and backward-looking components of wage inflation consistent with wage inflation equal to expected wage inflation in the long run, the benchmark specification imposes a constraint on the sum of coefficients on past wage inflation and inflation expectation to be one.

4. The wage Phillips curve is first estimated at the national level, and then separately for each sector. The national or sector-specific estimate of the relationship between wage growth and its drivers are used to quantify the contribution of the various drivers to wage inflation in each country.

5. The estimates of the wage Phillips curve based on AENA – derived wage measures do not yield sensible results and are thus not included in the main text. AENA-derived wage measures consider national accounts data on compensation of employees, adjusted by hours worked, to arrive at a proxy for the wage rate. However, WPC regression results all suggest a coefficient greater than one for lagged terms of wages, and negative coefficients for inflation expectations, which signals issues with stationarity and makes interpretation of results challenging.

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