SEEK ECONOMICS WORKING PAPER

The Australian Beveridge curve in the wake of COVID-19

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Working Paper 202501

Last updated: 25 July 2025

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Abstract

- I find that the Australian Beveridge curve has shifted left, or towards the origin, in the wake of COVID-19. That is, the vacancy rate is lower for a given unemployment rate. The estimated shift suggests that the labour market has become more efficient relative to 2019.
- SEEK's marketplace data shows that average advertised salaries have grown faster and each hirer has placed more ads on average post-COVID. This suggests an increase in recruitment intensity relative to 2019 causing a lift in the vacancy rate, offsetting the implied decline in vacancies due to the Beveridge curve shift. Over the last two years recruitment intensity has declined from its peak, as the labour market has cooled a little, but has remained above pre-COVID levels.
- Taken together this suggests that the Australian labour market has moved down the Beveridge curve it is currently on over the last year or so. Any further decline in labour demand is likely to be associated with an increase in the unemployment rate but the increase is not likely to be large, as the labour market is still on a relatively steep part of the Beveridge curve.
- My analysis suggests that the long-term unemployment rate is a good inverse proxy for movements in the Beveridge curve and labour market efficiency over time in Australia. With the labour market relatively tight as the economy reopened following COVID-19, the long-term unemployment rate declined, and the natural rate of unemployment implied by the Beveridge curve also declined.
- While the implied natural rate of unemployment is sensitive to the equilibrium vacancy rate chosen, for reasonable equilibrium vacancy rates the estimated natural rate of unemployment is below the Reserve Bank of Australia's (RBA) current 'full employment' estimate of 4.5%. The estimates also suggest that the natural rate has declined post-COVID rather than remained at 2019 levels as the RBA's modelling suggests. A lower natural rate of unemployment potentially opens the door to less restrictive monetary policy.
- Looking across the country, the natural rate of unemployment for most states and territories is estimated to have fallen since 2019. The gap between the natural rate and the actual unemployment rate has closed as unemployment rates have risen post-COVID, but unemployment rates in several states remain below their estimated natural rates, most notably Western Australian and Queensland.

JEL Classification Numbers: E24, J64, R23

Keywords: vacancies, unemployment rate**,** Beveridge curve, full employment, Australia

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[1] This work updates and expands on Chapman (2019). I would like to thank Jeff Borland, Matt Cowgill, Jonathan Hambur and Peter Lake for thoughtful comments and suggestions. The views expressed are those of the author and do not necessarily reflect those of SEEK.

Introduction

In 2020, COVID-19 and the government's policy response saw the job vacancy rate in Australia drop to its lowest level since the mid 2000s before it reached a record high in May 2022. Alongside this we saw the unemployment rate decrease from 7.5% in July 2020 to 3.9% in May 2022. However, since May 2022 the vacancy rate has declined to 2.3% without a commensurate increase in the unemployment rate.

The above observation raises an important question: has the long-run relationship between the unemployment rate and vacancy rate changed in Australia? That is, has the Australian Beveridge curve shifted in the wake of COVID-19? My results suggest the answer is, yes.

Using a time-varying parameter model I estimate that the constant in the Beveridge curve function has declined, after spiking in 2020, to be below its pre-COVID value. This indicates a leftward shift of Beveridge curve relative to its pre-COVID levels, suggesting a more efficient labour market.

The finding of a leftward shift of the Beveridge curve after 2020 is consistent with Mackey (2024) and Lake Shamiri, Sharma, & Bialowas (2024), who found that matching efficiency has increased in the Australian labour market over recent years.

Unpacking the drivers of movements in the Beveridge curve following Groenewold (2003) highlights how well movements in the long-term unemployment rate correlate with shifts in the Beveridge curve.[2] My analysis shows that the long-term unemployment rate is a good inverse proxy for labour market efficiency over time, as measured by movements in the estimated Beveridge curve constant.

The positive answer to the above question then naturally raises a second question which is important for monetary policy and the current Government's goals of achieving sustained and inclusive full employment:[3] What does the recent shift in the Beveridge curve imply for the natural rate of unemployment and how does this relate to other estimates of full employment?

My preferred extended Beveridge curve specification suggests that the natural rate of unemployment has increased recently to around 4.3%, having been as low as 4.0% in early 2023, when the equilibrium vacancy rate is chosen to be 2.2%. The natural rate estimate is sensitive to the choice of equilibrium vacancy rate, with a higher equilibrium vacancy rate decreasing the natural rate of unemployment, with a 0.25 percentage point increase in the equilibrium vacancy rate associated with a 0.10 percentage point decline in the final estimate of the natural rate.

This estimate of the natural rate of unemployment is just below the Reserve Bank of Australia's (RBA) current estimate of the non-accelerating inflation rate of unemployment (NAIRU), their estimate of full employment. It is further below the average estimate of full employment produced by the RBA's models, with the RBA currently placing downwards judgement on the average model outcome (RBA, 2025).

The risks around the natural rate estimate from the extended Beveridge curve are to the downside, with an upward trend in the vacancy rate having been noted in Australia and abroad (Nugent, 2025; Mongey & Horwich, 2023). A higher equilibrium vacancy rate may be appropriate, which would result in a lower estimate of the natural rate and further suggesting that the RBA's estimate of full employment may be too high. An equilibrium vacancy rate of 2¼% would imply a natural rate of

[2] The results of the estimation are broadly robust to estimation technique, with results from fully modified ordinary least squares (FMOLS), dynamic least squares (DOLS), and Integrated Modified OLS (IMOLS) and ordinary least squares (OLS) broadly similar.

[3] See *Working Future: The Australian Government's White Paper on Jobs and Opportunities*, (Commonwealth of Australia, 2023) for a discussion of delivering sustained and inclusive full employment.

unemployment of 4¼%, consistent with Treasury's estimate of the NAIRU (Commonwealth of Australia, 2023) and more in line with the views of many market economists.

This paper updates and builds on previous examinations of the Australian Beveridge curve, and drivers of changes in the relationship between the unemployment rate and vacancy rate, undertaken by Groenewold (2003); Kennedy, Luu & Goldbloom (2008) and Borland (2011). The use of SEEK data on hiring activity by businesses adds a richer perspective of changes in firm behaviour than previous studies of the Australian Beveridge curve.

In addition, I contribute to the literature on full employment in Australia by providing an updated estimate of the natural rate of unemployment derived from the Beveridge curve. Such an estimate of full employment is complementary to the approach taken by the RBA and the Commonwealth Treasury in assessing full employment, which generally focuses on the NAIRU and is broadly based on the Phillips Curve.[4]

The remainder of this paper introduces the Beveridge curve before discussing Australia's recent experience with unemployment and vacancies. I then estimate a time-varying Beveridge curve. Possible drivers of the estimated movements in the Beveridge curve are explored before the estimated relationship is used to generate an estimate of full employment. The resultant estimate of full employment is then compared to other published estimates of full employment for Australia.

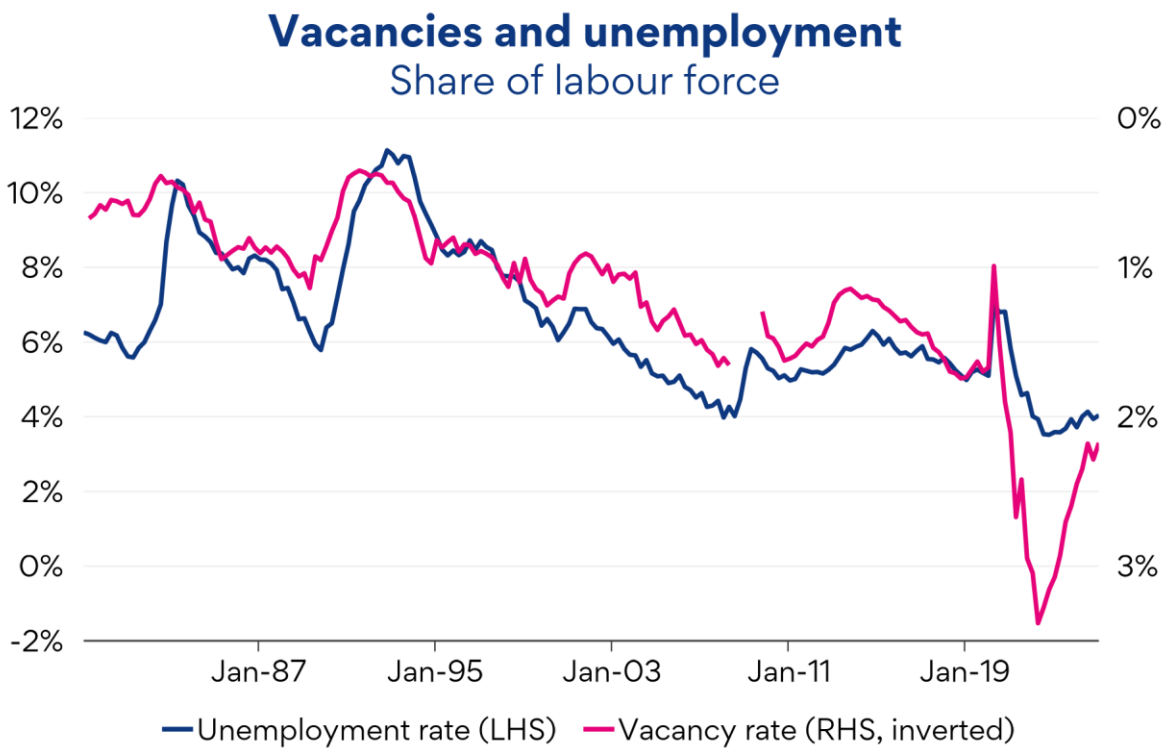
The Beveridge curve – an empirical relationship between vacancies and unemployment

A relatively robust relationship between job vacancies and unemployment has been found over time across several countries.[5] The vacancy rate (vacancies as a share of the labour force) typically increases as the unemployment rate declines.

Vacancies represent the number of open jobs in the economy. An increase in vacancies represents more available jobs to be filled which should lead to a decline in the unemployment rate as unemployed people fill these roles and exit unemployment. When the unemployment rate is low, vacant roles will be harder to fill with less potential employees to take the roles, and the number of vacancies is likely to increase. So, a low unemployment rate is associated with a high vacancy rate, while a high unemployment rate is associated with a low vacancy rate. This relationship has broadly played out over time in Australia.

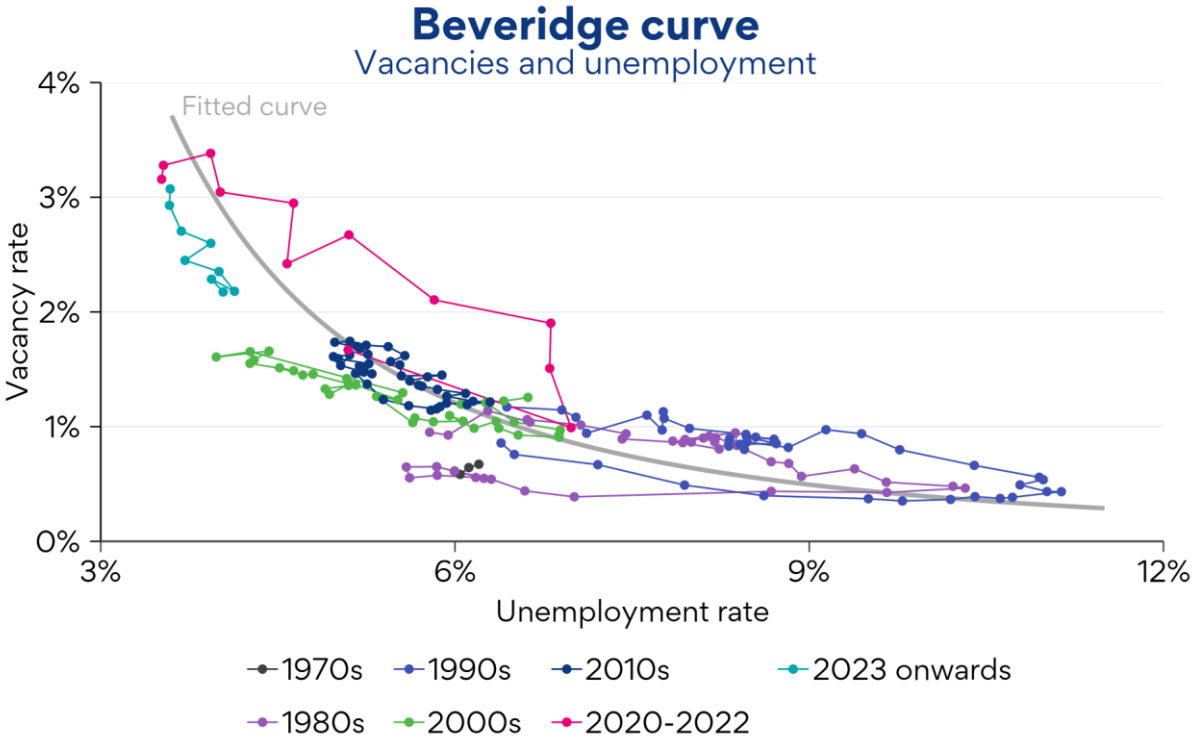
[4] A discussion of the RBA's approach to estimating full employment can be found in Ballantyne, Sharma & Taylor, (2024).

[5] For example, Hobijn & Sahin (2013) estimate and document shifts in the Beveridge curves of 14 OECD countries, including Australia following the Global Financial Crisis. Similarly, Bova, Jalles, & Kolerus (2016) estimate and document shifts in Beveridge curves across 12 OECD countries from 2000Q1 and 2013Q4. Elsby, Michaels, & Ratner (2015) provide a discussion of much of the economic theory that underpins the Beveridge curve. Appendix 1 highlights common functional form choices for Beveridge curve estimation.



Note: The ABS Job Vacancies Survey was suspended between August 2008 to August 2009 (inclusive).
Source: ABS, SEEK

The relationship between the unemployment rate and the vacancy rate is known as the Beveridge curve. Over shorter periods, movements are generally around a single curve with the vacancy rate increasing as the unemployment rate decreases. However, the Beveridge curve can shift when the relationship between the unemployment rate and the vacancy rate changes.



Note: The curve is fitted between Feb 1991 and February 2025 using the ln-ln functional form.
Source: ABS, SEEK

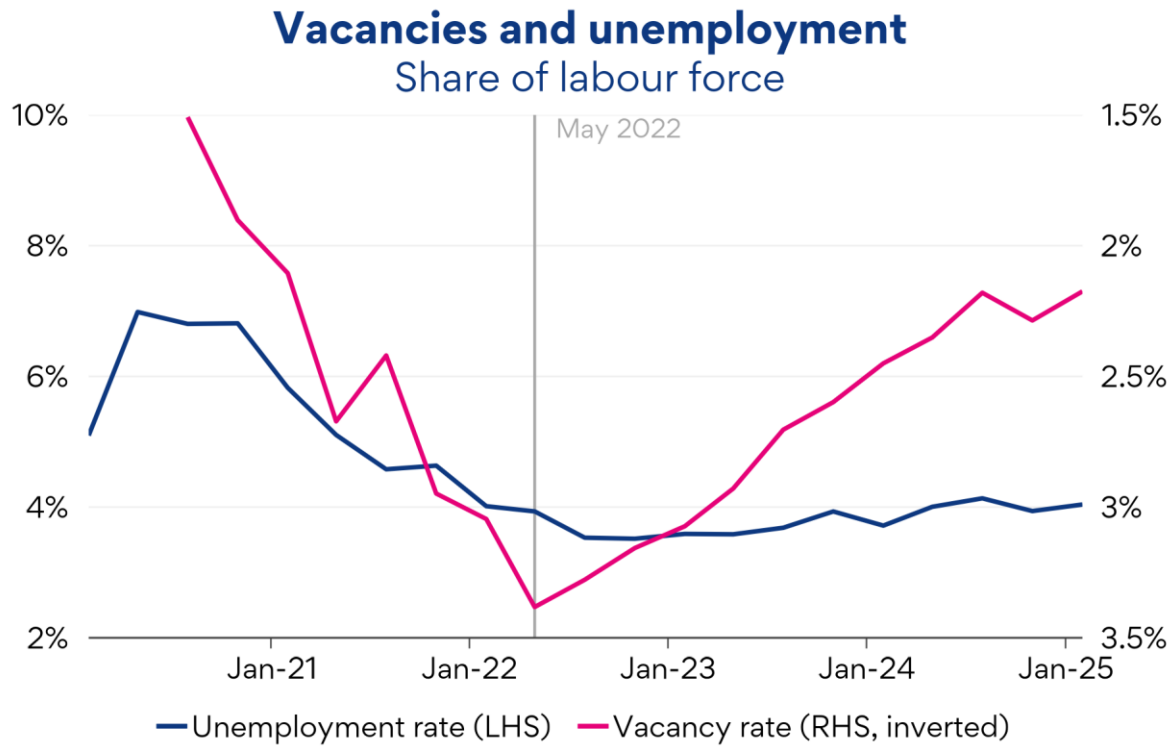
Factors that change the rate at which people join or leave unemployment can generate shifts in the Beveridge curve. These factors can generally be thought of as labour market features that affect the efficiency of matching between job openings and potential workers. For example, changes in the demographics of the population, industry composition of employment, the characteristics of the unemployed and the matching technology can all lead to shifts in the Beveridge curve.[6]

The dynamics of the Beveridge curve also depend on the behaviour of employers, who must decide whether to post a vacancy and how hard they will work to fill the vacancy. The outcome of these decisions broadly generates movements along the Beveridge curve, although they can be in response to economic changes that also shift the curve.

How has the Beveridge curve moved recently?

The national labour market post-COVID

The vacancy rate increased sharply between May 2020 and May 2022, from 1% to 3.4%, while the unemployment rate declined, from 7% to 3.9%. However, since then the vacancy rate has declined to 2.3% without a corresponding increase in the unemployment rate, which was virtually unchanged at 3.9% between May 2022 and November 2024. The large change in the vacancy rate without a corresponding change in the unemployment rate suggests that the Beveridge curve may have shifted.



Source: ABS, SEEK

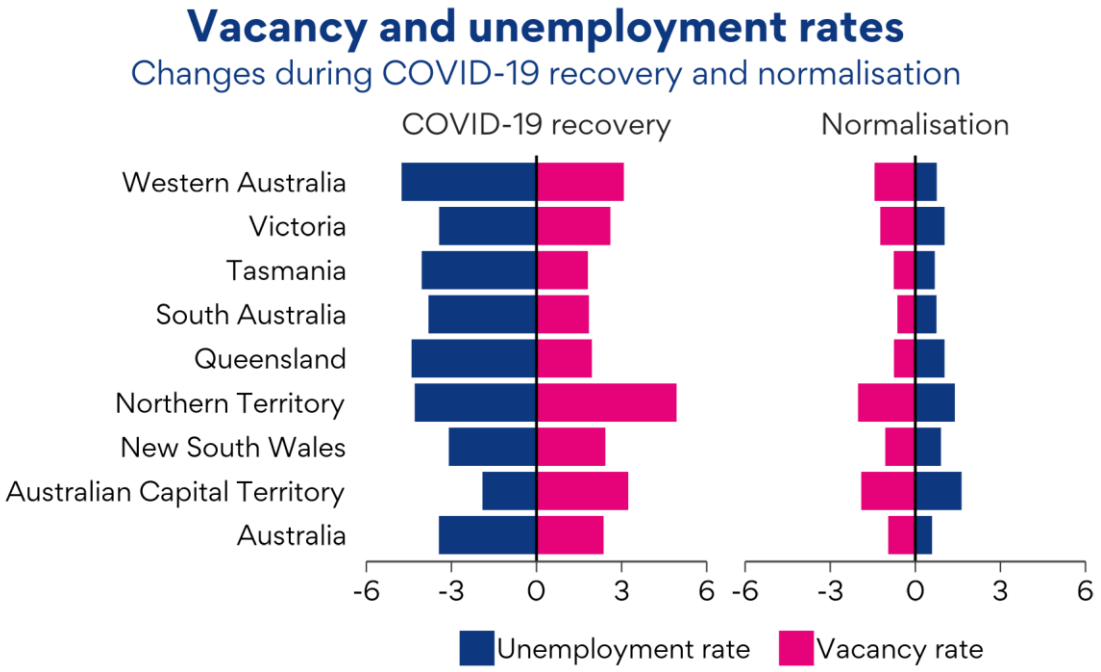
[6] Elsby, Michaels, & Ratner (2015) discuss in more detail the labour market features that affect the relationship between unemployment and vacancies. Similar labour market features can drive movements in the non-accelerating inflation rate of unemployment (NAIRU), for a discussion of some of the features and their impact on the NAIRU see Chapman (2023).

Not all states have experienced the same post-COVID recovery

Although all states and territories were impacted by COVID-19, the policy response and infection rates varied across the country. The subsequent labour marker recoveries were also varied.

Following the initial COVID-19 disruptions in early 2020, vacancy rates increased in every state and territory, with the two territories experiencing the largest increases in vacancy rates, followed by Western Australia. During this period Western Australia experienced the sharpest decline in unemployment rate across the country. Despite the sharp increase in the vacancy rate in the ACT, the decline in the unemployment rate was relatively subdued.

The territories also had their vacancy rates decline the most following the peak of vacancy rates in mid to late 2022 but their unemployment rate increases were also relatively large. Interestingly, South Australia has seen little decline in its vacancy rate, but its unemployment rate has increased more than most other states and territories, although its unemployment rate has been quite volatile, with a notable dip and recovery in the state's participation rate since early 2023. In contrast, Western Australia has seen a notable decline in its vacancy rate but little change in its unemployment rate since the vacancy rate peaked.



Note: The COVID-19 recovery includes 2020 through to November 2022, while the normalisation is from November 2022 onwards.
Source: ABS, Author's calculations

Australia's two largest states have experienced relatively similar post-COVID recoveries, with similar magnitude declines in their unemployment rates associated with similar increases in their vacancy rates during the recovery phase. They have also experienced relatively similar changes in their unemployment rates and vacancy rates in the normalisation from the jobs boom of late 2022 and early 2023.

So, like the national experience, recent movements in unemployment rates and vacancies are suggestive of possible Beveridge curve shifts across most states and territories of Australia, although they may not have all experienced the same magnitude of shift.

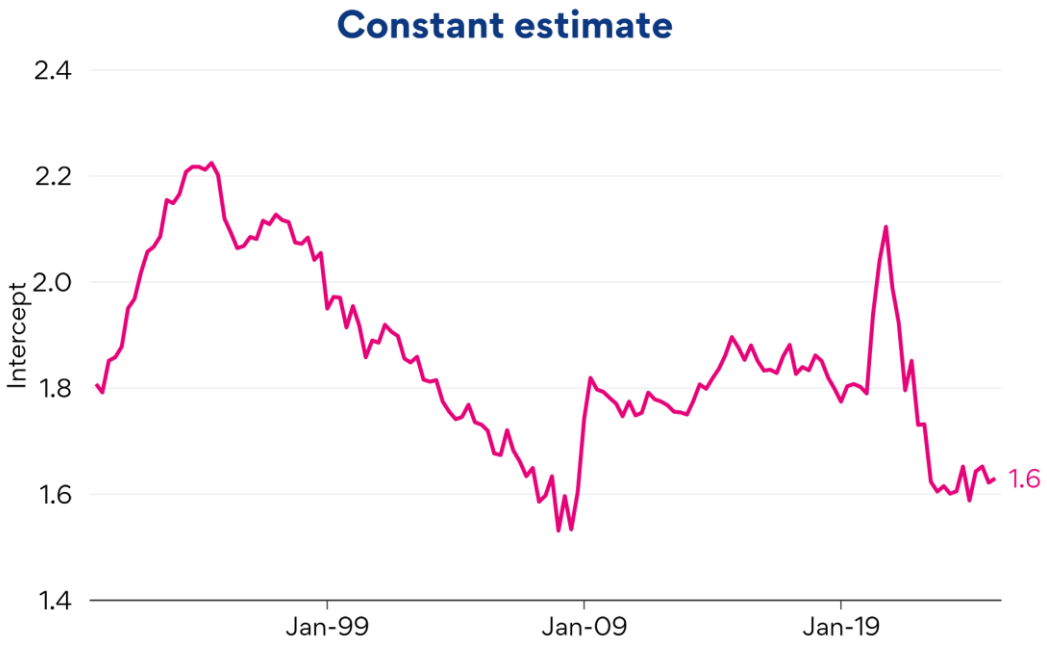
A time-varying parameter Beveridge curve

One way to explore possible shifts in the Beveridge curve over time is to estimate a time-varying parameter version of the model. Allowing the constant to vary over time reveals when the Beveridge

curve moved most from its multi-decade average.[7] These shifts generally correspond to major economic events such as the early 1990s recession, the Global Financial Crisis (GFC), and COVID-19.

Movements in the constant estimate and therefore shifts in the Beveridge curve broadly reflect the movements in the unemployment rate over time, although the same unemployment rate is now generally associated with a higher constant estimate.

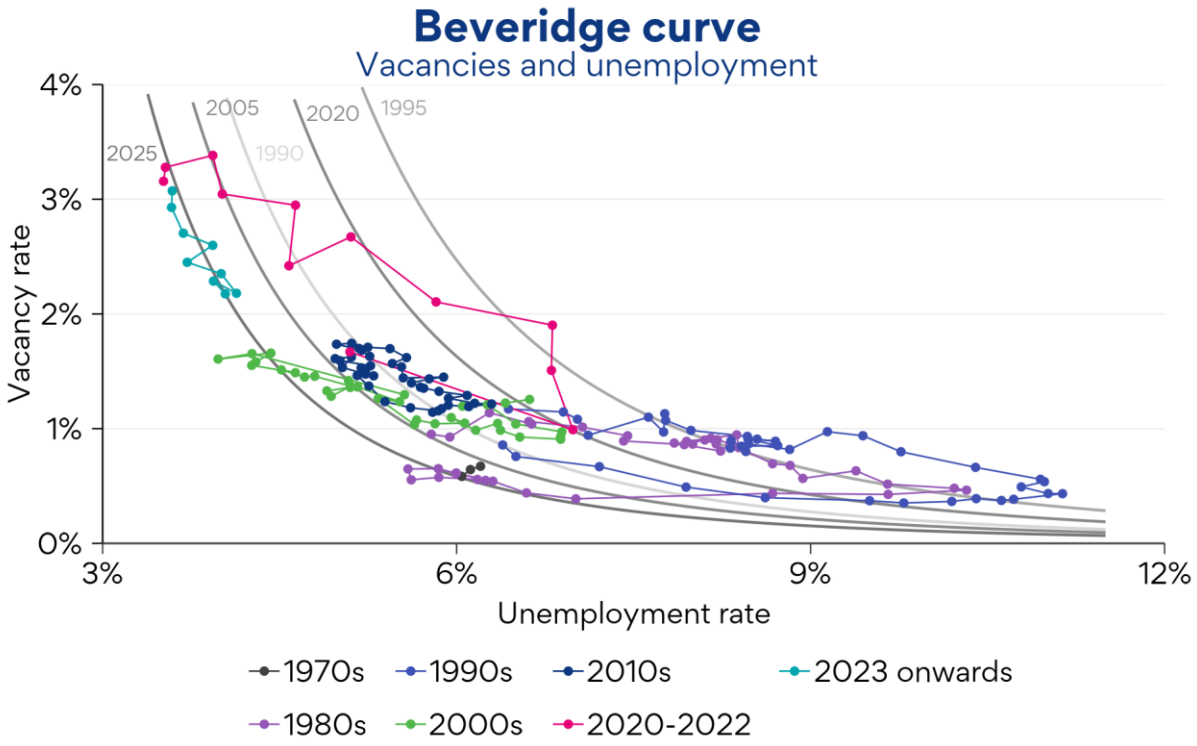
The estimated constant increases during the early to mid 1990s, following the early 1990s recession, suggesting a notable outwards shift of the Beveridge curve between 1990 and 1995. The estimated constant then broadly declines until the 2008, suggesting a shift to towards the origin in UV-space or that the labour market was becoming more efficient over this time. There is a sharp increase in the constant estimate following the GFC, with another upwards shift in the middle of the 2010s. These increases suggest that the labour market became less efficient in the 2010s.



Note: Estimated using a log-log specification of the Beveridge curve with the constant allowed to vary over time, with the sample beginning in 1990 and TRYM vacancy rates included.
Source: Author's calculations

The onset of COVID-19 saw a sharp rise in the constant estimate, suggesting a rightwards shift and a less efficient labour market because of the COVID-19 disruptions. Once the economy reopened the constant estimate declines sharply indicating a leftward shift of the Beveridge curve.

[7] The variation over time of the constant estimate is broadly robust to the functional form of the Beveridge curve used and whether the slope is also allowed to vary over time, see Appendix 2 for results.



Note: Fitted curves estimated using a log-log specification of the Beveridge curve with the constant allowed to vary over time, with the sample beginning in 1990 and TRYM vacancy rates included.
Source: ABS, Author's calculations

Time variation across the country

Movements in the national unemployment and vacancy rates are often dominated by New South Wales, Victoria and Queensland, given they account for three-quarters of the Australian labour force, so it can be instructive to look at the Beveridge curve relationship at the state level.

A visual inspection of unemployment and vacancy rate plots for each state (see Appendix 3) suggests that there are differences in the relationship across states and territories and that possible Beveridge curve movements across states and territories have potentially been different.

Repeating the time-varying parameter analysis by state and territory highlights that Beveridge curve shifts have broadly occurred at the same time across states and territories since the 1990s but the magnitude of these shifts has varied. Following the GFC, New South Wales is estimated to have experienced a more muted outwards movement in its Beveridge curve relative to other states.

While all states and territories experienced the inward shift during the jobs boom of the COVID-19 recovery period, some have experienced notable outward shifts during the subsequent normalisation period while others have had little to no outward movement. The recent movements have resulted in a contrast across regions in the current position of the Beveridge curve relative to its pre-GFC position.

In the three most populous states, in the wake of COVID-19 the time-varying parameter estimates of the Beveridge curve intercept suggest that the Beveridge curve has broadly shifted rightwards or back towards the curves' position just prior to the GFC. In contrast, in South Australia and Tasmania there is estimated to be little movement away from the origin, suggesting that these Beveridge curves are as close to the origin as they have ever been.

Recruitment intensity before and after COVID-19

When examining labour market dynamics, it is important not to ignore recruitment intensity even though it can often be hard to measure. For example, in the US following the GFC, the slow recovery in wage growth and hiring can in part be attributed to low recruitment intensity (Faberman, 2025). In combination with the number of vacancies, recruitment intensity should reflect the strength of labour demand and influences how fast vacant positions are filled. By changing the job filling rate, firms have an impact on the stock of vacant positions observed.

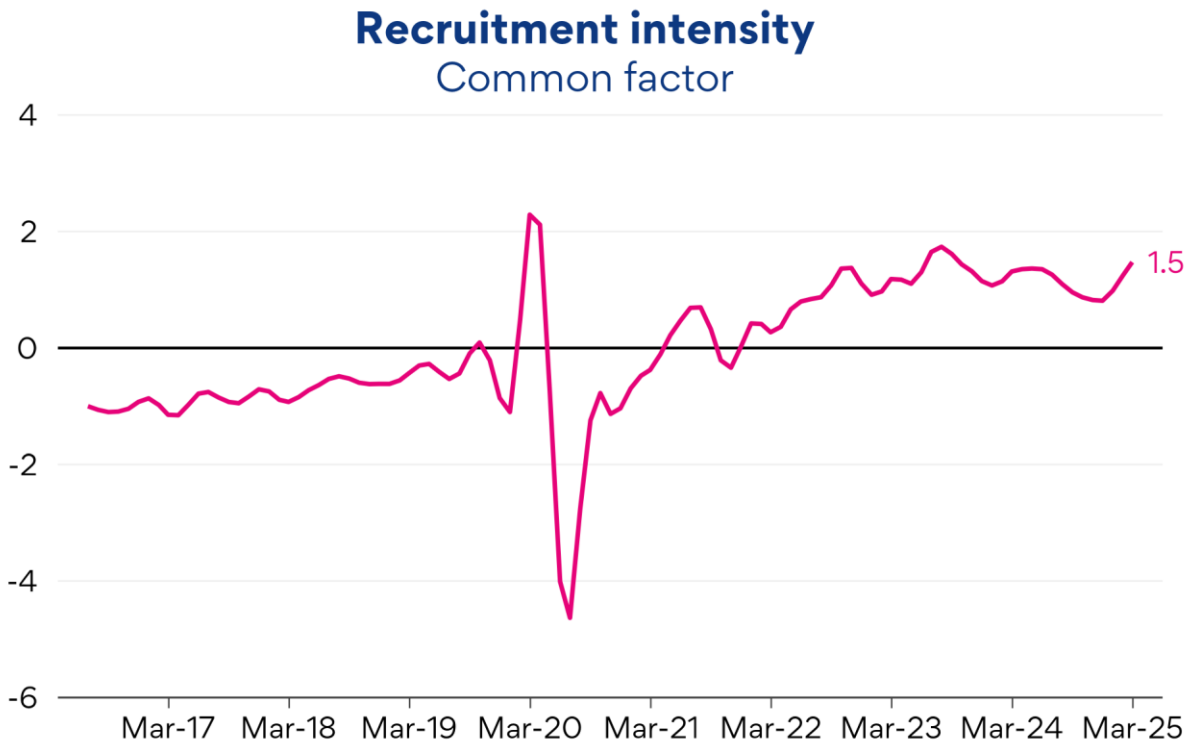
Posting a job vacancy is only one part of how an employer fills an open position. Employers have several ways to influence the number of job applicants they will receive, how quickly these are processed and how likely a candidate is to accept a job offer, that is they have several ways to vary their recruitment intensity and in turn their job filling rate. Aggregate recruitment intensity, which brings together how these individual firms behave, also responds to compositional change in the economy and labour market as well as current economic conditions (Gavazza, Mongey, & Violante, 2018). For example, a shift in demand across industries can influence aggregate recruitment intensity, with recruitment intensity varying across industries (Davis, Faberman, & Haltiwanger, 2012).

One simple way for businesses to change their recruitment intensity is to post ads for multiple positions, which would result in an increase in ads per hirer. Prior to the onset of COVID-19, ads per hirer on SEEK had increased slightly between 2016 and 2019. Ads per hirer then spike, reflecting fewer hirers, before ads per hirer trough. The number of ads per hirer then climb through to late 2022 before beginning to slow.

In addition to simply posting more ads, employers can make other adjustments to fill positions such as adjusting the position requirements or increasing advertised salaries. Prior to the onset of COVID-19 the average advertised salary on SEEK was broadly growing at around 2.3% year-ended, with little change over time. Average advertised salaries then dropped notably with the onset of COVID-19 before increasing to well over 4% as the Australian economy reopened and the labour market tightened. The average advertised salary growth peaked at 4.9% year-ended in September 2023 before beginning to slow alongside the loosening labour market. This suggests that employers increased their salary offers as the market tightened, reflecting increased recruitment intensity before they reduced their intensity as market conditions eased a little.

Gavazza, *et al* (2018), studying the US, highlight that firms changed their recruitment intensity in response the number of available job seekers per vacancy. This suggests that applications per ad could be a good (inverse) proxy for recruitment intensity, with firms needing to recruit less intensely when applications per ad are elevated. Applications per ad on SEEK increased dramatically with the onset of COVID-19 before declining as the labour market tightened. Applications per ad have since begun increasing again driven by an increase in unique applicants per ad over time.

These measures are unlikely to capture recruitment intensity perfectly. Combining ads per hirer, advertised salary growth, and applications per ad using dynamic factor analysis to extract a single recruitment intensity factor may better capture recruitment intensity over time. Prior to the onset of COVID-19, the estimated factor was below average but increasing slowly, consistent with a labour market on the loose side but tightening, requiring hirers to increase their efforts slightly to recruit new workers. The recruitment intensity factor jumped temporarily at the onset of COVID-19 in March and April 2020, driven by a jump in apps per ad and ads per hirer, with advertised salaries still growing despite a drop in total ads on SEEK. It then troughs before increasing through to mid 2023.



Source: SEEK, Author's calculations

Bringing the Beveridge curve and recruitment intensity together

Combining the recruitment intensity factor with the intercept estimate from the time-varying Beveridge curve allows the behaviour of the Australian labour market to be traced out between 2019 and today in UV-space.

The onset of COVID-19

In February 2020, the unemployment rate was 5.1% and the vacancy rate was 1.7%. The first case of COVID-19 had been detected in Australia on 25 January but it was not until 18 March 2020 that a human biosecurity emergency was declared in Australia. State governments began closing borders on 19 March, while the Commonwealth government closed international borders to non-residents and non-Australian citizens on 20 March, introduced a national lockdown on 29 March 2020 to prevent the spread of COVID-19 (Commonwealth of Australlia, 2024).

The national lockdown in combination with self-guided precautions saw a sharp decline in economic activity, with some industries virtually shut down. Inflows to unemployment from employment jumped, while a decline in the participation rate prevented the unemployment rate increasing more, with a notable outflow of workers from employment to outside the labour force. As a result, the unemployment rate rose to 7.0% as labour demand declined sharply between February and May, with the vacancy rate declining to 1.0%.[8] This large disruption in the labour market resulted in an outwards shift of the Beveridge curve at the same time as the job creation curve flattened as labour demand declined for most roles.

[8] The ABS LFS reference period for May data was 3 May to 16 May, when national lockdowns were still broadly in effect.

The initial reopening of the economy

The national COVID-19 related restrictions were eased slowly across the country beginning in late April 2020, with restrictions easing progressively across Australia.[9] The easing of restrictions, alongside fiscal and monetary stimulus, saw a large inflow of people back into the labour force, with flows from outside the labour force into employment and unemployment increasing sharply, while flows from unemployment to employment also increased, this resulted in an initial increase in the unemployment rate in June and July before it declined to 6.8% in August. At the same time the vacancy rate increased as recruitment intensity picked up.

The national lockdowns alongside border closures caused a large amount of dislocation of workers, with many employees from household services sector having lost employment and a lot of temporary visa workers (primarily working holiday makers, skilled employment visa holders and international students) absent from the labour market. This meant that as the economy reopened there was an increase in mismatch between labour supply and demand leading to a further outward shift of the Beveridge curve. At the same time the reopening of the economy induced an increase in labour demand and recruitment intensity, leading to a steepening of the job creation curve.

The recovery

Businesses and households slowly adapted to different ways of working as COVID-19 related restrictions unwound slowly across the country with shorter, localised lockdowns becoming common. At the same time, state and federal governments enacted policies for households and businesses to encourage consumption and investment. This increased the demand for labour and recruitment intensity increased relatively sharply, a steepening of the job creation curve. A tightening labour market saw businesses hold onto their employees and there was a notable decline in employment to unemployment flows, while the share of unemployed people able to find work increased, resulting in an inward shift of the Beveridge curve, as the job destruction rate declined notably.

The delta variant and the 2021 lockdowns on the east coast from mid 2021 until October, saw a temporary decline in recruitment intensity, with the vacancy rate dropping. The unemployment rate also increased temporarily in October 2021 as people anticipated the end of lockdowns in mid to late October, this is associated with a temporary outward shift of the Beveridge curve in November 2021. The start and end of the delta lockdowns induced a similar set of flows into and out of employment, unemployment, and the labour force as the original national lockdown but the magnitude of the flows was smaller.

Walking the narrow path

International borders reopened in February 2022, adding an additional source of labour supply to the labour market. Growth in economic activity slowed over 2022 as cost-of-living pressures mounted and the RBA lifted their cash rate target to fight inflation. The participation rate increased over this period as people joined the labour force, often flowing directly into employment without becoming unemployed, with flows into employment from outside the labour force declining from their post-COVID peaks but remaining elevated relative to their pre-COVID levels.

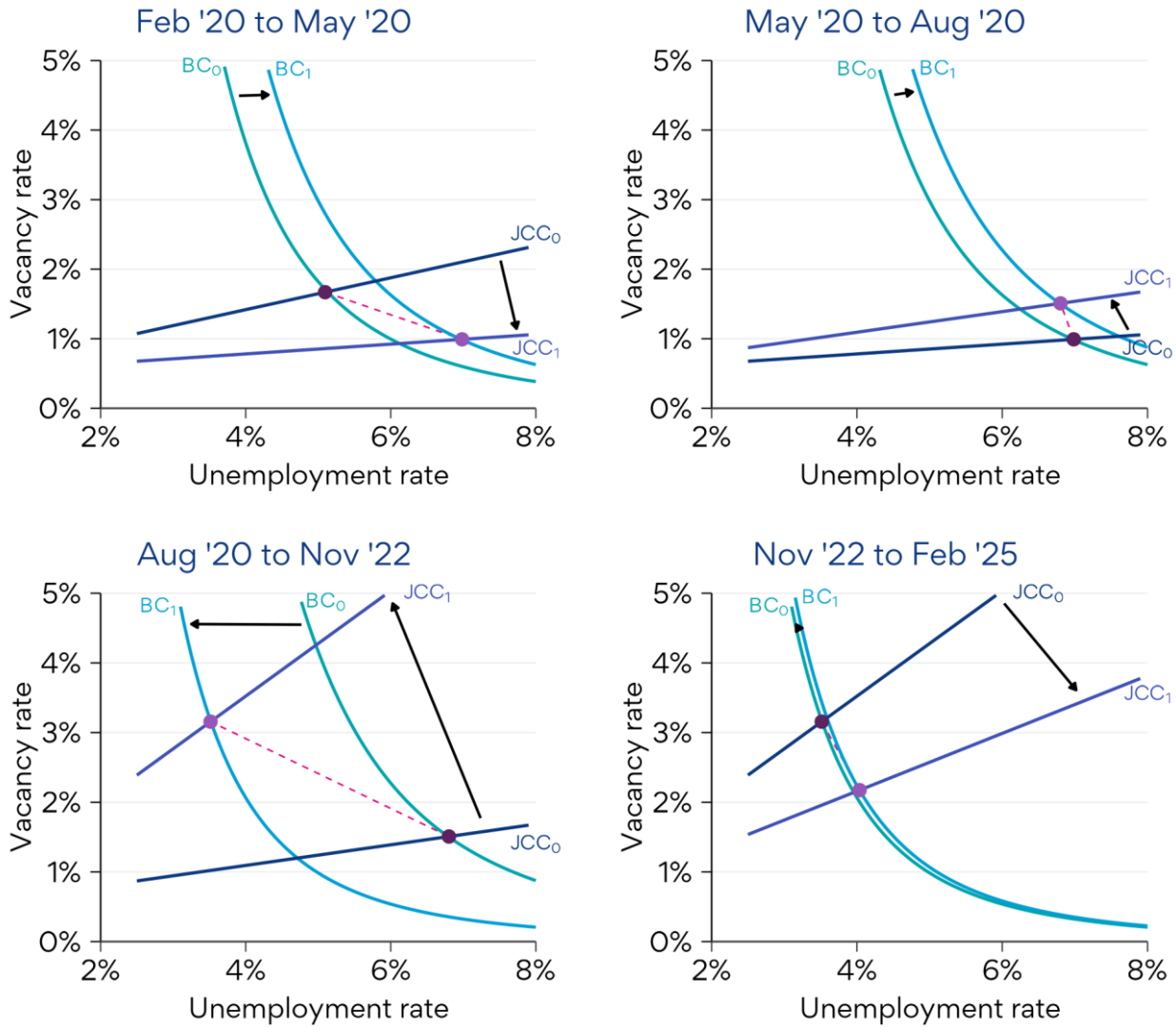
A slower labour market in 2023 saw the inflows to unemployment from employment begin to increase, while the number of inflows to unemployment from outside the labour market also increased. Despite a pickup in flows into unemployment, broadly corresponding increases outflows to

[9] Western Australia eased some restrictions in April ahead of most other states, with a majority of regions beginning to ease restrictions in May. More localised restrictions were used from May 2020, for example Victoria went back into lockdown in July, which ended in October.

employment and outside of the labour force have seen little change in the unemployment rate and the estimated position of the Beveridge curve.

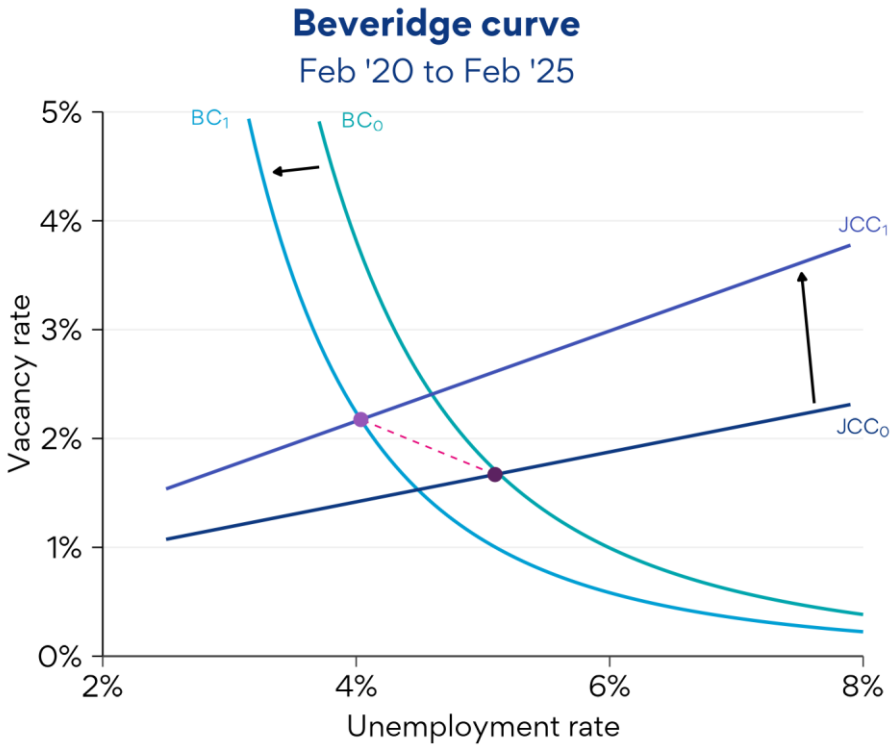
Recruitment intensity remained elevated into early 2023 before it began to decline, alongside a decline in labour productivity, resulting in a flattening of the job creation curve. In combination with only a small outward movement of the Beveridge curve, this has seen a notable decline in the vacancy rate without a corresponding large decline in the unemployment rate since 2022.

Beveridge curve and job creation curve movements between 2020 and 2025



Source: ABS, Author's calculations

Pulling the above together we see the inward shift of the Beveridge curve between 2020 and 2025, with a net steepening of the job creation curve. Currently, a return of the job creation curve to its 2020 position would imply a decline in the vacancy rate of around 0.7ppt to 1.5% and would result in an increase in the unemployment rate of 0.4ppt to 4.5%.



Source: ABS, Author's calculations

Exploring possible drivers of Beveridge curve shifts[10]

The Beveridge curve can shift for several reasons, with labour market changes that affect the efficiency of matching between open vacancies and available labour generally driving shifts over time. Following Groenewold (2003) and Kennedy, Luu, & Goldbloom (2008), I examine variables that can shift the Beveridge curve by including them in an extended Beveridge curve:

$$\ln(u_t) = \alpha + \beta_1 \ln(v_t) + \sum_i \beta_i Z_{it} + \varepsilon_t$$

where u_t is the unemployment rate, v_t is the vacancy rate, and Z_{it} is one or more explanatory variables that could drive the shift in the Beveridge curve over time.

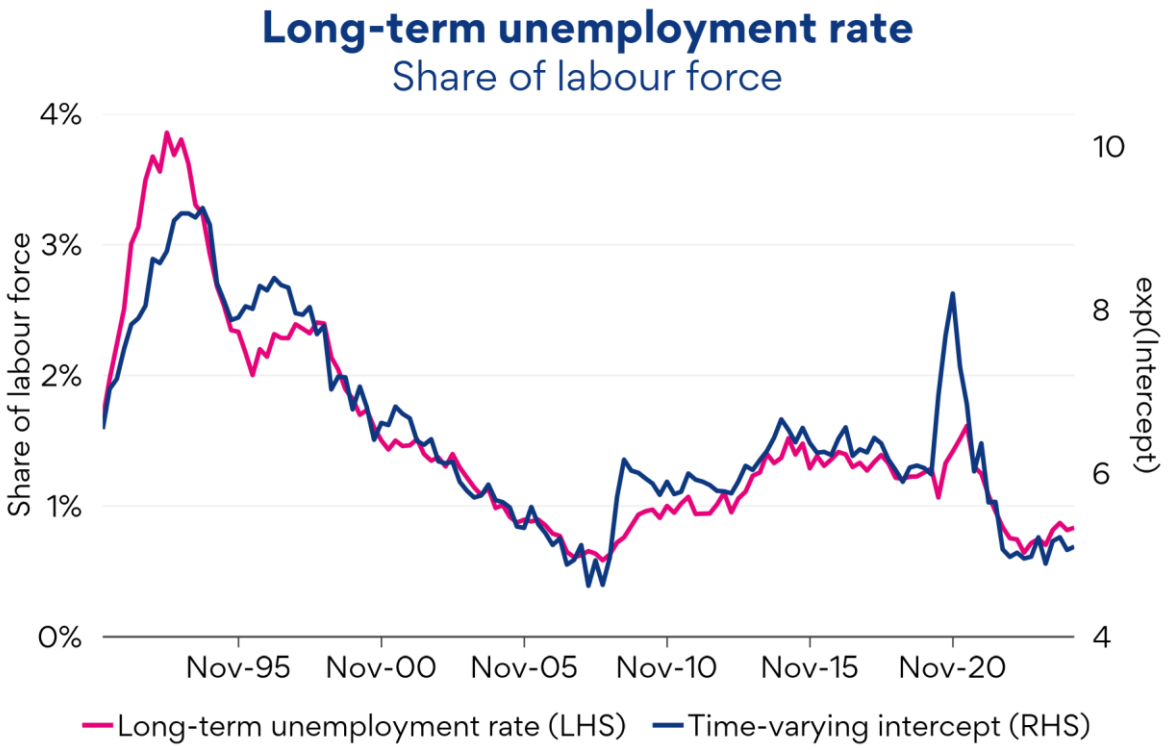
The estimated coefficients in the extended Beveridge curve regression generally indicate the direction of the curve shift with respect to that variable. A positive coefficient means that the variable results in a higher unemployment rate any given vacancy rate, which is an outward and/or upwards shift of the Beveridge curve. That is, variables that cause a decline in matching efficiency or an increase in job destruction should have a positive coefficient shifting the Beveridge curve outwards.

I explore several variables that are intended to reflect structural changes, changes in labour mobility and the rate of job destruction in the Australian labour market. The results of the analysis are given in Appendix 4 and 5. Several variables are found to have statistically significant coefficients with the expected sign. For example, the estimated coefficients on goods production unemployment rate and the employment share of business services, both of which should reflect Australia's transition from a goods-based economy to a service-based economy over time, are statistically significant and have the expected signs.

[10] While I am using the term shift, it is possible that broad anticlockwise loops are being traced around a single Beveridge curve rather than capturing shifts of the Beveridge curve over time. In this case, the exercise would be documenting cyclical movements overtime rather than structural shifts.

Long-term unemployment as a proxy for changing efficiency

Of the explanatory variables explored using the extended Beveridge curve framework, the long-term unemployment rate increases the adjusted R^2 the most (see Appendix 4), the estimated coefficient also has the expected sign, with an increase in the long-term unemployment rate associated with an increase in the unemployment rate at each level of vacancies, or an outwards shift of the Beveridge curve. The movements of the long-term unemployment rate over the last three decades also looks like the estimated constant from the time-varying parameter version of the Beveridge curve.

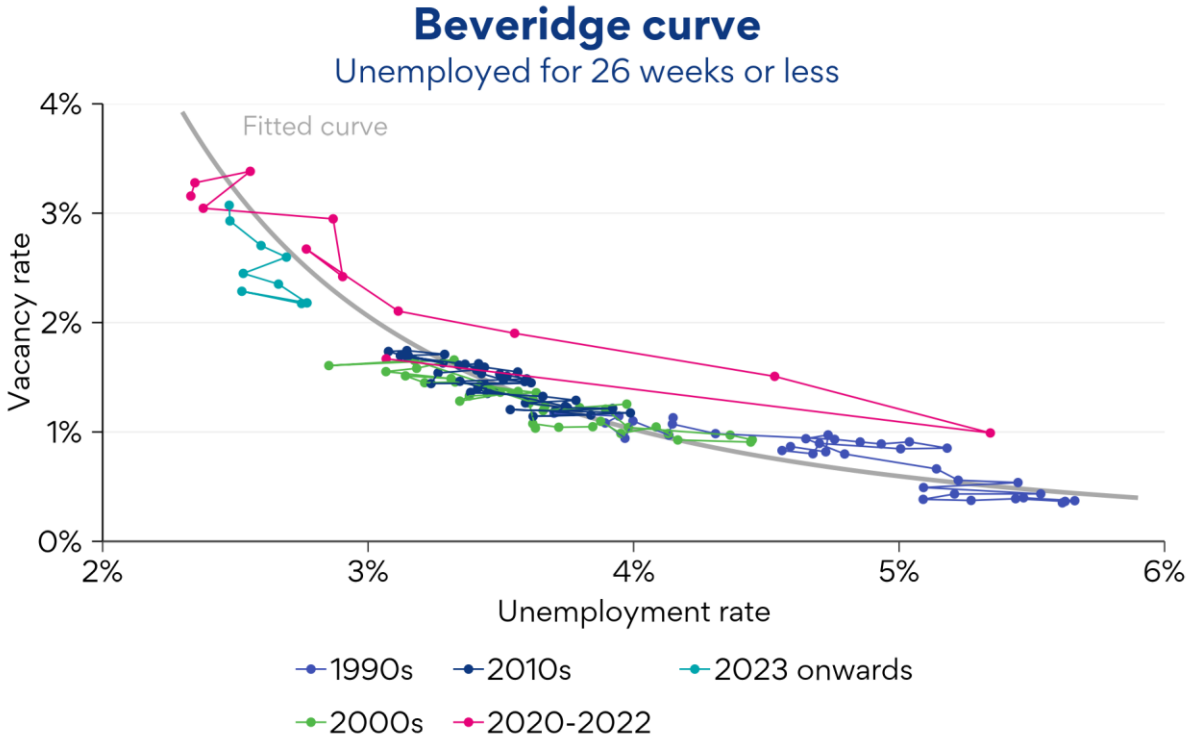


Source: ABS, Author's calculations

Long-term unemployment can reduce the efficiency of the labour market as it can reduce the probability of an individual finding employment for several reasons. But it is worth noting that long-term unemployment is likely both a symptom and cause of a less efficient labour market. For example, the high long-term unemployment rate in the early 1990s occurred alongside a very high unemployment rate in the goods production sector, as Australia transitioned away from car and heavy goods manufacturing amid a recession. This ongoing structural change meant that the skills of those becoming unemployed were less suited to posted vacancies, which were more likely to be in the business services sector, resulting in an increase in long-term unemployment.

If the Beveridge curve is estimated for only those unemployed for 26 weeks or less than the relationship is much tighter. When the above time-varying parameter exercise is repeated for this group, the estimated intercept varies much less, with the intercept broadly steady although with notable increases, suggestive of outward shifts during large labour market disruptions like those in the mid 1990s, alongside the GFC and with the onset of COVID-19. The estimated intercept has declined post-COVID, suggesting an inward shift of the Beveridge curve like the total unemployment rate equivalent, and like the total unemployment rate equivalent the intercept is currently estimated to be below the level broadly seen over the 2010s. This suggests that the labour market is slightly more

efficient than it was prior to the onset of COVID-19.



Source: ABS, Author's calculations

The above analysis highlights that high levels of long-term unemployment are linked with a less efficient labour market. This has implications for fiscal and monetary policy, especially for a government with an aim to deliver sustained and inclusive full employment and a dual mandate central bank.[11] On the fiscal front it is suggestive of a need for active labour market policies that help to reduce the prevalence of long-term unemployment, potentially anticipating where skill needs are likely to decline and assisting individuals to transition to new in demand roles before they become long-term unemployed. It also suggests that enhancing geographic labour market mobility, through policies that enable more inter-region migration, such as land taxes rather than stamp duty, could support a more efficient labour market.[12]

For monetary policy, it means that the central bank must be conscious of its impact on unemployment and the possible hysteretic effects from keeping monetary policy too restrictive at any point in time, as it could lead to the labour market becoming less efficient. Further, more immediate, implications for monetary policy coming from the Beveridge curve are discussed below.

Recruitment intensity

In addition to variables that are intended to reflect shifts in the Beveridge curve, I also examine variables that are intended to capture recruitment intensity to get a sense of the direction of movement of the job creation curve over time.

Ads per hirer is estimated to have a negative coefficient when it is included in the Beveridge curve regression. This is consistent with more intense recruiting leading to a lower unemployment rate and being associated with more vacancies.

[11] The Australian government has an aim to create an economy where everyone who wants a job can find one without having to search for too long (Commonwealth of Australia, 2023).
[12] Cho, May Li, & Uren (2024) using an overlapping generations model calibrated to the Australian housing market show that removing stamp duty raises household mobility.

Similarly, the estimated coefficient on the SEEK average advertised salary index is negative, consistent with higher advertised salaries being associated with a higher level of recruitment intensity and less unemployment for any given vacancy rate. That is, firms are likely to be filling vacancies faster so there are more people leaving unemployment for a given vacancy rate.

The estimated coefficient on SEEK applications per ad is positive and statistically significant at the 5% level when included as additional explanatory variable in the Beveridge curve and estimated between 2008 and 2023Q1. A positive coefficient is consistent with more applications per ad (lower recruitment intensity) being associated with a higher unemployment rate for a given vacancy rate. The estimated coefficient and its significance are sensitive to the estimation period. When estimated between 2016Q1 and 2025Q1, the coefficient remains statistically significant but has the opposite sign. The flip in the estimated sign may reflect that applications per ad is less useful as a proxy of recruitment intensity by itself following the onset of COVID-19.[13]

When the estimated recruitment intensity factor is included in the extended Beveridge curve specification, the estimated coefficient is negative as expected. That is, when recruitment intensity is higher the unemployment rate is lower at each level of the vacancy rate, or there are more vacancies at each unemployment rate.

The above findings are all broadly consistent with a steepening of the job creation curve relative to pre-COVID, which means that the labour market is more likely to be on the steeper part of any single Beveridge curve than it was prior to the onset of COVID-19.

The implied natural rate of unemployment

Following several other authors, such as Groenewold (2003), Kennedy, Luu, & Goldbloom (2008) and Borland (2011), in this section I estimate a 'natural rate' of unemployment implied by the Beveridge curve.

Choosing an appropriate 'equilibrium' vacancy rate

To calculate the implied 'natural rate' of unemployment from the Beveridge curve relationship an appropriate equilibrium vacancy rate must be chosen. One way to choose the equilibrium vacancy rate would be to simply choose the average over the sample, but as Groenewold (2003) points out there is nothing that requires the labour market is in equilibrium on average, so this approach does not necessarily provide an equilibrium vacancy rate.

An alternate possibility is to set the vacancy rate equal to the unemployment rate, as in Dixon, Lim, & Freebairn (2010).[14] This approach assumes that labour demand (employment plus vacancies) equals labour supply (employment plus unemployment), the appropriateness of this approach depends on the accuracy of vacancy data but also that employment plus unemployment reflects labour supply accurately. From time to time, there have been revisions to the ABS vacancies series due to survey improvements and changes in underlying dynamics of vacancies which suggests vacancies data do

[13] Overtime the online recruitment industry has increasingly become more proactive in sourcing applications for each advertisement, with products like targeted email prompts and notifications which may be increasing applications per ad regardless of the underlying labour market conditions and is likely changing the relationship between applications per ad and recruitment intensity.

[14] (Michaillat & Saez, 2024) argue social efficiency is the best way to interpret full employment. Their analysis suggests that the labour market is at full employment when u = v in the US and that it is not equivalent to the NAIRU. The authors make several assumptions to reach their conclusion, including that decisions by policymakers keep the Beveridge curve fixed. Such an assumption is at odds with the Australian government's aim to deliver sustained and inclusive full employment, which likely requires policies that will shift the Beveridge curve.

not always capture total labour demand.[15] In addition, at any point in time there are many potential workers that represent labour supply who are not counted as unemployed for various reasons, For example, in February 2024 there was around 810,000 people who wanted to work and available to work and did not look for work.

It is also important to note that the unemployment rate is measuring the number of unemployed *people* as the share of the labour force, while the vacancy rate is measuring the number of *jobs* as a share of the labour force. So, the unemployment rate and vacancy rate are not in the same units making it difficult to set equal without accounting for the different units. This observation suggests that an external reference point is likely required.[16]

Groenewold (2003) chooses an equilibrium vacancy rate in reference to capacity utilisation, or where actual output equals potential output. Adapting Groenewold's approach, Kennedy, et al (2008) use an equilibrium vacancy rate of 1.15%, the average vacancy rate that is associated with peaks in the growth cycle, an assumption that strong output growth proxies for potential output. Borland (2011) follows Kennedy, et al (2008) and assumes a vacancy rate of 1.2% in his estimation of the natural rate of unemployment implied by the Beveridge curve.

The above approaches are all aiming to establish the vacancy rate that prevails when the labour market is balanced, or output is balanced. Chapman (2024) constructs a labour market balance indicator that suggests the labour market was relatively balanced in 2019, similarly Chapman (2024) finds that the full-time employment to population ratio was broadly consistent with full employment in 2019 as well, although potentially on the low side. The average of the RBA's model estimates of the NAIRU in 2019 was around 4.5%, although the range of model estimates was from around 4¼ to 5% (Reserve Bank of Australia, 2025). The unemployment rate in 2019 averaged 5.2%, with a low of 5%, which based on the RBA's NAIRU would suggest that there was spare capacity in the labour market at the time. In 2019, the vacancy rate sat between 1.6% and 1.7%. This evidence would suggest that a vacancy rate around 2% would be associated with a labour market broadly in balance.

I use my preferred extended Beveridge curve specification estimate (which includes the long-term unemployment rate) and the minimum unemployment rate in 2019 of 5% to pinpoint an appropriate equilibrium vacancy rate. At the national level the implied equilibrium vacancy rate is 2.2%. An alternative to this approach would be to calibrate the equilibrium vacancy rate to the RBA's NAIRU estimate of 4.5% in 2019, this would then imply a national equilibrium vacancy rate of 3.4%, a much higher vacancy rate.

A medium to long-run upward trend in the vacancy rate?

In the previous section I have looked to establish an equilibrium vacancy rate that is appropriate for thinking about the evolution of the natural rate of unemployment in recent years. However, it is highly unlikely that the equilibrium vacancy rate(s) established above are appropriate for evaluating the natural rate of unemployment in all periods due to an upwards drift in the vacancy rate over time.

Looking at the immediate pre-COVID period, the equilibrium vacancy rates used in Kennedy, et al (2008) and Borland (2011) appear too low. Several authors have noted an upward trend in vacancy rates in Australia, as well as overseas, that is not evident in other labour market variables.[17] A broadly

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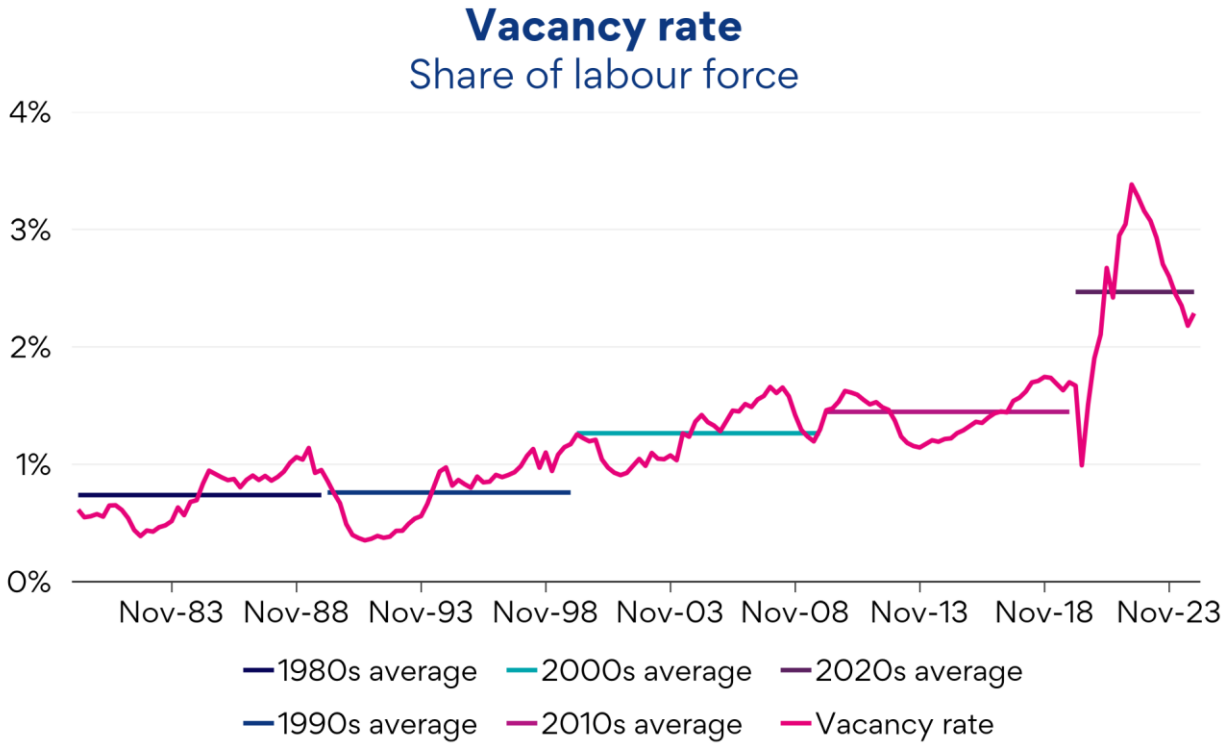
[15] The Australian Bureau of Statistics (2024) notes that a quality review of the Job Vacancies Survey (JVS) resulted in improvements for data for the Administrative and support services industry, given the specific vacancy dynamics within this industry, which resulted in downward revisions to the overall vacancy rate. The (Reserve Bank of Australia, 2018) had previously noted the divergence between the ABS vacancy series and job advertisements.

[16] An alternate solution would be to convert vacancies to a count of people or unemployment to a count of jobs before setting them equal.

[17] Nugent (2025) and Mongey & Horwich (2023) compare the vacancy rate to other labour market variables, such as the quits rate or job-finding rate, and conclude that the vacancy rate has trended up while other labour market variables have not. Stelmach, Kensett, & Schnattinger (2025) highlight the upwards trend in the vacancies to unemployment ratio has in the UK.

inward or leftward shift of the Beveridge curve since the 1990s should imply a lower vacancy rate for any given unemployment rate, so there must be another factor driving the upwards trend in the vacancy rate over time. The upwards trend is likely driven by forces that have resulted in a long-term steepening of the job creation curve.

The relative increase in vacancies is likely driven by firms increasing their recruitment activity overtime for a given set of labour market conditions. Stelmach, Kensett, & Schnattinger (2025) suggest three potential drivers of the increase in the vacancy rate observed in the UK: labour productivity growth; changes in matching efficiency; and a lower cost of advertising a vacancy. They highlight the decline in the cost of advertising a vacancy relative to labour productivity as playing a key role in the upwards trend in vacancies over time, with the lower relative cost resulting in a higher level of vacancies for any given unemployment rate.[18]



Note: The ABS Job Vacancies Survey was suspended between August 2008 to August 2009 (inclusive), values have been replaced with rates implied by the TRYM model.
Source: ABS, RBA Author's calculations

In Australia, there was a notable increase in the average vacancy rate between the 1990s and 2000s, which contrasts with the similarity of the average vacancy rate in the 1980s and 1990s. Online job posting became more common in the 2000s, for example Australia's largest online employment marketplace SEEK began in the late 1990s and quickly expanded. Prior to the launch of SEEK and its competitors, print media had been the primary way for employers to reach their audience. The lower cost nature of online advertising saw a notable increase in total job advertisements, with growth in online advertising while print advertising remain relatively stagnant between 2002 and 2005.[19] In 2002, there was already more than three times as many ads online as there was found in newspapers ANZ (2006). On top of the shift from print to online advertising, there has been a rise in free online

[18] Kroft & Pope (2014) find that the introduction of Craigslist significantly lowered the cost of job advertisements in the US markets they studied.
[19] The ABS vacancy data is survey based, and a business is asked to only record a vacancy if a job is "available for immediate filling on the reference date and for which recruitment action has been taken." (Australian Bureau of Statistics, 2025). Debelle (2018) touches on why job ads and job vacancies may differ over time.

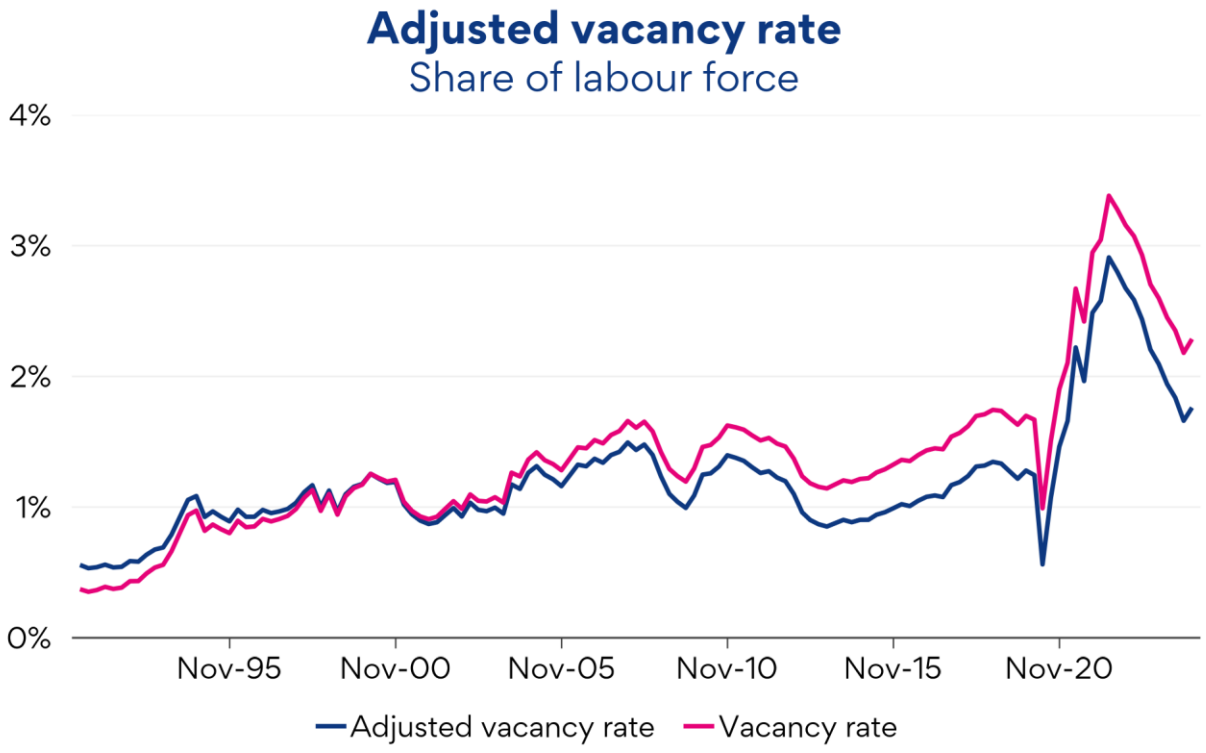
advertising platforms such as Jora, further reducing the cost of advertising and making it more accessible to smaller businesses.

A lower cost of advertising a vacancy not only enables more firms to post a job ad, it also potentially enables each firm to keep a job ad open longer in search of the "best" candidate, all else equal this would result in a steeper job creation curve.

In addition to the lower cost of posting a job ad relative to labour productivity, more efficient matching may also encourage organisations to post more ads, as the effective cost of filling a position falls with more efficient matching. Similarly, if the matching process starts to produce higher quality matches, resulting in higher labour productivity within the organisation or more stable matches then the returns to posting an ad increase encouraging more ad posting.[20] Again, higher labour productivity and more efficient matching would result in a steepening of the job creation curve.

One way to adjust for the increase in vacancies that has potentially been driven by the lower relative cost of job advertising is to use the relationship of vacancies to a third labour market variable like the quits rate or job finding rate that don't exhibit the upwards trend, as Mongey & Horwich (2023) and Nugent (2025) do.

Following Nugent (2025), I use the job finding rate to produce an adjusted vacancy rate, but I estimate the elasticity between the vacancy and job finding rate over the 1990s. Using the 1990s should ensure that the transition to online ads in the 2000s which likely contributed to the increase in vacancies is not influencing the estimated elasticity used to produce the adjusted vacancy rate.

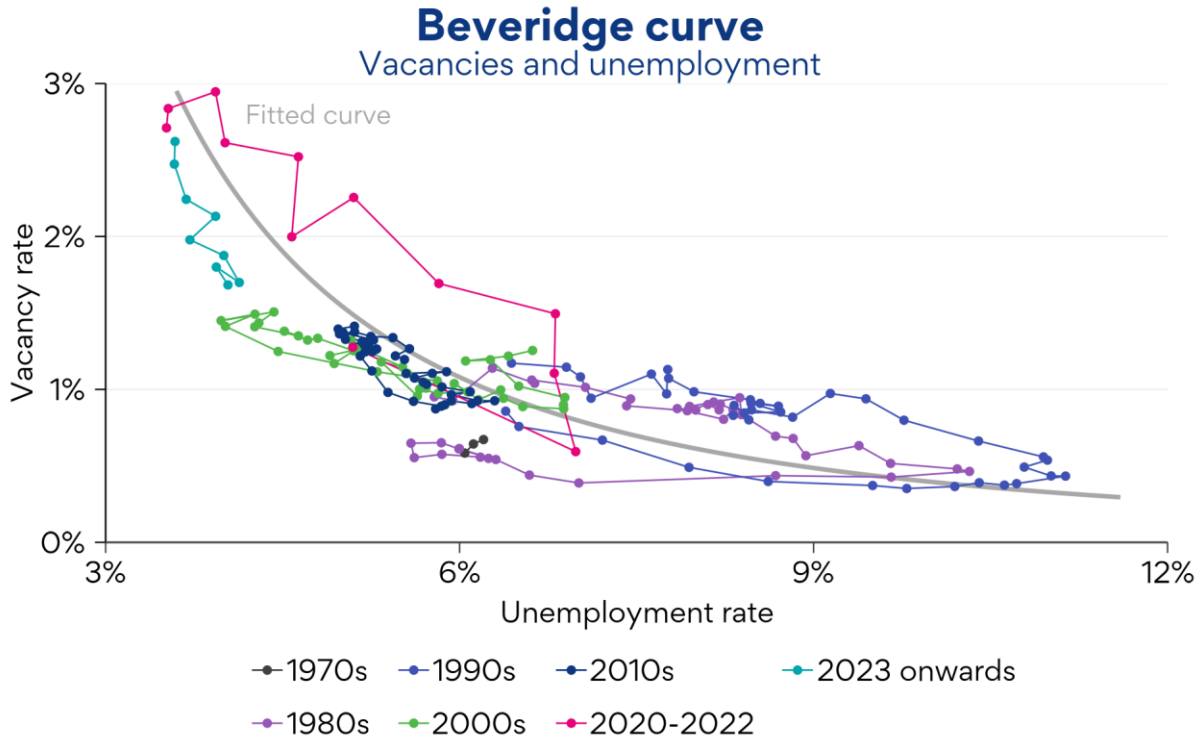


Note: The adjusted vacancy rate is calculated following Mongey & Horwich (2023) but the job-finding rate is used rather than quits. The elasticity between the vacancy rate and job-finding rate is calculated over 1990 to 2000.
Source: ABS, Author's calculations

[20] Faberman & Kudlyak (2016) conclude that in the US the effectiveness of online job search has increased overtime, while Mang (2012) found that job changers who found their new job online are better matched than those who found their job through other channels.

The national adjusted vacancy rate still drops dramatically with the onset of COVID-19 before increasing, the increase still large but the vacancy rate does not reach the same peak. In contrast to the unadjusted vacancy rate, the adjusted vacancy rate in 2019 is below the vacancy rate in 2007. Few economists would dispute that the labour market was tight in 2007 prior to the onset of the GFC, while few economists would argue that the labour market was tight in 2019, so having the adjusted vacancy rate in 2019 sitting below its 2007 level seems intuitive.

When looking at the adjusted vacancy rate and unemployment rate in UV-space, it is easy to see that the adjusted vacancy rate results in a tighter relationship between the unemployment rate and vacancies post 2000. Repeating the time-varying parameter analysis using the adjusted vacancy rate, the relative movements in the position of the Beveridge curve around the COVID-19 pandemic are unchanged.



Note: The adjusted vacancy rate is calculated following Mongey & Horwich (2023), but the job-finding rate is used rather than quits.
Source: ABS, Author's calculations

Following the same logic to that used above to determine an equilibrium vacancy rate produces a national equilibrium adjusted vacancy rate of 1.8%. The lower equilibrium adjusted vacancy rate is consistent with the upwards trend having been removed from the vacancy series post 2000. Similarly, when using an unemployment rate of 4.5% in line with the RBA's NAIRU, the equilibrium adjusted vacancy rate is lower at 2.6%.

A "full employment" estimate

With an equilibrium vacancy rate, or two, in hand, the preferred extended Beveridge curve specification estimates can be used to estimate a full employment or natural rate of unemployment:

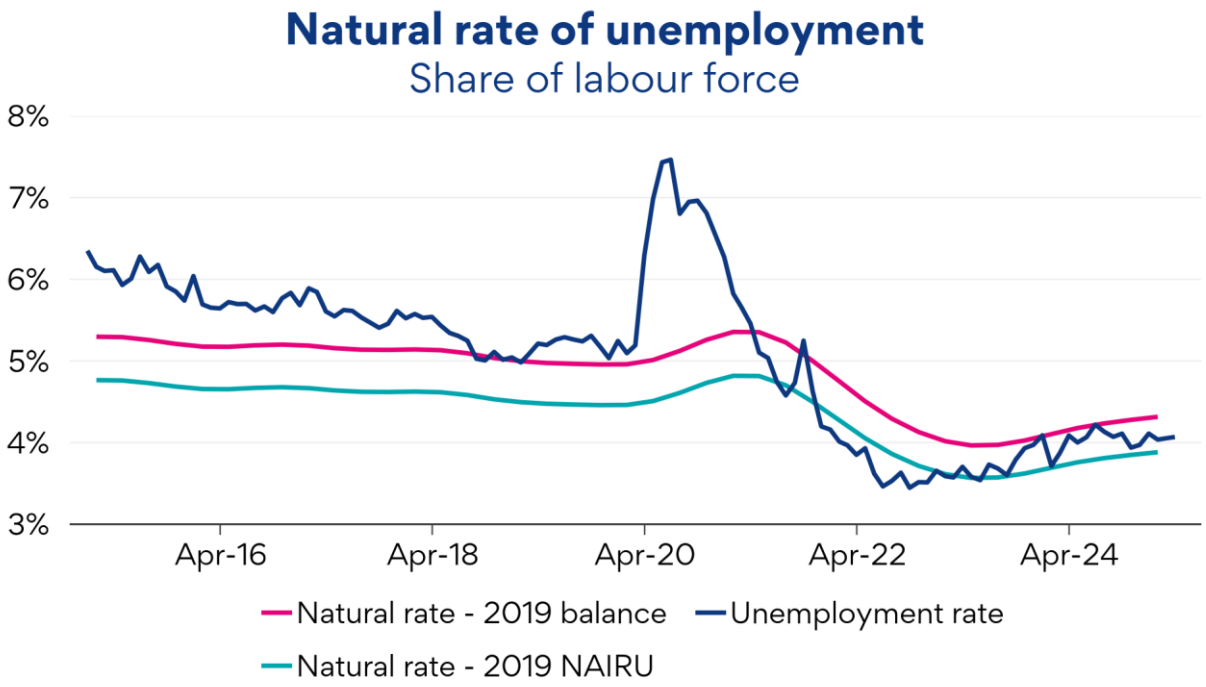
$$\widehat{\text{Natural}}\, u_{it} = \exp\left(\hat{\alpha} + \widehat{\beta_1} \ln(equilibrium\ v_i) + \widehat{\beta_2} \ln(long_{it})\right)$$

Consistent with estimates of the NAIRU from the RBA and the Commonwealth Treasury, the estimated natural rate of unemployment declines in the years prior to the onset of COVID-19 with both estimates suggesting that there was spare capacity in the labour market (Reserve Bank of Australia, 2025; Commonwealth of Australia, 2023).

Following the onset of COVID-19 the estimated natural rate increases before beginning to decline in mid 2021. Although the natural rate estimates decline, they do not decline as much as the unemployment rate and imply that the labour market was operating below the natural rate between early 2022 and early 2023 implying a tight labour market over this period. Consistent with this, wage price growth accelerated over 2022, to be growing faster than it had any time since 2012.

The higher natural rate estimates implied by assuming that the labour market was balanced in 2019 suggests that the unemployment rate is still below its natural rate, while the lower natural rate estimates implied by a NAIRU of 4.5% in 2019 suggests that currently the unemployment rate is above its natural rate. However, unlike the RBA's recent estimates of the NAIRU, neither natural rate estimate suggests that the natural rate is currently above or at the same level as they were in 2019. The upper estimate suggests that it is currently around 4.3%, while the lower estimate suggests that it is around 3.9%, both are below their 2019 levels. A decline in long-term unemployment driving a reduction in the estimate of full employment is consistent with a downward shift of the short-run Phillips curve, and a lower level of full employment around which the immediate unemployment-inflation trade-off is centred.

A natural rate of unemployment below the RBA's current estimate of full employment suggests that the labour market is not currently as tight the RBA believes it to be and that the labour market is not putting as much pressure on wage and price inflation as their estimates would suggest. This would open the door to less restrictive monetary policy.



Source: SEEK, Author's calculations

The analysis is robust to the use of the adjusted vacancy rate, with changes in the estimated Beveridge curve coefficients broadly offsetting the use of the equilibrium adjusted vacancy rate resulting in little impact on recent estimated natural rates. However, the analysis of the upward trend in the vacancy rate over the last two decades does suggest that using 2019 as a benchmark to establish an equilibrium vacancy rate may undershoot the prevailing equilibrium vacancy rate if the upward trend has continued through the COVID-related volatility. A higher equilibrium vacancy rate would result in lower full employment estimates than those above, pointing to possible risks to those full employment estimates to the downside.

State-based "full employment" estimates

The extended Beveridge curve framework can also be applied at the state level to generate state-based estimates of full employment or the natural rate of unemployment, see Appendix 8 for charts of the estimated natural rates of unemployment for each state and territory.

Similar to the national estimates, most of the state and territory based natural rate of unemployment estimates have declined in the wake of COVID-19 and have begun to increase more recently. The five larger states are all estimated to be at full employment at between 4% and 4.5%, with New South Wales having the lowest current natural rate of unemployment of the larger states at 4%. The Australian Capital Territory has the lowest natural rate of unemployment at 3.3%, reflecting that it typically has low aggregate and long-term unemployment rates.

Unlike the rest of the country, the Northen Territory, which has one of the most volatile labour markets, is estimated to have had its natural rate of unemployment drift up over time. The increase reflects an upward trend in the territory's long-term unemployment rate since about 2010.

Region	Equilibrium vacancy rate	Current full employment estimate	Current unemployment rate
National	2.2%-3.4%	3.9%-4.3%	4.1%
New South Wales	2.3%	4.0%	3.9%
Victoria	2.7%	4.5%	4.2%
Queensland	2.1%	4.4%	4.2%
Western Australia	2.2%	4.5%	4.2%
South Australia	1.9%	4.5%	3.9%
Tasmania	1.3%	5.0%	3.8%
Northern Territory	1.0%	6.4%	4.0%
Australian Capital Territory	2.9%	3.3%	3.8%

Notes: State equilibrium vacancy rates are calculated by assuming the labour market was balanced in 2019
Source: ABS, Author's calculations

The results suggest that the current unemployment rates in New South Wales, Victoria and the Australian Capital Territory are close to their natural rates. In contrast, the other states and territories all currently have unemployment rates sitting below their natural rates. This is broadly consistent with recent wage growth outcomes across states, where Western Australia and Queensland have seen faster wage growth than most other states and wage growth in New South Wales and Victoria has lagged the rest of the country (Australian Bureau of Statistics, 2025).

Conclusion

COVID-19 massively disrupted the Australian labour market like the GFC did just over a decade earlier. But unlike the GFC it appears that the Australian labour market has become more efficient rather than less efficient in the wake of COVID-19. Tracing out the movement of the Australian Beveridge curve using a time-varying estimate of the intercept term, suggests an inward or leftwards movement of the Beveridge curve on net since 2019.

The tight labour market conditions post-COVID saw a reduction in the job destruction rate, and more people moving directly into employment from outside the labour force. In addition, it appears that hirers increased their recruitment intensity in the tighter labour market, with average advertised

salaries growing and more ads on per hirer on average post-COVID. Together this meant that vacancies increased sharply while the unemployment rate declined notably.

Since 2022, movements around the labour market have steadied while labour demand has eased slowly resulting in only a small increase in the unemployment rate, even though the vacancy rate has decreased notably. Going forward, the unemployment rate is likely to increase relatively more for any decline in the vacancy rate, as the forces driving the inward shift of the Beveridge curve have waned although the Beveridge curve is not shifting outwards notably. With the labour market now on a part of the Beveridge curve with a more moderate slope but not yet on the shallow part, any decline in the vacancy rate is likely to remain larger than the decline in the unemployment rate.

The movement of the Beveridge curve post-COVID suggests that the natural rate of unemployment or the unemployment rate associated with full employment has declined since 2019. A lower full employment estimate suggests that there is more spare capacity in the Australian labour market and less inflationary pressures coming out of the labour market than the RBA currently thinks, which mean that monetary policy can potentially be less restrictive.

Work yet to be done/left for future work

In this paper, I discussed three potential indicators of recruitment intensity — ads per hirer, advertised salary growth, and applications per ad — and brought them together using dynamic factor analysis. There are several other potential indicators that weren't included that would likely improve the measurement of recruitment intensity. For example. changes in desired qualifications and experience are two dimensions that employers can adjust that will affect how quickly they can fill a role. Both indicators could be constructed through an examination of job ad text overtime but have been left to future work due to time constraints. Understanding how employers leverage these two dimensions over time could also be useful for policy makers and educational providers in understanding skills shortages and determining core job requirements versus highly desirable qualifications.

The potential drivers of shifts of the Beveridge curve go beyond the nine or so factors I have considered here and the importance of these drivers is likely to vary over time. Other variables that could be considered in such an analysis include but are not limited to the terms of trade, the unionisation rate, the replacement ratio of unemployment benefits, the flexibility of wages, and personal tax rates. In part, these additional variables were left out of this paper due to previous findings that they did not increase the explanatory power of the extended Beveridge curve as much as the variables included here. In addition, with a focus on relatively recent events, factors like changes in the female participation rate and part-time employment were deemphasised but likely played a more important part in shifts in the Beveridge curve between the 1980s and 2010s.

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Appendix 1 – Beveridge curve functional forms

Researchers use a range of alternate specifications of the Beveridge curve. The use of a particular functional form over another may lead to different conclusions. The primary functional form I use in this paper is the log-log specification, although I assess the robustness of results to this choice by repeating the analysis using alternate functional forms.

The log-log specification of the Beveridge curve is:

$$\ln(u_t) = \alpha + \beta \ln(v_t) + \varepsilon_t$$

Other commonly used functional forms include.

- The quadratic specification of the Beveridge curve is:

$$u_t = \alpha + \beta v_t + \delta v_t^2 + \varepsilon_t$$

- The square-root specification of the Beveridge curve is:

$$\sqrt{u_t} = \alpha + \beta \sqrt{v_t} + \varepsilon_t$$

- The hyperbolic specification of the Beveridge curve is:

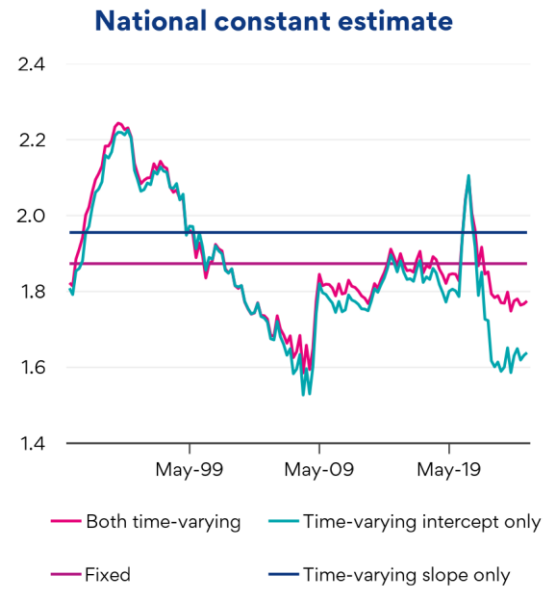
$$u_t = \alpha + \beta \frac{1}{v_t} + \varepsilon_t$$

Appendix 2 – Time-varying Beveridge curve coefficient estimates

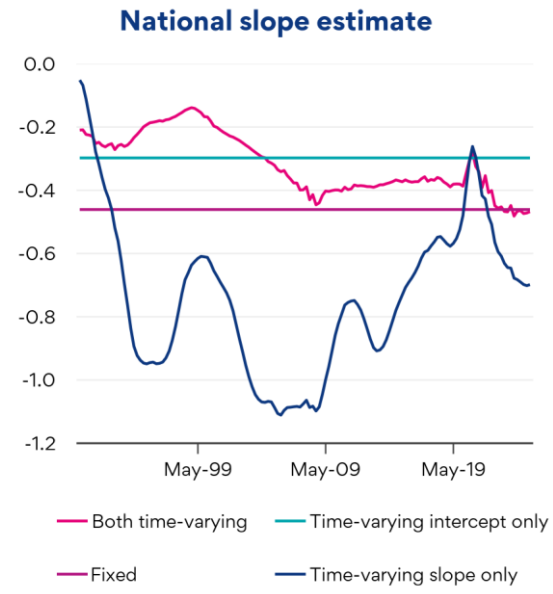
I use dynamic linear models, or linear state-space models, to estimate the time-varying parameter models.

The estimated variation over time of the constant is broadly robust to the functional form of the Beveridge curve used, although when using the square root functional form and allowing the slope to vary over time, there is estimated to be very little variation in the constant.[21] The final position of the Beveridge curve based on the intercept estimate relative to its history is sensitive to whether the slope is also allowed to vary, with the inwards shift post-COVID much more muted when the slope varies.

Log-log specification



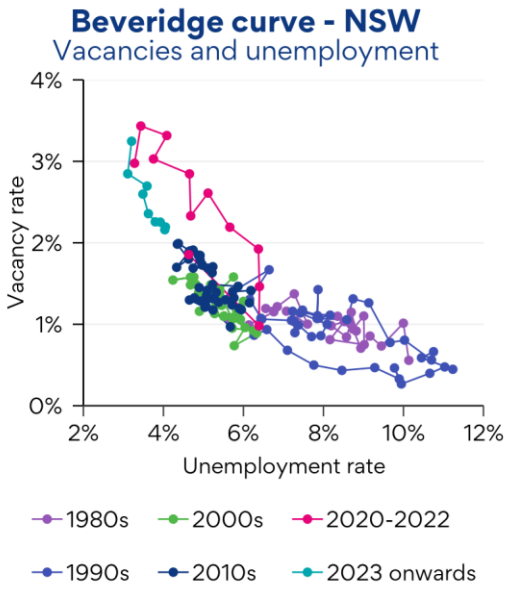
Source: Author's calculation



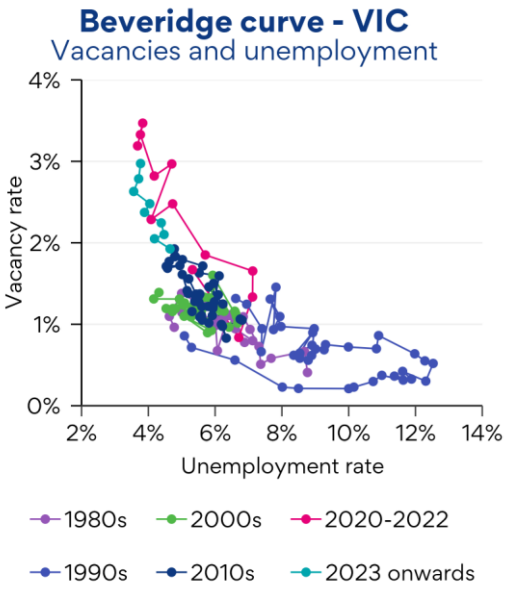
Source: Author's calculation

[21] Estimates for alternate specifications are available on request.

Appendix 3 – State-level unemployment and vacancy rates



Source: ABS



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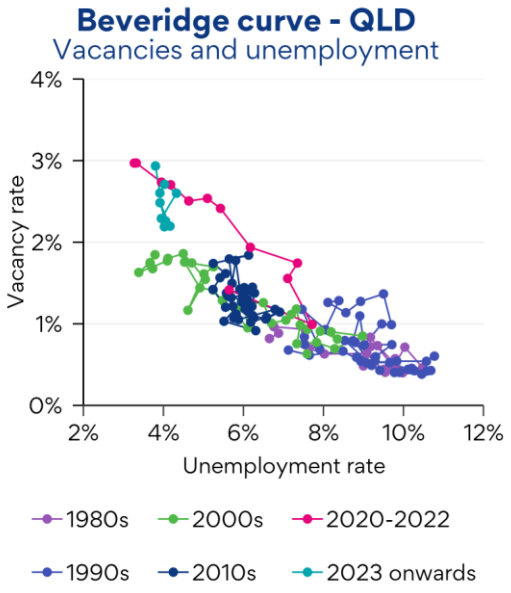
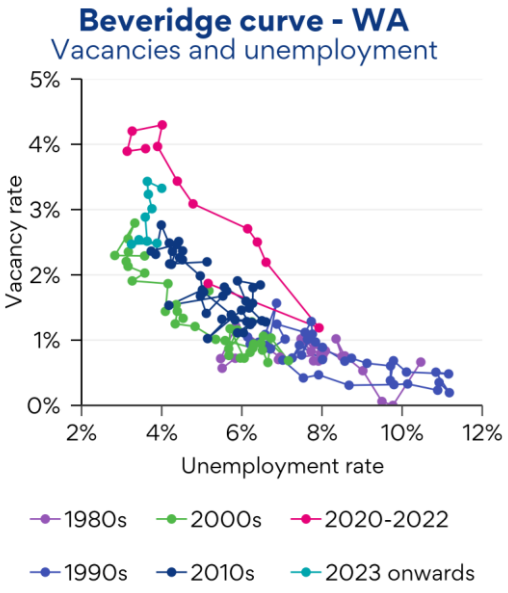
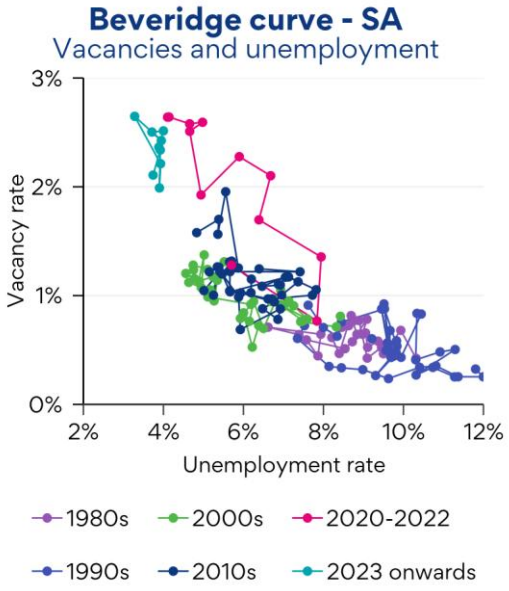


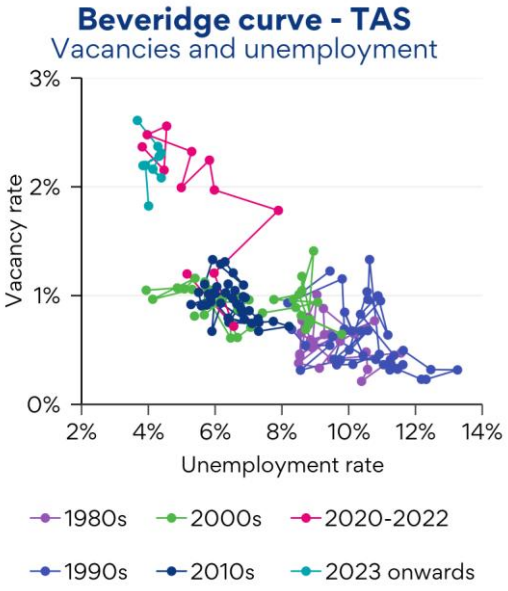
Source: ABS



Source: ABS



Source: ABS



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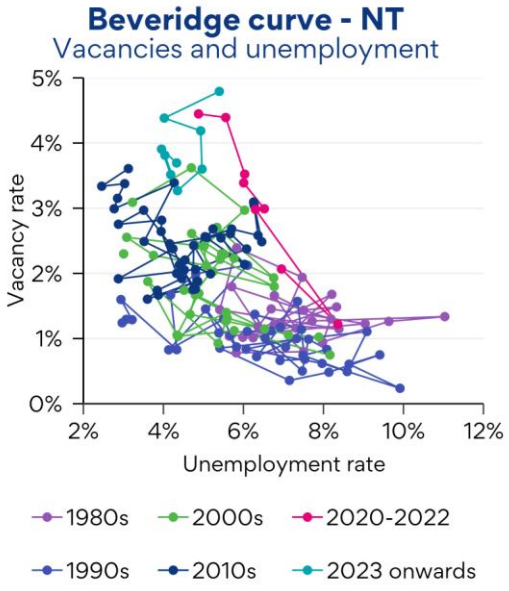

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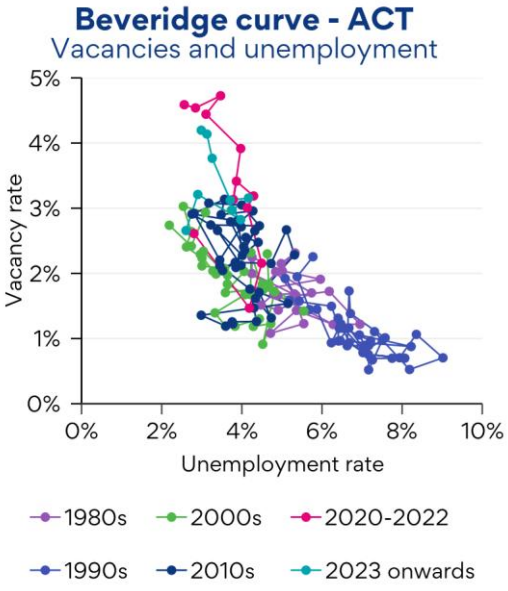
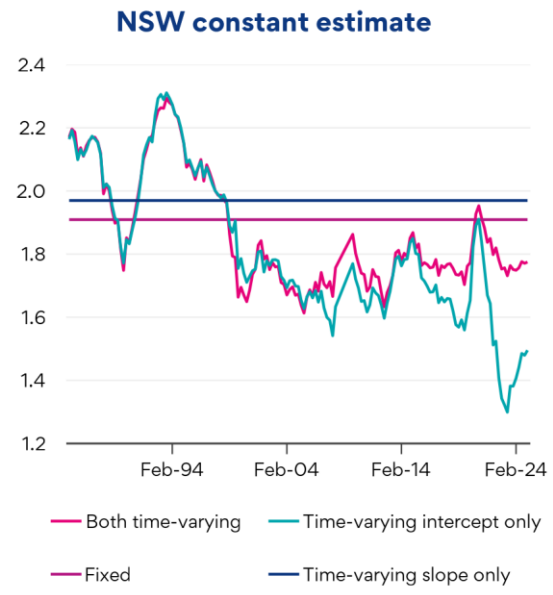


Source: ABS

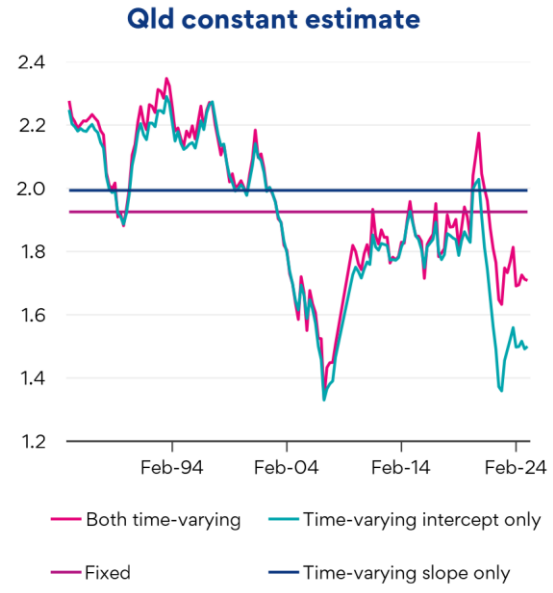
Appendix 4 – State-level time-varying intercept estimates

Estimates from a log-log specification, estimated from November 1984 are shown.



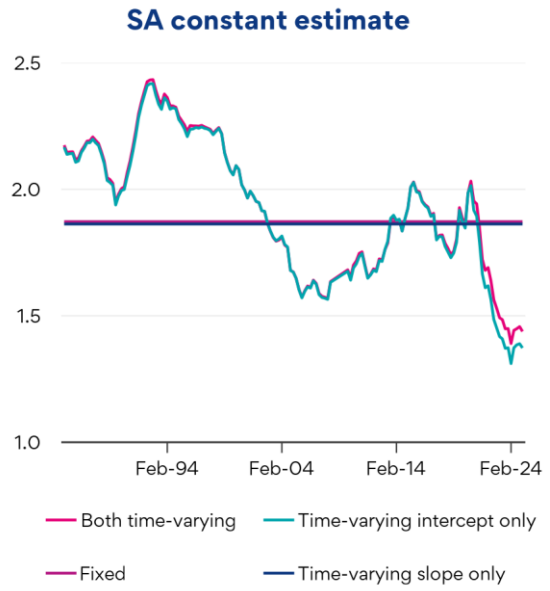
Source: Author's calculations

Source: Author's calculations

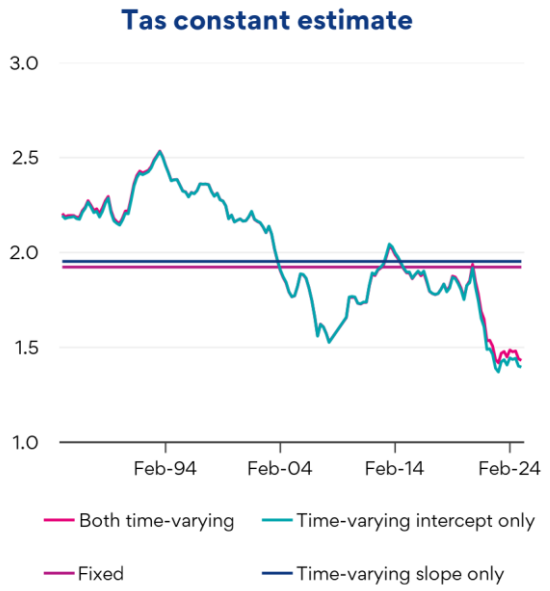


Source: Author's calculations

Source: Author's calculations

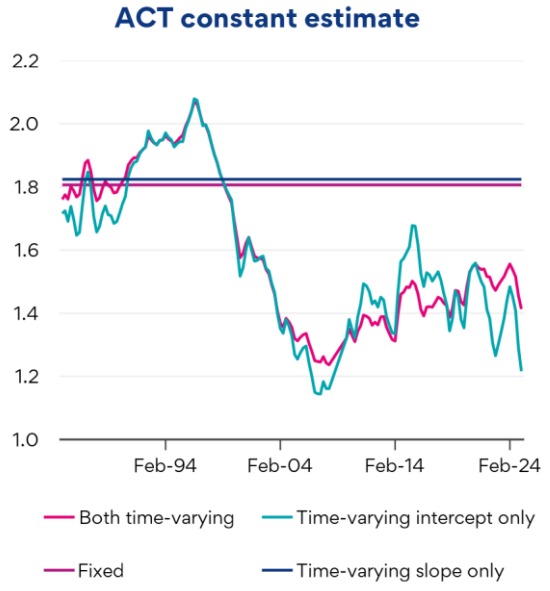


Source: Author's calculations



Source: Author's calculations

Source: Author's calculations



Source: Author's calculations

Appendix 5 – Potential drivers of unemployment and vacancy dynamics

Additional drivers that may have affected the labour market between 1991 and 2025

Theoretical concept	Move or shift?	Empirical equivalent/proxy	Coefficient	Adjusted R^2
Beveridge curve		No additional variables		0.81
Labour productivity	Move	GDP per hour worked[(i)]	-0.40	0.82
		Market GVA per hour worked[(ii)]	-0.28	0.75
Recruitment intensity	Move	Ads per hirer[(iii)]	-0.25*	0.72
		Applications per ad[(iv)]	0.13***	081
		Average advertised salary[(iii)]	-0.86**	0.78
		Recruitment intensity factor[(iii)]	-0.51***	0.85
Participation rate	*Shift*	Participation rate	-4.0	0.83
		Female participation	-1.15	0.83
		Youth proportion	-0.21	0.82
		Recent migrant proportion[(v)]	0.15	0.60
Job destruction rate	Shift	Separation rate	0.63**	0.83
Matching efficient/mismatch	*Shift*			
		Long-term unemployment rate	0.40***	0.97
Structural change - task		Employment by tasks[(vi)]	-0.26	0.82
Structural change - industry		Employment by industry[(vii)]	-1.61**	0.85
		Unemployment rate by industry[(viii)]	0.87***	0.89
		Standard deviation of industry unemployment rates	0.23*	0.84
Labour mobility		Standard deviation of SA4 unemployment rates[(ix)]	0.49***	0.76
Measurement	Shift	Part-time employment share	-0.59	0.83

Notes: Coefficient and R^2 reported for ln-ln regression with only the one added variable estimated over 1991Q1 to 2025Q2 using FM-OLS unless otherwise indicated. A positive coefficient increases the unemployment rate at any given vacancy rate, equating to an outward shift of the Beveridge curve. ***, **, * indicate statistical significance at the 1, 5 and 10% significance levels.

(i) Sample ends 2024Q4, relevant adjusted R^2 for comparison is 0.81
(ii) Sample begins 1994Q3 and ends 2024Q4, relevant adjusted R^2 for comparison is 0.74
(iii) Sample between 2016Q3 and 2025Q2, relevant adjusted R^2 for comparison is 0.71
(iv) Sample between 2008Q2 and 2018Q4, relevant adjusted R^2 for comparison is 0.67
(v) Sample begins 2006Q3, relevant adjusted R^2 for comparison is 0.60
(vi) Non-routine cognitive share of total employment reported
(vii) Business services share of total employment reported
(viii) Goods production unemployment rate reported

(ix) Sample begins 1998, relevant adjusted R^2 for comparison is 0.68

Business services include *Professional, Scientific & Technical Services*, *Administrative & Support Services, Information Media & Telecommunications*, and *Financial & Insurance Services*. Goods production includes *Agriculture, Forestry & Fishing*, *Mining*, *Manufacturing*, *Electricity, Gas, Water & Waste Services* and *Construction*.

Source: Author's calculations

Appendix 6 – National extended Beveridge curve estimates

$$\ln(u_t) = \alpha + \beta_1 \ln(v_t) + \sum_i \beta_i Z_{it} + \varepsilon_t$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Vacancy rate	-0.24	-0.24	-0.21	-0.16	-0.11	-0.12	-0.28	-0.43
	(0.04)	(0.04)	(0.04)	(0.04	(0.02)	(-0.03)	(0.02)	(0.09)
Participation rate		0.63						
		(0.70)						
Female labour force participation	0.65							
	(0.48)							
Separation rate	0.14	0.14	0.12	0.14	0.13			
	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)			
Long-term unemployment rate	0.33	0.33	0.32	0.28	0.28	0.28	0.36	
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02	(0.02)	(0.03)	
Non-routine cognitive employment	0.85	0.87	0.86	0.11				
	(0.31)	(0.31)	(0.31)	(0.07)				
Business services employment rate	-0.10							
	(0.22)							
Goods production unemployment rate	0.02	0.20	0.22	0.26	0.28	0.29		
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)		
Labour productivity (market)	-0.62	-0.53	-0.50					
	(0.23)	(0.21)	(0.21)					
SA4 unemployment rates	0.03	0.03						
	(0.04)	(0.04)						
Constant	-1.31	-2.08	0.51	0.78	1.13	1.30	1.74	1.83
	(1.48)	(2.77)	(0.24)	(0.23)	(0.08)	(0.06)	(0.01)	(0.04)
Adjusted R^2	0.95	0.95	0.95	0.94	0.94	0.94	0.92	0.67

Notes: Coefficient and R^2 reported for estimation over 1999Q1 to 2024Q2, using FM-OLS. Standard errors in parentheses.
Source: Author's calculations

Appendix 7 – State Beveridge curve estimates

$$\ln(u_t) = \alpha + \beta_1 \ln(v_t) + \beta_2 \ln(long_t) + \epsilon_t$$

	$\hat{\alpha}$	$\hat{\beta}_1$	$\hat{\beta}_2$	Adjusted R^2	Cointegrated?
National	1.89	-0.56		0.81	Yes
	(0.04)	(0.07)			
National - extended	1.72	-0.25	0.40	0.97	Yes
	(0.02)	(0.03)	(0.03)		
New South Wales	1.87	-0.56		0.71	Yes
	(0.04)	(0.07)			
New South Wales - extended	1.64	-0.20	0.46	0.95	Yes
	(0.02)	(0.03)	(0.03)		
Victoria	1.86	-0.49		0.75	Yes
	(0.03)	(0.06)			
Victoria - extended	1.72	-0.21	0.38	0.95	Yes
	(0.01)	(0.02)	(0.02)		
Queensland	1.93	-0.58		0.74	Yes
	(0.03)	(0.06)			
Queensland - extended	1.81	-0.34	0.32	0.89	Yes
	(0.02)	(0.04)	(0.04)		
Western Australia	1.86	-0.48		0.72	Yes
	(0.04)	(0.07)			
Western Australia - extended	1.79	-0.28	0.31	0.90	Yes
	(0.02)	(0.03)	(0.03)		
South Australia	1.85	-0.51		0.72	Yes
	(0.03)	(0.05)			
South Australia - extended	1.66	-0.24	0.38	0.93	Yes
	(0.02)	(0.03)	(0.03)		
Tasmania	1.89	-0.57		0.57	Yes
	(0.04)	(0.08)			
Tasmania - extended	1.55	-0.19	0.53	0.91	Yes
	(0.03)	(0.03)	(0.04)		
Northern Territory	1.76	-0.25		0.28	Yes

	(0.07)	(0.08)			
Northern Territory - extended	1.82	-0.19	0.28	0.52	Yes
	(0.04)	(0.05)	(0.05)		
Australian Capital Territory	1.82	-0.58		0.61	Yes
	(0.06)	(0.08)			
Australian Capital Territory - extended	1.76	-0.30	0.33	0.80	Yes
	(0.03)	(0.04)	(0.03)		

Notes: Estimated over 1991Q1 to 2025Q2, results reported for FM- OLS. t-stats reported in parentheses. Cointegration conclusion based on the Engle-Granger Augmented Dickey-Fuller test for cointegration at the 5% significance level.
Source: Author's calculations

Appendix 8 – Adjusted Beveridge curve estimates

$$\ln(u_t) = \alpha + \beta_1 \ln(adjusted\ v_t) + \epsilon_t$$

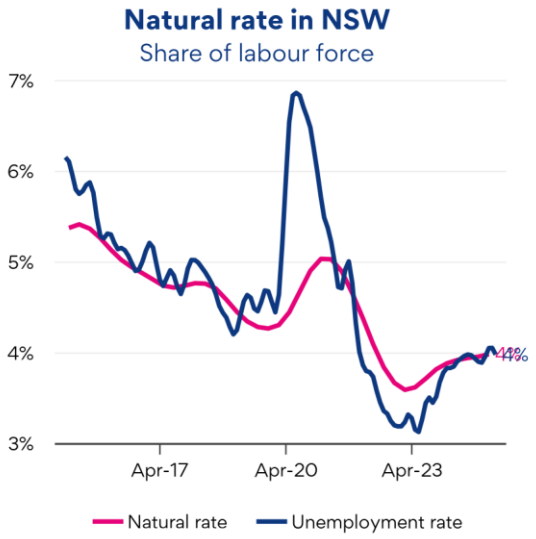
$$\ln(u_t) = \alpha + \beta_1 \ln(adjusted\ v_t) + \beta_2 \ln(long_t) + \epsilon_t$$

	$\hat{\alpha}$	$\widehat{\beta_1}$	$\widehat{\beta_2}$	Adjusted R^2	Cointegrated?
National	1.83	-0.64		0.74	Yes
	(0.04)	(0.09)			
National - extended	1.7	-0.29	0.4	0.96	Yes
	(0.02)	(0.04)	(0.03)		
New South Wales	1.81	-0.62		0.61	Yes
	(0.04)	(0.1)			
New South Wales - extended	1.61	-0.21	0.49	0.95	Yes
	(0.01)	(0.03)	(0.03)		
Victoria	1.84	-0.51		0.73	Yes
	(0.03)	(0.06)			
Victoria - extended	1.71	-0.22	0.39	0.95	Yes
	(0.01)	(0.02)	(0.02)		
Queensland	1.8	-0.6		0.54	Yes
	(0.05)	(0.12)			
Queensland - extended	1.71	-0.23	0.44	0.82	Yes
	(0.04)	(0.09)	(0.08)		
Western Australia	1.7	-0.48		0.53	Yes
	(0.05)	(0.09)			
Western Australia - extended	1.7	-0.2	0.36	0.8	Yes
	(0.04)	(0.08)	(0.08)		
South Australia	1.81	-0.55		0.7	Yes
	(0.03)	(0.05)			
South Australia - extended	1.64	-0.25	0.38	0.92	Yes
	(0.02)	(0.03)	(0.03)		
Tasmania	1.87	-0.57		0.53	Yes
	(0.05)	(0.09)			
Tasmania - extended	1.53	-0.19	0.54	0.91	Yes
	(0.03)	(0.03)	(0.03)		

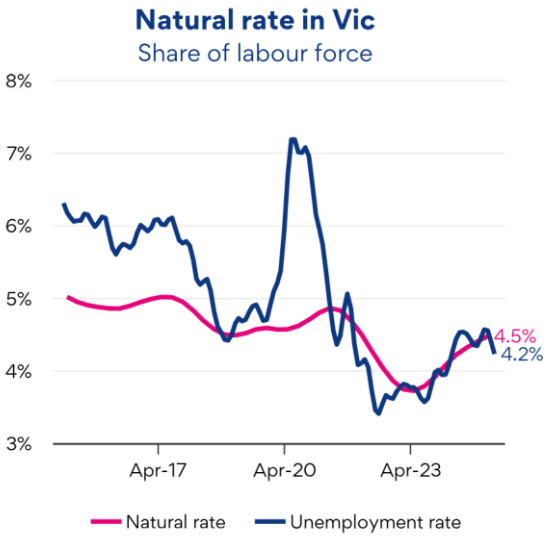
Northern Territory	1.65	-0.13		0.1	Yes
	(0.05)	(0.04)			
Northern Territory - extended	1.73	-0.09	0.24	0.31	Yes
	(0.04)	(0.03)	(0.06)		
Australian Capital Territory	1.74	-0.63		0.41	Yes
	(0.07)	(0.12)			
Australian Capital Territory - extended	1.72	-0.26	0.4	0.75	Yes
	(0.03)	(0.05)	(0.04)		

Notes: Estimated over 1991Q1 to 2025Q2, results reported for FM- OLS. t-stats reported in parentheses. Cointegration conclusion based on the Engle-Granger Augmented Dickey-Fuller test for cointegration at the 5% significance level.
Source: Author's calculations

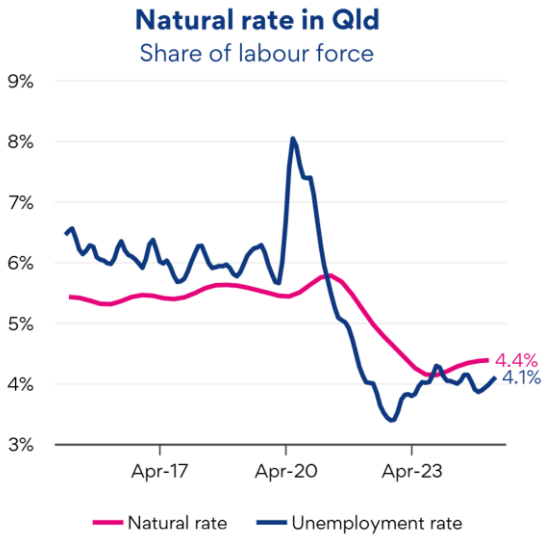
Appendix 9 – Estimated state natural rates – based on unadjusted vacancy rates



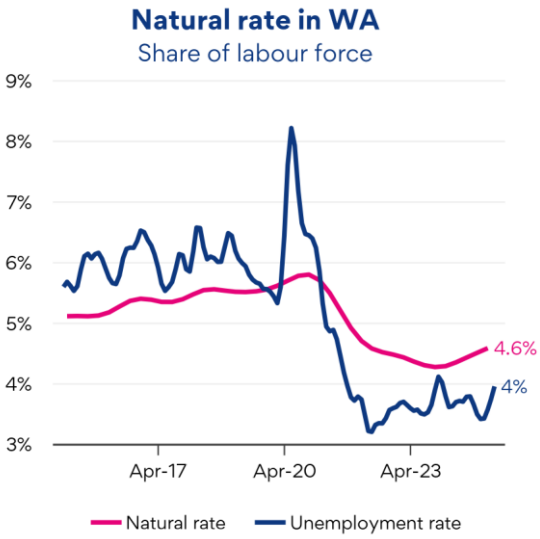
Source: ABS, SEEK, Author's calculations



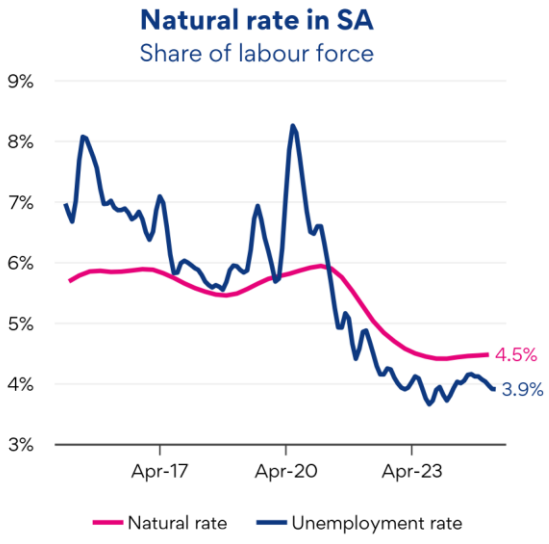
Source: ABS, SEEK, Author's calculations



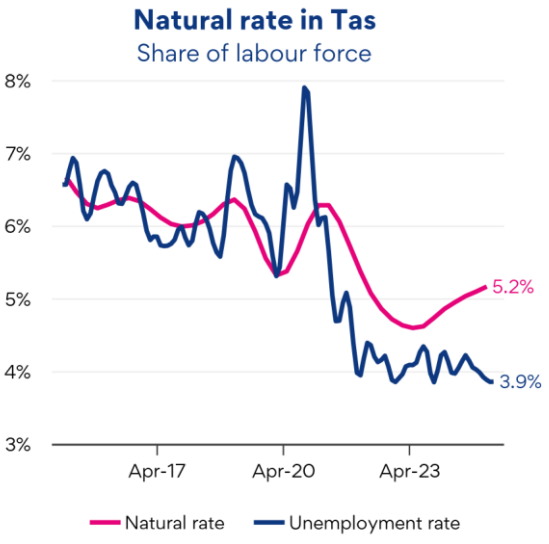
Source: ABS, SEEK, Author's calculations



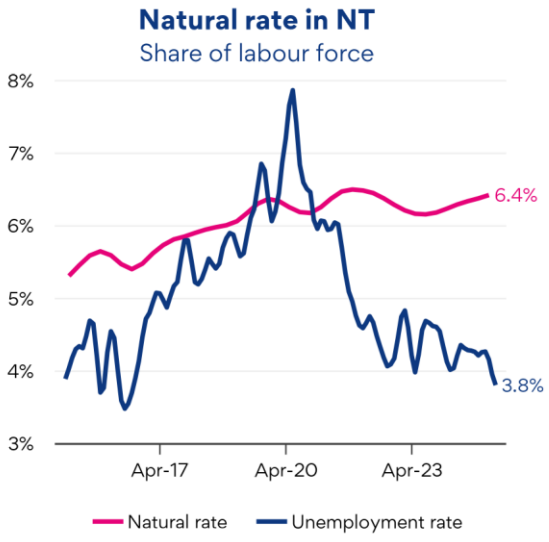
Source: ABS, SEEK, Author's calculations



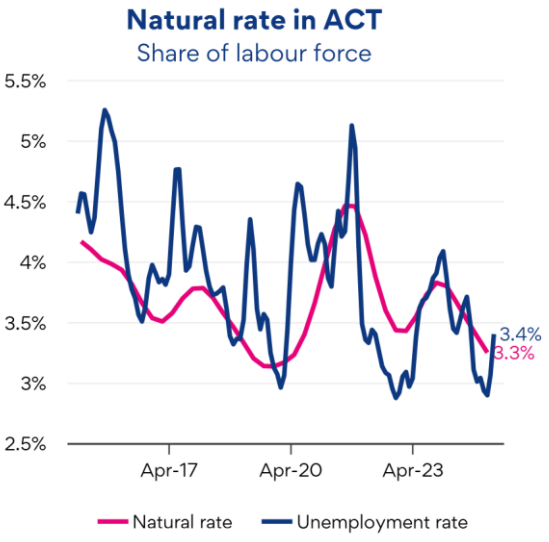
Source: ABS, SEEK, Author's calculations



Source: ABS, SEEK, Author's calculations



Source: ABS, SEEK, Author's calculations



Source: ABS, SEEK, Author's calculations

About Blair Chapman, PhD

Dr Blair Chapman is SEEK's Senior Economist. Blair undertakes economic analysis and forecasting of the Australian and New Zealand economies and labour markets. He leverages SEEK's data to develop unique insights about the economies SEEK operates in.

Blair's economic analysis and forecasting skills have been honed across both private and public organisations including ANZ, Deloitte Access Economics, the Reserve Bank of Australia (RBA) and the Australian Bureau of Statistics (ABS). While at the RBA, he was their representative on the ABS's Labour Statistics Advisory Group for several years.

Blair holds a PhD in Economics from Johns Hopkins University where his studies concentrated on macroeconomics and labour. He completed his undergraduate studies at Monash University, where he majored in Economics, Econometrics and Accounting.

About SEEK

SEEK operates market leading online employment marketplaces, helping people live more fulfilling and productive working lives and helping organisations succeed.

SEEK has a multinational presence that is focused on Australia, New Zealand, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore and Thailand.