RESERVE BANK OF AUSTRALIA

Speech

Inflation Expectations – Why They Matter and How They Are Formed

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Introduction

I would first like to pay respect to the traditional and original owners of this land, the Gadigal people of the Eora Nation, to pay respect to those who have passed before us and to acknowledge today's custodians of this land. I also extend that respect to any First Nations people joining us here today.

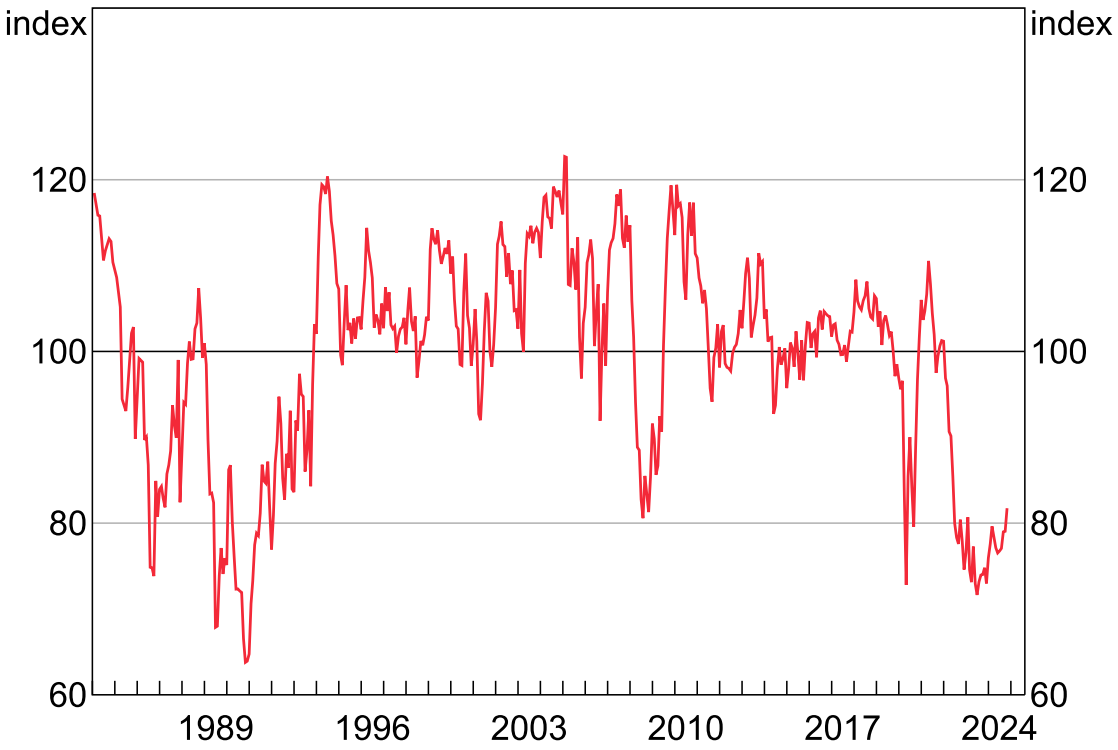
A low and stable inflation rate is critical to preserving macroeconomic stability. Having a good idea of what's going to happen to prices allows businesses to plan for investment and expansion. It also makes things like budgeting and financial planning easier for households. This is particularly true for those on low incomes, who typically have smaller financial buffers than others and spend more of their income on essentials.[1] And with more stable household and business balance sheets, the financial system is more stable.[2]

The experience of the last few years has clearly highlighted this. Everyone across the economy has felt the increased cost of living.[3] This is very clear in the data we monitor, such as household spending, but it's perhaps more apparent in survey metrics such as consumer confidence, which remains much lower than its pre-pandemic average (Graph 1). So there are a number of good reasons to bring inflation down and keep it at a low and stable rate.

Graph 1

Consumer Sentiment*

Average since 1980 = 100



* Mean of Westpac–Melbourne Institute and ANZ–Roy Morgan surveys; ANZ–Roy Morgan index rescaled to have the same average as the Westpac–Melbourne Institute index since 1996.

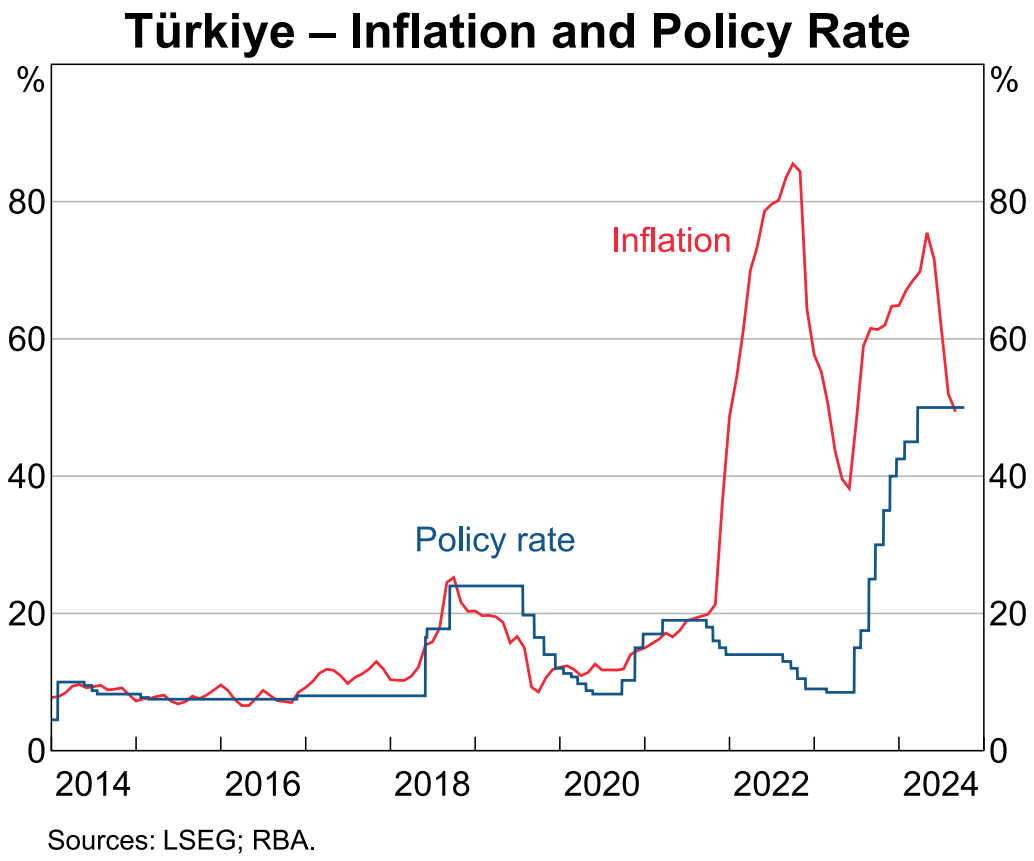
Sources: ANZ–Roy Morgan; RBA; Westpac–Melbourne Institute.

In addition to the tangible impact of elevated inflation today, central bankers often note that they want to make sure that inflation expectations remain anchored. But why is this the case? And what impact do current inflation outcomes have on expectations?

Why do inflation expectations matter?

Macroeconomists generally think that a prerequisite for consistently achieving low and stable inflation over time is well-anchored inflation expectations. That is, people across the economy believe inflation will generally average a low rate (in Australia's case, 2–3 per cent), and they make decisions based on this underlying belief that becomes self-reinforcing. Indeed, this is a key lesson from economic history; there are multiple episodes that demonstrate the damage de-anchored expectations can cause, and the policy effort and welfare costs associated with re-anchoring them. Türkiye's current experience is just one example (Graph 2).[4]

Graph 2



Sources: LSEG; RBA.

So why do expectations matter at all when it comes to economic outcomes? We think they matter because people don't just make decisions based on what is happening today, they also factor in what they think will happen tomorrow. In other words, inflation expectations are at least partly self-fulfilling.

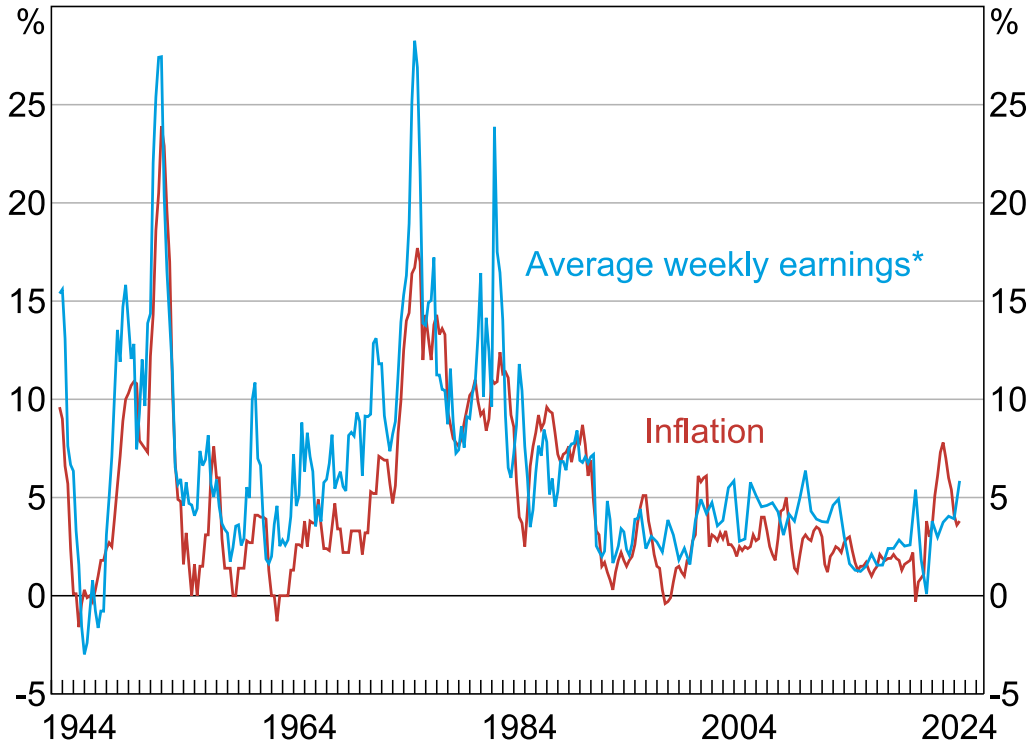
For example, our decision over how much to save for retirement today is determined by how much income we think we'll need once we stop working, and this is partly influenced by what we think will happen to prices between now and then.

In addition to changing the behaviour of households, inflation expectations also directly feed into all of the decisions firms make – for example, over capital investment, pricing and staffing. One way this occurs is through the wage-setting process (Graph 3).[5] This could be workers, or their union representatives, bargaining for higher wages if they think inflation will be higher.[6] Or it could be firms' expectations of higher future prices giving them the confidence to offer higher wages today to attract workers.

Graph 3

Earnings Growth and Inflation

Year-ended



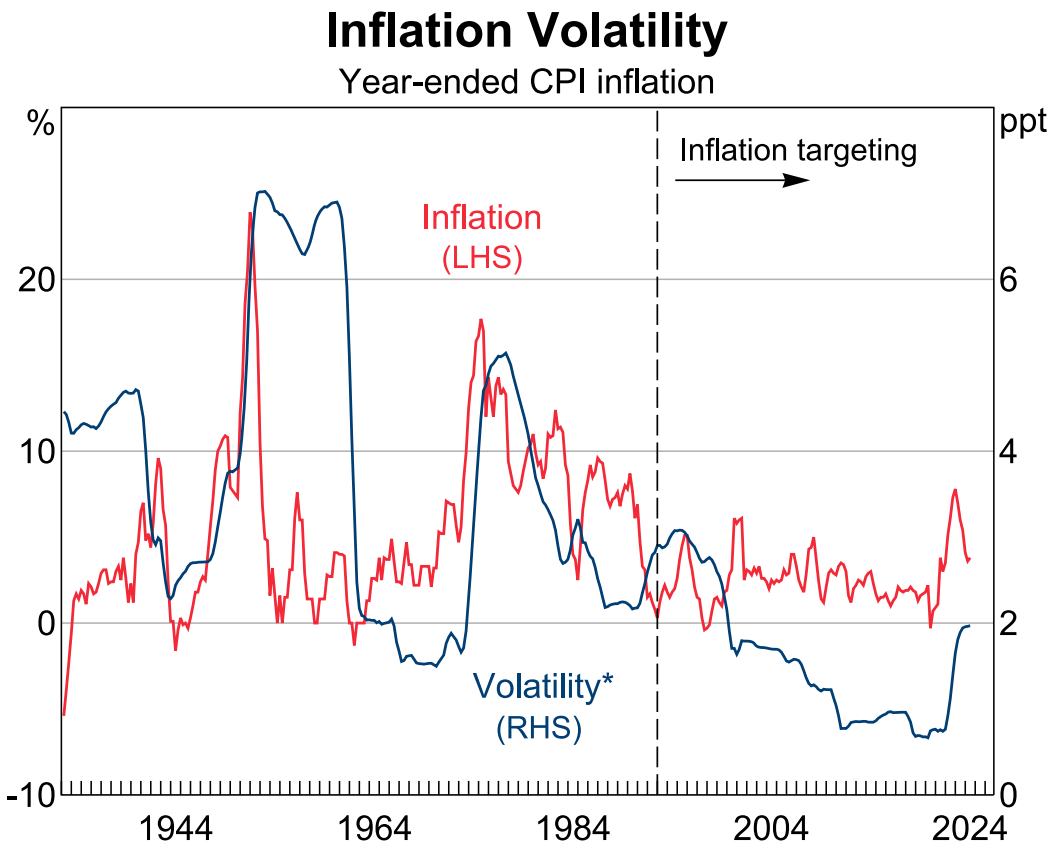
* Data up to June quarter 1995 include males only due to data availability.

Sources: ABS; RBA.

And given that this is an investment conference, I'd be remiss not to mention how important inflation expectations are to the domestic and international portfolio allocation decisions made by financial market participants. These expectations then feed into long-term interest rates, exchange rates, and the prices of assets in our superannuation funds and all other investment portfolios. In short, inflation expectations are a factor in pretty much every economic decision that's made every day.

The fact that expectations feed into actual inflation outcomes means de-anchored expectations typically leads to greater inflation volatility (Graph 4). Volatility breeds uncertainty, and uncertainty makes decisions harder for everyone. As a business, how do you decide when it's right to invest if you're less sure of the financial returns? And to go back to the example of households deciding how much to save for retirement or to buy a home, a bout of unexpectedly high inflation is very hard to plan for. Both the effort required to make decisions with uncertainty, and that some otherwise good decisions will not be made, makes us all worse off.

Graph 4



* Standard deviation of year-ended CPI inflation over previous 10 years.

Sources: ABS; RBA.

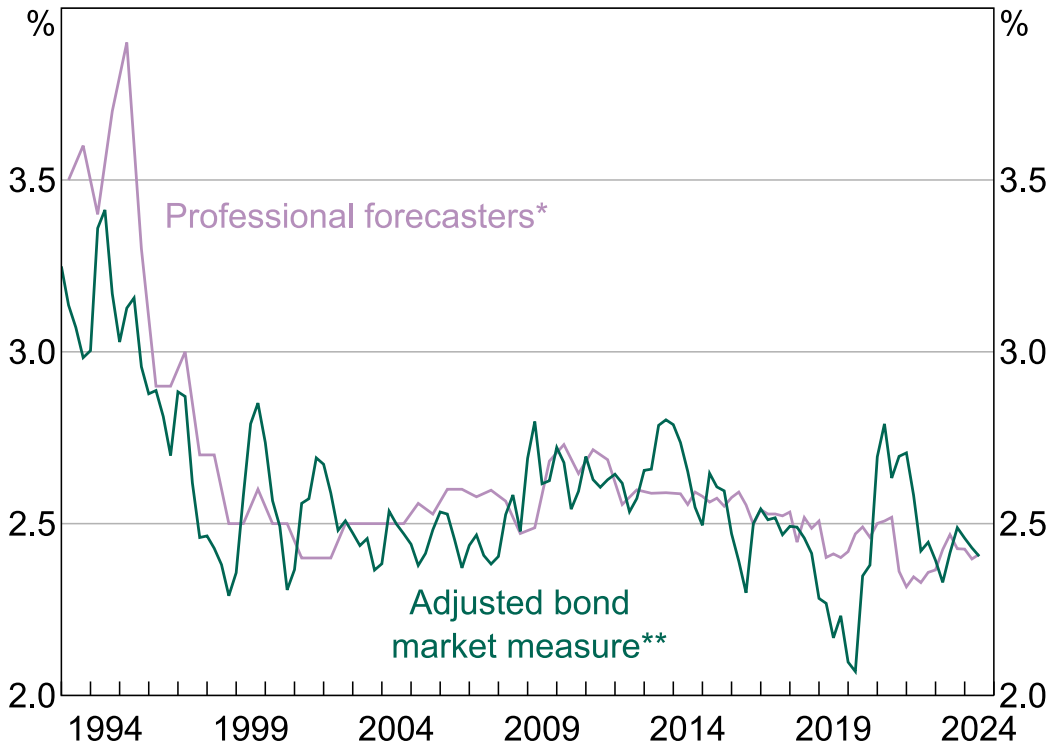
Tracking inflation expectations

Given the enormous damage that such de-anchoring can cause, and that policy can be enacted more flexibly while expectations remain anchored, the RBA Board is constantly alert for signs that this risk might emerge here in Australia.[7] It does that by tracking a range of inflation expectations measures, including multiple financial market measures, and surveys of households, unions and professional forecasters.[8] That analysis indicates that inflation expectations have not become de-anchored through the current high-inflation experience (Graph 5).[9]

Graph 5

Long-term Inflation Expectations

Average over the five years starting from five years ahead



* Average of responses from a survey conducted by Consensus Economics.

** Bond market measures of expectations can be affected by changes in risk; here, we have extracted the estimated risk component.

Sources: Consensus Economics; Hambur and Finlay (2018); RBA.

So we're not currently concerned that expectations could become de-anchored in the near term. But we do think it's important that we track how they're evolving and that we understand how expectations are formed, so we can monitor whether there are any signs of this risk materialising in the future.

As I've already alluded to, there are a number of different groups across the economy, and each plays a part in determining aggregate macroeconomic outcomes. To understand what's happening to expectations, we therefore need to understand how different groups form their inflation expectations, as they each play critical roles in determining how the economy evolves over time.

For consumption/savings decisions, households' own expectations matter the most. For wage bargaining and competition for labour, unions' and firms' expectations likely matter most. And when it comes to how inflation expectations feed into long-term interest rates, it's the financial markets' expectations that matter.

In short, given the importance of inflation expectations as a driving force of many economic decisions, we need to understand how all of the different groups across the economy form their inflation expectations so that we can do our best to keep them anchored.

So today I'm going to discuss some of the latest research in this area, which we have conducted ourselves and in partnership with our colleagues in academia. This includes a Research Discussion Paper that has been released in parallel with this event, which explores some of the points below in more detail – I encourage you all to have a look at my colleagues' work. [10]

The presentation I am giving today draws heavily on a presentation at one of the first 'Policy Issues Meetings' with RBA Board members earlier this year. As previously highlighted by Governor Bullock, these meetings:

… assemble a group of staff with the right experience and expertise to give the members insights and diversity of perspectives on the key issues relevant for policy. It will provide analysis of issues that are relevant to a few upcoming [Board] meetings, not just the immediate one. [11]

These new meetings have been very well received by Board members. They have appreciated the opportunity to explore policy-relevant topics in more depth and to meet with more of the staff that are engaged in the work. In turn, staff have valued the additional engagement with their work, so it's been a clear win-win.

For most of this speech, I'll be focusing on household and union expectations, and mostly on short-term expectations. In the past, how these groups form expectations has been less well-understood, and this is why we've focused our latest research here.

But before turning to unions and households, it is worth mentioning that we have a reasonable understanding of how financial markets form expectations. Financial markets efficiently incorporate signals about the likely future direction of inflation into market prices; by taking active positions that are contingent on economic outcomes, it's no surprise that market participants keep themselves very well-informed about what's happening. From these prices, we can discern whether their short- and long-term expectations remain anchored to the RBA's inflation target. [12]

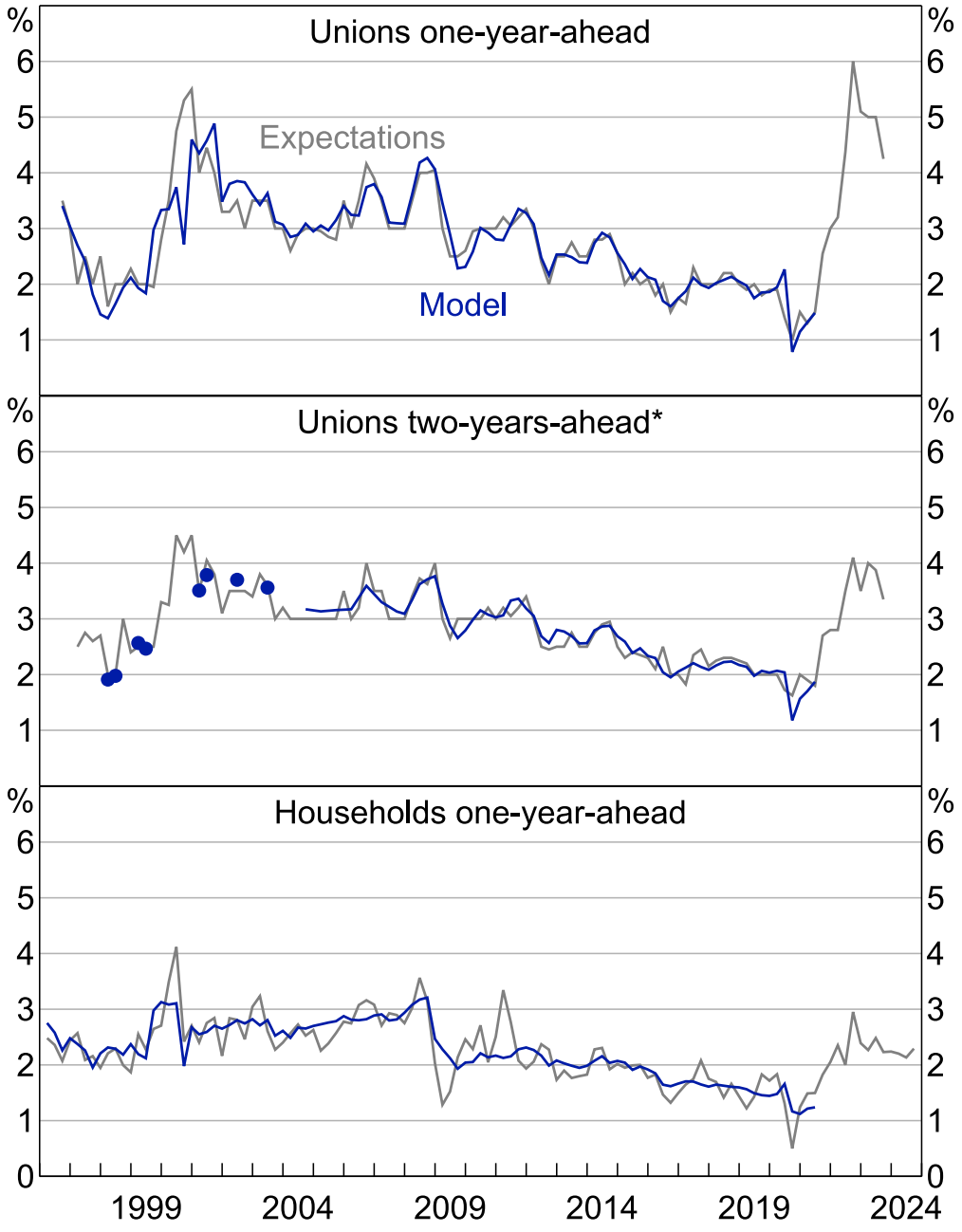
To understand how households and unions form their expectations, we've collaborated with academic colleagues to develop a very general model approach that we've then applied to different data series. The model assumes that some people form their expectations by extrapolating from their previous experience. That is, they assume that their experience of price increases in the past are a good guide for what they'll experience in the future. The model also assumes that some people build on this and

take account of forward-looking information as well. For example, they might expect to see a sharp increase in grocery prices in the future if it's reported that the harvest has been poor.

The first iteration of the model was run through to around the middle of the pandemic. The graph shows the fit of the model to actual data. In the grey lines are unions' one- and two-year-ahead expectations, and households' one-year-ahead expectations (Graph 6). [13] And then the blue lines are the model estimates of each of these. [14]

Graph 6

Inflation Expectations



* Dots used for model estimates pre-2004 due to data availability.

Sources: Australian Council of Trade Unions; Beckers and Brassil (2022); Brassil, Haidari, Hambur, Nolan and Ryan (2024); Employment Research Australia; Melbourne Institute; Workplace Research Centre.

We think the model did a reasonable job over the historical period. Especially for unions, where the model pretty much captured every major wiggle in their expectations.

We've learned a lot from this process, but there are three key insights that I want to highlight:

1. We estimate that around three-quarters of households and unions form their expectations by extrapolating from their lived experience. That is, they observe what inflation was yesterday and compare it to what they expected. Every time inflation turns out higher than what these people expected, they partially adjust their expectations up.
2. This extrapolation process happens a lot slower for households than it does for unions. That is, households only adjust their expectations a small amount each time they are surprised. As a result, inflation has to be persistently higher or lower than previously expected for expectations to change significantly.
3. The remaining one-quarter of unions and households don't just extrapolate, they incorporate a lot more of the broader economic information available to them (beyond inflation outcomes themselves) to make forward-looking judgements about where inflation is likely to go. In principle, this is similar to the RBA's forecasting process – we look at past outcomes and forward-looking indicators to assess how we think inflation will evolve from today.

Of the roughly 25 per cent who take on board additional information, this could come from a number of different sources. To carry on my groceries example from earlier, in 2011 this group might have expected that banana prices would shoot up in the months after Tropical Cyclone Yasi struck northern Queensland, given the reporting of the damage to that year's crop.[15] Or this group could be looking at economic forecasts – including the RBA's – to get a sense of where inflation may be heading.

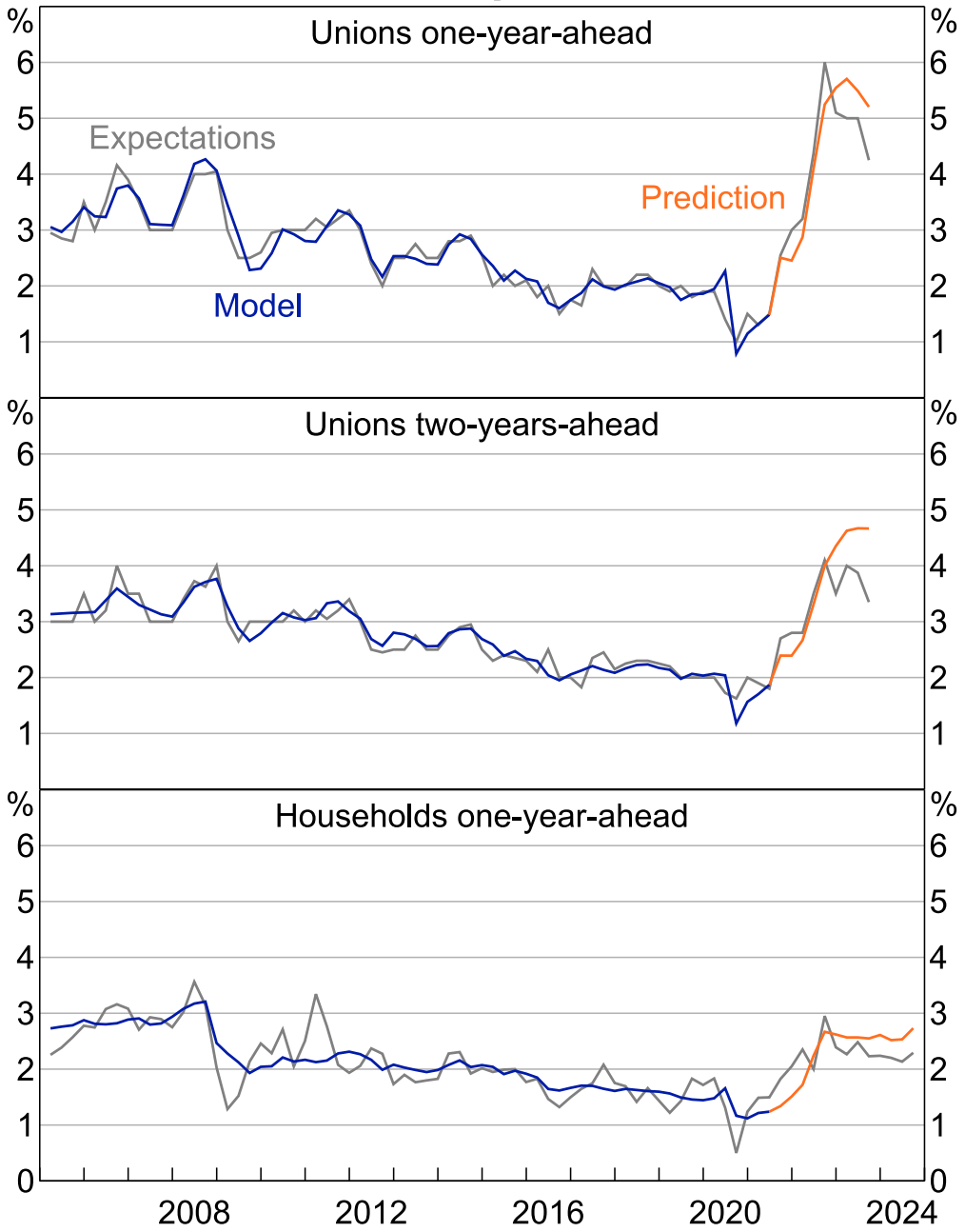
With this better understanding of how people form their inflation expectations, we can now assess how they have evolved recently, relative to what the models expected they would do.

Less extrapolation recently could reflect greater attention to inflation or recognition that the recent episode is temporary

The orange line is the model's prediction for how inflation expectations would evolve during the recent high-inflation period (Graph 7).[16] While inflation was rising, expectations were evolving in-line with the model's output. But the model suggested that the turning point in expectations would come later. So expectations are currently lower than our models thought would be the case.[17]

Graph 7

Inflation Expectations



Sources: Australian Council of Trade Unions; Beckers and Brassil (2022); Brassil, Haidari, Hambur, Nolan and Ryan (2024); Employment Research Australia; Melbourne Institute; Workplace Research Centre.

As best we can tell, the models missed the turning point because unions and households have been extrapolating less from the recent high inflation outcomes.[18] The model attributes part of this to an increase in the share of people who take on board forward-looking information, from around one-quarter to over two-thirds for unions.

This finding is consistent with a theory known as the 'rational inattention' hypothesis.[19] The idea being that when inflation is low and stable, extrapolation from the past provides a reasonably accurate expectation of the future, so it is not worth paying more 'attention'. Conversely, when

inflation does not fit this pattern – for example, in the recent past when it was much higher – extrapolation might provide a poor forecast. So it is 'rational' for people to put more effort into thinking about where inflation will head next.

Another finding from the model is that those who use previous inflation to form their expectations, that is they use yesterday's experience to guide today, have been adjusting their view more slowly in recent years. A possible reason for this is that some people have seen the recent experience as atypical and so don't expect it to continue – given the nature of the shocks (the pandemic and then the conflict in Ukraine), it's easy to understand this. So while this group only use previous inflation outcomes to form their expectations, they do appear to adjust how much weight they put on specific outcomes to take account of broader economic conditions.

Unfortunately, these are just plausible hypotheses at this point, we don't have enough evidence to be definitive. If once inflation sustainably returns to the target band expectation formation reverts to how it was before the recent episode, that would provide further evidence in favour of these hypotheses. But more importantly, it would give us comfort that in future inflationary episodes, expectation formation might similarly change in a way that mutes the increase in expectations.

Another possible explanation is that some more 'salient' prices have evolved differently to average prices

In everything I've shown so far, we assume that the price increases that matter most are the ones that people spend most of their money on. Which is exactly how the Consumer Price Index, or CPI, is constructed.

But that might not be how people extrapolate from what they have previously observed to form their expectations. Our lived experience is that we 'see' some prices much more frequently than others, and that some price changes are more noticeable than others.

Prices that change regularly or that people pay often may be particularly influential when people form their expectations – they're more visible, and they could be seen as a proxy for what's happening to all prices across the economy. These are known as salient prices.[20]

While there are some obvious candidates for prices that may be salient – such as fuel, groceries, rent, and energy prices – determining how salient they are has unfortunately proven difficult.

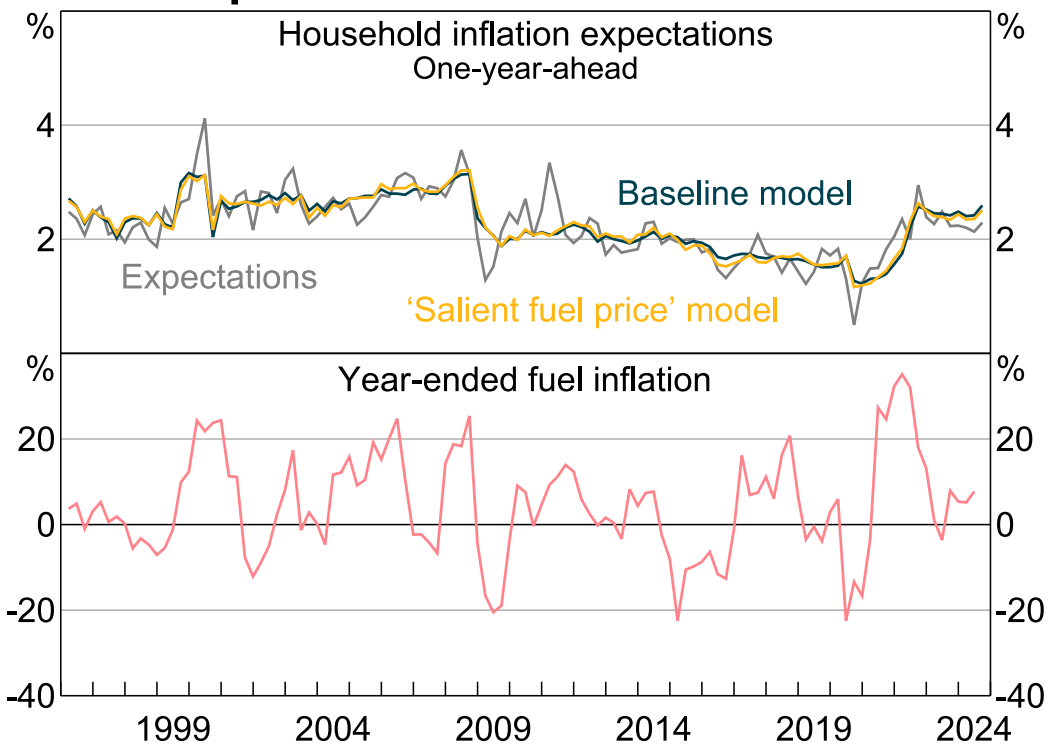
The strongest result we have obtained is with respect to petrol and diesel prices – that is, the prices you see changing every day when you drive past a petrol station or fill your car up. For other potentially salient prices, whether or not our models identify them as salient depends on the various other modelling decisions that are made. But for fuel prices, it doesn't seem to matter what you do to the model, these prices almost always show up as salient.

Having said all that, allowing for fuel to be a salient price in the model does not significantly change the model's estimate of inflation expectations most of the time. This occurs because fuel prices are volatile and households learn slowly. So it actually takes an extended period of fuel prices evolving differently to other prices before there would be a meaningful impact on expectations (according to the model).

But that's exactly what we have seen in the past few years (Graph 8). From the beginning of 2021 until mid-2022, fuel price inflation was much higher than average price inflation, increasing 61 per cent over this period.[21] But for most of the period since then, fuel price inflation has been around its historical average, while much of the broader consumption basket has continued to experience above-target price inflation.

Graph 8

Expectations and Fuel Inflation



Sources: ABS; Brassil, Haidari, Hambur, Nolan and Ryan (2024); Melbourne Institute.

So, for household's expectations, accounting for the salience of fuel prices can at least partially explain why the simpler inflation expectations model presented earlier predicted that short-term inflation expectations would remain higher for longer.

Conclusion

To conclude, recent research has improved our understanding of how people form inflation expectations. As a result, we have been able to better analyse how expectations have evolved during the recent high-inflation period. And it's a good news story with respect to expectations:

- Short-term expectations appear to be converging towards long-term expectations, and these have remained anchored through the recent past.
- There's no evidence of expectations being more persistent than normal.
- And there's even some evidence of households and unions extrapolating less from recent inflation, at least during the period of higher inflation.
- We need to be mindful of certain prices that may be particularly 'salient' for households. But such prices work in both directions, and recently have been working to bring expectations down faster.

Endnotes

[*] I would like to thank Anthony Brassil and Callum Ryan for their assistance in writing this speech. Helpful feedback was provided by Michelle Bergmann, Samuel Evangelinos, Andrew Hauser, Brad Jones, Christopher Kent and Martin McCarthy.

[1] For further discussion, see Bullock (2024); Wood, Chan and Coates (2023); Beckers *et al* (2024).

[2] For a fuller discussion of the costs of high inflation, see Bullock (2024).

[3] For surveys of US and European households, see Charm et al (2022); Bazzoni *et al* (2022).

[4] Economic history is clear that hyperinflation, where expectations are completely de-anchored and money supply growth is extremely rapid, produces very bad outcomes (e.g. the experience of Germany in the early 1920s, Hungary in the 1940s, through to Zimbabwe and Venezuela in the last 20 years). There is also plenty of evidence of poor outcomes under high inflation experiences, such as the United States in the 1970s (see Blinder (1982) for a short summary) and Türkiye today. On the other side, Japan's experience over the last 30 years highlights the difficulties of zero inflation/deflation.

[5] On the pass-through of labour costs into prices, see Ampudia, Lombardi and Renault (2024); Chin and Lin (2023); Suthaharan and Bleakley (2022).

[6] For an analysis of union bargaining power, see Bishop and Chan (2019).

[7] For discussion on the policy flexibility afforded by anchored expectations, see Bernanke (2013); Borio *et al* (2023).

[8] For detailed expositions, see Moore (2016); Beckers and Brassil (2022).

[9] See RBA (2024) for a recent assessment of inflation expectations. In Graph 5, the 'adjusted bond market measure' extracts the expected inflation rate from bond market prices using the Hambur and Finlay (2018) affine term-structure model, the parameters of which are disciplined by survey data.

[10] See Brassil *et al* (2024).

[11] Bullock (2023).

[12] The anchoring of these expectations is discussed further in RBA (2024).

[13] For the model estimates of unions' two-years-ahead expectations, dots are used prior to 2004 due to model data availability. For more information, see Beckers and Brassil (2022). The household measure of expectations used in this research is the average of responses excluding responses in exact multiples of five (i.e. 5, 10, 15 etc) as constructed by Haidari and Nolan (2022). This measure is used because the average that includes these rounded responses has a large upward bias relative to historical inflation outcomes. While there are other methods of removing this bias, previous research has found that changes in rounded responses tend to reflect changes in uncertainty: see, for example, Binder (2017); Reiche and Meyler (2022). And while uncertainty affects decision-making, the mechanism is separate to how inflation expectations affect decisions. The authors of this research therefore conclude that removing rounded responses is a more transparent and well-justified approach to removing this bias than other methods.

[14] For details of the model, see Beckers and Brassil (2022); Brassil et al (2024); Brassil, Gibbs and Ryan (forthcoming).

[15] Banana prices increased by over 400 per cent between June 2010 and June 2011.

[16] The 'prediction' uses the original model estimates and then projects the model forward using the model inputs available at each point in time. See Brassil *et al* (2024) for model details.

[17] Unions' expectation data are available until September 2023.

[18] See Brassil *et al* (2024)

[19] See, for example, Sims (2003); Coibion *et al* (2020); Afrouzi and Yang (2021); Maćkowiak, Matějka and Wiederholt (2023).

[20] For further discussion and exploration of salient prices, see Binder (2018); D'Acunto et al (2019); De Fiore *et al* (2022); Kilian and Zhou (2022); Chua and Tsiaplias (2024); Anesti, Esady and Naylor (2024).

[21] Percentage increase in automotive fuel between December 2020 and June 2022 (from monthly CPI data).

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The Reserve Bank of Australia acknowledges the Aboriginal and Torres Strait Islander Peoples of Australia as the Traditional Custodians of this land, and recognises their continuing connection to country. We pay our respects to their Elders, past and present. Aboriginal and Torres Strait Islander peoples should be aware that this website may contain the names, images and voices of people who are now deceased.