

Shedding Light on Uncertainty: Using Scenarios in Forecasting and Policy



RESERVE BANK OF AUSTRALIA

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I would first like to pay respect to the traditional and original owners of this land, the Kaurna people, 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.

Today I am going to talk about how the RBA uses scenarios – that is, alternative possible pathways for the economy to help us think through the outlook for the economy and set monetary policy.

Our baseline forecast of how the economy may evolve is a key input to the monetary policy decision. It represents what we think is the most likely single path for the economy. But it's only one path, and the chance of that precise path being the one that happens is approximately zero. So, acknowledging the uncertainty inherent in our forecasts is core to making good policy decisions.

The systematic use of scenario analysis is common in many professions where decisions are made under uncertainty – economists are not alone in not knowing exactly how things will play out. For example, scenario analysis is a fundamental part of financial stress testing exercises that are conducted on a regular basis by prudential regulators. Many central banks use scenarios internally to inform their policy decisions, and some publish them. The value of scenarios has been re-emphasised by the recent Bernanke Review of the Bank of England and our own RBA Review, which recommended greater use of scenarios to inform policy.¹

So, why are scenarios useful?

As forecasters, they can help us think through and communicate risks around our baseline. For example, by identifying which risks the forecast might be particularly sensitive to, and the balance of risks around the central case. They can also help us keep an open mind about alternative explanations for how the economy is evolving.

For policymakers, scenarios can provide a tangible link between risks and policy strategy. They allow policymakers to explore how a given policy option performs depending on how risks play out, or to compare alternatives. They also have the potential to help policymakers communicate how monetary policy may respond as conditions evolve – in economists' parlance, to better communicate their reaction function.

I'll develop these points in the rest of my remarks, and along the way talk through some examples of recent scenarios we have used. But before I get into scenarios, I want to briefly set the scene by outlining the baseline forecast process, and why the forecasts almost always turn out to be wrong in some way.

Forecasts are an important input to monetary policy ...

The baseline forecast represents our central view of how the economy will unfold, conditional on a series of assumptions including the exchange rate and the market-implied path for the cash rate. The forecasts also embed a set of judgements about how the economy may evolve. We typically call out the judgements we think are most important in the *Statement on Monetary Policy* (SMP), alongside the forecasts. Recently the key judgements have included assessments of the supply capacity of the economy, the trajectory of the labour market, and the extent to which households will spend their income.

The judgements and forecasts are built on a wide range of analysis of the data, models that embody relationships and linkages across the economy, and our assessment of how these relationships may evolve differently to what we've seen in the past. As well as resulting in quantitative forecasts, this process helps to refine the staff's narrative for the economy. Constructing a narrative in parallel with detailed outcomes can help test the forecasts and it helps us to communicate our view of the economy.

But we know the future is uncertain, and the forecasts will usually be wrong in various ways. Given the uncertainty in forecasts, why spend so much time and effort on them? The answer is that monetary policy operates with a lag, which means the Board needs to think ahead when setting the cash rate target today.

Given the importance of looking ahead in the monetary policy decision and the fact that we know forecasts often do not come to pass, there is significant value in thinking through the ways in which actual outcomes might deviate from the forecast. As we will see, scenarios help us do that.

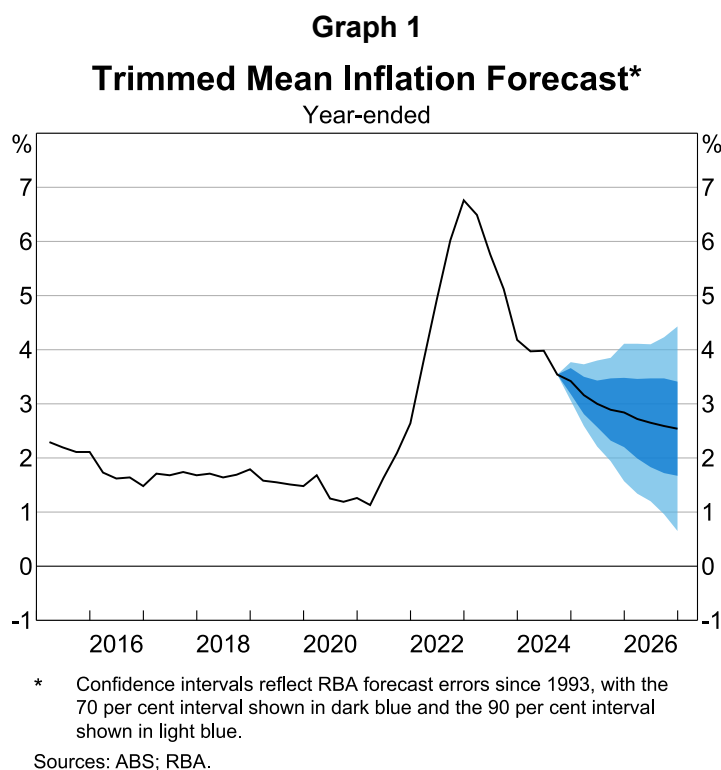
... but all forecasts turn out to be at least partially wrong

But first, why do forecasts turn out to be wrong? There are some things about the future we can be relatively confident about. For example, we know people typically spend more money in the last quarter of the year in the lead up to the holiday season. Observations like this are so normal that we always look through them and focus on the underlying picture.² That said, even the seasonal pattern of household spending is shifting, with the ongoing growth in Australia of Black Friday sales in November displacing some spending from December. That is just the tip of the uncertainty iceberg – there are many reasons why actual outcomes depart from the forecasts:

- Most obviously, unpredictable events that will have a meaningful impact on the macroeconomy can happen. Think of the pandemic, an unexpected change in domestic or foreign government policy and one-off weather events that affect prices or economic activity.
- Relationships between variables can turn out differently than expected – for example, households might save more (or less) of their income than they usually do. Or, our models and analytical frameworks designed to capture these relationships could be incorrect or incomplete.
- Assessments of the current state of the economy could be wrong. That could be due to imprecise data – which are often subject to sizeable revisions – or imprecise assessments of economic concepts like spare capacity that we can only infer from the data. Any errors in the assessment of the current state of the world are likely to translate into forecast errors.
- Undetected or uncertain structural changes in the economy can cause unforeseen outcomes. A change in the potential growth rate of the economy – maybe caused by the green energy transition, AI adoption or other technological changes – would have wide-ranging effects on variables we forecast.

These examples are specific cases where our baseline outlook for the economy may not come to pass. One way of quantifying and communicating general uncertainty in the forecasts is the 'fan charts' that the RBA shows in the SMP. These charts show the historical range of forecast errors around the current central forecasts, in this case

inflation (Graph 1). The dark blue range shows that 70 per cent of two-year ahead inflation forecasts have fallen within ± 1 percentage points of the central forecasts since 1993, and 90 per cent fall within ± 2 percentage points.



This picture highlights that we can't be very confident that our central projections will come to pass!

Scenarios help us understand and communicate specific risks and judgements

While the fan charts illustrate the typical level of uncertainty around our forecasts, scenarios enable a richer discussion of specific ways in which our baseline forecasts may be wrong. This could be due to any of the sources of uncertainty I talked about earlier – the risk of unpredictable events, economic relationships turning out to be different to what we thought, and so on.

Constructing a scenario involves making alternative assumptions to the ones in our baseline forecast about how things we are uncertain about play out, and thinking through what that implies for the economic outlook. We often use economic models to explore how these alternative assumptions affect economic outcomes.

Part of the value of producing scenarios is that they help us build our own understanding of which risks are important, because the scenario makes clear how sensitive the outlook is to a given risk. That can help us decide which issues we need to dig into more to understand better.

Scenarios also provide a way for us to communicate the risks that we think are most important, and a tangible way of illustrating and quantifying them. By tracing through the impact of a risk onto both inflation and unemployment, they help us to understand how risks around those variables are connected in a way that fan charts cannot.

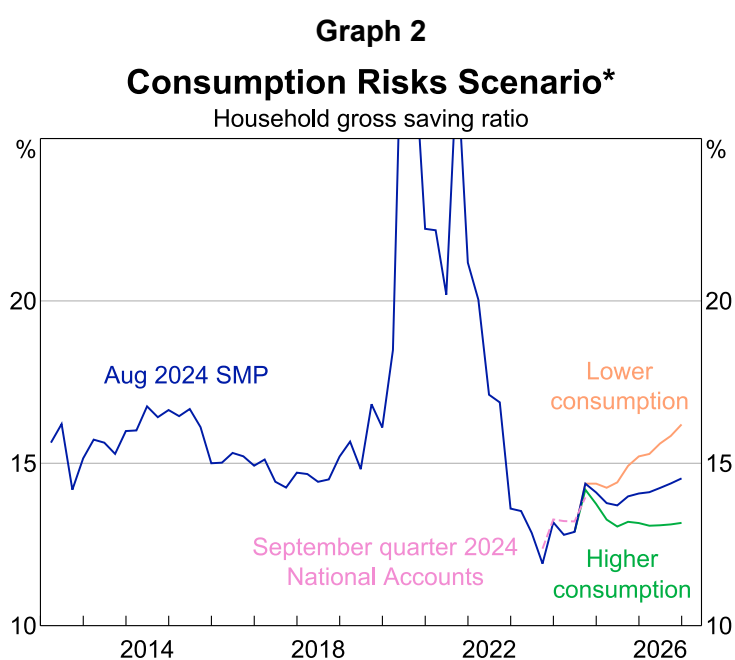
For us as forecasters, there is a further possible philosophical benefit to producing scenarios: I wonder if it might reduce the chance that we become too attached to our central forecast narrative. Constructing scenarios means thinking through alternative narratives, and that should help us keep an open mind when our central forecast turns out to be wrong. And as I said earlier, it almost certainly will be wrong in some way.

More concretely, scenarios can help us identify the indicators and outcomes that will tell us when we are deviating from our baseline view. This helps us to identify when things are playing out differently, allowing us to update our baseline forecast accordingly.

I'll return in a minute to talk about the value of scenarios in informing the policy decision. But let me first give two recent examples of scenarios we have used.

Household income growth and consumption

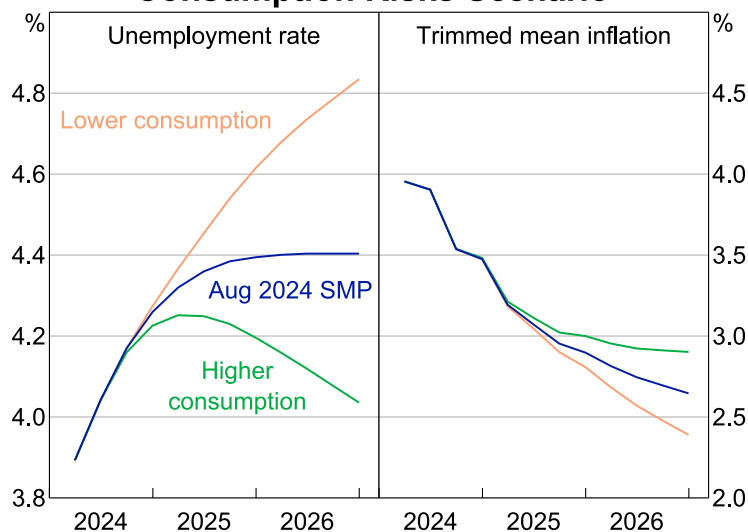
A key uncertainty we've been considering recently is how household income growth will affect consumption in the coming years. Household real income is currently being lifted by the Stage Three tax cuts taking effect. But we cannot be certain how consumers will react to this lift in income. Running different scenarios allows us to see how the different responses might play out and how material this would be for the labour market and inflation. The alternative plausible paths for consumption (Graph 2) and the savings rate led to noticeably different paths for inflation and unemployment that would have consequences for policy setting (Graph 3).³



* Scenario assumes exchange rate and policy path are fixed to August 2024 SMP assumptions; outliers during the COVID-19 pandemic have been truncated.

Sources: ABS; RBA.

Graph 3
Consumption Risks Scenario*



* Scenario assumes exchange rate and policy path are fixed to August 2024 SMP assumptions.

Sources: ABS; RBA.

We first published these scenarios in our August SMP.⁴ As the charts show, the different cases have material implications for inflation and the labour market. With this in mind, RBA staff are closely monitoring actual outturns and assessing their implication for the outlook for the labour market and inflation. To relate this to the chart, we're evolving our assessment of whether we're on the orange, blue or green lines. And the answer to this question is critical to the Board, as a move to the scenarios depicted in green or orange may require a change in policy strategy – I'll return to that point later.

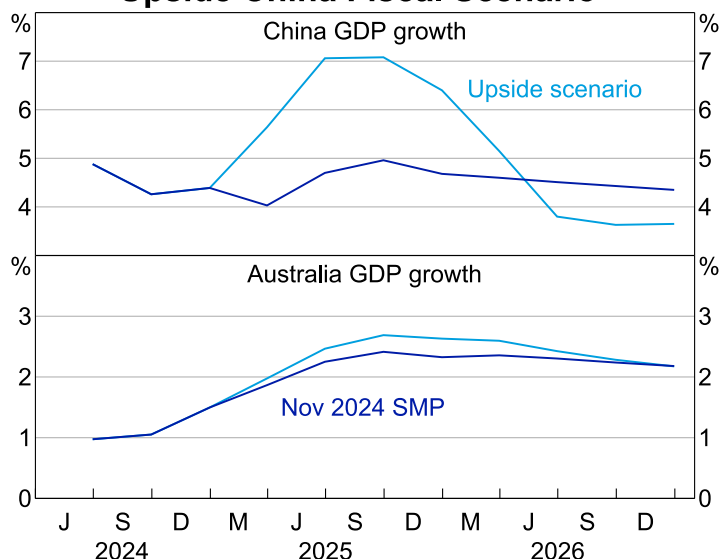
Higher Chinese fiscal spending

External risks to the Australian economy can also be interrogated with scenarios. At any given time, there are many known external risks (as well as unknown unknowns). Deputy Governor Andrew Hauser discussed one of the key unknowns, the global trading environment, in his speech earlier this week.⁵ Another current example of a material external risk is the path of future Chinese fiscal policy. China is a large economy and Australia's largest export destination, which means its trajectory is important for Australian monetary policy setting. One way we have explored that is to consider the effects of Chinese fiscal spending being higher than expected. There are several ways this could affect the Australian economy:⁶

- Stronger demand in China increases prices for commodities that Australia exports as well as the price of Chinese exports to Australia. Higher commodity prices increase Australian corporate profits and government tax receipts, some of which could lead to increased spending.
- Stronger Chinese demand also increases demand for other Australian exports. Services export volumes are more responsive to demand so there would likely be a direct activity channel for service exports. This could be offset to some extent, however, through adjustments via the exchange rate.
- Similarly, stronger demand in China lifts activity in China's other trading partners, many of which are important destinations for Australian exports.
- Financial channels impact the Australian economy. While direct financial links with China are minimal compared with trade links, Chinese activity influences exchange rates and asset prices. A large Chinese stimulus package would likely be associated with an appreciation of the Australian dollar and potentially boost equity market sentiment.

The scenario we consider is a very large stimulus package, beyond what we have assumed in our current baseline forecast profile (Graph 4). It is not an outcome we think is likely to be announced in the near term. Looking at a large, if unlikely, stimulus gives a sense of what it might mean for the Australian economy and also illuminates the channels that would be at play for a smaller stimulus (Graph 5).⁷ While here we look at the impact of a stimulus package in isolation, in practice a large stimulus would be most likely if growth prospects in China were to deteriorate for some reason. In that case, the impact on the Australian economy would differ from the scenario.

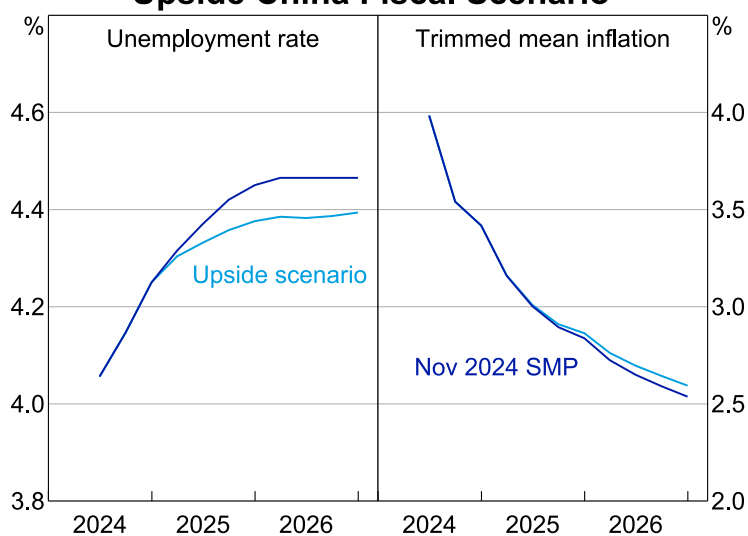
Graph 4
Upside China Fiscal Scenario*



* Year-ended; China fiscal scenario assumes CNY4 trillion additional fiscal spending on a CNY2 trillion fiscal spending baseline; scenario assumes exchange rate responds endogenously and policy path is fixed to November 2024 SMP assumptions.

Sources: ABS; CEIC Data; RBA.

Graph 5
Upside China Fiscal Scenario*



* China fiscal scenario assumes CNY4 trillion additional fiscal spending on a CNY2 trillion fiscal spending baseline; scenario assumes exchange rate responds endogenously and policy path is fixed to November 2024 SMP assumptions.

Sources: ABS; RBA.

Scenarios and monetary policy

The goal of all this work is ultimately to help inform good monetary policymaking.

I've already explained how scenarios help us understand and communicate the importance of different risks to the outlook⁸ and the economy's sensitivity to different channels. For example, the China fiscal stimulus scenario shows how Australian outcomes might be affected by Chinese policy, and how transmission of the stimulus might be sensitive to movements in the exchange rate.

I will focus now on how scenarios can inform the policy decision itself. Clearly, central forecasts are important inputs to monetary policy decisions. But the extent of uncertainty means it's equally important for policymakers to consider alternative scenarios, their likelihood and how their strategies might need to adapt.

The key point is that scenarios help to make the link between forecast risks and policy strategy. That helps the Board think through policy options and communicate their thinking. In particular:

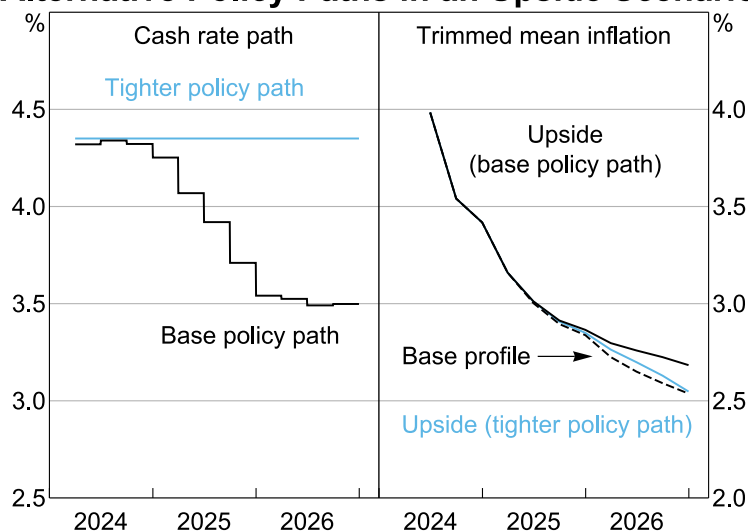
- Scenarios allow policymakers to consider how to make their strategy more robust to key risks materialising. That might mean choosing a policy strategy that performs well – in terms of inflation and employment outcomes – under a range of possible scenarios, rather than just in the most likely central forecast.
- Scenarios can also help the Board communicate how policy settings might need to respond if the economic outlook unfolds differently to our baseline. As flagged earlier, in economist-speak they can help the Board to communicate its reaction function to financial market participants and the public, helping them understand what might happen to interest rates over time. For example, the November Board minutes show examples of the Board considering alternative risks to the outlook for household spending and the labour market, and mapping those through to the potential consequences for policy.⁹

To make this more concrete, Graphs 6 and 7 provide an illustration of the sort of scenarios we might look at to map from risks to possible policy responses. I should emphasise that these are not actual scenarios the Board has considered – while some central banks publish the alternative policy paths that inform their decisions, the RBA has not yet done so. The graphs show hypothetical policy responses to illustrative scenarios where demand and therefore inflation are stronger or weaker than a base profile.

The Board has consistently communicated that it is aiming to return inflation to the midpoint of the target band (2.5 per cent) in a timely manner while retaining as many of the gains in the labour market as possible. The two cases considered here do not achieve these outcomes. That is, they would not bring the economy back into balance in the second half of 2026; in the strong-demand scenario, inflation would remain above 2.5 per cent, while in the weak-demand scenario it would drop below 2.5 per cent by the end of the forecast horizon (see solid black lines in right-hand panels of Graphs 6 and 7).

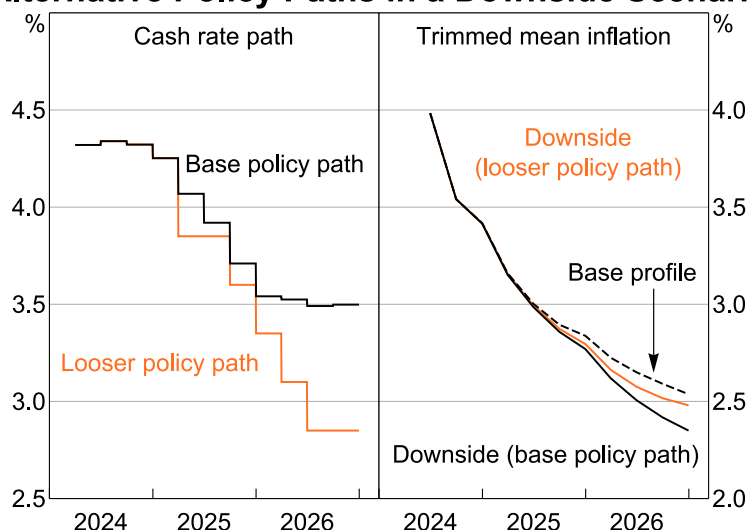
While the policy paths shown in these charts are not necessarily ones the Board would follow, the two scenarios are illustrative of how the strategy may need to be adapted as conditions unfold. In the upside scenario the Board may need to consider a tighter policy stance – this could be a rate hike or a longer period on hold. In the downside scenario, the Board may need to consider a looser stance – for example, by bringing forward rate cuts.

Graph 6
Alternative Policy Paths in an Upside Scenario



Sources: ABS; RBA.

Graph 7
Alternative Policy Paths in a Downside Scenario



Sources: ABS; RBA.

Conclusion

Where does all this leave us?

Each quarter, the RBA staff prepare a forecast for the economy, based on their careful assessment of the data, and past historical relationships, but acknowledging it relies on many judgments and assumptions. We select key judgments and risks to create scenarios that might differ from our central forecast. These scenarios help RBA staff understand the risks and they feed into the policy advice, though they only cover a fraction of the overall uncertainty.

The Board evaluates this information when setting policy, focusing on the strategy’s robustness amid inherent risks and the delayed effects of monetary policy on the economy. We hope the scenarios we publish help financial markets and the public better understand the forecasts and policy decisions, encouraging broader debate and discussion.

Endnotes

- * I would like to thank Tim Taylor, Thomas Cusbert and Nicholas West for their assistance in writing this speech and Andrew Hauser, Chris Kent, Brad Jones, Michael Plumb, Penny Smith, Dave Jacobs and Jeremy Lawson for their helpful comments.
- 1 See Bernanke BS (2024), 'Forecasting for Monetary Policy Making and Communication at the Bank of England: A Review', April; Australian Government (2023), 'Review of the Reserve Bank of Australia', Final Report, March. Although scenarios have only recently become a standard part of the policy process at the RBA, the need to consider uncertainty in forecasting and policymaking is well-tilled ground in speeches by RBA officials. For example, Stevens G (2011), 'On the Use of Forecasts', Address to the Australian Business Economists Annual Dinner, Sydney, 24 November; Debelle G (2017), 'Uncertainty', 7th Warren Hogan Memorial Lecture, Sydney, 26 October.
- 2 This particular observation is so typical that the ABS is able to take it into account in the data series it publishes. Seasonal adjustment is the process of removing the predictable fluctuations in economic data that the holidays and other regular calendar-based events create in order to more clearly reveal the underlying picture.
- 3 For this scenario taken from the August SMP we used the RBA's semi-structural macroeconomic model MARTIN – it captures the main empirical relationships we see in the economy so is useful for this kind of scenario.
- 4 RBA (2024), 'Statement on Monetary Policy', August.
- 5 Hauser A (2024), 'The Ghost of Christmas Yet to Come', Address to the Australian Business Economists' Annual Dinner, Sydney, 11 December.
- 6 See Guttman R, K Hickie, P Rickards and I Roberts (2019), 'Spillovers to Australia from the Chinese Economy', RBA *Bulletin*, June.
- 7 For this scenario, we again used MARTIN to consider the domestic implications. But because the focus of MARTIN is the Australian economy, we also leant on the Oxford Economics model of the global economy and literature on the effect of Chinese growth on commodity prices to calibrate some of the international transmission mechanisms.
- 8 Another dimension is the likelihood of any given scenario materialising. Defining objectively what the probability is of a given scenario materialising is generally not possible. Instead, staff and Board members must use their own subjective assessment.
- 9 See RBA (2024), 'Minutes of the Monetary Policy Meeting of the Reserve Bank Board', Hybrid, 4 and 5 November.