Appendix: How high could the RBA take the cash rate? Estimates of the neutral and terminal rate in Australia

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Full article: How high could the RBA take the cash rate? Estimates of the neutral and terminal rate in Australia
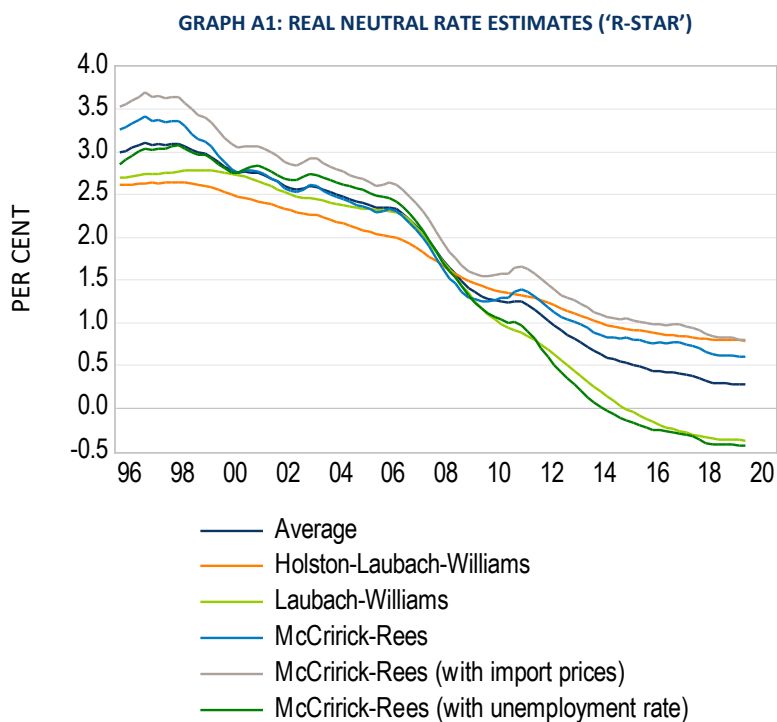
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This appendix provides more detailed results from the models described in Saunders (2022). These models include Australian versions of both Laubach and Williams (2001) and Holston, Laubach and Williams (2016), as well as the three models described in McCririck and Rees (2017).

Real neutral rate ('r-star')
The models' estimate r-star as the sum of two components: potential GDP growth and an unobserved component that accounts for the effect of other factors. The average estimate of the real neutral rate for Q4 2019 is 0.3 per cent, with the individual estimates ranging from -0.4 to 0.8 per cent (Graphs A1).

GRAPH A1: REAL NEUTRAL RATE ESTIMATES ('R-STAR')

Legend:
- Average
- Holston-Laubach-Williams
- Laubach-Williams
- McCririck-Rees
- McCririck-Rees (with import prices)
- McCririck-Rees (with unemployment rate)

Source: QTC

The downward trend in r-star is partly explained by a decline in potential GDP growth (Graph A2). However, lower potential GDP growth only explains around 40 per cent of the decline in r-star over the past 25 years, with the rest of the decline explained by factors that are not directly observed by the models.

GRAPH A2: POTENTIAL GROWTH ESTIMATES

Potential GDP growth and r-star

* Average of the individual model-based estimates

Individual potential GDP growth estimates
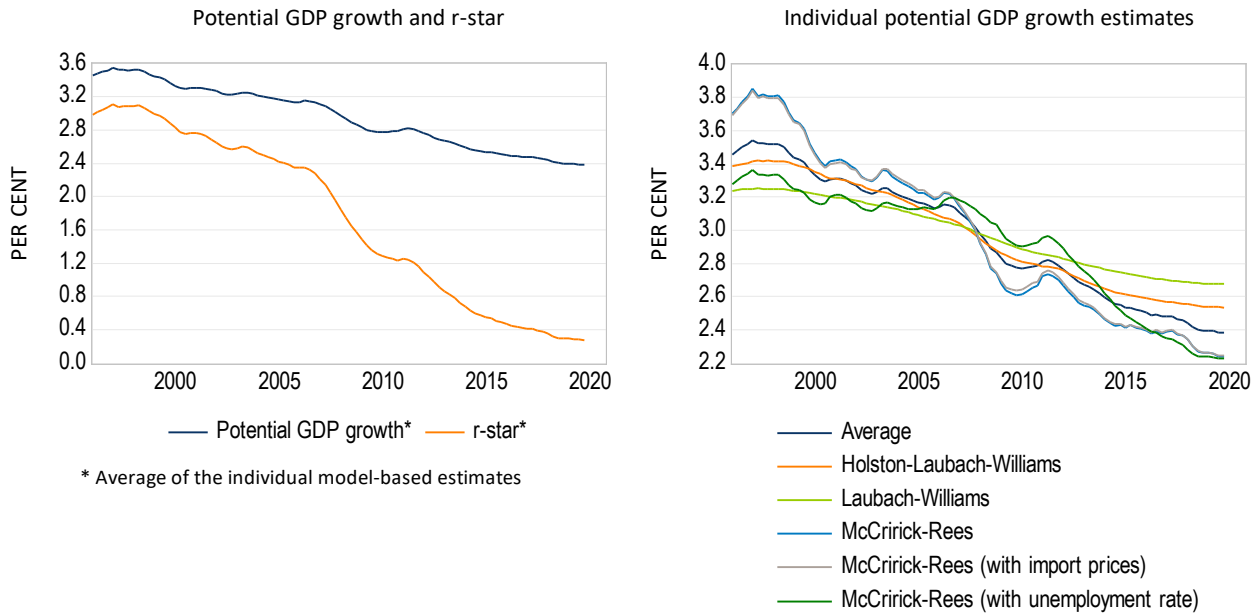
Source: QTC

Interest rate gap

The real interest gap provides a gauge as to whether monetary policy is expansionary or contractionary. We can estimate the real interest rate gap by comparing the *ex-post* real cash rate (that is, the cash rate adjusted for year-ended trimmed mean inflation) to our estimates of the real neutral rate. For example, a negative gap means that the real cash rate is below r-star, which should provide a boost to economic activity and inflation (and vice versa).

Graph A3 suggests that monetary policy has been stimulatory over much of the past decade, though the size of this stimulus increased noticeably in early 2020. The recent increase in trimmed-mean inflation has seen the real interest rate gap reach its most stimulatory level since the 1980s. These real interest rate gaps also do not account for other support measures provided by the RBA, including its yield curve target and the Term Funding Facility.
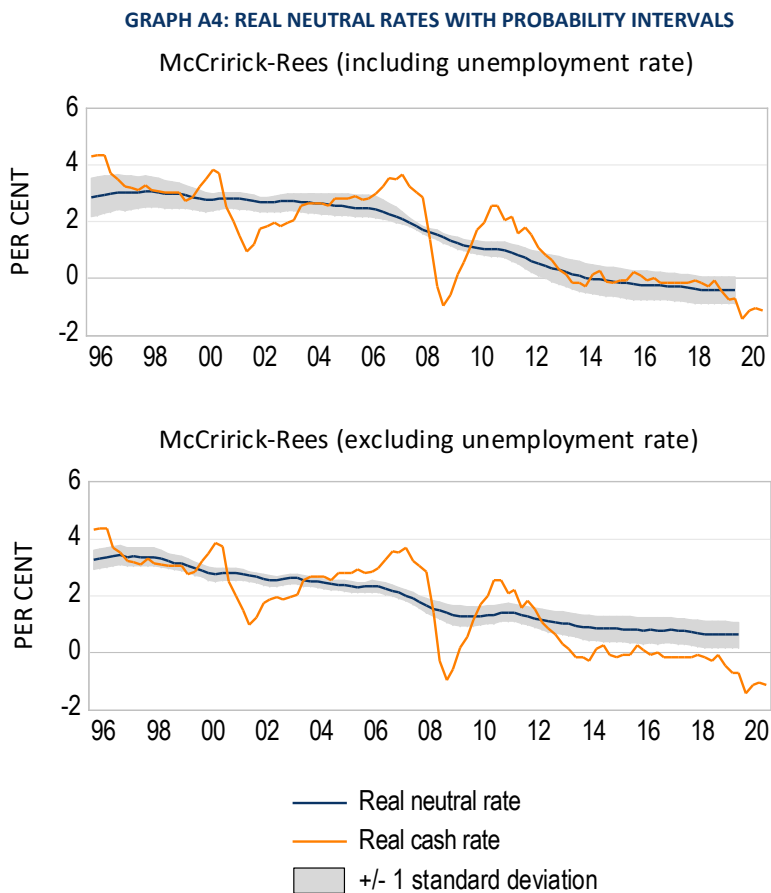
GRAPH A3: REAL INTEREST RATE GAP

Estimated real neutral rate

Real rate gap
(Real cash rate less neutral rate)
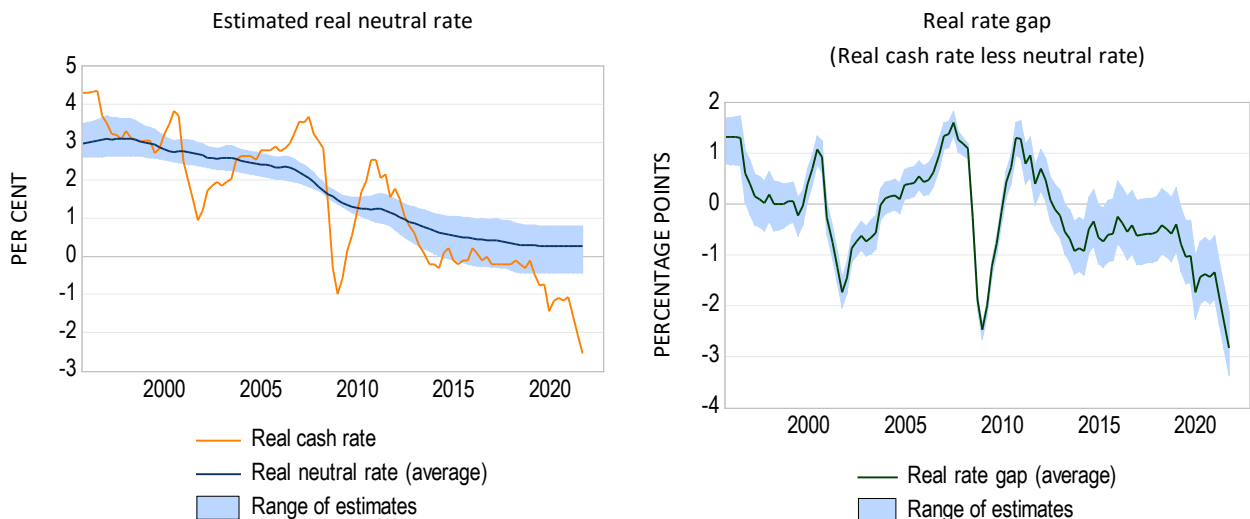
Sources: QTC; RBA

Accounting for uncertainty

There is considerable uncertainty around these estimates of the neutral rate. While I have attempted to address this issue by comparing the results across different models, it is also useful to estimate probability intervals around each of the estimates. I have provided this for two versions of the McCrirrick-Rees model in Graph A4.

The McCririck-Rees model that includes the unemployment rate suggests that there is a 68 probability of r-star being between -0.9 and 0.0 per cent. If we instead look at the model that excludes the unemployment rate, then this probability interval instead ranges from 0.1 to 1.1. This highlights how sensitive these models can be to different assumptions, with relatively small changes to the model resulting in noticeably different outcomes. Nonetheless, this uncertainty can be somewhat alleviated by estimating a range of different models and including probability intervals around the point estimates. When this is done for all of the models estimated in the article, a plausible range of estimates for r-star appears to be around -1 to 1 per cent.

GRAPH A4: REAL NEUTRAL RATES WITH PROBABILITY INTERVALS

McCririck-Rees (including unemployment rate)

McCririck-Rees (excluding unemployment rate)

— Real neutral rate
— Real cash rate
▨ +/- 1 standard deviation

Sources: QTC; RBA

Nominal neutral rate

In the article I have focused on the nominal neutral rate (rather than the real rate), as this is of more relevance for financial markets. The nominal neutral rate is simply the sum of the real neutral rate and inflation expectations. For inflation expectations, I have used a measure that is similar to that discussed by Cusbert (2017). This estimate suggests that expected inflation has increased to the middle of the RBA's target band, after having fallen to 2 per cent prior to the pandemic (Graph A5).

GRAPH A5: REAL NEUTRAL RATES WITH PROBABILITY INTERVALS
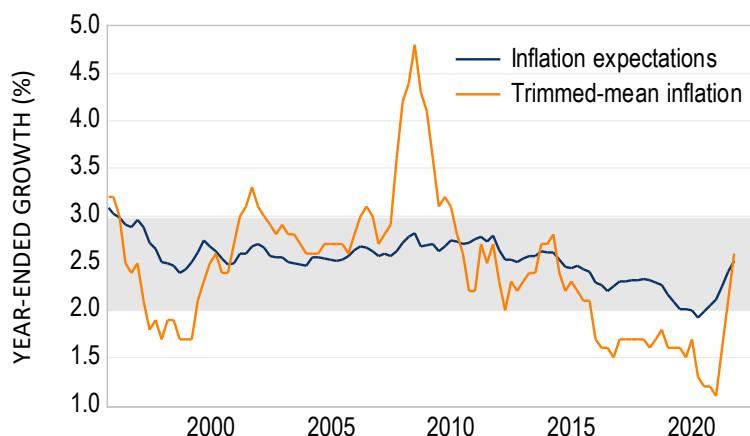
Sources: Refinitiv Datastream, QTC, RBA

The terminal cash rate

Financial market participants are often focused on the 'terminal rate', which is where the cash rate peaks in a tightening cycle or troughs in an easing cycle. While the cash rate should be guided towards its neutral rate over the course of the hiking cycle, there are a number of reasons why the cash rate might peak either higher or lower than the neutral rate. Some of the main reasons are discussed below.

- **Unexpected shocks:** The neutral rate is consistent with the economy being at 'equilibrium'. However, this is rarely the case, with the economy affected by various unexpected events (or 'shocks') at most points in time. If these shocks provide a boost to the economy, then the actual cash rate could peak higher than the neutral rate. Alternatively, a 'negative' shock could see the cash rate peak at a lower level.

- **Imperfect foresight:** Central banks do not have perfect foresight and the appropriate stance of policy can be uncertain in real time, even in the absence of external shocks. This is particularly relevant at present, given heightened uncertainty around the outlook for inflation. For example, if the RBA increased the cash rate too early in response to a transitory increase in inflation, then there would be a risk of the cash rate peaking at a level below the neutral rate. Alternatively, if it delayed its response to a sustained build-up of inflationary pressures, then the cash rate may need to increase faster or by more when the hiking cycle eventually occurs.[1]

- **Revisions to neutral:** The model-based estimates of neutral in this note are likely to change over time. While 2.8 per cent appears to be a reasonable estimate of the current nominal neutral rate, by the end of the hiking cycle this estimate may have changed. Over the past 20 years, estimates of the neutral rate have successively been revised lower, though it is not clear that this trend will continue.

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[1] The RBA's policy stance should account for both the relative probability of these different outlooks, as well as the relative cost of making an error in either direction. For example, if the economic costs of increasing the cash rate too early are deemed to be higher than the costs of delaying the initial hikes, than it would be appropriate for the RBA to take a more cautious approach to increasing its policy rate.