

# South African Reserve Bank Occasional Bulletin of Economic Notes OBEN/19/02

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Chris Loewald

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South African Reserve Bank

# SARB Occasional Bulletin of Economic Notes

## August 2019

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## Assessing the accuracy of the SARB's growth forecasts

*Riaan Ehlers, David Fowkes, Nkhetheni Nesengani and Rowan Walter*

### Abstract

The SARB's GDP growth forecasts have been inaccurate over long periods of time. They have also been biased, with the forecasts having been too low in the mid-2000s and too high during and after the global financial crisis. Other forecasters made similar errors, which points to underlying difficulties in forecasting SA GDP growth. This probably reflects large changes in the economy's underlying growth trend, which are difficult to anticipate.

### 1. Introduction

The SARB's GDP growth forecasts have been inaccurate over long periods of time. They have also been persistently biased.<sup>1</sup> The forecasts were too low from 2003 to 2006, and then too high during the Global Financial Crisis (GFC) as well as the late-2010 to late-2015 period. This pattern of errors is not unique. Private analyst forecasts were similarly flawed, both in terms of bias and the overall error size. A general explanation for these errors is a failure to recognise, early on, that potential growth rates were changing.

### 2. Data

This note draws on growth forecasts for every Monetary Policy Committee meeting of the inflation-targeting period, from 2000 up to early-2019. These forecasts were produced using the Core model, up to July 2017, and the Quarterly Projection Model thereafter. We compare the growth projections, expressed as an average of the period one to six quarters ahead, with actual outcomes. For instance, in January 2014 the average growth forecast was 2.7%, and the actual outcome was 1.6% (the individual quarters were forecast at 1.98, 2.50, 2.47, 3.11, 3.13, and 3.27%, while actual outcomes were 2.13, 1.78, 1.12, 1.32, 1.27 and 2.00%). We evaluate the forecasts for both accuracy and bias. Bias is measured using average errors, to show persistent mistakes in a particular direction. Accuracy is measured using root mean square errors (RMSEs), a technique which ensures errors in opposite directions do not cancel each other out and thereby create a false impression of accuracy. This forecast assessment exercise is important both for accountability purposes – the results were publicised in the April 2019 *Monetary Policy Review* – and for improving future forecasts, through learning from past errors.

### 3. Systematic forecast errors

The SARB's real activity forecasts have been biased for long periods at a time. Growth during the boom years of the 2000s exceeded the SARB projections. By contrast, actual growth was lower than

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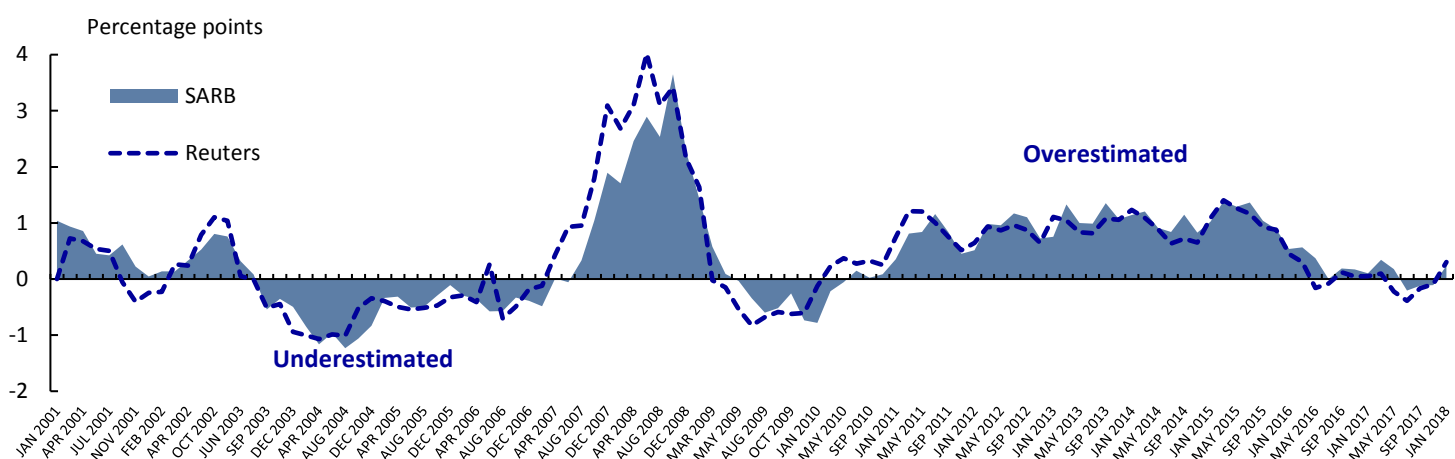
<sup>1</sup> Official forecasts from the Core model until the July 2017 MPC meeting and from the QPM thereafter.

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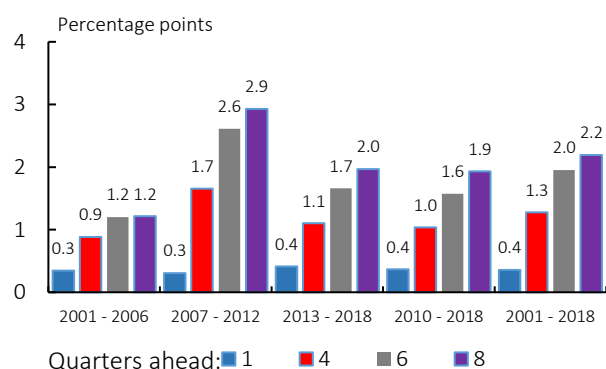
expected both during the global financial crisis and for half a decade afterwards (from late-2010 to late-2015).

The mistakes are quite large. For instance, between the end of 2010 and the end of 2015, the growth forecasts overstated average growth over the coming six quarters by an average of 1pp. The error was driven disproportionately by the longer-end of the forecast, with the average error growing from 0.1 percentage points at one quarter ahead to 1.8 percentage points at six quarters ahead.

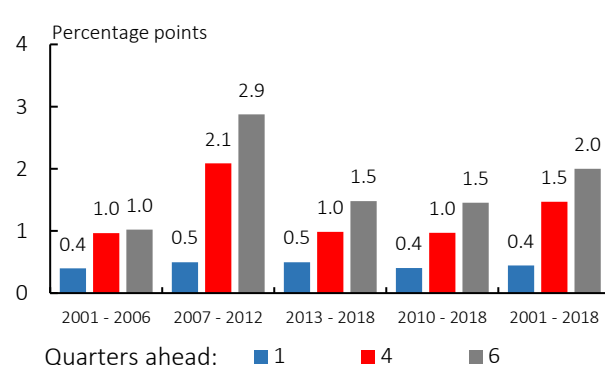
**Chart 1: GDP errors, average of one to six quarters ahead**



**Chart 2: SARB GDP RMSEs**



**Chart 3: Reuters GDP RMSEs**



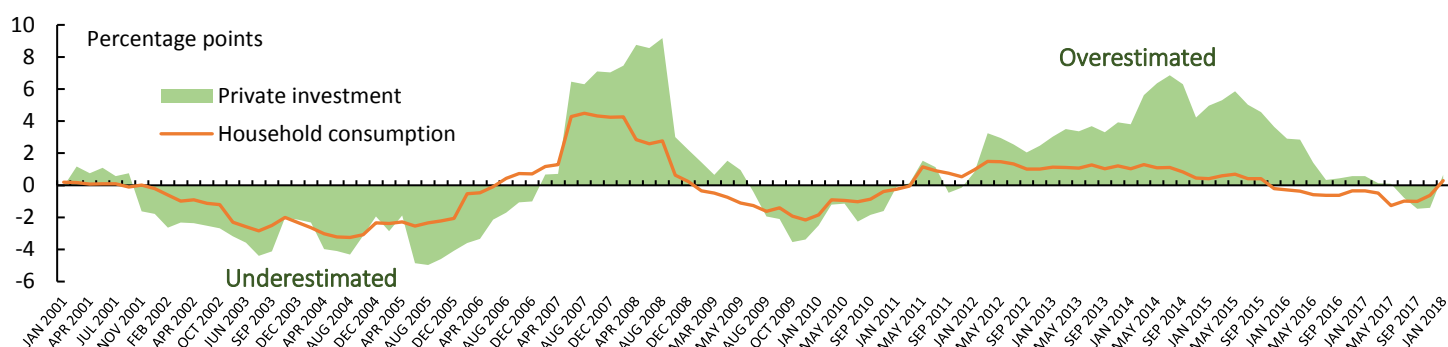
Sources: Reuters and SARB

In disaggregating the forecasts, we find the same pattern of errors for consumption, investments and imports. The mistakes are clearest with household consumption and investment, which is unsurprising as these are the largest components of GDP (in demand-side terms). Perhaps unexpectedly, exports were not clearly overstated during the post-crisis period, even though analysts and academics have expressed surprise exports did not respond more strongly to sustained exchange rate appreciation.<sup>2</sup> Net exports (exports less imports) were actually understated for much of the post-crisis period, which

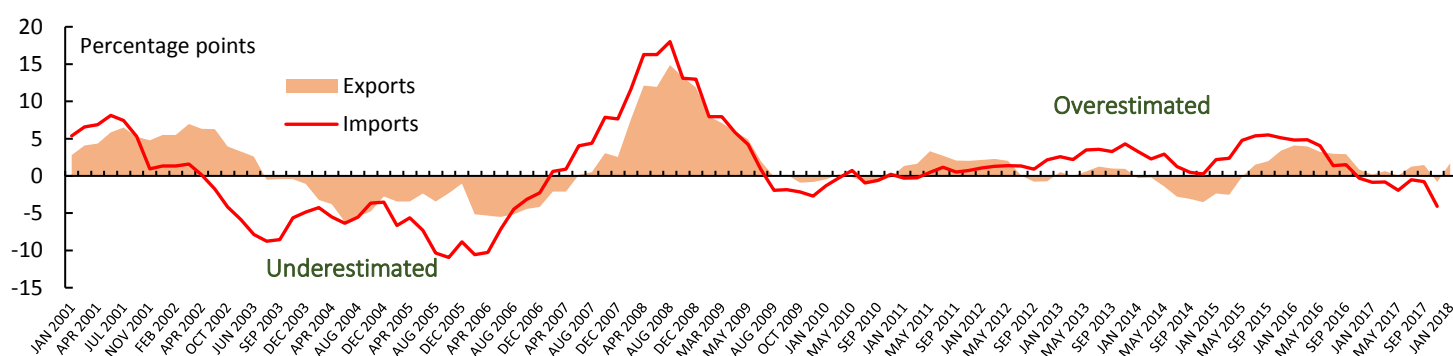
<sup>2</sup> For example, see Rahul Anand, Roberto Perrelli and Boyang Zhang (2016, February) "South Africa's Exports Performance: Any Role for Structural Factors" *IMF Working Paper 16/24*, Available at: <https://www.imf.org/external/pubs/ft/wp/2016/wp1624.pdf>

is consistent with growth disappointments: imports contracted as part of the broader growth slowdown.

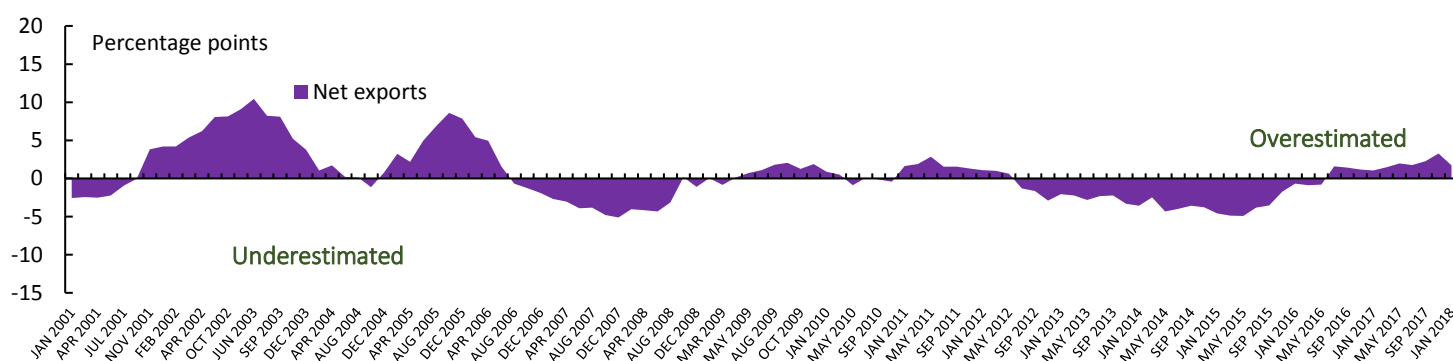
**Chart 4: SARB GDP component errors, average of one to six quarters ahead**



**Chart 5: SARB GDP component errors, average of one to six quarters ahead**



**Chart 6: SARB GDP component errors, average of one to six quarters ahead**

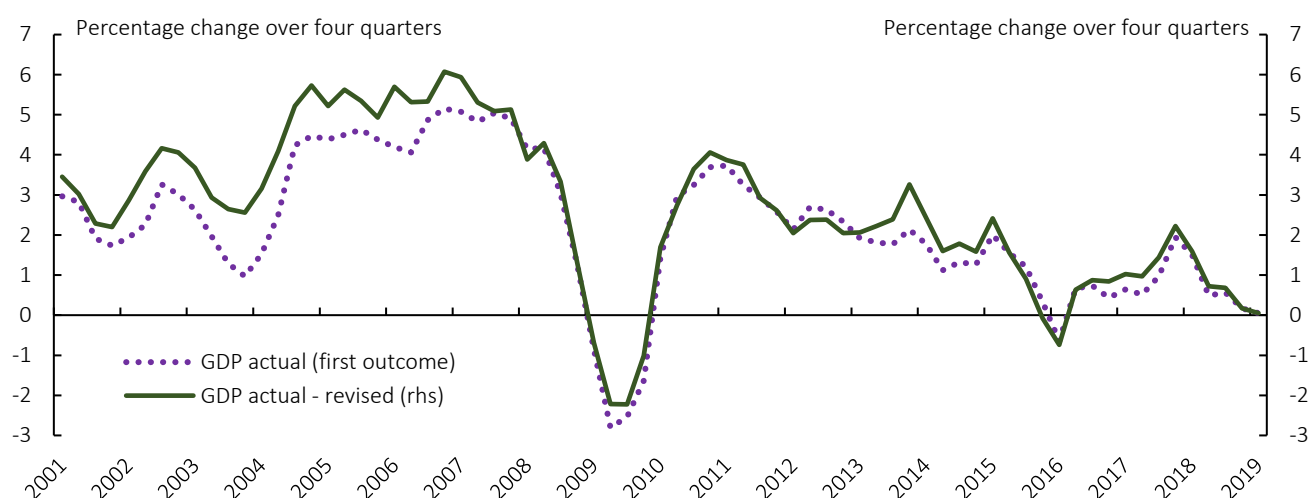


Sources: Stats SA and SARB

Our findings refer to forecast errors vis-à-vis first releases of GDP by Stats SA – as opposed to revised versions. Had we used revised versions, however, the forecasts would have been more inaccurate for the pre-crisis period. By contrast, they would have been marginally more accurate during the global financial crisis

and during the post-crisis period. The differences are not large enough to materially affect the error patterns described above.

**Chart 7: First-release and revised GDP data**



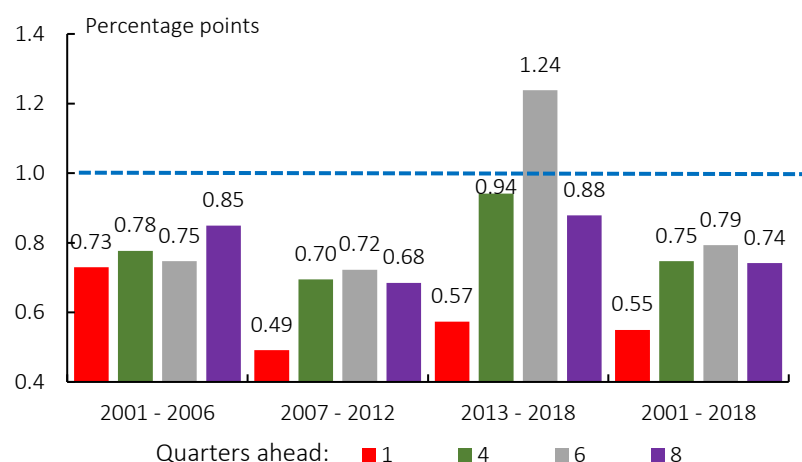
#### 4. Comparisons with outside forecasts<sup>3</sup>

Private sector forecasts have been about as inaccurate as the SARB's. The average of the Reuter's Econometer survey show a similar pattern of errors to the SARB – too low before the crisis, and too high afterwards (see chart 1). The precise scale of the GDP errors (see Charts 2 and 3) is also very similar: the root mean square errors (RMSEs) are identical for one and six quarters ahead, at 0.4 and 2.0 percentage points, and close at four quarters ahead (1.3 percentage points for the SARB, and 1.5 percentage points for the Reuters average). In addition, we have sourced World Bank forecasts. These show a similar pattern of errors.

We have also tested the forecasts against a naïve no-change model, which treats the latest known year-on-year growth number as the forecast. The outcomes are quantified using Thiel's U; results above 1 show the naïve model outperformed the forecast, and results close to 1 indicate the two performed similarly. For the 2013–2018 period, only the near-term growth forecasts clearly beat the naïve model. For 4 and 8 quarters ahead, the forecasts perform about as well as the naïve model, and at six quarters ahead, they are clearly worse.

<sup>3</sup> Reuters' forecasts are mostly only available from one to six quarters ahead.

**Chart 8: SARB GDP and Theil's U comparison**



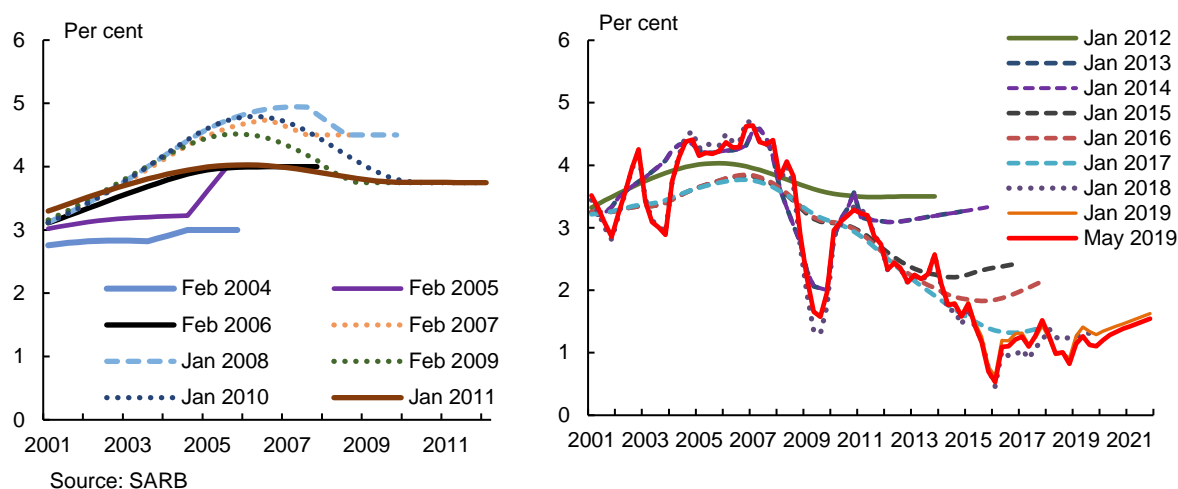
## 5. Explaining persistent mistakes

Large forecast errors sustained over multi-year periods cannot be due to idiosyncratic shocks such as droughts or strikes. The only clear instance of a shock-driven error in our sample data is the Global Financial Crisis. The SARB forecasts, in common with practically all growth forecasts worldwide, failed to anticipate the 2009 recession. This mistake was embarrassing for the economics profession, but it is not difficult to explain the SARB's errors for this period. Economic forecasting is insufficiently advanced, as a science, to predict low-probability, high-intensity events triggered by financial market non-linearities (like a sub-prime bubble that bankrupts an investment bank and then triggers an electronic bank run).

The pre- and post-crisis errors are more puzzling. The underlying problem appears to be large movements in the economy's potential growth rate. Where an economy has a stable trend growth rate, it is usually safe to project growth will revert to trend. In South Africa, however, potential growth has not been stable (a pattern common to emerging markets). It improved steadily through the 2000s (although potential growth was eventually revised up too far, and was revised down again post-crisis). It then reversed course post-crisis, deteriorating from over 4% in 2010 to around 1% currently. By projecting reversion to the previously observed trend, the forecasts systematically understated, and then later overstated, growth. This also helps explain why the growth forecasts have been more accurate, and less biased, since 2015: the SARB's potential growth estimate has been sharply reduced. The key challenge for the growth forecasts will be anticipating the next large movement in potential growth.



**Charts 9 and 10: Potential growth evolution for selected MPC meetings\***



\* At the start of each year (since 2004), as well as the most recent meeting.

## 6. Evaluating the MPC risk assessments

Since 2010, the MPC has consistently included forecast risk assessments in its post-meeting statements. These judgements have been generally pessimistic: 86% of the statements between January 2010 and March 2019 have reported downside risks to growth. By contrast, there have only been six balanced risk assessments (neither upside nor downside): in September 2015; from September 2016 to January 2017; and again in January and July 2018. Upside risks to the growth forecasts were only noted at the March and May 2018 meetings.

These risk assessments were accurate. Not only were the downside risk judgements appropriate, given that the growth forecasts ended up much too high, but the assessments also became less consistently negative as the accuracy of the growth forecasts improved after 2015. The implications for assessing policy, however, are less straightforward. One interpretation is that the MPC was alert to growth problems, and did not permit the optimistic forecasts to lull them into a false sense of security. However, it is not clear whether the MPC interpreted downside risks to growth as evidence of structural or cyclical weakness. For this reason, it is not possible to assess the calibration of the policy stance (too loose or too tight) using these data.<sup>4</sup>

## 7. Comparing the GDP and CPI forecasts

Contrasting the CPI and GDP forecasts shows one major point of contrast: the inflation forecasts have been significantly more accurate for the post-crisis period. By contrast, over the entire sample (pre- and post-crisis), the (in)accuracy of both the growth and inflation forecasts is similar. The RMSEs for the CPI forecasts are identical to the GDP errors for six and eight quarters ahead, at 2.0 and 2.2 percentage points. They are smaller, by 0.3 percentage points, one quarter ahead, but larger by the same magnitude four quarters ahead.

The improvement in the accuracy of the inflation forecasts since 2010 may be due to the absence of large shocks. (Note that the large errors in the pre-2010 forecast were due to the rand collapse of 2001

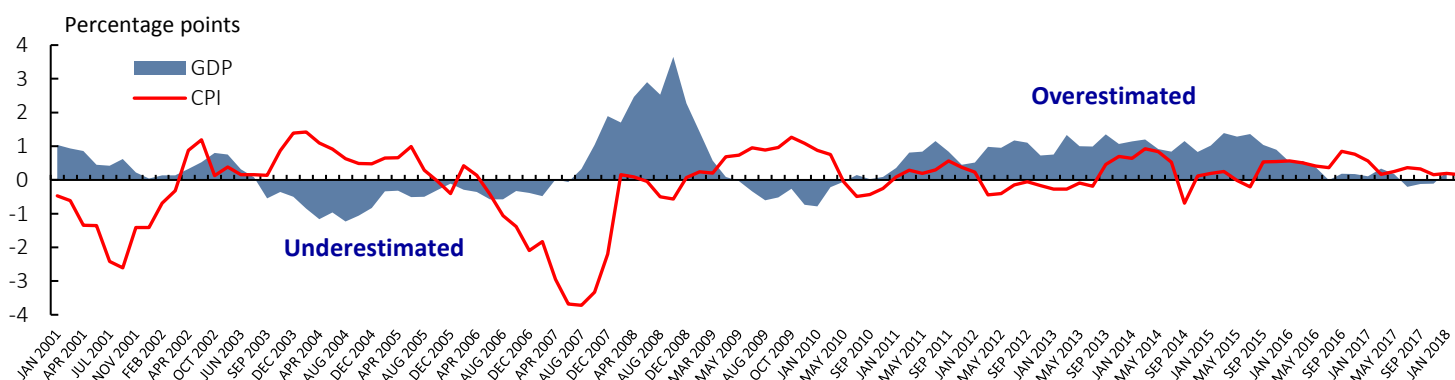
<sup>4</sup> For a recent discussion of output gap estimates, see B Botha, K Mojapelo and D Steenkamp (May 2019), "Which is our best output gap? Comparing our real-time and ex-post output gap estimates" EN/1910



and the food- and oil-price booms of 2007–08.) This explanation is incompletely satisfying, however, as there have been significant post-crisis shocks, including the 2015 Nenegate-episode. It may also be the case that inflation is less difficult to forecast than growth, or has become easier to forecast as inflation expectations have become better anchored.

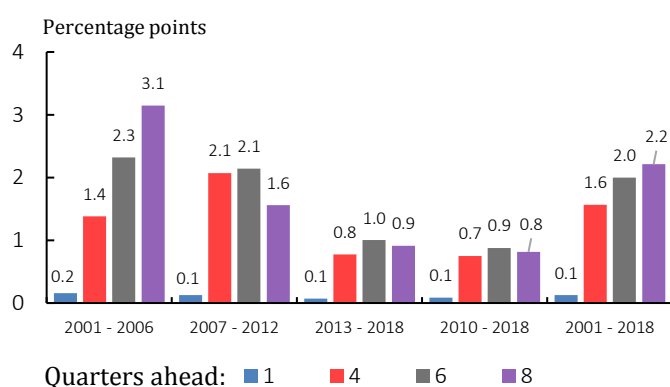
In addition, it is striking that the inflation forecasts have performed relatively well *despite* the faulty GDP forecasts. This is consistent with evidence of a flatter Phillips curve (that is, a weaker relationship between economic activity and inflation).<sup>5</sup>

**Chart 11: SARB GDP and CPI average errors**



Sources: Stats SA and SARB

**Chart 12: SARB CPI RMSEs**



## 8. Conclusion

This assessment of the SARB's GDP growth forecasts finds large errors in the forecasts, with persistent biases. Other analysts made similar mistakes. The MPC correctly diagnosed downside risks to growth in the post-crisis period. The challenge for producing better growth forecasts appears to be calling turning points in potential growth more accurately. More research and innovation in this sphere could contribute to better GDP forecasts.

<sup>5</sup> See for instance B Botha and D Steenkamp (Feb 2019), 'Decomposing the South African Phillips curve', EN/19/06, South African Reserve Bank. J Fedderke and Y Liu (May 2016), 'Inflation in South Africa: an assessment of alternative inflation models', WP/16/03, South African Reserve Bank.