

Comparison of quarterly GDPP forecasts: Reserve Bank, the NZIER and the National Bank of New Zealand

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Editor's Note

Here we examine forecasts of production GDP growth in more detail. We choose to examine quarterly growth in GDP since annual growth is subject to serial correlation issues. Ideally we would also compare forecasts of the output gap, but few external forecasters publish estimates of this measure.

Executive summary

This note examines the Reserve Bank of New Zealand's forecasts of quarterly real production GDP (GDPP) growth and compares our forecasting performance to that of the NZIER and the National Bank of New Zealand. When examining forecasting performance we use revised GDPP data, rather than the latest release (ie data as it stands in the middle of the following year). We find that:

- Up to 3 quarters ahead, our mean forecast errors for GDPP growth have been relatively small. However, 4 to 8 quarters ahead we have tended to over-predict quarterly GDPP growth by at least 0.25 per cent (on average).
- In terms of accuracy and bias our GDPP growth forecasting performance has been similar to that of the NZIER.
- We do not find a significant difference between the accuracy of the National Bank of New Zealand's quarterly GDPP growth forecasts and our own.

1 Introduction

Recent research into the Reserve Bank of New Zealand's forecasting performance has shown that we have tended to under-predict the level of CPI inflation.¹ Further research has also indicated that the NZIER and the National Bank of New Zealand have outperformed us in terms of bias and accuracy when forecasting inflation for medium- to long-term forecast horizons.² We have compared forecasts of other key variables from the Reserve Bank to forecasts from these external forecasters to explore the reasons for this. In this paper we examine forecasts of quarterly GDP growth.

¹ This is examined in "[Inflation forecast errors: preliminary findings](#)".

² This is examined in "[Comparison of inflation and GDP forecasts](#)".

GDP growth is measured using the seasonally-adjusted quarterly percentage change in real production-based GDP (GDPP). Forecasts of GDP growth from December 1994 to June 2001 are examined, and forecast errors are calculated using revised data (ie GDPP as it is measured in the middle of the following year).³ While the choice of vintage of ‘actual’ GDPP data has implications for our measured bias and accuracy, it is of less importance when comparing our forecasting performance to other forecasters, as long as the choice is consistent.

We compare our forecasting performance to that of the NZIER and the National Bank of New Zealand. Only very limited quarterly data is available from the National Bank of New Zealand. Hence, we consider qualitative aspects of their forecasting performance.

Forecasts are defined as ‘forecast minus actual.’ Hence a positive mean forecast error reflects a tendency to over-predict real GDPP growth, while a negative forecast error reflect a tendency to under-predict. Forecasting performance is assessed with regards to the presence and level of bias (as measured by the mean forecast errors) and forecast accuracy (as measured by the mean absolute forecast error and the root mean forecast error).⁴

A limited sample period, regime changes and a relatively small number of comparable observations between organisations make a detailed examination of forecasting performance difficult, particularly when conducting statistical tests. Further, our findings are likely to be strongly dependent on the sample period, which includes the Asian crisis, for example. Hence, caution is needed when interpreting our findings.

The remainder of this note is structured as follows: Section 2 examines the Reserve Bank’s forecasts of real GDPP growth. Section 3 compares our forecasting performance to those of the NZIER and the National Bank of New Zealand. Section 4 concludes.

2 The Reserve Bank’s GDPP growth forecasting performance

As discussed in our earlier paper, on average we have not consistently under- or over-predicted quarterly growth in real GDPP up to 3 quarters ahead.⁵ Four to 8 quarters ahead, our forecasts of quarterly GDPP growth have been at least 0.24 per cent higher than actual quarterly GDPP growth on average. However, because of the volatility of our sample, only mean forecast errors for the 5 and 6 quarters ahead horizons are statistically different from zero. As expected, the accuracy of our forecasts (as measured by the MAE and RMSE) declines as the forecast horizon lengthens. Summary statistics for our forecasting performance are presented in figure 2.1 and [appendix 1](#).

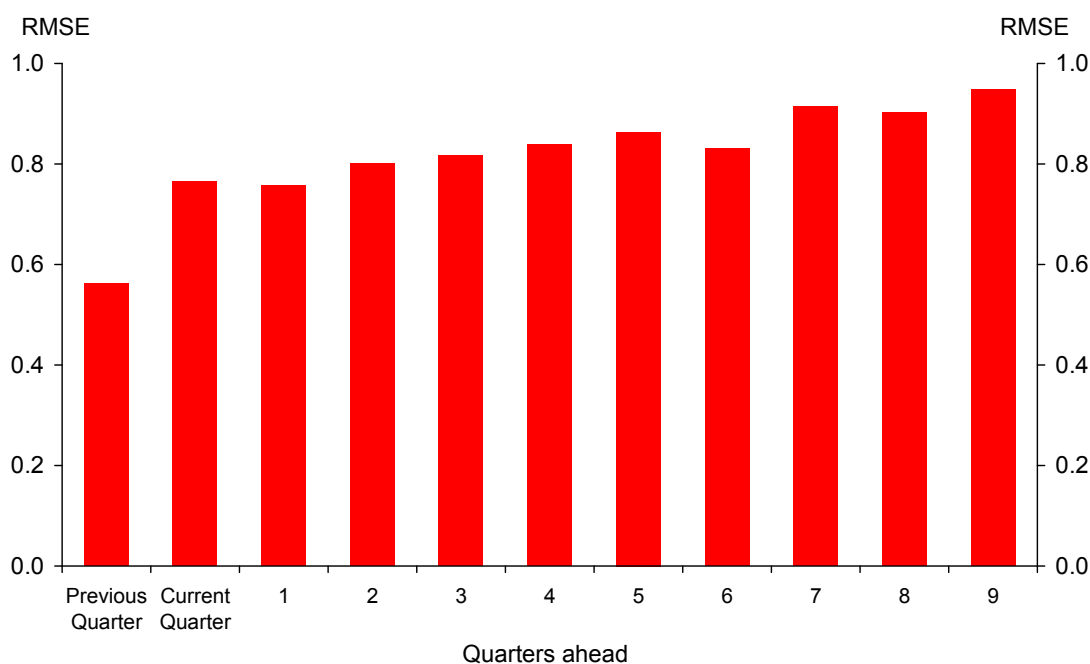
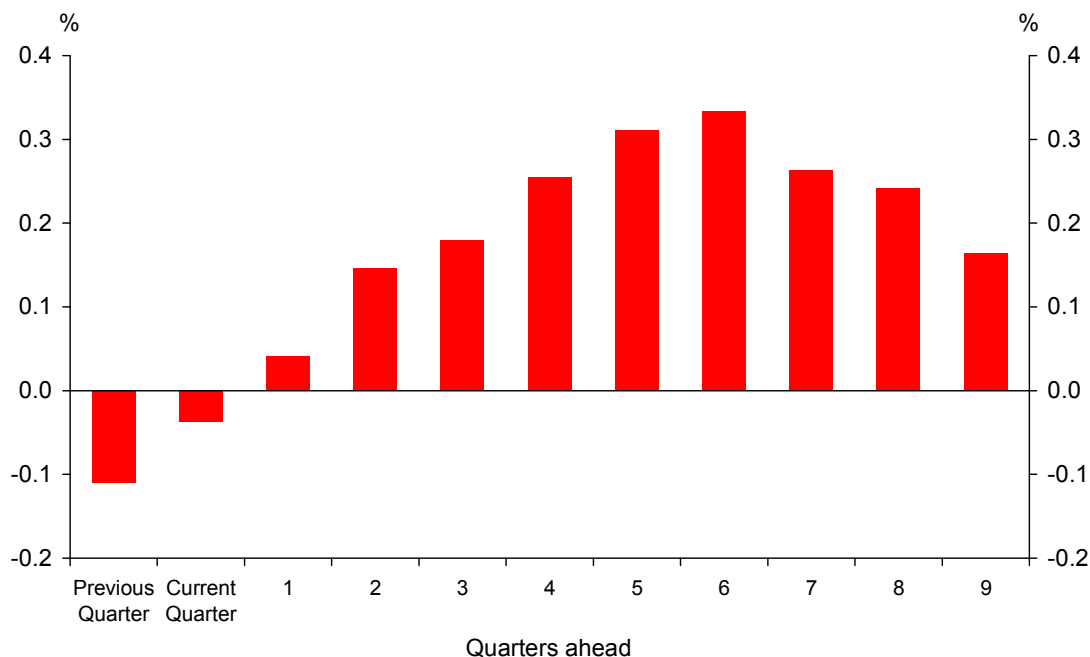
³ Hence we do not yet have the relevant outturns for the most recent forecasting rounds. Revised data is viewed as a suitable outturn for assessing forecasting performance as it tends to be more reliable than first release data. Further, it tends to bear a closer relationship to forecast data than the most up to date data, especially in the presence of data revisions and level shifts. This is consistent the work of St Clair and Yates (2001) within the Reserve Bank, and the works of Zarnowitz and Braun (1992) and Batchelor (2001) externally. Our GDP forecasting performance using alternative outturns is examined in “[GDP forecast errors](#)”.

⁴ Details of the statistics used when examining forecast errors are provided [here](#).

⁵ This is examined in “[GDP forecast errors](#)”.

Figure 2.1

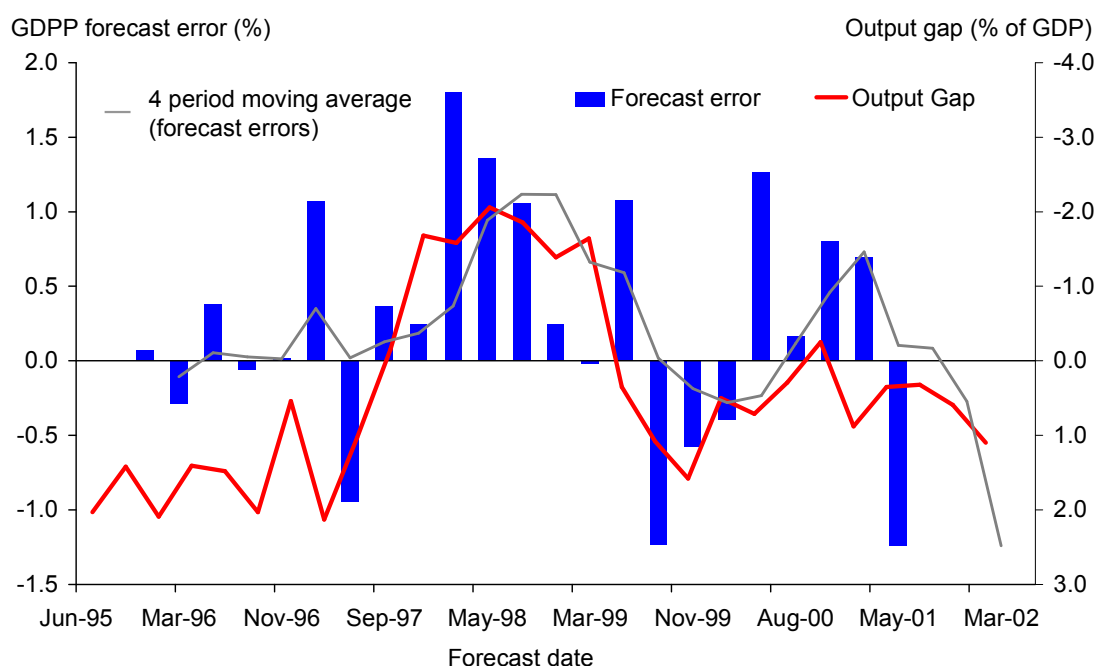
Summary statistics for the Reserve Bank real GDP growth forecast errors (December 1994 to June 2001, revised data)



In June 1997 the Reserve Bank changed from forecasts which assumed no policy response, to its current endogenous forecasting system, where interest rates adjust to ensure projected inflation outcomes are consistent with the Policy Targets Agreement. Our examination indicates that the Reserve Bank's medium-term GDP growth forecasts have tended to be less biased since the adoption of endogenous policy forecasts; however, the difference is not statistically significant. Our forecasts for short-term horizons appear to have been more accurate prior to the adoption of endogenous policy forecasts. However, we note that these findings are strongly influenced by the sample period; the endogenous policy forecasts period includes several large shocks such as the Asian crisis and two droughts.

A portion of the observed bias in our medium-term forecasts errors (4 to 8 quarters ahead) appears to be related to the output gap. When the output gap is negative we have tended to over-predict GDP growth by a larger amount and by a lesser amount when it is positive. Our 1 year ahead forecasts and the output gap are presented in figure 2.3. The presence of such a pattern is not surprising. Economic shocks and the precise nature of cyclical patterns cannot be forecast for longer horizons. Over time our forecasts assume that the effect of known shocks will even out and the economy will tend towards its long-run growth rate. As a result, our forecast errors for longer horizons will display a pattern reflecting cyclical trends or the impact of shocks.

Figure 2.2
One year ahead Reserve Bank quarterly GDP forecasts (December 1994 to June 2001, revised data)



Note:

The X-axis crosses the forecast errors axis (the left hand Y-axis) at 0.26, the mean forecast error for this horizon.

3 Comparison to external forecasters

To ensure the comparability of our samples, we include observations only for those quarters when both the Reserve Bank and external forecaster prepared forecasts. Summary statistics for the comparison are presented in [appendix 1](#).

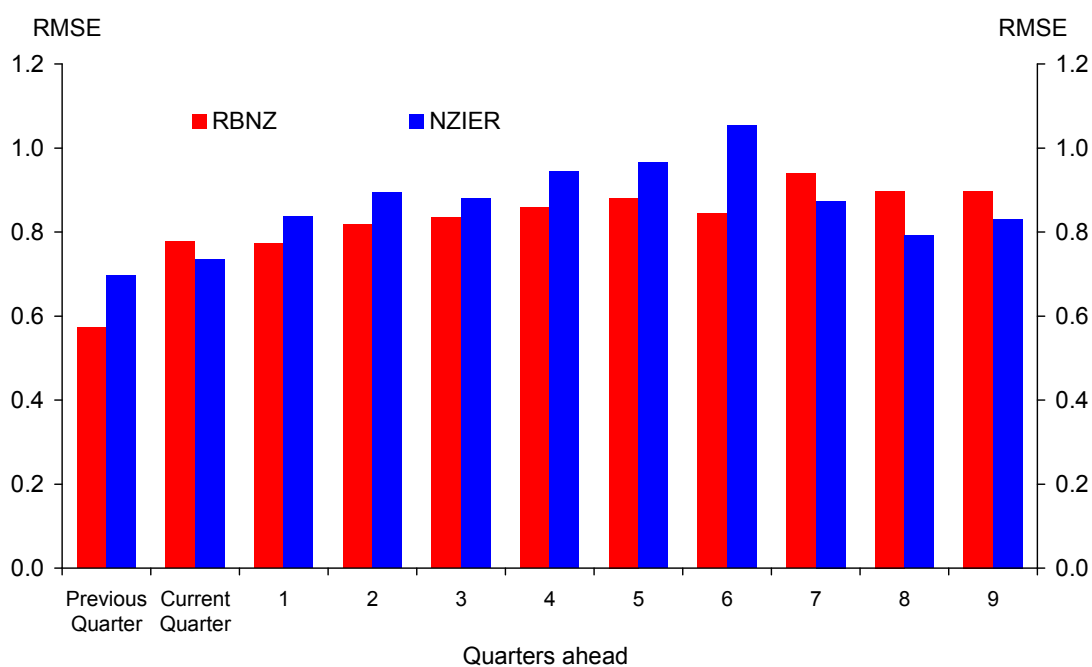
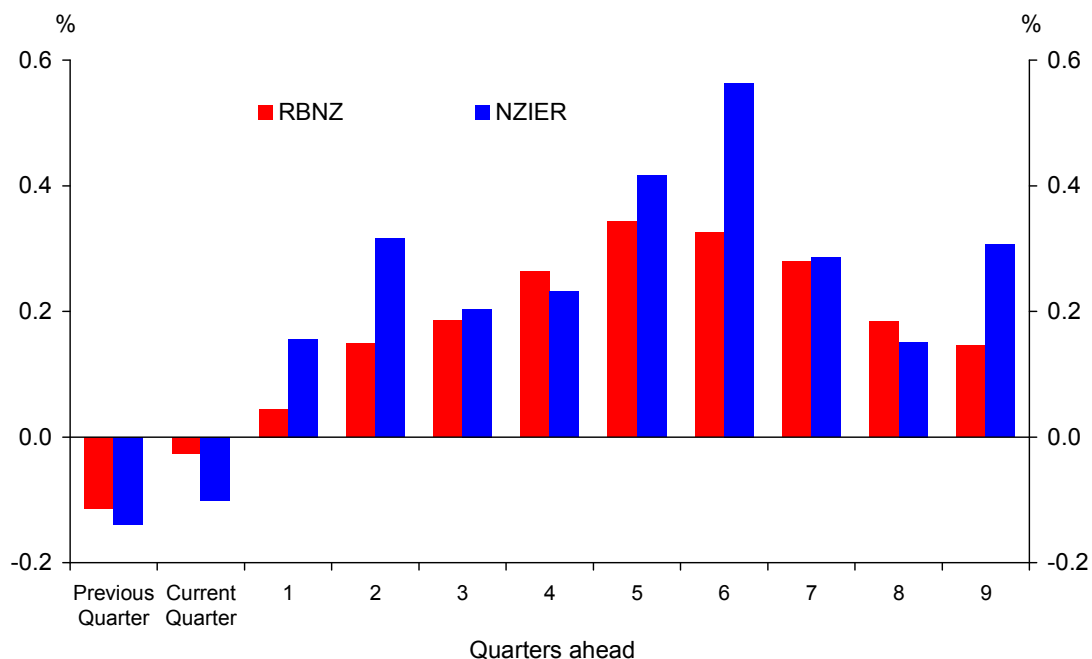
3.1 Comparison to the NZIER

When comparing our forecasting performance to that of the NZIER our sample period is March 1995 to June 2001. Both the Reserve Bank and the NZIER have tended to over-predict quarterly growth in real GDP for medium-term horizons. At most horizons the forecasting performance of the two organisations is very similar in terms of accuracy and bias. We note that the NZIER's mean forecast errors are greater than our own for the 2, 6 and 9 quarter ahead horizons. For these horizons our mean errors are at least 0.15 per cent lower than the NZIER's. However, no significant difference exists between the two organisations at

any horizon, and both the MAE and RMSE indicate that the two sets of forecasts are similar in terms of accuracy.

A comparison of the forecast growth tracks from each organisation does not indicate any systematic difference between the forecasts from the different organisations. The NZIER's forecasts appear slightly more variable than our own. In recent periods the two sets of forecasts have been very similar.

Figure 3.1
Summary statistics for the Reserve Bank and the NZIER quarterly GDP forecasts (March 1995 to June 2001, revised data)



3.2 Comparison to the National Bank of New Zealand

We have the National Bank of New Zealand's published quarterly forecasts of real GDPP growth only from June 1998 onwards. Hence, we have relatively few observations available when making comparisons between the organisations. This lack of data hinders a detailed comparison of forecast errors. In terms of bias and accuracy, we do not find strong evidence of a significant difference between our forecasting performance and that of the National Bank of New Zealand.

Given the very limited amount of quarterly data available from the National Bank of New Zealand, we briefly compare forecasts of annual average GDPP growth from the Reserve Bank and the National Bank of New Zealand. We examine forecasts since December 1994. We again find that the two sets of forecasts are similar in terms of accuracy and bias. When we compare the forecast tracks, we do not observe any systematic difference between the two sets of forecasts over this period.

4 Conclusion

When analysed using revised GDPP data, results show that the Reserve Bank has tended to over-predict quarterly growth when forecasting real GDPP in the medium term. Four to 8 quarters ahead our mean forecast errors have been at least 0.24 per cent. Our forecasting performance has been similar to that of the NZIER in terms of bias and accuracy. We do not find strong evidence of a significant difference between the National Bank of New Zealand's quarterly GDPP growth forecasts and our own.

The NZIER and the National Bank of New Zealand have tended to out-perform the Reserve Bank (in terms of bias and accuracy) when forecasting inflation. Consistent with the findings of our other recent papers looking at TWI and interest rate forecasts,⁶ the findings of this paper suggest that the observed difference between our own forecasting performance and those of the NZIER and the National Bank of New Zealand are unlikely to be the result of our forecasts of a single variable. Instead it seems likely that a combination of factors has resulted in these organisations producing more accurate medium-term inflation forecasts.

The NZIER's forecasts of GDPP growth have been similar to our own and no systematic difference is observed between their interest rate tracks and our own. However, their TWI forecasts have tended to be slightly lower than ours and their forecast inflation tracks are considerably higher. This suggests that they may have a different view on what expected inflation will be for a given output gap or exchange rate. Alternatively, the NZIER may have a different view of potential output, ie they have thought the economy has a lower 'speed limit' than we have. In this case, a given GDP growth profile would imply more inflation pressure in their forecasts. However, we cannot say for certain why the observed difference in inflation forecasting performance exists as the precise nature of their forecasting methodology is not known.

⁶ ["Comparison of TWI forecasts: Reserve Bank, NZIER and National Bank"](#) and ["Comparison of interest rate forecasts: Reserve Bank, NZIER and National Bank."](#)

References

Batchelor, R (2001), "How useful are the forecasts of intergovernmental agencies? The IMF and OECD versus the Consensus," *Journal of Applied Economics*, 33(2), pp 225-235.

St Clair, R and N Yates (2001), "A comparison of inflation and output forecasts of the New Zealand Economy," *Reserve Bank of New Zealand Memorandum*.

Zarnowitz, V and P Braun (1994), "Twenty-two years of the NBER-ASA Quarterly Economic Outlook surveys: aspects and comparisons of forecasting performance," *NBER Working Paper 3965*.

Appendix 1: Comparison of the Reserve Bank's quarterly GDPP

growth forecasts to external forecasters: summary statistics

The tables below present summary statistics for the quarterly GDPP growth forecasting performance of the Reserve Bank relative to individual forecasting agencies. These figures are calculated using a matched observations approach. This means that when constructing each data set we include only observations for those quarters when both the Reserve Bank and forecaster of interest produced forecasts. These tables only compare individual forecasters to the Reserve Bank and should not be used to make comparisons between external forecasting agencies.

Caution is needed when interpreting the findings. In many cases there are relatively few comparable observations. In such cases, the findings may be highly susceptible to distortions due to events specific to particular sample periods. As a result, summary statistics based on a limited number of observations may not accurately represent forecasters' general performances.

Note that the dates referred to indicate to the final month of the relevant quarter, not the dates at which forecasts were prepared. Revised GDPP data (GDPP as it was measured in the following year) was used to calculate forecast errors. As a result, the latest quarter for which we have data is June 2001.

Table A1.1

Quarterly real GDPP growth forecast error summary statistics for the Reserve Bank (December 1994 to June 2001, revised data)

Quarters ahead	Mean Errors	RMSE	Observations
Previous Quarter	-0.11	0.56	28
Current Quarter	-0.04	0.76	27
1	0.04	0.76	26
2	0.15	0.80	25
3	0.18	0.82	24
4	0.26	0.84	23
5	0.31 *	0.86	22
6	0.33 **	0.83	21
7	0.26	0.92	20
8	0.24	0.90	19
9	0.16	0.95	18

Notes:

Asterisks indicate the significance with which the null hypothesis: Mean Error = 0 can be rejected:

** = Significant at the 5 per cent level

* = Significant at the 10 per cent level

Table A1.2

Summary statistics for the Reserve Bank's and the NZIER's real GDP growth forecasting performance (March 1995 to June 2001, Revised data)

Quarters ahead	MEAN ERRORS		RMSE		Significant Difference in ME	Significant Difference in MAE	Sample size
	RBNZ	NZIER	RBNZ	NZIER			
Previous Quarter	-0.11	-0.14	0.57	0.70	No	No	27
Current Quarter	-0.03	-0.10	0.78	0.74	No	No	26
1	0.04	0.16	0.77	0.84	No	No	25
2	0.15	0.32*	0.82	0.89	No	No	24
3	0.19	0.20	0.83	0.88	No	No	23
4	0.26	0.23	0.86	0.94	No	No	22
5	0.34*	0.42**	0.88	0.97	No	No	21
6	0.33*	0.56**	0.84	1.05	No	No	20
7	0.28	0.29	0.94	0.87	No	No	19
8	0.18	0.15	0.90	0.79	No	No	15
9	0.15	0.31	0.90	0.83	No	No	11

Notes:

Asterisks indicate the significance with which the null hypothesis: Mean Error = 0 can be rejected:

** = Significant at the 5 per cent level

* = Significant at the 10 per cent level

Table A1.3

Summary statistics for the Reserve Bank's and the National Bank's real GDP growth forecasting performance (June 1998 to June 2001, revised data)

Quarters ahead	MEAN ERRORS		RMSE		Significant Difference in ME	Significant Difference in MAE	Sample size
	RBNZ	NBNZ	RBNZ	NBNZ			
Previous Quarter	-0.10	0.01	-0.10	0.01	No	No	14
Current Quarter	-0.05	0.00	-0.05	0.00	No	No	13
1	-0.04	0.11	-0.04	0.11	No	No	12
2	0.00	0.08	0.00	0.08	No	No	11
3	0.01	0.15	0.01	0.15	No	No	9
4	-0.06	-0.10	-0.06	-0.10	No	No	8

Notes:

Asterisks indicate the significance with which the null hypothesis: Mean Error = 0 can be rejected:

*** = Significant at the 1 per cent level

** = Significant at the 5 per cent level

* = Significant at the 10 per cent level