Assessing recent external forecasts

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This article compares the performance between external forecasts and Reserve Bank of New Zealand published projections for real GDP growth, CPI inflation, the 90-day interest rate and the trade weighed index (TWI) to examine the accuracy of different forecasts.

Since 2003, the Reserve Bank has collected and analysed forecasts from as many as 13 external forecasting agencies as part of the process of monetary policy formulation. The forecasts help to identify risks around the Reserve Bank forecasts.

Reserve Bank forecasts are more accurate than most, significantly outperforming the external average for one-year ahead GDP growth, two-year ahead CPI inflation and two-year ahead TWI forecasts. However, our analysis shows that a number of external forecasting agencies perform reasonably well, suggesting that these forecasts are likely to be useful when formulating monetary policy.

1 Introduction

Due to the lags with which monetary policy affects inflation, macroeconomic forecasting is a critical component of monetary policy (for further discussion, see Drew and Frith 1998). The current Reserve Bank published forecasts are constructed with the assistance of our new dynamic stochastic general equilibrium (DSGE) model 'KITT' (see Lees 2009). However, as part of the decision-making process, the Reserve Bank also considers information from a variety of sources, including forecasts from external agencies. Consequently, the Reserve Bank dedicates significant resource to gathering and assessing external forecasts each quarter. This article seeks to enhance the value of this exercise by establishing the recent forecasting accuracy of the relevant agencies.

Over the past 5-10 years, several pieces of work have analysed the accuracy of Reserve Bank forecasts and compared them to those from external agencies. McCaw and Ranchhod (2002) assessed the Reserve Bank's forecasts between 1997 and 2002 and found that the Reserve Bank consistently under-predicted CPI inflation over that period. While the work concentrated on explaining this bias, it also included a comparison with several external forecasters and found those forecasts were about as biased and accurate as the Reserve Bank. Turner (2006) updated this work by assessing the Reserve Bank's forecasting performance over 2003 to 2005 against New Zealand Consensus forecasts for several macroeconomic variables produced by Consensus Economics Inc.[1] Turner found that Reserve Bank forecasts were at least comparable to this average. In the case of the 90-day interest rate and CPI inflation, Reserve Bank forecasts were more accurate and less biased.[2]

This article updates these assessments of forecast accuracy. However, in contrast to previous work in this area, the majority of our data has been collected two-to-three weeks prior to the Reserve Bank projections being finalised. Consequently, the comparisons are more meaningful, as each forecaster has a similar information set – placing each contender on a level playing field.

The article proceeds as follows. Section 2 describes the forecast data. Section 3 discusses the large changes in economic conditions over our sample period to illustrate the difficulties faced by forecasting agencies during this time. Section 4 details the methodology used to determine forecasting accuracy. Section 5 contains the results of our analysis and notes the limitations of this work. Section 6 concludes.

[1] Consensus Economics Inc compiles simple forecast averages for a range of economic and financial variables using survey responses from 16 reputable forecasters within the New Zealand and Asia Pacific Region.

[2] Goh and Lawrence (2006) evaluated the GDP and CPI forecasting performance of the Treasury over 1995 to 2004 against a range of external forecasters that included the Reserve Bank. However, individual forecasters were not identified.

2 The forecasts

The data for this work comes from Reserve Bank published forecasts and external forecasts collected over the period 2003q1 to 2008q4. In contrast to previous work assessing the accuracy of Reserve Bank and external forecasts, the majority of our forecast data has been collected two-to-three weeks prior to the Reserve Bank projections being finalised. Consequently, the forecast comparisons are more meaningful as most forecasters have had access to a similar information set. The exceptions are New Zealand Institute of Economic Research (NZIER) and NZIER Consensus:[3] their forecasts can be up to three months out of date. However, we include these forecasts in our average measure due to their comparable forecasting performance over our sample period.

As in a horse race, where contenders perform better in some conditions than others, forecasters have their stronger areas of performance. While recent economic conditions have proved difficult for forecasters, comparisons between external and RBNZ forecasts still play an important role in monetary policy formulation.

The data includes one-year and two-year ahead forecasts for real GDP growth (March year annual average percentage change), CPI inflation (March year annual percentage change), the 90-day interest rate (March year annual average) and the TWI (March year annual average) from eight external forecasting agencies as well as the Reserve Bank. An equally weighted external average forecast is also assessed.

We also examine an external forecast median and a weighted average where external forecasts are combined based on their historical inverse mean squared forecast errors. The motivation for this type of forecast combination comes from Bates and Granger (1969), who argue that it often leads to more accurate forecasts than a simple average. However, neither of these alternative measures outperformed the simple average in terms of out-of-sample forecasting performance and consequently they are not reported. In the case of the weighted forecast combination, this poor performance is perhaps due to the small sample size and low frequency of re-weighting.

Table 1 provides a list of forecasters and the number of one-year and two-year ahead forecasts evaluated.[4] We

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[3] **NZIER Consensus is an average of forecasts collected by the NZIER.**

[4] **We exclude six forecasters that have provided external forecasts to the Reserve Bank over the sample period – ASB, Infometrics, Treasury, Goldman Sachs JB Were and BERL due to insufficient observations; and ANZ due to their merger with National Bank.**

Table 1

External forecasters

Forecaster	Number of one-year ahead forecast observations (out of 24)	Number of two-year ahead forecast observations (out of 20)
ANZ National	24	20
BNZ	24	20
Deutsche Bank	24	20
FNZC	23	19
NZIER	24	20
NZIER Consensus	24	20
UBS Warburg	24	20
Westpac	24	20

Table 2

Forecast definitions

Date forecast made	One-year ahead outturn	Actual forecast horizon	Two-year ahead outturn	Actual forecast horizon
2003Q1	2004q1 annual	4 quarters	2005q1 annual	8 quarters
2003Q2	2004q1 annual	3 quarters	2005q1 annual	7 quarters
2003Q3	2004q1 annual	2 quarters	2005q1 annual	6 quarters
2003Q4	2004q1 annual	1 quarter	2005q1 annual	5 quarters
2004Q1	2005q1 annual	4 quarters	2006q1 annual	8 quarters

define one-year ahead forecasts as those pertaining to the following March year annual outturn. Similarly, we define two-year ahead forecasts as those pertaining to the March year annual outturn in two years' time. Consequently, these forecasts are often not strictly one- or two-year ahead forecasts. Table 2 gives an example of how we define one-year and two-year ahead forecasts.

3 Recent economic conditions

The past five to six years have been particularly difficult for forecasters in New Zealand. Key macroeconomic variables have moved significantly over this time as is illustrated in figures 1 to 4.

The year 2003 was a particularly uncertain time for the New Zealand economy. After reasonably strong growth in 2002, driven by favourable export conditions, many analysts believed the appreciating New Zealand dollar (as measured by the TWI) and global uncertainty due to severe acute respiratory syndrome (SARS) would see New Zealand growth abate over 2003 and 2004. However, this slowdown did not eventuate. Growth in the non-tradable sector continued strongly through 2004-2006, supported by significant population growth and large house price-driven increases in household wealth.

Through this period, the appreciating TWI placed downward pressure on CPI inflation. However, over 2007 and early 2008 significant increases in world commodity prices, coupled with a stubbornly strong non-tradable sector, saw annual CPI inflation, the 90-day interest rate and the TWI reach levels not seen in the previous 15 years. Nevertheless, tight policy settings and the global financial crisis saw this situation reverse over 2008 – much more rapidly than any forecaster predicted. GDP growth turned negative in the first quarter of 2008, and stayed negative throughout the year; the 90-day interest rate moved from 8.8 percent to

Figure 1

GDP growth

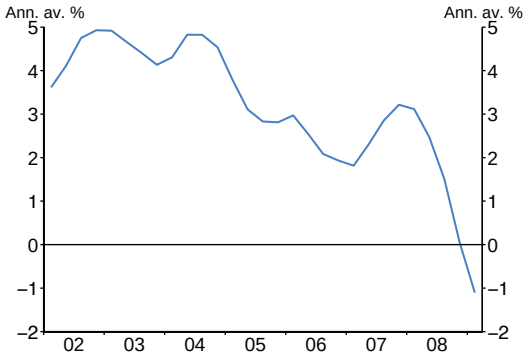


Figure 2

Annual CPI inflation

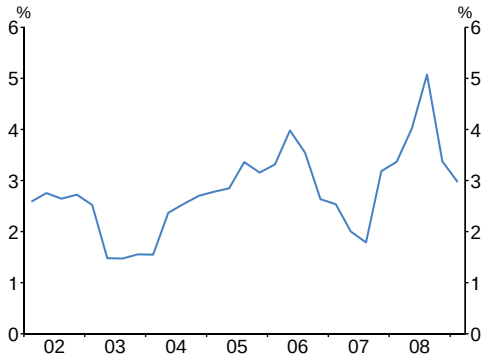


Figure 3

90-day interest rate

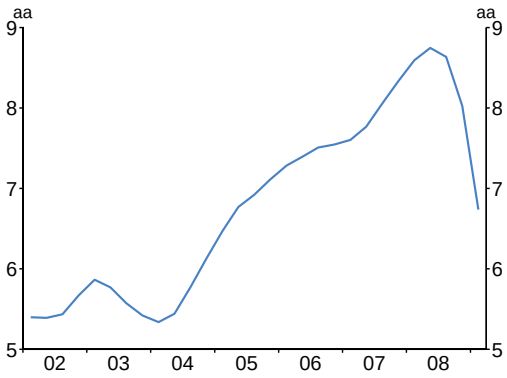
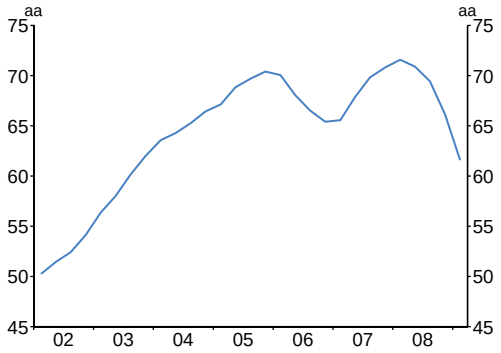


Figure 4

TWI



Source: Statistics New Zealand, Reuters.

3.7 percent; and the TWI dropped from 71.9 in 2008q1 to 53.9 in 2009q1.

4 Methodology

Forecast accuracy can be measured in a variety of different ways. We measure forecast accuracy with two commonly used statistics: Root Mean Squared Forecast Error (RMSFE) and Mean Forecast Error (MFE).

$$\text{RMSFE} = \sqrt{\text{variance(errors)} + \text{MFE}^2}$$

$$\text{MFE} = \text{mean(errors)}$$

RMSFE measures the size of the forecast errors, while MFE measures whether the forecast errors are biased on average. We assess all forecasts against 'final' vintage data (ie, the data released at 2009q1).

In our results, a negative MFE indicates a tendency for a particular forecaster to under-predict the variable of interest. For example, a forecaster who, on average, under-predicts one-year ahead GDP growth by 0.1 percent will have a one-year ahead GDP growth MFE of -0.1. A relatively good forecaster will be one who has a low RMSFE and a MFE that is close to zero.

However, it is important to remember that good forecasting performance in the past does not guarantee good performance in the future. For example, staff turnover may contribute to a lack of forecasting consistency over time. As a result, we caution against drawing any firm conclusions from the results presented in the next section – they should be viewed as descriptive only.

5 Results

Tables 3 to 6 report one-year and two-year ahead RMSFE and MFE for each forecaster. In addition, we report whether a particular forecast is significantly better or worse than the Reserve Bank published forecasts and whether a particular forecaster's bias is significantly different from zero. This is established using the Diebold-Mariano test for comparing predictive accuracy (Diebold and Mariano 1995).

Table 3

GDP growth

		RMSFE		MFE	
Rank*	Forecaster	1 Year	2 Years	1 Year	2 Years
1	RBNZ	1.15	1.85	-0.05	0.23
2	A	1.25	1.83	-0.40	0.23
3	B	1.28†	1.63	-0.30	0.21
4	C	1.29	1.99	-0.28	0.41
5	D	1.30	1.59	-0.61	0.13
6	Average	1.34†	1.77	-0.42	0.18
7	E	1.39†	1.82	-0.60	-0.22
8	F	1.42†	1.94	-0.32	0.24
9	G	1.46†	1.80	-0.32	0.40
10	H	1.72†	1.95	-0.47	0.12

Table 4

Annual CPI inflation

		RMSFE		MFE	
Rank*	Forecaster	1 Year	2 Years	1 Year	2 Years
1	A	0.55	0.76	0.05	-0.40††
2	Average	0.61	0.84†	-0.18	-0.71††
3	C	0.61	0.90†	-0.25††	-0.79††
4	G	0.64	0.85†	-0.15	-0.73††
5	RBNZ	0.66	0.64	0.04	-0.42††
6	D	0.66	0.83†	-0.08	-0.75††
7	B	0.72	0.89	-0.12	-0.68††
8	F	0.78	0.96†	-0.20	-0.86††
9	E	0.87*	1.00†	-0.24	-0.63††
10	H	0.90*	0.97†	-0.49††	-0.85††

Table 5

90-day interest rate

		RMSFE		MFE	
Rank*	Forecaster	1 Year	2 Years	1 Year	2 Years
1	A	0.65	1.30	0.04	-0.79††
2	RBNZ	0.70	1.10	0.14	-0.32
3	D	0.71	1.45	-0.08	-0.90††
4	C	0.71	1.30	0.06	-0.60
5	Average	0.72	1.45	-0.12	-0.99††
6	B	0.75	1.60†	-0.20	-1.08††
7	E	0.76	1.51	-0.28	-1.11††
8	F	0.80	1.72†	-0.06	-1.07††
9	G	0.83	1.40	-0.17	-0.99††
10	H	1.02	1.52	-0.26	-1.23††

Table 6

TWI

		RMSFE		MFE	
Rank*	Forecaster	1 Year	2 Years	1 Year	2 Years
1	RBNZ	3.24	7.39	-0.29	-3.48††
2	B	3.57	9.42	-1.69††	-7.30††
3	E	3.65	7.38	-1.60	-4.96††
4	Average	4.05	8.72†	-1.95††	-6.58††
5	C	4.11	8.00	-1.35	-5.04††
6	A	4.21	9.28†	-1.95††	-7.41††
7	G	4.58	8.57†	-2.26††	-6.30††
8	D	4.83	9.80†	-2.52††	-7.83††
9	H	5.00	7.50	-1.31	-4.74††
10	F	6.17†	11.19†	-2.81††	-7.95††

* **As determined by 1-year ahead RMSFE**
† **Indicates a forecaster that is significantly worse than the RBNZ at a 5% level**
†† **Indicates a forecaster whose bias is significantly different to zero at a 5% level**

The identities of individual forecasters are not disclosed as some forecasts were not publicly available at the time of collection and permission to publish was not requested; instead they are simply labelled forecaster A through H.

At the one-year horizon, Reserve Bank-published forecasts for GDP are significantly better than several external forecasters, including the external forecast average. Figure 5 shows that at the 2-year horizon, most forecasters, including the Reserve Bank, underestimated the strength in GDP growth over the first half of our sample and failed to predict the significant declines in growth towards the end of our sample.

In the case of CPI inflation, table 4 shows that the majority of forecasters under-predicted inflation on average over our sample period despite some particularly large positive forecast errors over 2006 – a time where CPI inflation reached almost 4 percent. At the two-year ahead horizon, perhaps the most important time frame for monetary policy, Reserve Bank CPI inflation forecasts are significantly better than six of the eight external forecasters.

Figure 7 shows that after under-predicting the 1-year ahead 90-day interest rate over 2003 to 2007, most of the forecasters in our sample made large positive forecast errors over 2008 when asked to predict the future 90-day interest rate. It appears that all forecasters, including the Reserve Bank, did not anticipate the extent to which monetary policy would loosen in response to the financial crisis and the subsequent global recession. If one excludes this period, the Reserve Bank provided the most accurate forecasts of the 90-day interest rate. Perhaps unsurprisingly, the Reserve Bank outperforms all the external forecasters at the two-year ahead horizon for the 90-day interest rate.

Figure 5

GDP forecast errors

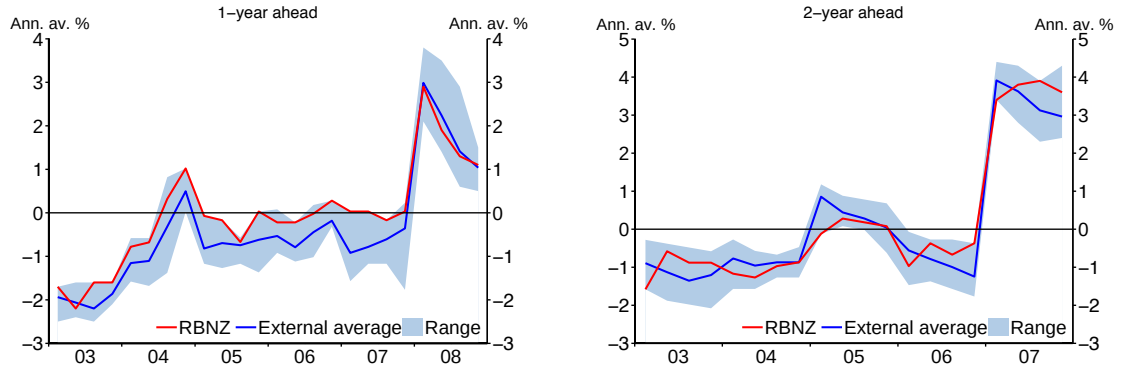


Figure 6

CPI inflation forecast errors

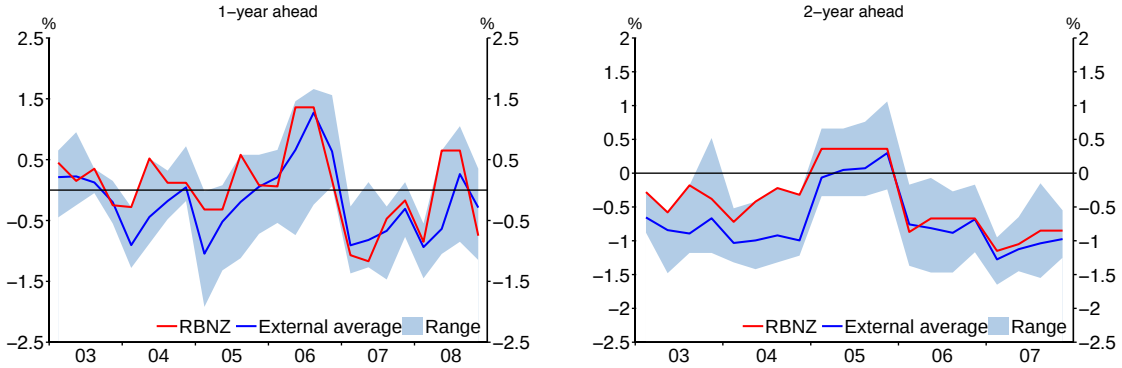


Figure 7

90-day interest rate forecast errors

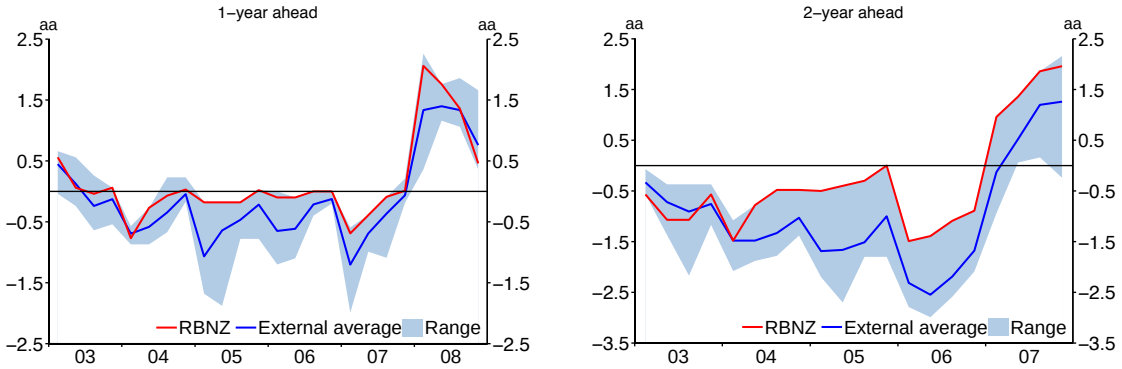
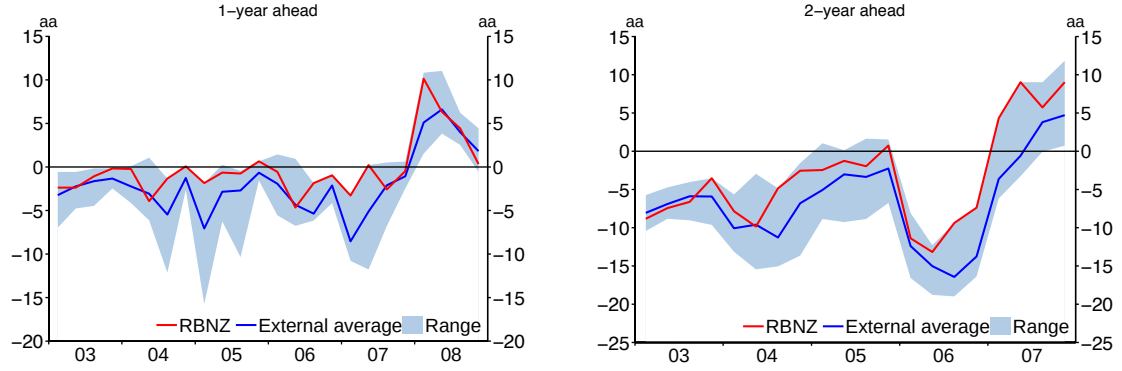


Figure 8

TWI forecast errors



All forecasters under-predicted the level of the TWI over most of our sample period. In addition, forecast errors at the two-year ahead horizon are particularly large, suggesting that no forecaster in our sample can predict the exchange rate with much accuracy. However, Reserve Bank two-year ahead forecasts for the TWI are significantly better than those of most external forecasters.

6 Conclusions

This work has evaluated the accuracy of Reserve Bank and external forecasts for real GDP growth, CPI inflation, the 90-day interest rate and the TWI over the period 2003q1 to 2008q4.

Our analysis has shown that a number of external forecasting agencies perform reasonably well when assessed against Reserve Bank-published forecasts – suggesting that these forecasts are likely to be useful when formulating monetary policy. However, Reserve Bank forecasts have been more accurate than most, significantly outperforming the external average for one-year ahead GDP, two-year ahead CPI inflation and two-year ahead TWI forecasts over the sample period.

Most forecasters, including the Reserve Bank, underestimated the strength of GDP over 2003-04 and failed to predict the recent declines in growth. On average, the majority of forecasters underestimated CPI inflation over our sample and consequently, up until 2008, also underestimated the 90-day interest rate. However, over 2008, nobody in the sample predicted the extent to which monetary policy would be loosened in response to the financial crisis. Unsurprisingly, no forecaster in our sample predicted the TWI with much accuracy – all failing to forecast its strength over 2004 to 2008.

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