

An assessment of recent Reserve Bank forecasts

Jane Turner, Aidan Yao and Tim Hampton

Reserve Bank of New Zealand

Corresponding author: aidan.yao@rbnz.govt.nz

Abstract

We compare the Reserve Bank's forecasts of key variables from the past four years against a benchmark of the *Consensus* average as well as a selection of prominent private sector forecasters. The Reserve Bank's forecast performance compares favourably against these benchmarks, consistently being in the top quartile in terms of forecast accuracy. In the case of the 90-day interest rate, the Reserve Bank has performed better than the other forecasters considered. While some of this out-performance is likely to reflect the fact that the Reserve Bank has additional information about very near-term interest rate movements, the results suggest that there is additional information content for financial market participants in the Reserve Bank's published interest rate projections. Furthermore, the Reserve Bank's out-performance this cycle has resulted from the Reserve Bank consistently projecting interest rates being higher for longer than projected by the other forecasters.

1. Introduction

It is widely recognised that it takes a considerable time for interest rate changes to have their full impact on inflation. Monetary policy operates in a forward looking environment in which a central bank's ability to operate effective monetary policy depends on its ability to produce good quality forecasts.

Inevitably, forecasts of economic activity and inflation will be subject to error. Forecasting is inexact and subject to a range of uncertainties. Most obviously, forecast errors can result from shocks not foreseen when the forecasts were made. By way of illustration, international oil prices more than doubled in the two years to the middle of 2006, before easing back slightly since then.¹ Higher oil prices flowed through into domestic petrol prices and lifted headline inflation rates. Few, if any, forecasters predicted the extent of this oil price 'shock' and the consequent sharp rise in inflation. Forecast errors can also result from poor judgement, overly simplistic modelling techniques or poor quality data. If these occurrences result in systematic forecast errors, they can have serious policy implications.

Reviewing forecasting performance provides the Reserve Bank with a better understanding of its forecasts' strengths and weaknesses, and as a result, the bounds of uncertainty that surround future forecasts and policy decisions. McCaw and Ranchhod (2002) examined the Bank's forecast performance between 1997 and 2002 with comparisons to individual forecasters. Their results showed the Bank tended to underestimate CPI inflation over this period while its GDP forecasts had been unbiased. The Reserve Bank's overall forecasting performance was found to be similar to most other forecasters.

¹ Quarterly average daily US dollar price of Dubai oil.
Ref #3007040

Turner (2006) assessed the Bank's forecast performance against the average of the economists contributing to *Consensus* forecasts covering the 2003-2005 period. This article updates that work to include 2006 and extends it by comparing the Reserve Bank's forecast performance against a number of local private sector forecasters.² Section 2 provides an overview of the recent economic cycle, highlighting the key drivers of economic activity and inflation. Section 3 details the methodology used to analyse forecasting performance, while the results are discussed in section 4. Section 5 concludes.

2. *The recent economic cycle*

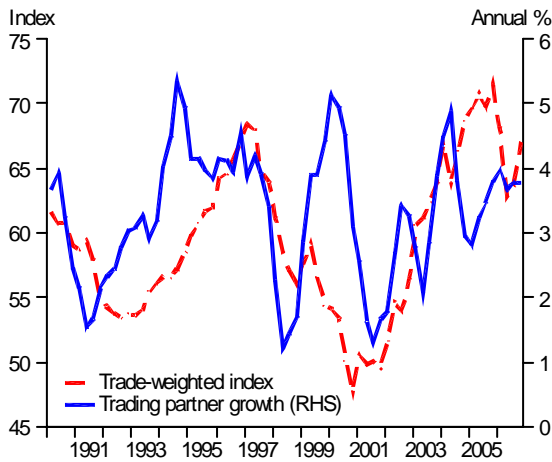
The current growth cycle, which commenced in late 1998, has been New Zealand's strongest expansion in more than 40 years. The key drivers of this expansion were initially focussed in the tradables sector, with exporters benefiting from very favourable export conditions created by a low exchange rate, rising commodity prices in world markets, and a strong recovery in world economic growth following the Asian crisis. Strong export receipts soon spilled over into domestic demand in the form of rising household consumption and business investment. By 2003, this strong performance was generally expected to begin waning as the exchange rate had begun to rise and trading partner growth had weakened amidst increased uncertainty in global conditions, with events such as the correction in the US equity market and the September 11 terrorist attacks dampening confidence.

However, domestic economic momentum was maintained, underpinned by strong population growth, strong construction activity and significant increases in household wealth, mainly in the form of rising house prices. Further, consumption growth was supported by strong growth in employment and labour incomes combined with lower prices for imported goods (due to a higher exchange rate and lower cost goods from developing economies such as China) and increased government spending. A lot of the increase in domestic demand was met by higher imports, which, when combined with a slowdown in export growth, contributed to a slowing in aggregate GDP growth over 2005 and 2006. Domestic demand started to show material signs of slowing through 2006.

Strong domestic growth, particularly in the construction sector, saw New Zealand quickly absorb spare productive capacity and domestically sourced inflation pressures began to emerge. Initially, headline CPI inflation remained in check as strong non-tradables inflation was offset by falling tradables inflation (due to an appreciating exchange rate and falling world prices). However, during 2004, the effects of an appreciating exchange rate began to wane and annual tradables inflation turned positive. The sharp increase in oil prices exacerbated the increase in tradables inflation. Non-tradables inflation remained persistently high, reflecting the prolonged strength in domestic demand. As a result, annual CPI inflation increased from a low of 1.5 per cent at the start of 2004 to 4 per cent in mid 2006. The Bank had gradually tightened monetary policy over this period in response to the strong domestic inflation pressures. The Official Cash Rate was raised from 5 per cent at the start of 2004 to 7.25 per cent by the end of 2005, and remained unchanged through 2006. The extent of the policy tightening cycle was greater than expected throughout the cycle by the Bank, its observers, and financial markets.

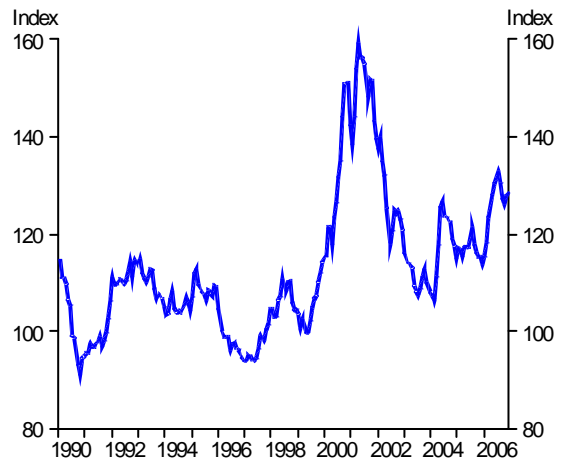
² The results for the *Consensus* average in this paper differ to those in Turner (2006), partly reflecting the inclusion of forecasts for 2006 in this analysis, but also due to the correction of an error that slightly affected the earlier results.

Figure 1: TWI exchange rate and trading partner growth



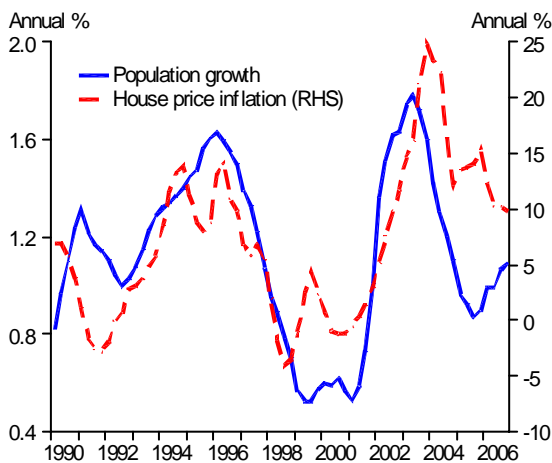
Source: RBNZ, Consensus Economics Inc.

Figure 2: New Zealand dollar commodity prices



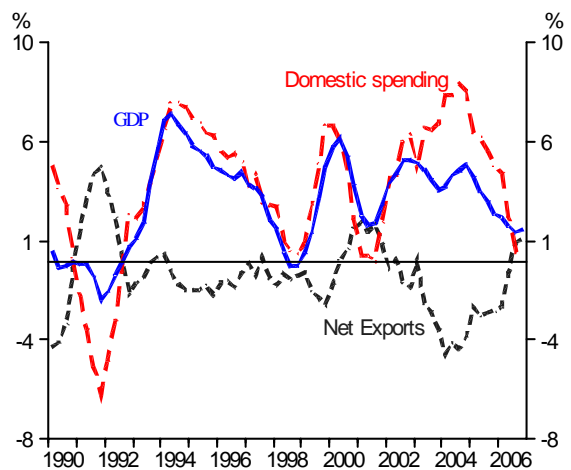
Source: ANZ National Bank Group Ltd.

Figure 3: Population growth and house price inflation



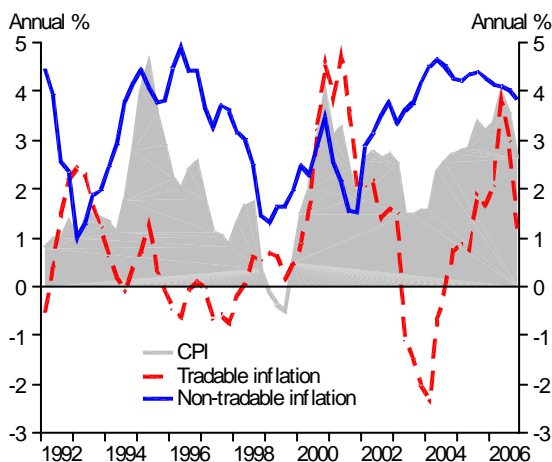
Source: Statistics New Zealand, Quotable Value Ltd.

Figure 4: Real gross domestic product, domestic demand and net exports (contributions to annual average percent change)



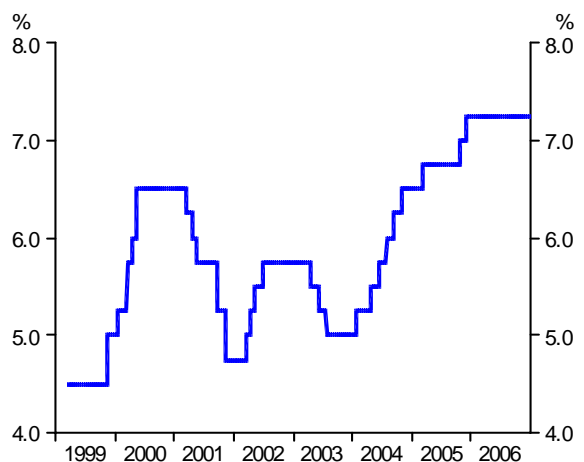
Source: Statistics New Zealand.

Figure 5: CPI, non-tradables and tradables inflation



Source: Statistics New Zealand.

Figure 6: Official Cash Rate



Source: Reserve Bank of New Zealand.

3. Methodology

Against this background, how did the Reserve Bank's forecasting performance during this period compare with that of other forecasters? In order to answer that question, it is necessary to establish a framework for assessing the Bank's forecasts.

The standard statistical measures used to evaluate forecast accuracy are the mean forecast error (MFE) and the root mean squared forecast error (RMSE).³ The MFE captures the degree of bias in forecasts – that is whether there is any over or under predicting over time.⁴ The RMSE provides a measure of forecast accuracy⁵ by measuring how far away forecasts were from actual outturns.

As these measures are dependent on the unit of measure, a benchmark is necessary in order for these measures to be meaningfully interpreted. Researchers typically assess forecast performance against that of a 'random walk'.⁶ However, in this review, we are more interested in our performance relative to other forecasting agencies. To gain a sense of overall performance, we have compared our forecasts against a survey average. It has been found that taking an average of a range of forecasts will tend to outperform most individual forecasts, over time. Hence a forecast evaluation against a forecast average is a fairly tough benchmark.

We use the *Consensus* forecasts produced by *Consensus Economics Inc*, which is a private UK-based institution that produces simple forecast averages from a survey of reputable forecasters for a range of economic and financial variables. For New Zealand, the survey covers 16 analysts within New Zealand and the Asia Pacific Region. *Consensus* provides forecasts for calendar year annual average growth for both GDP and CPI. It is unusual to express CPI inflation as an annual average as forecasts are typically produced for annual CPI inflation (that is inflation from the same quarter in the previous year). We have calculated the implied annual average inflation rate from the Reserve Bank's quarterly inflation forecasts. Interest rate and exchange rates forecasts are presented for 3 months and 12 months ahead.

Once the overall performance has been ascertained, we compare the Reserve Bank's performance relative to individual forecasters.⁷ Rather than taking the individual forecasts provided to *Consensus*, we have based the following analysis on the forecasts published by individual local forecasters.⁸ While this means that the forecasts from the individual forecasters were not all produced at the same time, it has the advantage of bringing the timing closer to that of the Reserve Bank's forecasts (key data releases are known to contain enough information to drive substantial revisions). This issue is especially important for financial market variables.

³ Mean forecast error (MFE) = mean (errors);

Root mean forecast error (RMSE) = $\sqrt{\text{mean}(\text{errors})^2}$

⁴ It is widely known that forecasters tend to underestimate variables such as economic growth or inflation during upswings and overestimate them during downswings. Accuracy should really be measured over a complete business cycle in order to get a fair estimate of actual bias. However, as we have selected a smaller sample, this measure is better interpreted relative to another forecast – ie which forecaster has underestimated the most during an upswing.

⁵ The MFE and RMSE are not invariant to the unit of measurement; therefore caution must be applied to comparing error measures of interest rates and growth rates, for example.

⁶ Under the simplest random walk model, the forecast of a variable X will be given by last period's value plus a constant representing the average change between periods. Random walk forecasts have often been shown to provide forecasts as good as, or better than, those produced using more elaborate structural models.

⁷ The forecasters considered are listed in the data appendix, but their identities have been hidden for the purposes of the analysis in Section 4.

⁸ We have not included forecasts from the Treasury. Their forecasts are only made twice a year (opposed to four times) and therefore the sample of observed revisions would have been too small to make inference from. Also, the Treasury forecast rounds are sufficiently out of sync with the Reserve Bank to make comparison very difficult.

Ultimately, there were some mismatches that could not be avoided, but we have tried to produce consistent estimates in the notes to each table.

Given that we are only examining forecast performance over a relatively short sample period (four years), one cannot place too much emphasis on the quantitative results. However, given the nature of economic activity and inflation pressures over the recent cycle, we can still draw useful qualitative inferences from the results. Also, while it is ideal to compare forecasts over a full business cycle, it is not always practical or informative. Forecasting methodology is changing all the time, with new technologies in forecasting and statistics continuously being introduced. Indeed, the FPS model currently used in the Reserve Bank has evolved considerably since it was first introduced. An additional issue for the private sector forecasters is that their forecasting teams are typically quite small, and their forecasts are therefore susceptible to changes in personnel. Furthermore, historical revisions to GDP can result in large forecast errors, even for very near-term forecasts.

4. Forecast comparison to the Consensus average and individual forecasters

4.1 Forecasts of GDP growth

The Reserve Bank's calendar-year GDP forecasts, on an annual average percent change (AAPC) basis, over the period from 2003 to 2006 were very similar to those of the *Consensus* average (table 1). Furthermore, the range of forecast errors for the individual forecasters being relatively tight, with any difference being reasonably marginal, suggesting that the GDP forecasting profiles did not differ significantly among forecasters over the period from 2003 to 2006.

Table 1: RMSE and MFE for GDP growth forecasts

	AAPC			
	RMSE		MFE	
	< 1 year	< 2 year	< 1 year	< 2 year
RBNZ	0.5	0.8	0.0	-0.2
Forecaster A	0.5	1.0	-0.2	-0.4
Forecaster B	0.9	1.1	-0.2	-0.4
Forecaster C	0.6	1.0	-0.2	-0.4
Forecaster D	0.6	0.8	-0.2	-0.4
Forecaster E*	0.5	1.0	-0.2	-0.6
Forecaster F**	0.5	0.8	-0.1	-0.3
Forecaster G	0.6	0.7	-0.4	-0.4
Forecaster H	0.7	1.2	-0.3	-0.6
Average of above	0.6	1.0	-0.2	-0.4
<i>Consensus</i>	0.6	0.9	-0.1	-0.3
All forecasts are for December year GDP 2003-2006, unless otherwise stated.				
* Forecaster E excludes forecasts for 2006; Comparable estimates for RBNZ are RMSE:0.6, 0.9; MFE -0.1, -0.2.				
** Forecaster F's forecasts are for March year, up to March 2006; Comparable estimates for RBNZ are RMSE:0.5, 0.7; MFE -0.1, -0.3.				

Over the short-term (up to one year ahead) forecast horizon, the Reserve Bank appears to have performed slightly better than the individual forecasters considered. However, we are hesitant to draw any concrete conclusions regarding forecasting accuracy given the small sample size over which the analysis is based.

At the longer (up to two years ahead) horizon, the size of the forecast errors increases, in some cases markedly. This reflects the difficulty of making forecasts for economic variables that occur

in the distant future. Having said that, it is evident that the majority of the deterioration in forecast performance stems from the projections for 2004 GDP growth, as all forecasters underestimated the strength of economic growth to various degrees. Again, the Reserve Bank was amongst the best performers.

Over the past four years, it appears that all the forecasters had a downward bias (as indicated by a negative MFE), with the exception of the Reserve Bank. The negative biases are due to a few large negative errors, especially in 2004, rather than any persistent or systematic underestimation of growth. The forecasters with larger forecasting errors were those who were slower to respond to the signals of stronger economic growth.

Figures 7 to 10 show the forecast errors at a quarterly frequency for the Reserve Bank and the *Consensus* average. That is the forecast made for December year annual average GDP from eight quarters (two years) ahead up to one quarter ahead. The shaded areas represent the range of forecasts of the individual forecasters considered. The charts are intended to show how the forecasts have evolved from longer forecast horizons to shorter forecast horizons.

GDP forecasts for the calendar year 2003 and 2004 between the Reserve Bank and the *Consensus* average were remarkably similar (figures 7 and 8). Both had the tendency to underestimate the strength of economic growth over this period, but the Reserve Bank's slightly more bullish forecasts resulted in more accurate forecasts.

The forecasting profile of 2004 GDP growth is of most interest, since all forecasters (the Reserve Bank and the *Consensus* included) underestimated GDP growth quite significantly at longer horizons (although all quickly revised up around the beginning of 2004). The reasons for the initial pessimistic outlook, in the Reserve Bank's case, were concerns that the high exchange rate was suppressing the export sector and fears that the SARS outbreak would seriously harm New Zealand's economic performance. Consequently, forecasters largely overlooked the upbeat domestic activity early on, especially the robustness in residential construction and household spending, both of which were supported by ongoing population growth.

GDP growth forecast errors (December year, AAPC)

Figure 7: 2003

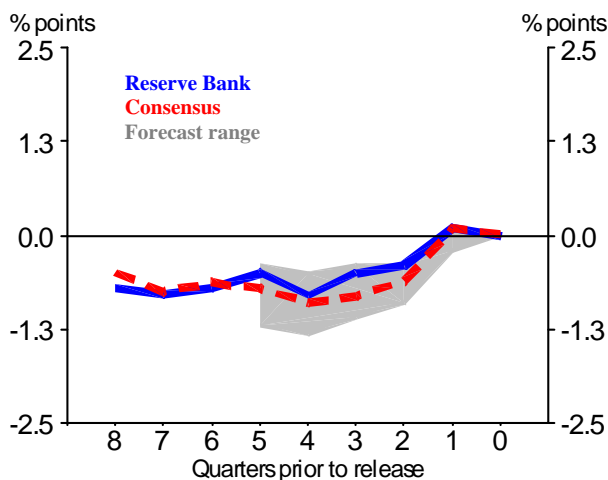
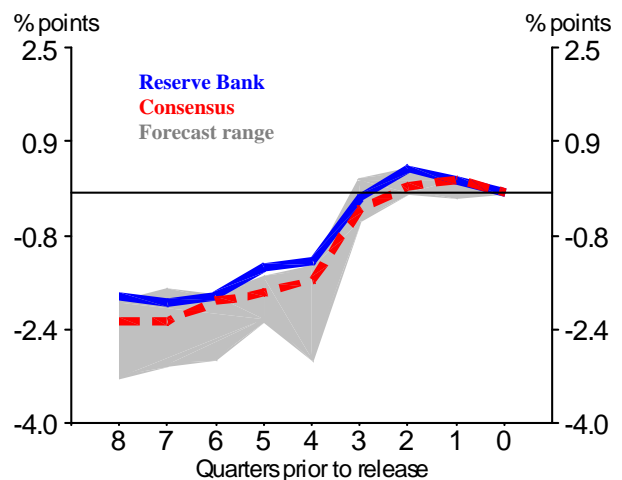


Figure 8: 2004



Note: Individual forecasts were only collected back to December 2002, hence longer horizon forecasts are missing for 2003. Forecaster F's forecast errors are not included in these charts because their forecasts correspond to March years.

For 2005 GDP, the evolution of the Reserve Banks forecasts was more volatile relative to the *Consensus* profile (implying more volatile revisions). While both over-estimated GDP growth at

most forecasting horizons, the Reserve Bank over-predicted GDP growth for 2005 by more than the *Consensus* average.

Despite some minor differences in the 2006 GDP forecasts at longer forecasting horizons, the near-term forecasts were almost identical between the Reserve Bank and the *Consensus* average. Once again, over-estimating was the predominant feature of the forecast errors.

GDP growth forecast errors (December year, AAPC)

Figure 9: 2005

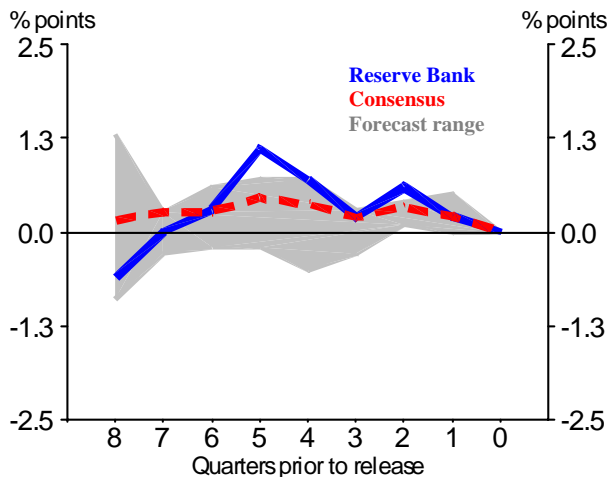
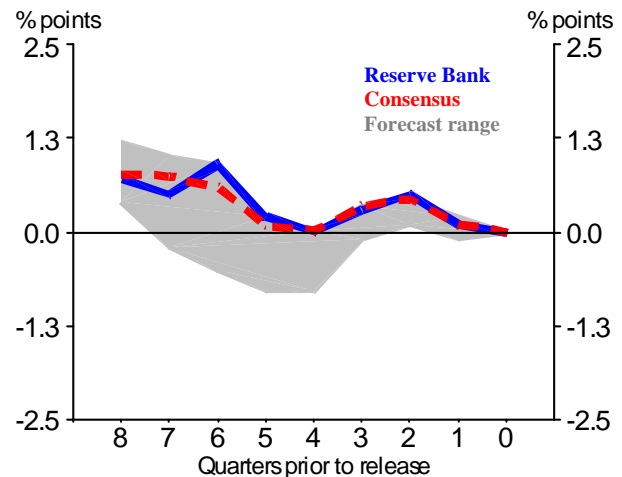


Figure 10: 2006



4.2 Forecasts of CPI inflation

Accuracy of Reserve Bank short-term forecasts (less than one year ahead) for CPI inflation, on an annual average basis, have been comparable to that of the *Consensus* average over recent years. Over the medium term (forecasts up to two years ahead) the Reserve Bank performed slightly better than the *Consensus* average, as the *Consensus* average tended to under-estimate inflation.

Table 2 presents estimates for RMSE and MFE for the Reserve Bank's forecasts (both for annual and annual average CPI inflation), *Consensus* average forecasts (annual average) and individual forecasters (annual). Because *Consensus* surveys annual average inflation (which is unusual), these results are not directly comparable to the errors of individual forecasters (annual inflation). However, they can be compared to the equivalent Reserve Bank forecasts.

For short-term forecasts (less than one year), the accuracy of the Reserve Bank's forecasts is similar to that of the *Consensus* average as well the individual forecasters, with only two private sector forecaster slightly out-performing the Reserve Bank. For the longer-term forecasts, the Reserve Bank had slightly better accuracy than the other forecasters; the one forecaster with very similar forecasting accuracy to the Reserve Bank also had very similar forecast profiles.

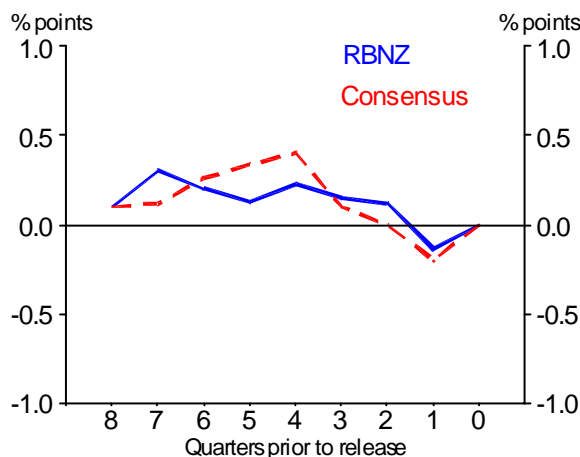
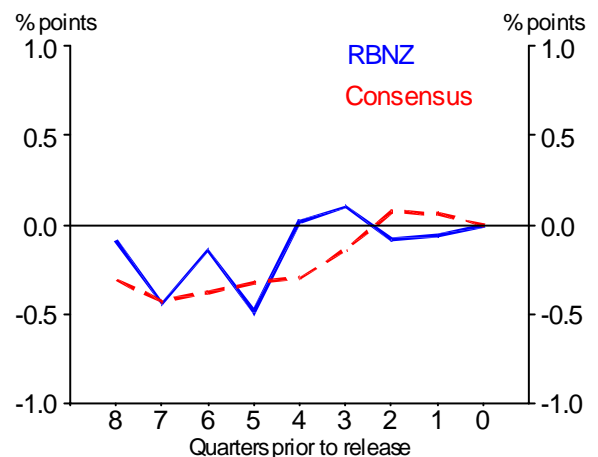
Most forecasters tended to underestimate inflation, as indicated by a negative MFE. This is in part due to the run up in oil prices over 2004 to 2006, which all forecasters failed to fully anticipate. The majority of other forecasters held a weaker view of inflation pressures relative to the Reserve Bank, especially at longer forecast horizons. The negative MFEs for Forecasters D and E were a result of them under-predicting inflation throughout the period. Conversely, forecaster B switched from under-predicting inflation early in the sample to over-predicting.

Table 2: RMSE and MFE for CPI inflation forecasts

	RMSE		MFE	
	< 1 year	< 2 year	< 1 year	< 2 year
AAPC				
Consensus	0.2	0.4	0.0	-0.2
RBNZ	0.2	0.2	0.0	0.0
APC				
RBNZ	0.5	0.4	0.1	0.0
Forecaster A	0.7	0.8	-0.2	-0.4
Forecaster B	0.5	0.6	0.2	-0.1
Forecaster C	0.5	0.6	0.1	-0.2
Forecaster D	0.5	0.7	-0.1	-0.4
Forecaster E*	0.5	0.9	-0.4	-0.7
Forecaster F**	0.4	0.4	0.3	0.2
Forecaster G***	0.7	0.7	0.6	0.1
Forecaster H	0.6	0.7	-0.1	-0.2
Average of above	0.6	0.7	0.0	-0.2
All forecasts are for December year inflation 2003-2006, unless otherwise stated.				
* Forecaster E excludes forecasts for 2006; Comparable estimates for RBNZ are RMSE:0.3, 0.3; MFE -0.1, -0.2.				
** Forecaster F's forecasts are for March year, 2003-2007; Comparable estimates for RBNZ are RMSE:0.5, 0.5; MFE 0.3, 0.1.				
*** Forecaster G sample only covers 2006; Comparable estimates for RBNZ are RMSE:0.8, 0.6; MFE 0.6, 0.4.				

The charts below show the forecast errors at a quarterly frequency for the Reserve Bank and the *Consensus* average. Over 2003 and 2004 forecasts by the Reserve Bank and the *Consensus* average were broadly similar (see figures 11 and 12). Both the Reserve Bank and the *Consensus* average over-estimated inflation in 2003. Indeed, most forecasters were surprised by the extent tradables inflation fell (due to an exchange rate appreciation and a fall in oil prices), offsetting strength in non-tradables inflation. The one exception was Forecaster E, who was the only forecaster to underestimate inflation for 2003.

CPI inflation forecast errors* (December year, AAPC)

Figure 11: 2003**Figure 12: 2004**

*The range of individual forecasters cannot be charted as they are on an APC basis, while the *Consensus* average is on an AAPC basis. See appendix for graphs showing RBNZ APC forecasts against the range of individual forecasters.

All forecasters underestimated inflation in 2004 at medium-term horizons. Through time, the *Consensus* average was slower than the Reserve Bank to revise up its forecasts.

While inflation forecasts had been relatively similar over 2003 and 2004, 2005 inflation forecasts became markedly different, particularly at longer horizons (figure 13). For example, at 7 quarters ahead, in response to a significantly stronger outlook for tradables inflation, the Reserve Bank revised up its forecast to 3.3 percent, while *Consensus* average continued to predict a relatively subdued 2.4 percent. However, the *Consensus* average eventually revised up its view, towards that of the Reserve Banks, and forecasts were then relatively similar at closer forecast horizons.

Similarly, forecasts for 2006 inflation also differed at longer horizons, with the *Consensus* average again predicting weaker inflation pressures than the Reserve Bank (figure 14). The Reserve Bank revised its 2006 near-term inflation forecasts more aggressively in response to the oil price shock in that year. As inflation eventually came in weaker, the Reserve Bank's near-term accuracy fell relative to its performance in previous years, and as a result, has become more comparable with the *Consensus* average.

CPI inflation forecast errors (December year, AAPC)

Figure 13: 2005

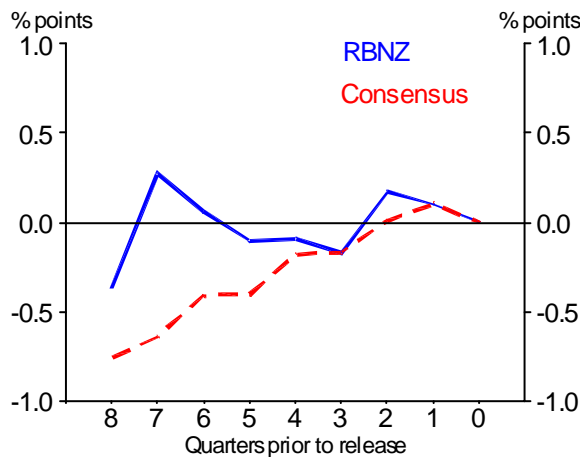
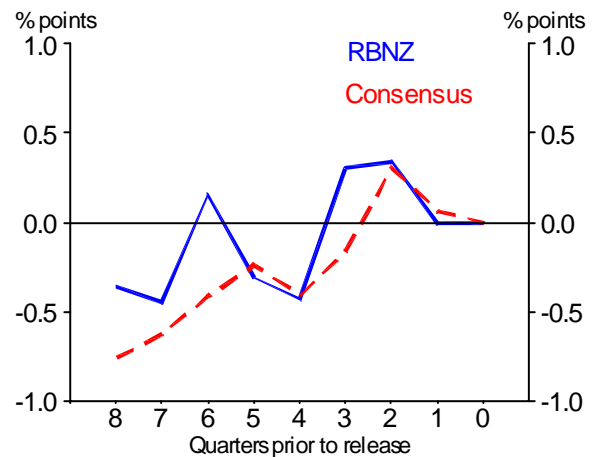


Figure 14: 2006



4.3 Forecasts of 90-day interest rates

In assessing the accuracy of the 90-day interest rate (and TWI) forecasts, we consider the errors made by each forecaster three months ahead and 12 months ahead over the period from 2003 to 2006. Overall, the Reserve Bank performed well against other forecasters over the four year period, with the lowest RMSE at both horizons (table 3). These results suggest that there is additional information content for financial market participants in the Reserve Bank's published interest rate projections, but the fact that even the Reserve Bank makes interest rate forecast errors also means that the Reserve Bank's forecasts should in no way be considered a commitment for future interest rate settings. The MFEs are predominately negative, indicating forecasters (including the Reserve Bank) were surprised by the persistent strength in the interest rates.

When it comes to forecasting financial market variables such as the 90 day interest rates, timing of publication can be a key determinant on forecasting accuracy. As a result, it should be noted that early publication time has put some forecasters to a disadvantage in forecasting precision, particularly for Forecaster D.

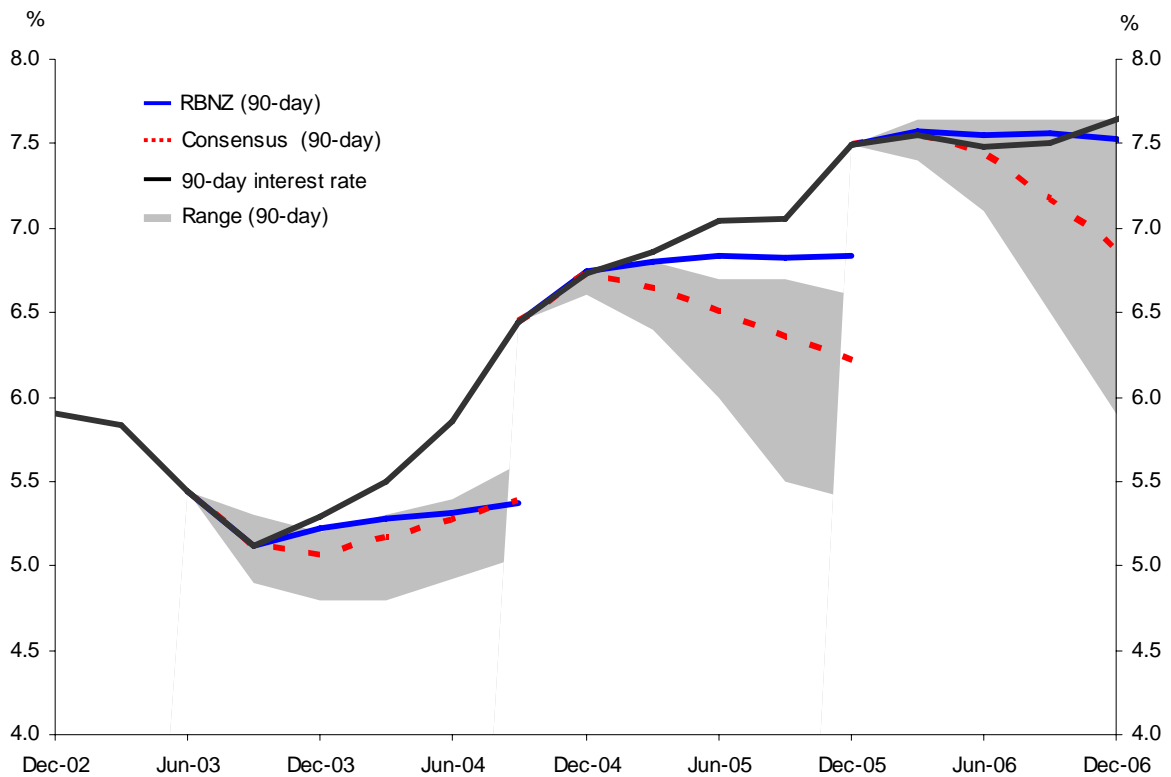
Given the relationship between inflation and interest rates, it is not surprising to see that forecasters who under-estimated the CPI also tended to under-predict the strength in 90-day interest rates more than others (Forecasters D, E and H).

Table 3: RMSE and MFE for 90-day interest rate forecasts

	Percentage Point			
	RMSE		MFE	
	3 months	12 months	3 months	12 months
RBNZ	0.2	0.6	0.0	-0.4
Forecaster A	0.3	1.1	-0.2	-0.8
Forecaster B	0.2	0.8	0.0	-0.5
Forecaster C	0.3	0.9	-0.1	-0.8
Forecaster D	0.4	1.4	-0.3	-1.1
Forecaster E	0.3	1.3	-0.2	-1.2
Forecaster F	0.2	0.8	0.1	-0.3
Forecaster G*	0.3		-0.2	
Forecaster H	0.4	1.3	-0.3	-1.3
Average of above	0.3	1.1	-0.2	-0.9
<i>Consensus</i>	0.2	1.0	-0.1	-0.8

*Forecaster G had insufficient data to estimate error at 12 month horizon.

Figure 15 depicts the evolution of the 90-day interest rate and a selection of Reserve Bank and *Consensus* forecasts made over the past four year period.⁹ The grey shaded area covers the range of the individual forecasters shown in Table 3. It can be seen that, while the Reserve Bank forecasts were generally stronger than the *Consensus* average, they were not always at the top of the range (although they were very close to it).

Figure 15: Reserve Bank and *Consensus* 90-day interest rate forecasts and the range of other forecasters

⁹ We have shown forecasts only at selected intervals for presentational simplicity.
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4.4 Forecasts of the exchange rate

Consensus surveys the forecasts for the US dollar rather than the TWI. We have estimated RMSE and MFE for the *Consensus* average forecasts; however these are not directly comparable to estimates produced for the TWI forecasts as these statistics are not invariant to unit of measure. They are intended to be indicative only.

The Reserve Bank marginally out-performs most other forecasters (table 4). Similar to the 90-day interest rate forecasts, we stress the caveat that any forecasting accuracy is susceptible to the difference in the timing of the publication, which unfortunately we are unable to control for in this paper. However, this is less of an issue for medium-term forecasts.

Almost all the forecasts made contained a downward bias, suggesting all the forecasters typically underestimated the strength of the exchange rate. This result is not surprising given the difficulty in forecasting exchange rates and that the TWI has mostly appreciated over the cycle.

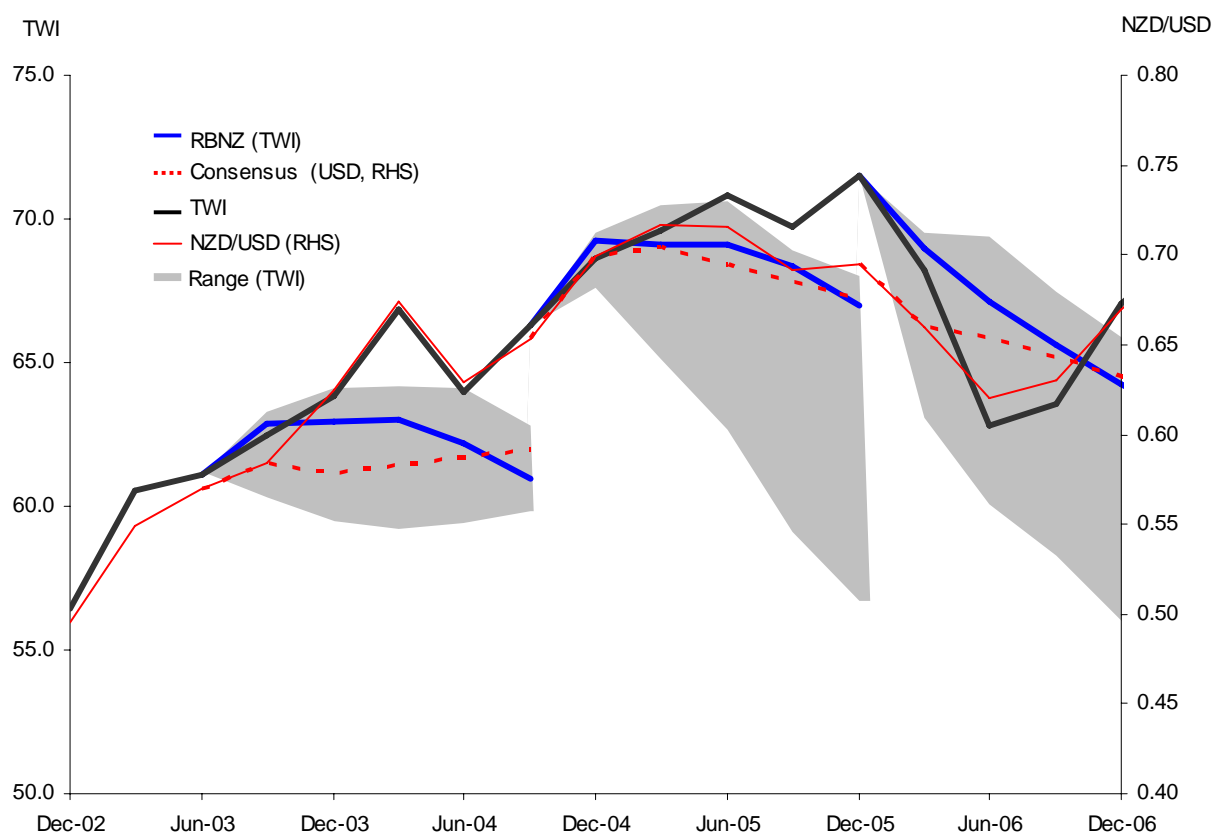
Table 4: RMSE and MFE for TWI and US dollar forecasts

	Percentage Difference*			
	RMSE		MFE	
	3 months	12 months	3 months	12 months
RBNZ	3.9	7.9	-1.1	-6.2
Forecaster A	5.0	6.8	-1.7	-4.5
Forecaster B	7.1	11.0	-4.5	-9.9
Forecaster C	3.8	9.5	-1.3	-8.2
Forecaster D	8.3	15.2	-5.3	-13.6
Forecaster E**	3.7	6.8	-1.6	-6.1
Forecaster F	3.9	9.0	0.4	-7.4
Forecaster G***	7.0		-4.7	
Forecaster H	5.3	10.2	-2.5	-7.0
Average of above	5.5	9.8	-2.6	-8.1
<i>Consensus</i> (USD)	5.2	9.9	-2.0	-6.9

* $(\text{Forecast} - \text{Actual})/\text{Actual} \times 100$
** Forecaster E excludes forecasts for 2006;
Comparable estimates for RBNZ are RMSE: 3.6, 8.7; MFE -1.1, -8.1.
*** Forecaster G had insufficient data to estimate error at 12 month horizon.

Figure 16 depicts the evolution of the TWI and a selection of Reserve Bank TWI forecasts made over the past four years, with the grey shaded area covering the range of the individual forecasters shown in Table 4. Also included is the evolution of the NZ dollar and *Consensus* forecasts for the NZ dollar (again, not directly comparable, indicative only). Similar to what was seen with the interest rate forecasts, the Reserve Bank's TWI forecasts were generally near the top of the range, with some forecasters consistently (and incorrectly) predicting significant exchange rate depreciations.

Figure 16: Reserve Bank TWI forecasts, the range of other forecasters (TWI) and the *Consensus* average forecast for the US dollar.



5. Conclusion

The results from this study indicate that the Reserve Bank's forecast performance over the past four years has been comparable, if not slightly better, than the forecasters considered. In fact, the Reserve Bank has consistently been in the top quartile in terms of forecast performance. Both the Reserve Bank and *Consensus* displayed similar forecast accuracy for GDP growth and the exchange rate. Both under-estimated the strength of GDP growth over 2003 and 2004 and over-estimated the slowdown in growth that occurred during 2005. Likewise, both under-estimated the extent of the exchange rate appreciation.

The Reserve Bank tended to perform slightly better at forecasting medium-term inflation, as well as the 90-day interest rate – typically forecasting higher levels for both of these variables relative to the other forecasters. Some of the out-performance by the Reserve Bank in forecasting the 90-day interest rate is likely to reflect the fact that the Reserve Bank has additional information about very near-term interest rate movements. Nevertheless, it does suggest that there is additional information content in the Reserve Bank's published interest rate projections for financial market participants. Furthermore, the out-performance this cycle has resulted from the Reserve Bank consistently projecting interest rates being higher for longer than projected by the other forecasters.

Having quantified the magnitude of the forecast errors, it is important to identify the sources of those errors and determine what, if anything, can be done to improve forecast performance. This is a continuous process at the Reserve Bank, but a comprehensive assessment of the potential sources of forecast errors is very time consuming. Forecast errors can often be traced back to shocks to largely exogenous factors, such as world oil prices. Also, errors in forecasting variables not included in the above analysis, such as potential output, could also be important

sources of errors in forecasting GDP and CPI. Incorrect assumptions about elasticities are likely to have also played a role at different times. The last published comprehensive analysis of the drivers of forecast errors by the Reserve Bank was McCaw and Ranchhod (2002).

It is important to reiterate that the comparisons made in this article relate only to the period 2003-2006. The Bank's performance relative to other forecasters can be expected to change over time as economic conditions vary and as the methods used to make forecasts evolve. The Bank will continue to closely monitor the quality of its forecasts and is committed to making ongoing improvements to its forecasting models and procedures. Finally, point forecasts are only one of many inputs into policy decisions, with an accurate assessment of risks around the central projection just as important.

References

McCaw, S and S Ranchhod (2002), "The Reserve Bank's forecasting performance," *Reserve Bank of New Zealand Bulletin*, December, Vol 65, No 4, pp5–23.

Turner, J (2005), "An assessment of recent Reserve Bank forecasts," *Reserve Bank of New Zealand Bulletin*, September, Vol 69, No 3, pp38–43.

Appendix

CPI inflation forecast errors (December year, APC)

Figure 17: 2003

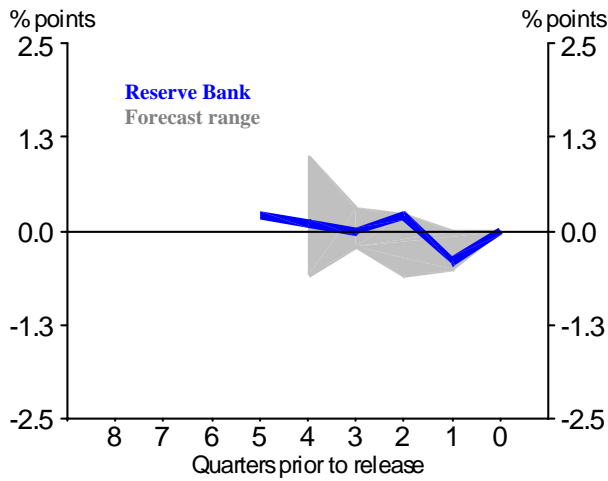


Figure 18: 2004

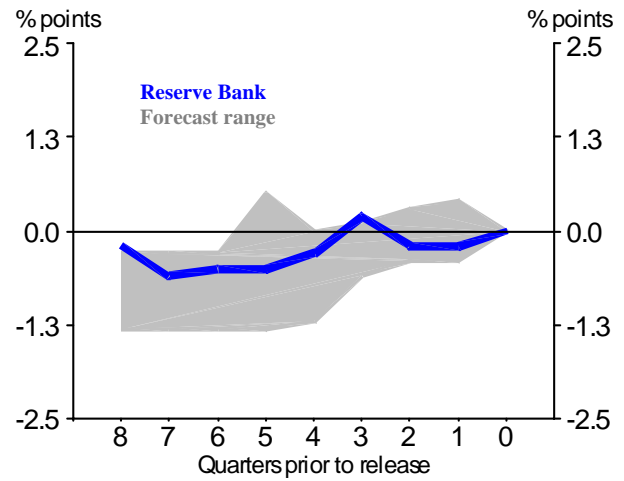


Figure 19: 2005

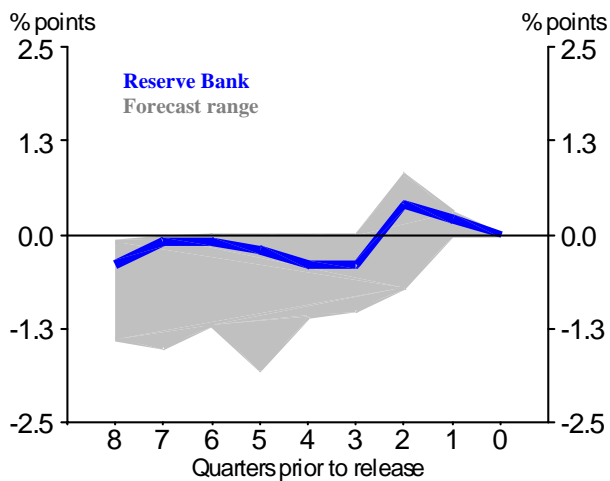
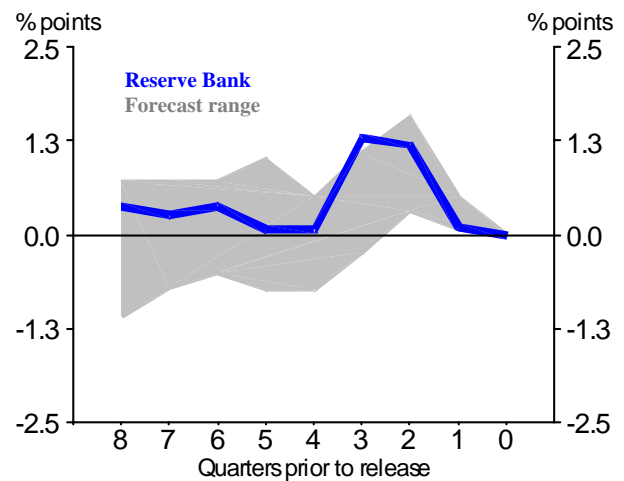


Figure 20: 2006



Forecasters analysed

- Consensus
- ANZ National
- ASB
- Bank of New Zealand
- Deutsche Bank
- Goldman Sachs JB Were
- New Zealand Institute of Economic Research
- UBS
- Westpac