

TWI forecast errors

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Editor's note

Early on in our research, we realised that the exchange rate was a likely contributor to our forecast errors. This paper examines our forward-path assumptions about the future trade-weighted index (TWI) in more detail.

Executive summary

As part of our examination of the Reserve Bank's forecasting performance, we have examined our quarterly assumptions between December 1994 and September 2002 regarding the future TWI. We find that:

- Between December 1994 and March 1997 our assumptions did not tend to consistently under- or over-predict the level of the TWI at most forecast horizons.
- Since 1997 (which coincides with the adoption of the Forecasting and Policy System model (FPS) and a change in methodology for generating our TWI assumptions) our assumptions have tended to over-predict the level of the TWI. Forecast errors for near-term horizons are relatively small. Four or more quarters ahead our assumptions have been, on average, at least 5 per cent higher than the actual level of the TWI.
- Differences in forecasting performance pre- and post-FPS are probably not greatly due to the change in forecasting methodology. The findings are likely to be strongly influenced by the fact that the turning point in the TWI happened to coincide with this change.

1 Introduction

Our recent examination of the Reserve Bank's forecasting performance indicates that we have tended to underestimate the quarterly CPI inflation for medium- to long-term horizons.¹ As part of our ongoing examination of our forecasting performance we have examined our assumed forward paths for the trade-weighted index (TWI).

We examine quarterly assumptions between December 1994 and September 2002 for the future TWI. Our sample period is split into two parts, reflecting the change that occurred in our methodology for generating TWI assumptions. Forecasts are examined on the presence and level of bias² (as measured by the mean forecast errors) and the accuracy (as measured by the mean forecast error and the root mean forecast error).

Caution is needed when interpreting our findings. Our findings are likely to be strongly dependent on the sample period. For example, the TWI changed direction at the same time that we changed forecasting methodology. In addition, the endogenous policy forecasts period includes the Asian crisis.

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

² When assessing forecasting performance we standardise forecast errors by the level of the TWI in the following manner: $Forecast\ deviation = ((Forecast\ TWI_t - Actual\ TWI_t) / Actual\ TWI_t) * 100$. This allows us to measure the deviation of our forecasts from the actual level of the TWI as a percentage.

2 The Reserve Bank's TWI forecasting performance

Prior to June 1997 we used flat-line assumptions regarding the real exchange rate and real interest rate. With the adoption of the Forecasting and Policy System model (FPS) in June 1997 we moved to assuming a gradual return to an equilibrium exchange rate level (which we have occasionally adjusted). These relatively mechanical approaches reflect the inherent difficulty of forecasting exchange rates. The deviations in the actual TWI versus our assumptions cannot therefore be interpreted as traditional 'forecast errors'. However, they could of course still be a driver of our inflation forecast errors.

Given the change in methodology, we examine forecast errors for the periods prior to and since the adoption of endogenous policy forecasts separately. However, we note that due to the forward-looking nature of forecasts it is impossible to get a 'clean' separation of sample periods.

Figure 2.1 plots the actual level of the TWI versus our forward assumptions of it, at 3 quarter intervals. Over the sample period the TWI rose consistently until March 1997 and then declined sharply. We have tended to under-predict the level of the TWI when it is rising and over-predict its level when it is falling. As a result, we have tended to under-predict the TWI during the pre-FPS flat-line assumption period, and have tended to over-predict the TWI since FPS and the return-to-equilibrium assumption was adopted in mid-1997. Over a full exchange rate cycle such errors may average out. We do not have a full exchange rate cycle to examine under either forecasting regime. Hence, the short sample periods are an important caveat to our findings. Our examination of the Reserve Bank's forward-path assumptions for both regimes is summarised in table 2.1 and figure 2.2.

Figure 2.1
TWI levels and Reserve Bank forward-path assumptions (3 quarter intervals)

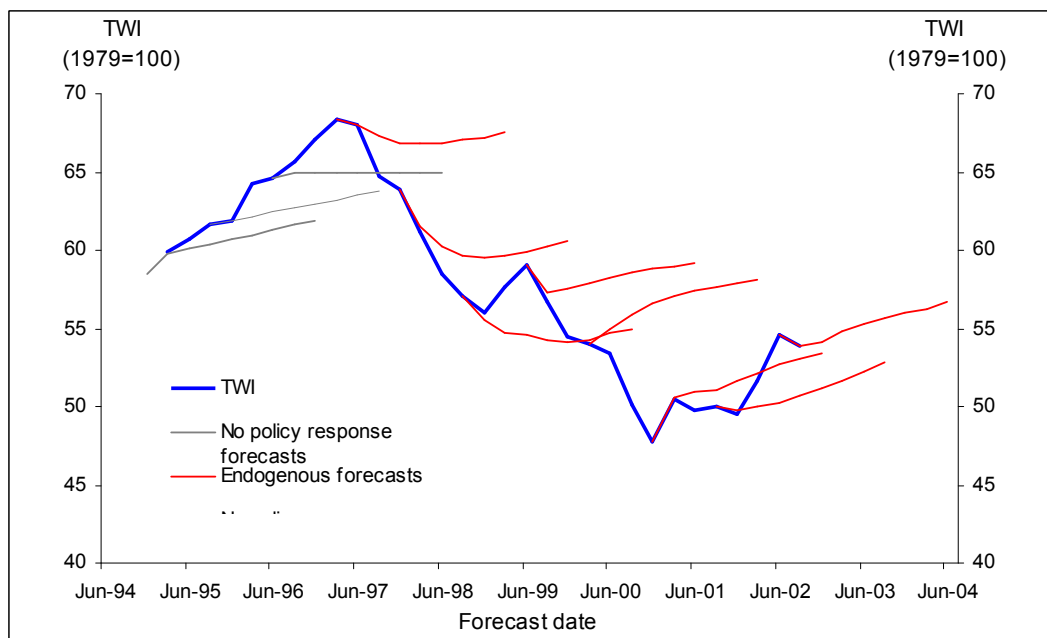


Table 2.1
TWI ‘Forecast’ error summary statistics for the Reserve Bank

Quarters ahead	Mean Errors		RMSE		Observations	
	Exogenous Policy	Endogenous Policy	Exogenous Policy	Endogenous Policy	Exogenous Policy	Endogenous Policy
	1994 Q4 to 1997 Q1	1997 Q2 to 2002 Q3	1994 Q4 to 1997 Q1	1997 Q2 to 2002 Q3	1994 Q4 to 1997 Q1	1997 Q2 to 2002 Q3
Current Quarter	-0.42 **	0.04	0.67	1.31	10	22
1	-1.71 ***	1.58	2.09	4.83	10	21
2	-2.15 *	3.20	3.41	7.05	10	20
3	-2.30	5.11 *	4.31	8.91	10	19
4	-1.84	7.19 **	5.56	10.76	10	18
5	-0.83	9.04 ***	7.51	12.30	10	17
6	0.79	10.88 ***	9.17	13.51	10	16
7	2.68	12.48 ***	10.77	14.15	10	15
8	4.38	14.74 ***	11.52	15.30	10	14
9	6.00	16.78 ***	11.74	17.49	10	13
10	10.35 **	18.26 ***	12.89	19.24	9	11

Notes:

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

*** = Significant at the 1 per cent level

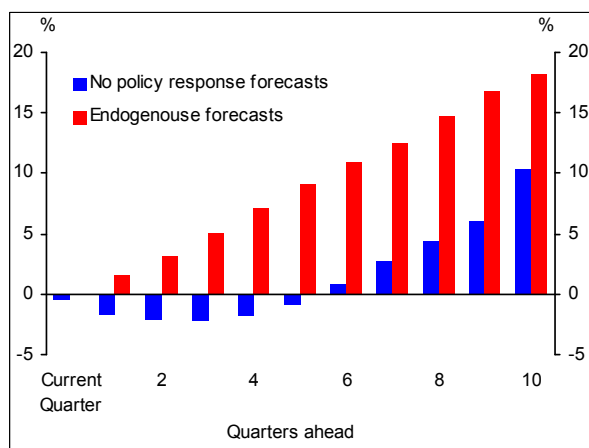
** = Significant at the 5 per cent level

* = Significant at the 10 per cent level

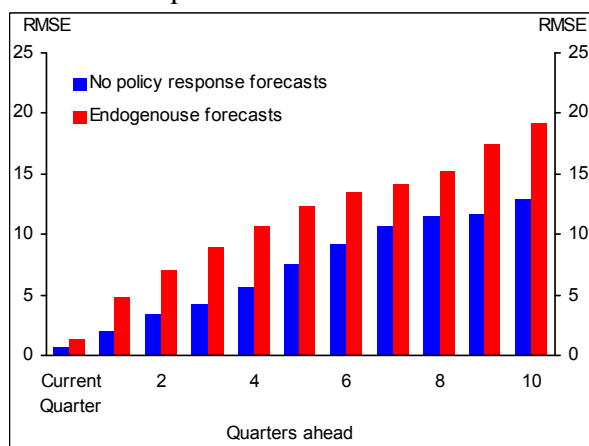
Forecast errors for the 2 quarters ahead horizons are not normally distributed for the exogenous policy tracks period. For these horizons we test the null hypothesis: median forecast error = 0

Figure 2.2
Summary statistics for the Reserve Bank’s TWI forward-path assumptions

Mean forecast errors



Root mean squared errors



2.1 TWI ‘forecast’ errors between December 1994 and March 1997 (flat-line real TWI assumption)

During this period our projections of the nominal TWI were determined using flat-line assumptions regarding the real interest rate and real exchange rate. Hence our ‘forecast errors’ do not have the traditional interpretation, as we were not in fact publishing any kind of ‘best-guess’ of the future exchange rate.

There is no statistically significant bias in our TWI assumptions up to 9 quarters ahead during this period.³ However, we did significantly over-predict the level of the TWI 10 quarters ahead. Assumed tracks for the TWI for this horizon were, on average, 10 per cent higher than the actual TWI turned out to be. As would be expected, the accuracy of our assumed track declines as the forecast horizon lengthens.

2.2 TWI ‘forecast’ errors between June 1997 and September 2002 (return-to-equilibrium TWI assumptions)

Since 1997 we have seen a dramatic decline in the nominal and real TWI. Not surprisingly, our TWI assumptions have tended to over-predict the level of the TWI during this period. Up to three quarters ahead this over-prediction has been relatively small. However, for longer forecast horizons we have tended to over-predict the level of the TWI by a much larger amount. On average our one year ahead assumed tracks for the TWI since mid-1997 have tended to be 7 per cent higher than the actual TWI and two years ahead our assumed tracks have been 15 per cent higher. Again we find that the accuracy of our assumptions declines as the forecast horizon lengthens.

Caution is needed when generalising from these findings. The TWI was depreciating for most of this period. Further, although our TWI tracks are assumptions rather than forecasts, this was an unusual period, in which the nominal exchange rate fell to levels much lower than ever seen before (and its usual relationship to world commodity prices broke down). The real exchange rate reached lows last plumbed briefly in the foreign exchange crisis of 1984.

Mean errors from the pre- and post-FPS periods are dominated by the very different trends in the TWI itself in the two sample periods. The accuracy of our assumptions appears to be lower since the adoption of endogenous policy tracks; however, this finding is probably also be a feature of the sample period rather than forecast methodology.

³ Although the mean forecasts errors for the current quarter and 1 and 2 quarters ahead horizons are negative and significantly different from zero, they are still relatively small. This finding is most likely a reflection of the sample period and the low variability of errors for these horizons.

3 Conclusion

Foreign exchange rate movements are inherently difficult to forecast. Between December 1994 and March 1997 our technical assumptions did not tend to consistently under- or over-predict the level of the TWI at most forecast horizons. Since the June 1997 adoption of FPS and the assumption of the TWI gradually returning to equilibrium, our assumed tracks have tended to over-predict the level of the TWI. It would be misleading to attribute the difference in forecasting performance in the two periods solely, or even largely, to changes in our methodology for generating our technical assumptions. Our findings are likely to be strongly influenced by events specific to each sample period. In particular we note that the change in methodology coincided with the turning point of the TWI.

References

Ranchhod, S (2002), "Preliminary findings on forecast errors," *Reserve Bank of New Zealand Memorandum*.