Is monetary policy in New Zealand similar to that in Australia and the United States?

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Introduction

Monetary policy in New Zealand is often compared with monetary policy in other countries, such as Australia and the United States of America. Comments are often made suggesting that the Reserve Bank of New Zealand should be more like the Reserve Bank of Australia or the United States Federal Reserve in the operation of monetary policy. It is therefore instructive to assess how different monetary policy in New Zealand would be if other central banks – particularly the United States Federal Reserve and the Reserve Bank of Australia – were running monetary policy here. This paper examines New Zealand's monetary policy and asks the question: "Would the United States Federal Reserve (the Fed) or the Reserve Bank of Australia (the RBA) have operated monetary policy in New Zealand differently if they were in our shoes?"

Applying estimation results from the internal research of the Bank and research from the Fed, we find that the Taylor rule appears a reasonable characterisation of the broad pattern of interest rates in the United States, Australia and New Zealand.

The estimated Taylor rule assumes that the monetary authority responds to deviations of contemporaneous inflation from the inflation target and deviations of current output from potential output, but also allows for interest rate smoothing. Our approach enables us to examine the effects of adopting the somewhat different responses of the Fed and the RBA, and to derive the implied policy path they might have taken if they were charged with controlling monetary policy in New Zealand. The analysis suggests that, over the past decade, both the Fed and the RBA might have acted broadly in much the same way as did the Reserve Bank of New Zealand (RBNZ). Furthermore, we also find some evidence that under the Official Cash Rate (OCR) regime the Bank's policy adjustment appears to have become more 'flexible', and more like that of the Fed.

Have we become more gradualist in our approach?

The Taylor rule, first proposed by John Taylor in 1993, has become a popular and useful tool for analysing monetary policy operations[2]. The standard rule postulates that the monetary authority sets short-term nominal interest rates equal to a constant and reacts to deviations of contemporaneous inflation from the inflation target and deviations of current output from potential output (the output gap)[3]. The constant in this rule represents an amalgam of the neutral real interest rate and the inflation target.

However, many researchers have since found the lagged interest rate to be a significant variable in estimated monetary policy rules. For example, in a recent Federal Reserve Board discussion paper, English, Nelson, and Sack (2002) analyse how well a Taylor rule with interest rate smoothing characterises the broad pattern of the Fed's target interest rate during the Greenspan era.[4] They find that the Taylor rule with interest rate smoothing works well, and that some previous criticisms[5] do not affect the result. We employ the

[1] I am grateful for comments and suggestions from a number of my colleagues, in particular, Chris Plantier, Leni Hunter, David Hargreaves, David Archer, Geof Mortlock and Nils Bjorksten. I take full responsibility for remaining errors and omissions.

[2] For a non-technical exposition of the Taylor rule, particularly in the New Zealand context, see Plantier L.C. and Scrimgeour D. (2002), "The Taylor rule and its relevance to New Zealand monetary policy", *Reserve Bank of New Zealand Bulletin Vol. 65 No. 1.*

[3] The standard Taylor rule can be specified as: $i^*_t = b_0 + b_p .p_t + b_y .y_t$, where i^*_t is the Taylor rule short-term interest rate, b_0 is the constant, p is inflation, and y is the output gap. b_p and b_y are the response coefficients to inflation and the output gap, respectively. The constant term is defined as $b_0 = r^* - b_p .p^T$, where r* is the neutral real interest rate and p^T the inflation target.

[4] English W.B, Nelson W. R., and Sack B.P. (2002), "Interpreting the significance of the lagged interest rate in estimated monetary policy rules", *Board of Governors of the Federal Reserve System Discussion Paper* #24.

[5] See Rudebusch G.D, (2002), "Term structure evidence on interest rate smoothing and monetary policy inertia", *Journal of Monetary Economics* (49), 1161-1187.

same technique on data for Australia and New Zealand, and discuss the nature of our policy adjustment before and after we began targeting overnight interest rates in March 1999 (ie the OCR period). Specifically, we estimate two different sample periods for New Zealand – one that includes the OCR period and the other that excludes it.

Table 1 displays our results for Australia and New Zealand during the Brash era compared with the results generated by English et al (2002) for the United States. The estimates should be viewed as a general indication of monetary policy-makers' possible reaction, rather than specific coefficient values that add up to prescribe actual interest rate settings.

The first three coefficients in Table 1 represent the standard Taylor rule estimated using English et al's (2002) specification. For example, the results in Table 1 for the United States suggest that if inflation increased by one percentage point, all else constant, the Fed would raise policy rates by approximately 160 basis points. On the other hand, if the output gap increases by one percentage point, all else being equal, the output gap coefficient of 0.72 indicates that the Fed would wish to increase interest rates by around 72 basis points.

The next coefficient in Table 1, the weight on last period's interest rate, indicates whether the monetary authority adjusts gradually towards the interest rate implied by the Taylor rule. Again, interpreting the results in Table 1 for the United States, a weight of 0.6 on last period's interest rate implies that a weight of 0.4 (=1-0.6) is placed on closing the gap between the current interest rate and the Taylor rule rate, given the reaction coefficients.

The fifth coefficient displayed in Table 1 is the coefficient on serially correlated errors. Sometimes in an estimated equation, we may see patterns in the error term, which points to the possibility of omitting significant variables. Hence, to account for this possibility, English et al's (2002) approach includes a coefficient on serially correlated errors to test whether significant factors that explain actual interest rate changes are missing.

A striking difference between the results in Table 1 is that the constant appears to be higher in Australia and New Zealand compared with the United States constant. This result is consistent with a common finding that Australia and New Zealand generally have higher real interest rates than in the United States. This finding may relate to a number of factors, including the depth of United States capital markets, Australia's and New Zealand's greater susceptibility to economic shocks, given that they are small open economies, and, in the case of New Zealand at least, a risk premium for the relatively high level of New Zealand's external debt.

In comparison with the Fed, the RBNZ in its conduct of monetary policy seemed to place less emphasis on the fluctuations of output around potential GDP, and more emphasis on inflation, prior to the introduction of the OCR regime in 1999. This is reflected in the greater volatility of output and interest rates in New Zealand in the period leading up to the adoption of the OCR. Subsequent to the introduction of the OCR, the data indicates a lower level of interest rate and output volatility, reflecting (among other matters) the greater flexibility and interest rate-smoothing capacity of the OCR regime.

Interestingly, this estimation approach suggests that the New Zealand response to inflation and output does not seem much different than the United States responses. This similarity contrasts with the generally lower response to inflation in Australia. In fact, the Australian response to inflation is less than 1, although not significantly so. The lower inflation coefficient value of 0.91 implies that on average for every percentage point increase in inflation, the RBA would increase nominal rates by approximately 91 basis points. Yet, a less than one-for-one response to inflation, particularly during an inflationary episode, would likely lead to an unstable inflationary process, where policy rates do not rise aggressively enough to bring inflation down. For consistency reasons, we impose a coefficient of 1 for the Australian inflation response in the graphs in this paper, given that we only want to see how interest rate settings in New Zealand might change if we responded less aggressively to observed inflation[7].

Another key finding is that our policy adjustment appears to have become more gradual under the OCR regime, and that the amount of interest rate smoothing does not look substantially different than in the cases of Australia or the

[7] Imposing 1 on Australia's inflation response does not significantly alter other estimated coefficients.

Table 1
Estimated monetary policy rule allowing both partial adjustment and serially correlated errors[6]

Coefficient	NZ (Pre-OCR) (1988Q2-1999Q2)	NZ (Including OCR) (1988Q2-2002Q1)	US (1987Q1-2000Q4)	Australia (1987Q1-2002Q1)
Constant (b_0)	3.65	3.51	1.87	3.97
	(5.77)	(2.57)	(2.50)	(3.93)
Inflation (p)	1.95	1.67	1.60	0.91
	(12.53)	(3.49)	(5.66)	(1.94)
Output gap (y)	0.40	0.66	0.72	1.04
	(3.54)	(1.55)	(4.65)	(1.37)
Weight on last period's interest rate (l)	0.54	0.77	0.60	0.81
	(6.39)	(9.58)	(6.08)	(12.59)
Serially correlated errors (r)	0.21	0.33	0.62	0.44
	(1.60)	(2.41)	(4.87)	(2.63)
R^2	0.96	0.95	0.97	0.97

Note: (1) The estimated monetary policy rule (see footnote 6) is made up of the following components:
$i^*_t = b_0 + b_p .p_t + b_y .y_t$ (Standard Taylor rule)
$i_{t-1} = (1-l).i^*_t + l.i_{t-1} + n_t$
$n_t = r.n_{t-1} + e_t$,
where n_t is a serially correlated error term and other variables are defined in footnote 3 and 6.
(2) R^2 is reported for regressions in levels. (3) The values in brackets are t-statistics. (4) United States results are extracted from English et al (2002).

United States. Also, because this technique allows for serially correlated errors as well as interest rate smoothing, the results are more robust than the Bank's previous work on interest rate smoothing[8]. In any case, the coefficient values for serially correlated errors for New Zealand are lower than those of the United States and Australia, indicating that omitted factors may be less of a problem for New Zealand than they are for the United States.

Overall, this analysis of the Bank's interest rate settings supports the view that, even with the New Zealand economy's greater susceptibility to shocks, the Bank operates monetary policy in a broadly similar way to that of the Fed.

New Zealand interest rates compared to interest rates in Australia and the United States

From Figure 1 we can see that, during the period from 1988Q2 to 2002Q1, New Zealand's short-term interest rates have moved through a slightly bigger range than have the Fed funds rates[9]. Casual observation suggests that our policy

[6] The English et al (2002) estimation approach incorporates the standard Taylor rule in a policy decision rule that includes interest rate smoothing and allows for the possibility of serially correlated errors. The coefficient for serially correlated errors tests whether the lagged interest rate's presence is justified in a monetary policy rule, and also indicates whether there are omitted factors that may cause serially correlated errors.

The estimated policy rule in first difference is specified as follows:

$Di_t = (1-l).Di^*_t + (1-l).(1-r).(i^*_{t-1}-i_{t-1}) + l.r.Di_{t-1} + e_t$, where i_t is the actual interest rate and i^*_t is the Taylor rule rate. l, the weight on last period's interest rate, indicates the inertial movement of the policy rate towards the Taylor rule rate, so the higher the l, the more gradual the policy in moving towards the Taylor rule rate. r is the coefficient on serially correlated errors.

[8] Drew A. and Plantier L. C. (2000), "Interest rate smoothing in New Zealand and other dollar bloc countries", *Reserve Bank of New Zealand Discussion Paper Series*, DP2000/10.

[9] US Federal funds rates are very similar to US bankers acceptance 90 day discount rates, thus are comparable with our 90-day bank bill rates.

is somewhat more reactive, with more turning points, especially over the late 1990s, during the Monetary Conditions Index (MCI) period. The difference in the interest rate settings over the period under review may have contributed to perceived differences in the way we operate monetary policy from some other central banks, such as the Fed. However, in considering the different interest rate trends and levels in New Zealand and the United States, it is important to bear in mind that the New Zealand and United States economies are often not in the same stage of the business cycle at the same time and are influenced by different factors. For example, the New Zealand economy has been experiencing relatively robust growth in the last two years, while the United States economy has been in a period of slowdown following its earlier vigorous growth. It is therefore not surprising that New Zealand's interest rates have been following a quite different trend in the last two years than in the United States. Comparisons of interest rate trends and levels between economies therefore need to take into account the different stages of the business cycle and underlying growth rates of the respective economies if meaningful conclusions are to be drawn about the conduct of monetary policy.

Figure 1
90 day Bank Bill Rate versus US Federal Funds Rate 1988Q2-2002Q1

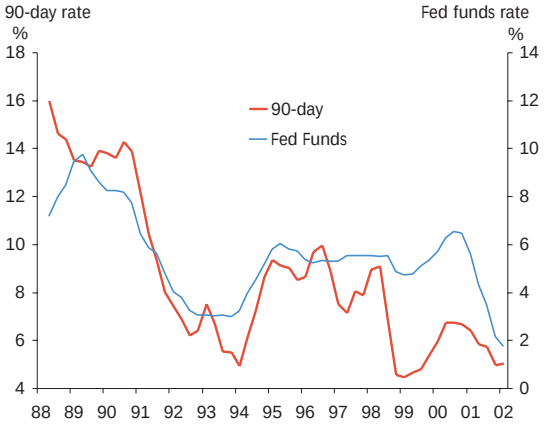
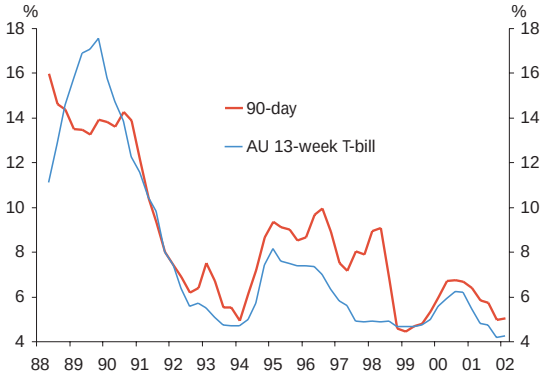


Figure 2 compares our 90 day bank bill interest rates with Australian 13 week Treasury bill rates over the same period. Our actual interest rate settings appear to be closer to those of the RBA than those of the Fed. While this observation may seem at odds with the results in Table 1, which suggests that the Bank acts more like the Fed than the RBA, one should bear in mind that the Australian and New Zealand economies are more likely to share similar economic cycles than the United States and New Zealand economies. Therefore, similarity of the broad pattern and level between Australian and New Zealand interest rates does not necessarily mean that the Bank's behaviour is more RBA-like than Fed-like.

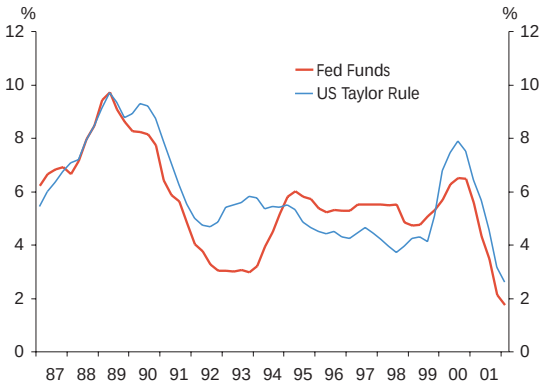
Figure 2
90 day Bank Bill Rate versus Australian 13 week Treasury Bill Rate 1988Q2-2002Q1



Before deriving implied policy paths for how policy-makers at the Fed and the RBA might operate monetary policy in New Zealand, we require a proxy of how policy-makers operate within their own countries. This is where the Taylor rule comes in.

To trace the Taylor rule paths for each country, we apply the estimated coefficients in Table 1. Figures 3, 4 and 5 plot actual interest rates against the Taylor rule rates for the United States, Australia and New Zealand respectively.[10]

Figure 3
US Taylor Rule Rates versus US Fed Funds Rates



[10] The Taylor rule rates are derived by imposing the estimated coefficients (including weight on last period's interest rate implied by the Taylor rule) on the each country's data.

Figure 4
Australian Taylor Rule Rates versus Australian 13 week T-bill Rates

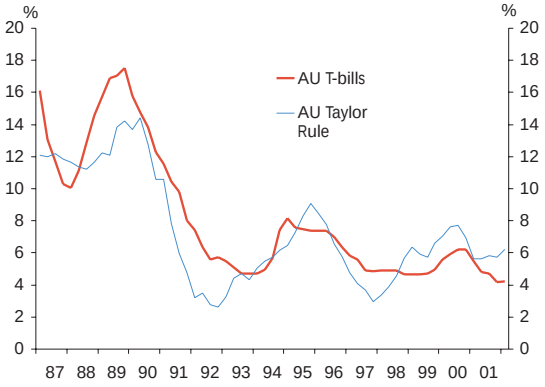
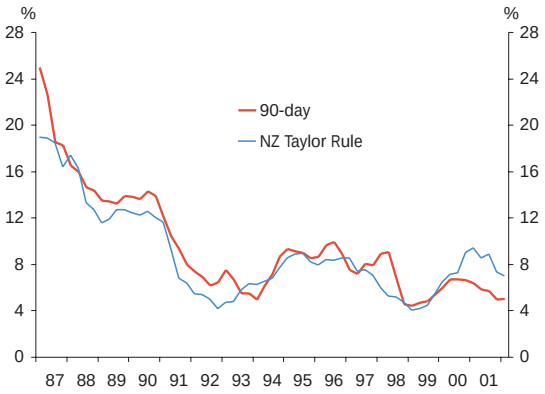


Figure 5
New Zealand Taylor Rule Rates versus 90 day Rates



For New Zealand, the Taylor rule (with a fixed neutral real interest rate) provides a close match to the actual path of short term interest rates for most periods, but fails to explain the relatively low interest rates after 2000. This may reflect a gradual decline in New Zealand's neutral real rate as Plantier and Scrimgeour (2002) suggest[11], or omission of other factors not associated with deviation from potential output or inflation responses. Overall though, the Taylor rule appears to be a reasonable characterisation of actual policy for both the United States and Australia, and for New Zealand for most periods.

Therefore, we can use the Taylor rule as a proxy for United States and Australian policy-makers' likely response if they were operating monetary policy in New Zealand. Of course, there are significant caveats to this analysis. In particular, we are assuming that the Fed and the RBA would still respond in the same manner when faced with our economic conditions, and that policy responses would not change if policy-makers are faced with real-time inflation and output gap information[12].

Implied policy paths of the Fed and the RBA if they operated monetary policy in New Zealand

We derive the Fed's and the RBA's implied policy paths for monetary policy in New Zealand by imposing estimated United States and Australian Taylor rule coefficients on New Zealand data. Figure 6 shows a possible representation of the Fed's reaction and Figure 7 illustrates the implied path for the RBA[13].

Interestingly, prior to 1991, it seems that the RBA may have prescribed lower interest rates than did the Bank. Nevertheless, given that our primary focus at the time was to bring inflation down to much lower levels, our actual policy path would appear consistent with this objective. Another observation is that actual interest rates in the last two years of the sample are persistently lower than what the Taylor rule would suggest. As previously mentioned, a recent fall in the neutral real interest rate after the Asian crisis may be one of a few plausible explanations for this trend.

[11] Plantier L.C. and Scrimgeour (2002), "Estimating a Taylor rule for New Zealand with a time-varying neutral real rate", *Reserve Bank of New Zealand Discussion Paper Series*, DP2002/06.

[12] See Huang A., Margaritis D., and Mayes D. (2001), "Monetary policy rules in practice: evidence from New Zealand", *Bank of Finland Discussion Papers #18*. They show that real-time data does not drastically change NZ Taylor rule estimates.

[13] Given that our neutral real interest rate is higher than that of the United States, a constant of 4.53 is applied to the Taylor rule to form the line US- the Fed's possible path. This constant is derived by imposing the Fed's estimated output gap and inflation coefficients on New Zealand data. A constant of 6.40 is applied to the Taylor rule to form the line AU- the RBA's possible path, derived the same way as for the United States.

[14] Although not reported, the conclusion remains the same even when we adopt the forward-looking U.S. Taylor rule coefficients using real-time forecast data estimated by a Fed economist. See Orphanides A. (1998) "Monetary policy rules based on real-time data", *Board of Governors of the Federal Reserve System Discussion Paper* #3.

For the most part, the paths for the Fed and the RBA appear quite similar to our actual policy path[14]. Perhaps unsurprisingly, the Fed's implied path is very close to our actual interest rates, as the United States and New Zealand estimated coefficients adopted from table 1 are not substantially different. Nevertheless, from this analysis we tentatively conclude that the Fed and the RBA may not have acted very differently over the last decade if they were faced with our shocks. The timing differences in the hypothesised RBA interest rate settings would necessarily cause some changes in inflation and output variability. However, because inflation variability would likely rise and output variability would likely fall, we do not know whether interest rate variability would be rise or fall in response to these timing differences.

Figure 6
Implied Taylor Rule Path for the Fed and 90 day Bank Bill Rates in New Zealand

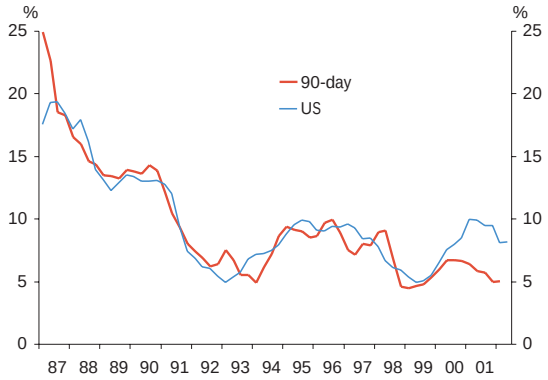
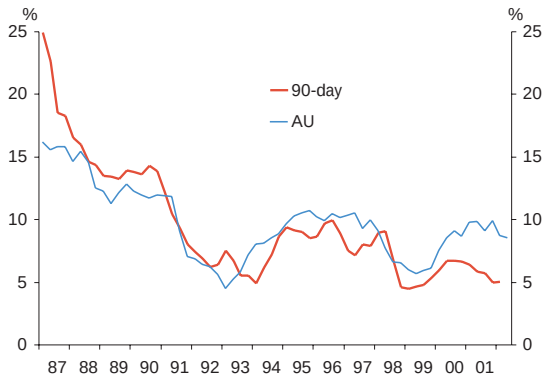


Figure 7
Implied Taylor Rule Path for the RBA and 90 day Bank Bill Rates in New Zealand



Conclusion

Over the last two decades, our policy interest rates covered a larger range than those of the Fed, and appear more volatile prior to 1999. This variation is at least partly the result of our greater susceptibility to external shocks and the fact that we are occasionally in different stages of the business cycle as compared with the United States.

One way to compare monetary policy operation between the central banks is to simulate the Fed's and the RBA's policy responses for New Zealand. We estimate Taylor rules and find that they perform reasonably well in characterising the broad pattern of policy interest rates in the United States, Australia, and New Zealand.

The estimation results and the implied policy paths suggest that the Fed and the RBA might not have operated significantly differently if they had been charged with controlling monetary policy in New Zealand. Furthermore, we also find some evidence that under the Official Cash Rate (OCR) regime, the Bank's monetary policy adjustment has become more 'flexible', and as a result even more Fed-like.