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Survey expectations of monetary conditions in New Zealand: Determinants and implications for the transmission of policy

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Abstract[**]

In this paper, we use a unique database on expected monetary conditions from the Reserve Bank of New Zealand *Survey of Expectations* to study how policy signals are transmitted. In order to exploit the ordinal nature of the data, we run an ordered probit model where expected monetary conditions are a function of expected financial market variables and some "narrative" measures of monetary policy shocks. Although conclusions about the impact of policy shocks on public's expectations are somewhat tentative, the results could be interpreted as evidence of "divergence" between the Reserve Bank's and the public's view. Overall, the paper shows that surveyed expectations contain valuable information on the transmission of monetary policy. On average, respondents place more weight on the interest rate than on the exchange rate, and particularly so in sectors that are less exposed to international trade. Moreover, the relative weights vary substantially over time as different shocks hit the economy. We test for the presence of regime shifts in expectations due to changes to either the institutional framework or the implementation system. We find a significant effect of the introduction of the Reserve Bank Act in 1989.

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1 Introduction

Central banks have an obvious interest in summary measures of the overall stance of monetary policy. In this regard, indicators based on public's expectations may have some attractive properties for policy makers. At an aggregated level, these indicators summarise the effects of monetary policy shocks that are not fully captured by market variables, providing useful feedback on the signalling strategy pursued by the monetary authority. At a disaggregated level, they contain valuable information on the policy transmission mechanism.

New Zealand is a particularly interesting case in this respect. The Reserve Bank of New Zealand (RBNZ) used to have an unusual implementation regime, relying almost completely on public announcements, or "open mouth operations" (Guthrie and Wright 1999).[1] Moreover, since 1988 the Reserve Bank collects qualitative information on perceptions and expectations of monetary conditions from a sample of informed observers. These data, available at the individual level, constitute an ideal source to verify the effectiveness of the Reserve Bank's signalling, and, more generally, to look at how expectations of the overall monetary stance are formed.

Following from previous work by Fischer and Orr (1994), this paper uses data from the *RBNZ Survey of Expectations* to identify the determinants of expected monetary conditions, with a particular emphasis on the effects of central bank announcements. However, the treatment of the data in this paper is quite different. Fischer and Orr (1994) transform qualitative into quantitative information by using a modified version of the Carlson-Parkin (1975) procedure. Here we look directly at the qualitative information provided by the survey at the individual level, thereby avoiding arbitrary assumptions and aggregation problems.

The paper is divided into six sections. After the introduction, Section 2 describes the Reserve Bank *Survey of Expectations*. Section 3 briefly illustrates New Zealand's implementation regime and outlines some key issues. Section 4 describes the model framework and the econometric methodology. Section 5 presents the results of the econometric analysis and section 6 draws some conclusions.

2 The RBNZ Survey of Expectations

Since the late 1980s the Reserve Bank of New Zealand has operated the quarterly *Survey of Expectations* with the intention of establishing a database for use in monitoring economic developments and for research.[2] The survey questionnaire is sent to around 250 individuals, with an average response rate of 62 percent over the last ten years (see figure 1). Many quantitative questions are asked on a wide range of economic variables, such as prices, GDP, interest rates and exchange rates. However,

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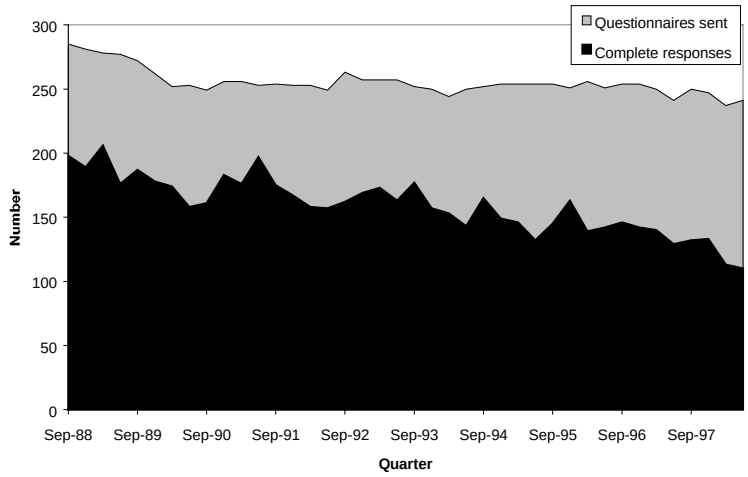
[1] However, the old implementation system has been replaced by a more conventional cash-rate targeting regime starting from March 1999. Section 3 provides a brief description of the old system. Reserve Bank of New Zealand (1999) explains the reasons for the change.

[2] The survey is conducted by the MRL Research Group, with the results being analysed and published by the Reserve Bank.

the survey is unique in that it collects qualitative data on currently perceived and expected monetary conditions one and three quarters ahead. Respondents are asked to rank monetary conditions on a seven-point scale from "very tight" to "very relaxed."[3]

The sample is not random, but represents a significant group of firms, financial institutions, and government agencies that are likely to be opinion leaders. The respondents are classified into five activity groupings labelled as "financial," "business," "agriculture," "labour," and "others."[4] The largest majority (between 70 and 80 percent) of respondents belongs to either the "financial" or the "business" sector (see figure 2). The "agricultural" grouping (about 10 percent) is relatively large, reflecting the weight of this sector in the New Zealand economy.

Figure 1
Sample size



The answers include individual identification and a longitudinal database can be constructed. However, the panel is unbalanced, *ie* no respondents have answered the questionnaire continuously for every quarter over the last ten years. Any respondents that drop out of the sample are replaced with new entrants in order to keep the number of questionnaires sent out at around 250. As a matter of fact most respondents remain in the survey only for a relatively short period of time. As table 1 shows, a total of 570 respondents was part of the survey over the ten-year period. Over 38 percent was in the sample for five quarters or less, and the average number of periods was 11 out of the possible 40 quarters.

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[3] Copies of the questionnaire can be obtained on request.

[4] "Labour" includes trade federations and unions; "others" consists of academics and journalists.

Figure 2
Sample composition by sector

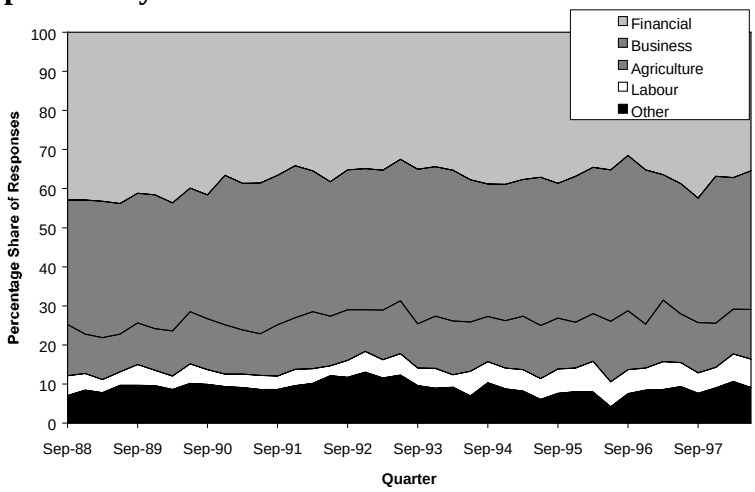

Table 1
Frequency distribution of quarterly responses per survey member (September 1988 - June 1998)

Membership in panel (no. of quarters)	Number of respondents	Percent
1-5	220	38.6
6-10	113	19.8
11-15	78	13.7
16-20	54	9.5
21-25	48	8.4
26-30	29	5.1
31-35	14	2.5
36-40	14	2.5
Total	570	100.0

In the analysis presented here, we focus on expected monetary conditions three quarters ahead. The reason is only practical: expected 90-day interest rates, which are one of the determinants we investigate in the econometric analysis, are only available for that time horizon.

3 Policy Implementation and Public's Expectations

Public's expectations of the monetary policy stance are affected by the way policy changes are signalled. Hence it is important to note some peculiarities of New Zealand's implementation regime that has been in place till recently. What follows is a simple characterisation of that system.[5]

[5] As we noted in footnote 1, a new cash-rate-based system has been introduced on 17 March 1999. An accurate description of the old system is provided in *Huxford* and *Reddell* (1996).

As many other central banks, the Reserve Bank of New Zealand does not impose reserve requirements on commercial banks. However, the latter hold reserves with the Reserve Bank for the purpose of settling payments with other banks and with the Government. The supply of these reserves, called settlement cash balances, is controlled by the Reserve Bank through open market operations, aimed at achieving a quantitative daily target. The cash target is the key policy lever, but it is used very rarely - only four times in the last ten years. On the other hand, open market operations are only used to smooth daily fluctuations in liquidity and therefore contain no signalling information. The Reserve Bank, however, threatens to use its instrument through public statements, or "open mouth operations." If policy is credible, the threat becomes effective and markets deliver the conditions "desired" by the Reserve Bank.

However, the latter are known with some precision only at the time the policy document is released each quarter.[6] As new information becomes available, the Reserve Bank's "desired" conditions evolve, but market participants don't know how until new projections are released. Participants have to guess and their guess is incorporated into market prices. The Reserve Bank watches closely market developments, focusing on the variables that best summarise the evolution of monetary conditions: the 90-day bill rate and the trade-weighted index of the exchange rate (TWI).[7] If it is not comfortable with how monetary conditions are moving, the Reserve Bank issues a statement. The probability of this happening depends on the number and the size of shocks hitting the economy, the Bank's tolerance of deviations from "desired" conditions, and the costs incurred by the Bank in making announcements. The amount of information provided in the quarterly update by the Reserve Bank is also likely to influence the outcome.

What are the effects of "open mouth operations" on public's expectations? To find the answer, it may be useful to distinguish between: a) the markets' guess about the future policy stance, which is incorporated into forward market prices (and in respondents' expectations about interest rate and exchange rate); and b) the respondents' view about the appropriate policy stance, which may differ from that of the Bank. Guthrie and Wright (1999) show that statements generally come as a surprise and are readily incorporated into the whole interest rate structure. One implication of this evidence is that statements contain private information about the future policy stance. At a minimum, they reveal the central bank's assessment of new information, which is crucial to determine market reactions. However, the central bank's view of the appropriate policy stance embodies its forecasting and modelling effort. If the central

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[6] Every quarter the Reserve Bank issues the *Monetary Policy Statement*, to which the Bank has a six-monthly obligation for accountability purposes. Not only the document reports about past policy decisions, but also discusses future developments and the projected path of most key variables - monetary conditions included - is presented in some detail. Since June 1997, the document reports the quarterly track for endogenously-determined (consistent with the inflation target) monetary conditions.

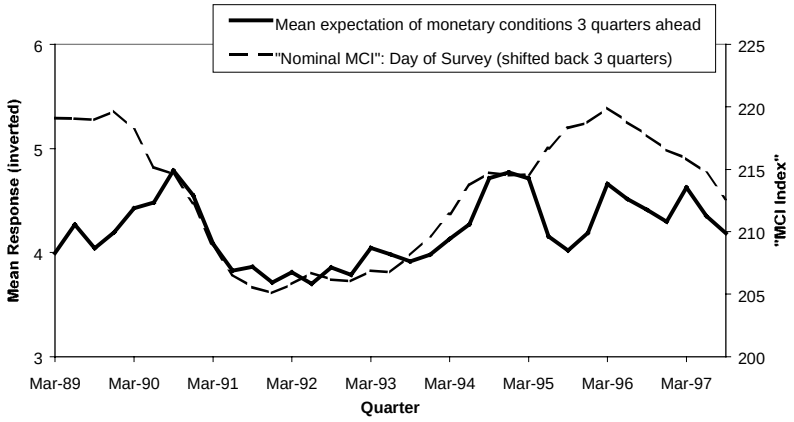
[7] This is particularly true since December 1996, when the Monetary Conditions Index (MCI) - a linear combination of the two variables mentioned above - was formally adopted. However, it can be argued that both interest rate and exchange rate have had a most prominent role in monetary policy over the whole period 1988-98, even if the emphasis has shifted between the two channels from time to time.

bank's forecasting reputation is good enough, statements are likely to influence the public's view of the appropriate policy stance.

Figure 3 compares the average expectation of surveyed monetary conditions (inverted) with a weighted combination of the nominal 90-day bill rate and the log of the nominal TWI exchange rate (lagged three quarters). Hence, this measure is akin to the nominal Monetary Conditions Index (MCI) used by the Reserve Bank.[8] Over the last ten years, we can clearly identify three different periods. In the central part of the decade, between late 1990 and early 1995, expectations of monetary conditions track the MCI very closely. Before and after that period, when the tightening phase of the policy cycle reaches its peak, expectations show a clear bias towards looser conditions.

What are the reasons behind this bias? One possibility, as discussed before, is that the public's view of the appropriate policy stance may not agree with that of the Reserve Bank, as expressed by the simple MCI. On the other hand, it is possible that the "true" MCI ratio, unlike the 2:1 rule of thumb on which the MCI is based, varies in the expectation of the public depending on the shocks hitting the economy. The ratio may also vary across sectors. Producers of traded goods may be generally more concerned with exchange rate developments when assessing the stance of policy, while suppliers of domestic services may focus more on interest rate developments.

Figure 3
Average monetary expectations three quarters ahead and nominal MCI (lagged three quarters)



[8] Note that the original data on expectations have been transformed (1 = "very relaxed;" 7 = "very tight") to make them consistent with the MCI. The MCI weighting is based on a 2:1 ratio, which reflects econometric estimates of the relative impact of interest rate and exchange rate on demand (*Dennis* 1997). Formally, the RBNZ nominal MCI is calculated as $\{(90\text{day rate} - r_0) + (1/2)*[\ln(TWI) - \ln(TWI_0)]*100\}*100 + 1000$ where 90-day and TWI are nominal rates and r_0 and TWI_0 are corresponding averages of daily rates for the December 1996 quarter, where r_0 = 8.91 and TWI_0 = 67.11. A description of the MCI and of the rationale for its introduction is in Reserve Bank of New Zealand (1996).

4 The model[9]

We assume that the underlying expectations of monetary conditions are determined by the following model:

$$y_{it+3}^{*} = X_{it+3}^{'}\beta + S_{t}^{'}\gamma + u_{it}$$

where:

y_{it+3}^{*}	=	survey respondents' underlying expectations of monetary conditions three-quarters ahead
X_{it+3}^{*}	=	a matrix of indicators representing survey respondents' expectations of actual monetary conditions three-quarters ahead
S_t	=	a matrix of indicators representing monetary policy statements in the current quarter
u_{it}	=	the error term, which varies across time and survey respondent

Section 3 described the rationale for this simple specification. Fundamentals (or their associated expectations) do not appear in the model, as their influence is summarised by either survey respondents' expected monetary conditions (interest rate/exchange rate) or policy statements. The set of variables representing expected monetary conditions can be restricted to interest rate and exchange rate, by far the most relevant indicators for monetary policy. The former $(EXPBILL_{t+3})$ is measured by the expected nominal 90-day interest rate; the latter $(EXPLTWI_{t+3})$ by the logarithm of the expected nominal TWI exchange rate (multiplied by 100).[10]

To assess survey respondents' reaction to the varying types of monetary policy announcements, we in essence follow Fischer and Orr (1994) in classifying Reserve Bank monetary policy announcements into three impulse dummies.[11] The first (*P*) indexes Reserve Bank statements that refer to actual changes in the stance of monetary policy, where -1 is a monetary policy loosening announcement, +1 a monetary policy tightening announcement, with 0 indicating no policy change.[12] The second dummy variable (*CP*) corresponds to conditional announcements, which outline what changes are necessary to avoid policy intervention at some future date. More and more frequently the Reserve Bank has managed to sway the market in the desired direction by making conditional policy statements, thereby pre-empting any necessity for an official intervention. The final dummy variable (*CASH*) defines only temporary technical adjustments to policy.

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9 For an overview of methods for analysing survey data, see *Zimmermann* (1997).

10 The use of nominal, rather than real, variables is justified by the small difference existing at quarterly intervals, particularly in the latter part of the sample.

11 These variables can be interpreted as "narrative" measures of monetary policy akin to that used, for example, by *Boschen* and *Mills* (1991). For further detail on how these measures are constructed, see the appendix.

12 This formulation assumes that two policy shocks of opposite sign have the same effect of no policy shocks.

While *CASH* should have no effect on expectations of monetary conditions, the expected impact of *P* and *CP* depends on whether statements directly affect the public opinion or they simply reveal a divergence of views between the Bank and the public. Central bank statements can affect the public's view because they contain private information. In this case (the "convergence" story) we would expect a zero coefficient, because the public's view on the future policy stance would move together with their expectations of monetary conditions, and the effect of the statement would be completely absorbed by the expected change in the interest rate and the exchange rate. On the other hand, if the public maintains a different view (the "divergence" story), coefficients would be either positive or negative, depending on whether the public expect conditions to adjust too much or too little in the future following the current policy shocks.

Moreover, due to the occurrence of some important institutional changes during the sample period, we test for the presence of regime shifts. Dummy variables are used to capture the impact of: a) the introduction of the Reserve Bank of New Zealand Act (ACT, March quarter 1990); b) the change in the focus of policy towards the exchange rate (REG, in September 1988 - December 1989 and September 1991 - December 1994); and c) the change in the Policy Targets Agreement to a wider inflation target band (NEWPTA, March quarter 1997).

The above model posits that underlying expectations y_{it+3}^{*} are formed as a linear function of these various indicators of monetary policy. Two particular aspects of the econometric specification deserve further comment: the treatment of individual heterogeneity; and the ordered scale of the responses.

In the general model, coefficients are restricted to be the same for all respondents. While heterogeneity at the individual level may be empirically relevant, our interest rather lies with how a "typical" or "average" person forms his or her expectations, because this is what will best describe market expectations as a whole. One way to proceed would be to compute a separate set of coefficients for each individual and then take averages. As this process is somewhat cumbersome, we use a result by Keane and Runkle (1990) that an alternative approach based on pooled cross-section time-series data produces an estimator of the average effect that has the same probability limit.[13]

The panel nature of the data is exploited by a two-way error components structure:

$$u_{it} = \lambda_t + \mu_i + \varepsilon_{it}$$

The first error component, λ_t, reflects contemporaneous correlation in individual responses due to common shocks. The second error component, μ_i, captures

[13] Note that if all individuals assign the same relative weight to interest rate and exchange rate, then this relation must also hold on average. The "aggregation" problem (*Keane* and *Runkle* 1990, *Theil* 1971) implies that computing regression coefficients based on averaged variables (over respondents) is in general not equivalent to taking averages of regression coefficients. We prefer the pooled approach on individual data as it increases the degrees of freedom, and allows us to avoid the *ad hoc* assumptions needed for aggregating ordered data.

heterogeneity between respondents, which is constant over time. Essentially, this component allows for the fact that some individuals persistently expect monetary conditions tighter (or looser) than others, independently of the actual indicators of monetary policy. One possible reason is that respondents work with different (but time-invariant) reference scales when they form their expectations. The third error component ε_{it} is a white-noise error that captures non-systematic deviations in expectations.

If y_{it+3}^* were observed, the parameters of the linear random effects model could be estimated by GLS. Estimation is somewhat complicated by the fact that we do not observe y_{it+3}^*, but rather an ordinal variable y_{it+3} with responses varying from 1 to 7. The relationship between y_{it+3} and y_{it+3}^* is assumed to be determined by the following *threshold* mechanism:

$$\begin{aligned}
&\Pr(y_{it+3}=1)=\Pr(y_{it+3}^*<cut1)\\
&\Pr(y_{it+3}=2)=\Pr(cut1<y_{it+3}^*<cut2)\\
&\ldots\ldots\ldots\ldots\ldots\ldots\\
&\Pr(y_{it+3}=7)=\Pr(cut6<y_{it+3}^*)
\end{aligned}$$

In words, the probability that a respondent reports a particular expectation such as "tight (6)" on the "very tight (7)" to "very relaxed (1)" scale depends on the distribution of the underlying continuous expectation variable *y** as well as on the threshold parameters *cut* that translate (unobserved) values of *y** into (observed) outcomes *y* = 1, 2,...,7. In order to make the model operational, one has to make an assumption with respect to the probability distribution of *y**. Following the linear model, where it is typically assumed that ε_{it}, λ_t, and μ_i are normally distributed with mean 0 and constant variances, we obtain the ordered probit model. If we take the first cut-off point as an example, the model assumes:

$$\begin{aligned}
\Pr(y_{it+3}^*<cut1)&=\Pr(y_{it+3}^*-X'_{it+3}\beta-S'_t\gamma<cut1-X'_{it+3}\beta-S'_t\gamma)\\
&=\Phi(cut1-X'_{it+3}\beta-S'_t\gamma)
\end{aligned}$$

where Φ stands for the cumulative density function of the standard normal distribution. Two normalisations are required. First, the overall constant is set equal to zero. Second, the variances of the residuals are assumed to sum to unity, *ie* $\sigma_\lambda^2+\sigma_\mu^2+\sigma_\varepsilon^2=1$.

Overall, the model has then *k-1* regression coefficients and 6 cut-off points that in principle could be jointly estimated by the method of maximum likelihood.

Unfortunately, the presence of time and individual-specific random effects complicates the exact likelihood function. This is the case because observations for the same respondent over time and contemporaneous observations across individuals are correlated and the likelihood function is no longer a simple product of independent densities. To the best of our knowledge, none of the available econometric software packages offers yet an implementation of this model. Alternatively, one can perform maximum likelihood estimation under the independence assumption (with $\lambda_t=0$ and $\mu_i=0$ for all *i* and *t*) and adjust the estimated standard errors in order to take the

correlation into account for the purpose of inference. This is the approach followed here.[14]

Not only the presence of macroeconomic shocks may affect the reliability of the estimated variance-covariance matrix. If aggregate shocks have an impact on any of the regressors, the latter will be correlated with the error term and parameter estimates will be inconsistent. This possibility needs to be considered as interest rate and exchange rate are certainly endogenous variables. Having acknowledged the existence of the problem, one way to achieve consistency is to use time dummies to eliminate the effects of aggregate shocks. This is what we choose to do here.

Finally, we would like to point out two additional features of the model. Firstly, the estimated cut-off points are of independent interest. The distance between two cut-off points can be compared to the magnitude of the coefficients to determine how large a change in the explanatory variable would be required in order to change the response of the average individual. Furthermore, the structure of the cut-off points can reveal asymmetries in the sensitivity of adjustments of responses to changes in explanatory variables under tight or loose conditions. The second feature is that due to the normalisation, the coefficients *per se* have no direct interpretation. However, comparisons, for instance the computation of the interest rate-to-TWI ratio, are entirely valid and unaffected by the normalisation.

5 Results

Table 2 shows the results for three separate models. Model 1 only controls for the expected interest rate and exchange rate while Model 2 includes in addition the various indicators of monetary policy and policy environment. The latter cannot be included in Model 3, where we use time dummies to eliminate the effects of macroeconomic shocks, because of their collinearity with time-specific fixed effects. Standard errors are given in parentheses.

In terms of explanatory power, Model 2, which includes the policy variables, is clearly superior to Model 1. The likelihood-ratio test statistic of 181 leads to an overwhelming rejection of the restrictive Model 1. In Model 1 the point estimate of the ratio of the expected interest rate to the expected TWI coefficient is 1.6. However, the Wald F-test statistic of 0.19 shows that the ratio is not significantly different from 2:1.[15] The implicit trade-off estimated by Model 2 is 3:1, larger than in Model 1, but not significantly different from 2:1. Hence, one might conclude that expectations three quarters ahead are formed in accordance to the Reserve Bank's published MCI index measure. That is, one cannot reject that a 2 percent rise in the nominal TWI exchange rate is roughly equivalent to a 100 basis point rise in the 90-day interest rate in the minds of survey respondents. Such movements have an overall neutral impact on

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[14] See the procedure "svyoprob" in Stata (1997) for further detail. In practice, Stata only allows for a one-dimensional adjustment. In Model 1 and Model 2, we found that adjusting for λ_t is quantitatively much more relevant and report the corresponding standard errors. Conversely in Model 3, where time-specific effects are treated as fixed, we adjust for μ_t

[15] The null hypothesis is H_0: $\beta_{\text{EXPBILL}} - 2\beta_{\text{LEXPTWI}} = 0$. The corresponding F-statistic is also known as the "Fieller" statistic. See *Ericsson* et al. (1997) for further detail.

respondents' expectations of monetary conditions three quarters ahead. However, once we control for aggregate shocks in Model 3, the results look very different. The coefficient for the interest rate increases substantially and that for the exchange rate falls. The implicit trade-off now rises to about 16:1. The Wald F-test statistic of 15.5 shows that the ratio is significantly different from 2:1.

Table 2
All respondents' expectations of monetary conditions 3 quarters ahead, ordered probit regression
(September quarter 1988 - June quarter 1998, 4587 observations)

	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
	Model 1		**Model 2**		**Model 3**	
EXPBILL	0.030	(0.016)	0.084	(0.024)	0.169	(0.037)
LEXPTWI	0.019	(0.005)	0.028	(0.009)	0.011	(0.006)
P			0.220	(0.136)		
CP			-0.252	(0.083)		
CASH			0.004	(0.075)		
ACT			0.722	(0.250)		
REG			0.312	(0.215)		
NEWPTA			-0.114	(0.116)		
cut1	-2.845	(0.089)	-2.256	(0.225)	-2.050	(0.208)
cut2	-2.022	(0.078)	-1.417	(0.225)	-1.191	(0.186)
cut3	-1.011	(0.072)	-0.389	(0.224)	-0.131	(0.188)
cut4	0.056	(0.075)	0.700	(0.225)	0.999	(0.197)
cut5	1.181	(0.071)	1.854	(0.231)	2.199	(0.222)
cut6	2.111	(0.067)	2.807	(0.264)	3.166	(0.307)
Log-Likelihood	-6439.5		-6348.9		-6204.3	
F-test (2:1)	0.188		1.629		15.545	

In addition to testing the implicit MCI ratio in the formation of expectations, Model 2 allows us to study the effect of central bank announcements and the operating regime on expected monetary conditions. Recall that the Reserve Bank policy announcements are coded such that a value of +1 (-1) represents a tightening (loosening) announcement. We would expect to find no effect for technical policy actions - table 2 shows that the effect of technical policy actions (CASH) is statistically insignificant, as expected. Direct policy actions - implying a change in the instrument - have a positive, but insignificant effect on expectations. The opposite holds true for conditional policy statements. This is consistent with the "divergence" story, and could help explain the difference between expected and realised monetary conditions shown in figure 3.

The remaining three explanatory variables in table 2 capture the changing policy environment in which the Reserve bank has operated over the last ten years. Firstly, the Reserve Bank has moved its focus between the exchange rate and interest rate

transmission channels of monetary policy. The former had a primary role over 1988-90 and late 1991-94. These adjustments in the Bank's focus for operating monetary policy have not had a significant impact on expectations. Secondly, the introduction of the Reserve Bank Act (1989) had a significant positive impact on expectations. With the Reserve Bank Act establishing central bank independence and making the Bank accountable for the achievement and maintenance of price stability, survey respondents expected monetary conditions to be tighter than before. Finally, when the Policy Targets Agreement was changed at the end of 1996 to a wider inflation target, survey respondents factored in a loosening of future monetary conditions, though not statistically significant.

The results obtained for Model 3 suggest some caution in the interpretation of the policy effects. The change in the size of the estimated coefficients and the value of the likelihood-ratio test (the test statistic of 289 for Model 3 vs. Model 2 would lead to a rejection of the latter) seem to indicate that policy dummies do not fully control for aggregate shocks.

5.1 Asymmetries

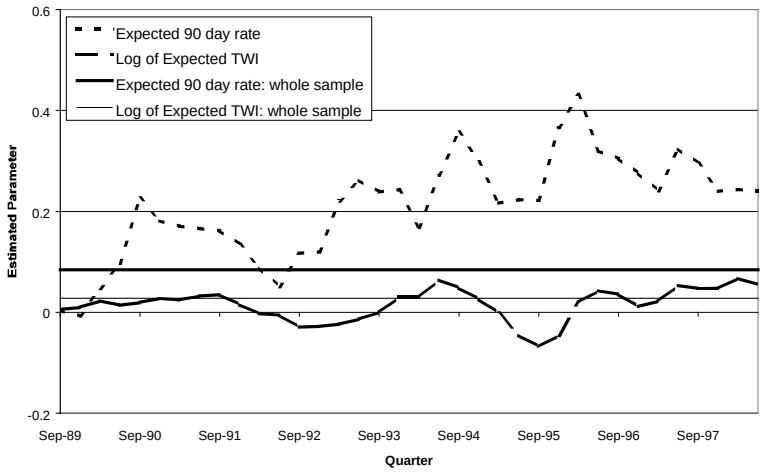
The estimated cut-off points reported in table 2 provide no evidence of asymmetry. The probability of respondents shifting their expectations of monetary conditions is the same no matter which direction policy is moving.

As we explained in section 4, the estimated cut-off points show how sensitive expected monetary conditions are to changing expected monetary indicators and policy announcements. More specifically, the cut-off points allow one to quantify how much of a change in the expected interest rates or the expected exchange rate is required to shift respondents' expectations along the seven point scale used in assessing their expectations of monetary conditions. Table 2 shows that, as responses move from "very relaxed" to "very tight," the distance between cut-off points does not change significantly.

5.2 Stability over time

Here we examine the stability of the results over time by running a total of 36 rolling regressions (for five quarters each) of expected monetary conditions on the expected nominal 90 day interest rate and the log of the expected nominal TWI exchange rate. These regressions exclude the policy variables as they do not show any variation over many sub-periods. The results are only reported graphically in figure 4.

Figure 4
Stability over time of estimated interest rate and exchange rate coefficients



We find that the trade-off ratio is clearly sensitive to the time period. After discounting some obvious outlying parameter estimates from around a dozen of the rolling regressions, a simple average of the remaining results suggests that respondents have placed more weight on their expected interest rate movements over most years, with a trade-off ratio in the region of 6:1.

5.3 Stability across sectors

Here we present disaggregated results on the determinants of expected monetary conditions across sectors. Apart from providing an additional sensitivity check, these results will give useful insights into the nature of the monetary policy transmission mechanism.

Table 3
Sector expected monetary conditions 3 quarters ahead, ordered probit regression (September quarter 1988 - June quarter 1998; standard errors in parentheses)

	Sector 1: Financial	Sector 2: Business	Sector 3: Agriculture	Sector 4: Labour	Sector 5: Other
Average Proportion of Survey Population	38%	36%	12%	5%	9%
Coefficient on Expected 90-day rate	0.074	0.125	0.093	0.203	0.023
	(0.031)	(0.029)	(0.039)	(0.054)	(0.028)
Coefficient on log of Expected TWI	0.035	0.020	0.037	0.008	0.031
	(0.010)	(0.013)	(0.012)	(0.015)	(0.014)
P	0.300	0.158	0.158	0.148	0.229
	(0.173)	(0.147)	(0.190)	(0.272)	(0.071)
CP	-0.317	-0.267	-0.254	0.011	-0.058
	(0.110)	(0.100)	(0.080)	(0.150)	(0.092)
CASH	-0.014	0.124	0.196	-0.126	-0.224
	(0.104)	(0.092)	(0.118)	(0.471)	(0.085)
ACT	0.915	0.530	0.538	1.472	0.571
	(0.319)	(0.328)	(0.365)	(0.373)	(0.230)
REG	0.459	0.155	0.145	0.529	0.257
	(0.261)	(0.289)	(0.251)	(0.229)	(0.225)
NEWPTA	-0.029	-0.057	-0.230	-0.149	-0.552
	(0.135)	(0.144)	(0.216)	(0.451)	(0.159)
Cut-off range tight minus relaxed	4.202	5.331	5.233	3.867	3.730
Implicit trade-off ratio	2.1:1	6.3:1	2.5:1	27:1	0.7:1
Log-likelihood	-2774.7	-1781.2	-707.2	-270.2	-693.3

Table 3 shows the ordered probit results separately for the five sectors. The results reveal that business (largely non-tradeable and about 35 percent of the surveyed respondents) and labour (non-tradeable, but only 5 percent of surveyed respondents) place the most weight on interest rates when formulating expectations of monetary conditions three quarters ahead. As expected, the agriculture sector (largely tradeable and around 10 percent of respondents) places more weight on the exchange rate. Interestingly, the financial and agricultural sectors come the closest to the 2:1 trade-off ratio between interest rate and exchange rate movements.

There are equally pronounced differences between sectors in terms of their responses to changes in policy. Conditional policy announcements and the introduction of the Reserve Bank Act tend to be the most significant determinants across all sectors. When compared to other sectors, expectations of future monetary conditions for business and agriculture tend to react less to central bank policy announcements and to changes in the institutional environment. Labour is the only sector surveyed where central bank policy announcements are all statistically insignificant, but it shows a clear reaction to both the introduction of the Reserve Bank Act and the prominence of the exchange rate in policy.

Some evidence of asymmetric behaviour can be detected in some sectors. For example, when compared with the other sectors, business and agriculture must adjust their expectations of interest rates and the exchange rate by a larger amount in order to move their expectations of overall monetary conditions (three quarters ahead) toward the tight end of the rating scale.[16] This can be seen in table 3, where the cut-off range is the widest for these two sectors.

6 Conclusions

In this paper, we use a unique database on expected monetary conditions from the Reserve Bank *Survey of Expectations*. In order to exploit the ordinal nature of the data, we run an ordered probit model where expected monetary conditions are a function of expected interest rate and exchange rate, and some "narrative" measures of monetary policy changes. The results show that announcements have a statistically significant impact on public's expectations. This could be interpreted as evidence of divergence between the public's and the Reserve Bank's assessment of future conditions, possibly explaining the observed difference between expectations and realisations of monetary conditions.

Overall, the paper shows that surveyed expectations contain valuable information on the transmission of monetary policy. On average, respondents place considerable more weight on the interest rate than on the exchange rate. There is only weak evidence that the 2:1 ratio embedded in the Reserve Bank's Monetary Conditions Index holds for all respondents. When the effects of macroeconomic shocks are properly taken into account, this evidence fades away. The stability analysis shows that, over the last ten years, there have been numerous periods when respondents have placed a much higher weight on the interest rate. As expected, respondents from sectors that are more exposed to international trade - like finance and agriculture - attribute a relatively higher weight to the exchange rate.

We test for the presence of regime shifts in expectations due to changes to either the institutional framework or the implementation system. We find a clear effect of the introduction of the Reserve Bank Act in 1989. Since then, the public has expected the monetary policy stance to be tighter, *ceteris paribus*. On the other hand, the widening of the target band at the end of 1996 has had the opposite effect, but the size of it is

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[16] The outcome "very relaxed" ($y_{it+3} = 1$) does not occur in our sample for sectors 4 and 5. Thus, only 5 threshold parameters are estimated in those models. To preserve comparability across all 5 sectors, the cut-value range is reported for a move from $y_{it+3} = 2$ to $y_{it+3} = 7$.

much smaller and not statistically significant. Lastly, the move towards a stronger focus on the exchange rate, as it happened in policy implementation in 1988-90 and 1991-94, did not have any detectable effect on public's expectations.

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Appendix: Reserve Bank announcements and their classification

Reserve Bank Action	Date	Impact Quarter	Tech-nical (Cash)	Condi-tional Warning (CP)	Policy Action (P)	Direction (+1 Tighten)
Temporary Cash Target change - increase in the target from $20m to $50m, to counter manipulation of the cash market	Jun. 12 1989	SQ89	X			-1
Cash Target increased to $45m, and then reduced back to $30m on 5 December - aim of the move was to relieve unduly tight liquidity conditions which had recently developed	Dec. 1 1989	MQ90	X			-1
Reserve Bank of New Zealand Bill	Feb. 1 1990, passed Dec. 15 1989	MQ90				
First Policy Targets Agreement, Brash and Caygill	Mar. 2 1990	JQ90				
Reserve Bank tightens monetary conditions	Aug. 1 1990	SQ90			X	+1
Reserve Bank tightens monetary conditions	Aug. 3 1990	SQ90			X	+1
Reserve Bank tightens monetary conditions	Oct. 17 1990	DQ90			X	+1
Monetary conditions – RBNZ released a public statement - as the yield curve began to become increasingly positive – reiterating that short-term interest rates should generally exceed long-term rates while inflation is being reduced	Jan. 11 1991	MQ91		X		+1
Technical change to monetary policy implementation - expected to have a neutral impact on monetary conditions	Feb. 22 1991	JQ91	X			0

The RBNZ reminded financial markets that monetary conditions - for a flat or positive yield gap – were not yet evident	May 15 1991	SQ91		X		+1
RBNZ released a statement that it was unhappy with recent pressures in the call market	Aug. 13 1991	SQ91	X			-1
RBNZ temporarily increased the cash target to $30m, to alleviate pressures in the call market – then on 22 August the target reverted to its usual $15m	Aug. 21 and 22 1991	DQ91	X			0
Increase in the cash target - the RBNZ eased monetary policy, announcing a $5m increase in the settlement cash target – now up at $20m	Sept. 25 1991	DQ91			X	-1
Settlement account interest adjustment - did not reflect a shift in the stance of monetary policy	Dec. 18 and 24 1991	MQ92	X			0
RBNZ released a statement reiterating their focus on the inflation outlook for 1992-93 – and noted that the RBNZ would be concerned if there were further weakening in the exchange rate	Jan. 6 1992	MQ92		X		+1
RBNZ comment that if the exchange rate sustained its recent fall then price stability targets could be put at risk	Sept. 3, 9 and 30 1992	DQ92		X		+1
RBNZ comment that if the exchange rate sustained its recent fall then price stability targets could be put at risk	Dec. 1 1992	MQ93		X		+1
RBNZ responded to a weakening exchange rate by purchasing $30m government bonds in an OMO	Dec. 15 1992	MQ93			X	+1
RBNZ again responded to a weakening exchange rate	Dec. 24 1992	MQ93			X	+1

RBNZ tightened monetary policy given a sharp fall in the exchange rate - the cash target was reduced to zero	Jan. 6 1993	MQ93			X	+1
An improvement in monetary conditions led the RBNZ to announce an increase in the settlement cash target from zero to $5m	Jan. 8 1993	MQ93			X	-1
The RBNZ further eased monetary policy by increasing the cash target from $5m to $10m	Jan. 18 1993	MQ93			X	-1
The RBNZ restored monetary policy setting to the levels which prevailed before January 6 1993 - the cash target increased to $20m	Feb. 3 1993	MQ93			X	-1
The RBNZ said that given the significant rise in the exchange rate, the Bank was open to some small market-driven fall in interest rates - leaving overall monetary conditions broadly unchanged	Jul. 10 1995	SQ95		X		-1
The RBNZ stated that there was no scope for an easing in overall monetary conditions - or for a further fall in short-term interest rates without a compensating rise in the exchange rate	Jul. 12 1995	SQ95		X		0
RBNZ stated that they were now concerned about the easing in monetary conditions in recent days and was watching the situation very closely	Jul. 28 1995	SQ95		X		+1
The RBNZ cut the settlement cash target from $20m to $15m in order to keep monetary conditions firm	Aug. 11 1995	DQ95			X	+1
The RBNZ tightened again, reducing the settlement cash target from $15m to $5m	Aug. 25 1995	DQ95			X	+1

RBNZ stated that if further evidence supports the picture of a more rapid easing of inflation, there may be room for conditions to ease a little sooner than we had previously expected	Oct. 17 1995	DQ95		X		-1
The RBNZ stated that it was important that financial markets did not over-react to the statement released by the Bank on October 17 1995	Oct. 30 1995	DQ95		X		0
The RBNZ stated that it was important that financial markets did not over-react to the statement released by the Bank on October 17 1995	Oct. 30 1995	DQ95		X		0
The RBNZ reiterated its tone of the 30 October statement saying that a firming of monetary conditions might be required if further evidence confirming a slowing in inflation pressures did not emerge	Nov. 1 1995	DQ95		X		+1
RBNZ states that any further easing in monetary conditions would be inappropriate	Oct. 16 1996	DQ96		X		+1
RBNZ indicates that monetary conditions had become a little firmer than needed for the task of keeping inflation inside the target range.	Oct. 24 1996	DQ96		X		-1
RBNZ signs new PTA with wider target band	Dec. 10 1996	MQ97				
RBNZ announces that conditions can ease	Dec. 17 1996	MQ97		X		-1
RBNZ announces that there is some scope for current conditions to ease somewhat	Mar. 13 1997	JQ97		X		-1

RBNZ states that **overall monetary conditions are settling at levels somewhat too low** to be consistent with the March 1997 desired stance	May 12 1997	SQ97		X		+1
RBNZ announces that **conditions can ease**	Jun. 27 1997	SQ97		X		-1
RBNZ announces conditions have **eased too far**	Jul. 3 1997	SQ97		X		+1
RBNZ announces conditions are **too loose**	Jul. 11 1997	SQ97		X		+1
RBNZ announces conditions are **too loose**	Aug. 18 1997	DQ97		X		+1
RBNZ now views **current monetary conditions as appropriate**	Sept. 18 1997	DQ97		X		0
RBNZ warns that conditions are becoming **too loose**	Dec. 5 1997	MQ98		X		+1
RBNZ announced **current conditions appropriate**	Dec. 16 1997	MQ98		X		0
RBNZ stated that actual monetary conditions have **eased too far** over recent days	Feb. 23 1998	JQ98		X		+1
RBNZ **eases monetary policy**	Mar. 18 1998	JQ98		X		-1
RBNZ states that markets are **over-reacting to policy easing -** by increasingly anticipating further policy easings to too great an extent	Mar. 27 1998	JQ98		X		+1