News and Interest Rate Expectations: A Study of Six Central Banks

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1. Introduction

Central banks around the world have become considerably more transparent over the past decade. An important part of this has been the increased efforts by central banks to communicate their views about the economic outlook and its implications for monetary policy. On an abstract level, if a central bank was operating a fully transparent monetary policy rule, market participants would only require macroeconomic news to anticipate future changes in monetary policy. However, in practice, policy-makers must deal with uncertainty and structural change, which requires them to use some discretion in formulating policy. No policy framework can specify how the policy-maker should respond to every possible contingency. Therefore, there is a role for central banks to regularly articulate their thinking to help market participants filter macroeconomic news.

There is a substantial body of academic work on the theoretical and empirical aspects of monetary policy transparency. In a recent study, Coppel and Connolly (2003) found that the predictability of monetary policy is very similar across a panel of central banks in developed economies, possibly reflecting similarities in central bank communication strategies. Our study expands their results by asking which channels of communication influence expectations of future policy. One approach to address this question is to examine empirically the effect of different channels of central bank communication on financial market expectations of future interest rates. Of course, the impact of monetary policy communication has to be judged in the light of other news events, which can have a much larger effect on the market, such as international developments, domestic macroeconomic data releases and monetary policy decisions themselves. In this paper we therefore estimate the impact of four types of news on interest rate expectations: domestic macroeconomic news, foreign news, monetary policy surprises and central bank communication.

The effect of macroeconomic news and policy decisions on interest rate expectations has been the subject of a number of event studies that investigate what moves interest rate futures, in which interest rate expectations are embedded. The widely used approach in this literature is to estimate the daily change in interest rate futures as a function of macroeconomic and policy surprises. However, it is more difficult to measure the impact of monetary policy communication on interest rate futures. The main reason is the difficulty of quantifying the information content of,

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for example, a speech in a one-dimensional measure. It is even sometimes difficult to establish the direction in which a certain communication event should influence interest rate expectations. One way of measuring the impact of policy news, irrespective of the direction of movement, is to examine its effect on the variance of interest rate futures on the day. Both elements – the effect of macroeconomic and monetary policy surprises on the change in interest rate futures and the effect of central bank communication on the variance of interest rate futures – are combined in the GARCH-type model applied in this paper.

A few papers have empirically examined this issue for individual economies, such as a recent study for the United States by Kohn and Sack (2003), and for Australia by Campbell and Lewis (1998). In this paper we apply a framework similar to that suggested by Kohn and Sack to a panel of economies (Australia, Canada, the euro area, New Zealand, the United Kingdom and the United States), which allows us to compare central bank communication channels across different institutional frameworks.

Our results suggest that central bank communication is not a large contributor to overall movements in interest rate futures. We find that the important channels of communication add only a few basis points to the standard deviation of rates on the days on which these communication events occur, which is a small minority of trading days. In comparison, across all trading days, the standard deviation of daily changes in the futures rates averages around 6 basis points for our panel of economies. Domestic and foreign macroeconomic news events that we examine occur on a majority of trading days and make a much larger contribution to the variance of changes in interest rate futures. This pattern holds across all economies.

While the effects of central bank communication are generally small, we find that they increase the standard deviation of interest rates on the day on which the communication occurs, as a result of providing new information to the markets. Among the different types of communication, commentaries following rate decisions, monetary policy reports and parliamentary hearings are found to have the greatest influence on expectations for future policy in the economies examined. Speeches, on the other hand, have typically much less of an impact.

The remainder of the paper is structured as follows. The next section reviews some conceptual considerations on how news affects interest rate expectations of financial markets. Section 3 discusses the data and some preliminary empirical evidence of the link between news and interest rate futures, followed by the estimation of a full-scale model in Section 4. Section 5 concludes.

2. News and Interest Rate Expectations: Some Conceptual Issues

Many asset prices incorporate, among other factors, expectations about the future path of monetary policy. The most direct measure of expected future policy rates are interest rate futures, since these incorporate expectations of market interest rates, which are closely linked to the policy rate over the short to medium horizon. Over

this horizon, movements in interest rate futures mainly reflect revisions in market expectations regarding the future path of monetary policy.[2]

The efficient market hypothesis suggests that interest rate futures incorporate all relevant information about future interest rates that is available at any point in time. As a consequence, a variable that can be forecast perfectly will have no measurable effect on changes in interest rate futures. This, however, does not mean that the variable is unimportant for monetary policy setting, but it means that expectations will not significantly change following the release of news on such a variable. As a result, the literature on the movement of financial markets in response to news releases usually focuses on the surprise element in the data (see, for example, Fleming and Remolona 1997).

Potentially, any type of news event that can convey information on the future path of monetary policy can affect interest rate expectations. For example, the yield curve should be influenced by both policy-related events such as meetings of the committee or board that sets policy rates and by the release of macroeconomic news. Central bank communication more generally can provide new information to the extent that it helps the markets to interpret the relevance of macroeconomic developments for the decision-making process. Consequently, in this paper we look at four types of news:

- domestic macroeconomic news, comprising domestic macroeconomic data releases;
- foreign news, comprising data releases and policy decisions in important international markets;
- monetary policy news, that is (domestic) monetary policy decisions; and
- central bank communication, including regular reports, parliamentary hearings, press releases, minutes of meetings and speeches.

Estimating the effect of macroeconomic news on interest rates is relatively straightforward. The widely used approach in the event-study literature is to estimate the daily change in the interest rate futures as a function of macroeconomic surprises (see, for example, Jansen and de Haan 2003, and Kohn and Sack 2003). The surprise element is measured by taking the difference between the actual outcome of macroeconomic news releases and the outcome expected in a survey of market economists.[3]

2. In principle, a change in interest rate expectations can reflect two different channels: revisions of expectations about monetary policy settings, or revisions of expectations about the monetary policy framework, which in turn affects expectations about long-run inflation. We would expect the former to affect interest rate futures at the short to medium end of the yield curve, while the latter is more relevant for expectations of longer-term nominal interest rates. In this paper, we concentrate on the short- to medium-term expectations of interest rates, and, therefore, on news that is relevant for an assessment of monetary policy conditions over that period.

3. Many financial time-series studies use tick-by-tick data to examine the impact of a specific event, instead of daily data. This has the advantage of being able to more easily identify the source of interest rate movements if more than one news event occurs on the day. However, this was difficult in our study for several reasons. First, a number of our communication variables, such as parliamentary hearings or speeches, have no specific time when the information content is released. Second, interest rate futures markets are not always liquid enough to examine tick-by-tick data. Finally, given the scope of our dataset, with a large number of news releases across six economies, establishing the exact timing of all data releases and communication events was not feasible.

Developments in important foreign markets, especially the US, appear to have a major impact on all asset classes in other economies. Consequently, in a number of studies foreign news has been identified as an important determinant of domestic interest rate futures. Some of these studies account for foreign news by explicitly considering the effect on domestic interest rate futures of foreign policy decisions and a number of selected foreign data releases (see, for example, Campbell and Lewis 1998, and Gravelle and Moessner 2001). Others have modelled domestic and foreign interest rate futures jointly, thus accounting for linkages between economies (for example, Ehrmann and Fratzscher 2002, and Kim and Sheen 2000). In this paper, we assume that any important development in the foreign market must be reflected in a change of the foreign interest rate futures. These changes in foreign interest rate futures can therefore be seen as a proxy for both foreign macroeconomic data releases and foreign policy surprises.

Estimating the effect of monetary policy surprises on interest rates has been the subject of numerous studies on the predictability of monetary policy (see, for example, Bomfim and Reinhart 2000, Haldane and Read 2000, Kuttner 2001, Lange, Sack and Whitesell 2001, Muller and Zelmer 1999, and Ross 2002). In these studies, monetary policy surprises are typically defined as the change in the 30-day interest rate on the day of announcement, which is shown to be very closely related to the change in the expected policy rate over the following month. In a recent study, Coppel and Connolly (2003) compare the predictability of monetary policy across a panel of central banks. Table 1 replicates their results, updated to June 2004, the endpoint of the dataset used in our study. The coefficients reported measure the response of the 30-day interest rate to monetary policy moves. A coefficient of zero implies that monetary policy is, on average, fully predictable, and there are no policy surprises. A non-zero coefficient measures the size of the surprise element per basis point increase in the policy rate, on average.

The results confirm Coppel and Connolly's conclusion: the predictability of monetary policy is very similar across these central banks. This suggests that, despite differences in the communication framework, central banks in these economies convey information to financial markets to a very similar degree. Our study expands on these results by looking in more detail at the different communication channels that influence financial markets' expectations of future monetary policy.

Table 1: Market Response to Monetary Policy Moves
Same-day change in 30-day interest rates, January 1999–June 2004

	Australia	Canada	Euro area	NZ	UK	US
Change in market	0.16***	0.18***	0.25***	0.21***	0.32***	0.19*
interest rate	(0.06)	(0.05)	(0.09)	(0.07)	(0.08)	(0.11)

Notes: Updated results from Table 2, Coppel and Connolly (2003). The coefficients are based on a regression of the daily change in the 30-day interest rate on the changes in the policy rate. Numbers in brackets are the standard deviations. *** and * denote coefficients that are significant at the 1 and 10 per cent level, respectively.

Estimating the effect of central bank communication on expectations of monetary policy has been the subject of only a few studies. While there is a substantial body of theoretical literature (for recent reviews of the literature, see Geraats 2002 and Hahn 2002), the empirical literature on this topic is relatively recent, partly because it is difficult to measure the impact of monetary policy communication on interest rate expectations. To determine the effect of communication on interest rate futures directly would require a measure that can summarise and quantify the information contained in a communication event. However, sometimes it might even be difficult to establish the direction in which a certain communication event should influence interest rate expectations. One way of measuring the impact of policy news, irrespective of the direction of movement, is to examine the variance of interest rate futures on the day, since any change in the mean will also affect the variance on the same day. A specific type of communication can then be associated with a dummy variable that can take the value of one on days where such a communication event happens and zero otherwise.[4] This approach is consistent with Kohn and Sack (2003), who look at the effect of communication on expectations in the US, Chadha and Nolan (2001) who examine the UK, and Campbell and Lewis (1998) who include an 'RBA commentary' variable in their study of changes in Australian interest rate futures.

An interesting question is whether increased variance on the day of central bank communication should be viewed as good or bad. While Chadha and Nolan characterise higher variance as bad, Kohn and Sack assume that increased variance is evidence that central bank communication conveys important information to market participants. We take the view that if central bank communication is to have any influence on expectations, this must show up as an increase in the daily standard deviation on days of communication. However, it is possible for some communication to be poorly worded or misinterpreted, which could be viewed as causing unnecessary volatility in financial markets. Therefore, since we cannot compare the intention of the central bank with the markets' reaction to the communication, we are only measuring whether a channel of communication has the effect of providing information to market participants, irrespective of whether that information is necessary or accurate.

Our study shares a number of features with earlier studies that estimate the effect on interest rate expectations of different types of news relevant to the future path of monetary policy. We examine daily changes in interest rate futures, though concentrate on the futures one to eight quarters ahead (Campbell and Lewis 1998 and Fleming and Remolona 1997 also analyse the long end of the yield curve). Similar to Kohn and Sack (2003) and Chadha and Nolan (2001), we estimate a model that

4. Alternatively, some studies, such as Jansen and de Haan (2003) and Andersson, Dillén and Sellin (2001), address this problem by reading each communication and making a subjective determination of whether it should have a positive or negative effect. However, it is likely to be difficult to make a judgement on the 'intention' of a speech on a consistent basis, especially in a cross-country study such as ours. Moreover, some communication events such as speeches can include a question and answer session, which may convey important information. Unfortunately, transcripts of such sessions are usually not available on central banks' websites.

allows us to judge the effect on both the mean and the standard deviation of the daily changes in expected interest rates. Unlike these studies, however, we estimate our results across a panel of economies. This may allow us to gain some insight into whether different types of central bank communication convey information 'universally'.

3. Does News Matter?

As outlined in the previous section, in this paper we model the various influences – domestic and foreign – on interest rate expectations in six different economies. We concentrate on influences that change expectations for the future path of monetary policy: domestic macroeconomic data surprises, changes in foreign news reflected in changes in foreign interest rate futures, domestic monetary policy surprises and central bank communication. The next section summarises the data underlying our analysis, followed by a preliminary analysis. This analysis investigates the contribution of surprises in the four news categories to daily changes in interest rate futures, before a formal model of the effect of individual news events is estimated in Section 4.

3.1 Data

At the core of our empirical analysis are changes in interest rate expectations. We measure these using changes in daily implied interest rates from 90-day interest rate futures, Δf_t , at maturities from one to eight quarters, based on the last trade available for each day. Our data for individual economies start in January 1997 for Australia, Canada, the United Kingdom and the United States, and in 1999 for the euro area and New Zealand.[5] Our panel results therefore start in 1999. The last data point included is 17 June 2004.

Domestic macroeconomic surprises, $news_{b,t}$, related to a release of data on b (for example, GDP, CPI or employment releases), are measured by taking the difference between the actual outcome of data released and the outcome expected in a survey of market economists. Consulting Bloomberg yielded a large number of surveys of expected macroeconomic news outcomes for constructing surprise variables (Table 2).

Foreign news surprises can be approximated by the contemporaneous change in the interest rate futures of equivalent maturity in an important foreign market, Δf_t^{OS}, and its lags. These should capture both the macroeconomic surprises for these foreign economies and monetary policy surprises. A number of studies have found that developments in US financial markets have an important effect on other

5. A number of the news releases and market expectations were readily available only since 1997. Moreover, by then all inflation targeters included in the samples had put in place most elements of their current communication frameworks. The Bank of Canada changed elements of their communication strategy up until December 2000 (see, for example, Siklos 2003), but our results for Canada were qualitatively unchanged when estimated over the shorter time period starting in 2001.

Table 2: Number of Observations
1 January 1997–17 June 2004

	Australia	Canada	Euro area	NZ	UK	US	Panel
Observations	1 947	1 947	1 425	1 372	1 947	1 947	8 550
Policy decisions	84	45	100	44	92	63	357
News releases	801	1 384	3 246	354	1 731	3 857	9 804
Release variables	16	24	74	16	26	61	217

Notes: The data for the euro area start on 1 January 1999 and for NZ start on 17 March 1999; the panel includes data for all six economies from 1 January 1999.

economies' financial markets. We therefore include changes in US interest rate futures in the equations for all other economies, and also changes in Australian interest rate futures in the model for New Zealand.[6]

Monetary policy surprises, ps_t, are measured by taking the change in 30-day interest rates on the day of monetary policy decisions, consistent with Campbell and Lewis (1998) and Kohn and Sack (2003). This 30-day interest rate, a market interest rate, should reflect market participants' expectation of the actual policy rate for the following month. Since central banks in our sample have regular policy meetings in a monthly or 6-weekly cycle, the expected policy rate should be very similar, if not the same, over this month. Consequently, any change of the 30-day interest rate can be attributed to a change in the (expected) policy rate which is set on the first day of the 30-day paper.

The information or news content of central bank communication cannot be collapsed into one empirical measure, making it difficult to measure the surprise element or even the direction. Therefore, we measure different types of communication, *w,* by the central bank through a communication dummy, $com_{w,t}$, that takes the value one if a certain communication event has happened on a day, and zero otherwise. These communication events include policy rate decisions with and without commentary, monetary policy reports, parliamentary hearings, minutes of meetings (and voting records) and speeches. The data were available on the websites of the six central banks.

A number of variables control for time-specific and other events, $Other_{d,t}$, where *d* denotes the different variables. These include four dummies for day-of-the-week effects, $Other_{1\text{-}4,t}$, a dummy for public holidays, $Other_{5,t}$, and a dummy for 11 September 2001, $Other_{6,t}$.[7] We also include a measure for the *days to rollover* for each futures contract, $Other_{7,t}$. Every three months on a pre-set date, the 1st futures

6. Ehrmann and Fratzscher (2002) find that US developments seem to be more important for euro interest rates than vice versa. They argue that one reason for this may be that US data are typically released earlier than euro area data, and thus might provide a leading indicator function. For our sample of economies, US macroeconomic data are typically released earlier than domestic data in a similar category.

7. Day-of-the-week effects can be expected to proxy for news events that we have omitted from our study. Since releases of a specific category of news are often scheduled for the same day of the week, this can show up as additional variance on that weekday.

contract is settled and the remaining futures contracts are rolled over to the next contract. Since volatility may be expected to vary as a contract approaches expiry, we include this variable to capture this effect.

3.2 A preliminary analysis

In Section 2 we have noted a number of theoretical reasons why macroeconomic and monetary policy news should affect interest rate expectations. However, many other factors can affect the variance of daily financial data. One simple way to assess whether different types of news affect interest rate expectations is, therefore, to ask whether interest rate futures have a higher variance on days of news releases than on other days.

Table 3 is based on the 100 largest daily changes in interest rate futures for each of the six economies in our study. For illustrative purposes, we only present the results for the 4th futures contract in the tables, which measures expectations for one year in the future, roughly the middle of the horizon of our futures data. For each economy the first column shows the proportion of the top 100 daily changes that fall on days with foreign market movements, macroeconomic data surprises, monetary policy surprises and central bank communication. The second column shows the corresponding proportion of news days in the entire sample, which – except for the euro area and New Zealand – comprises 1 947 observations. If economic announcements or monetary policy news did not affect markets, the proportion of large changes in interest rate futures occurring on news days should not be significantly different to the proportion of news days in the entire sample.

Table 3: 100 Largest Changes in Interest Rate Futures
4th contract, 1 January 1997–17 June 2004
Proportion of days, per cent

	Australia		Canada		Euro area[a]		NZ[a]		UK		US	
	Top 100	All	Top 100	All	Top 100	All	Top 100	All	Top 100	All	Top 100	All
Foreign market movements[b]	57	24	72	24	49	27	80	27	47	24	–	–
Macro news surprises	38	29	50	45	77	79	25	16	43	38	86	72
Policy surprises	9	3	6	2	9	4	19	2	14	3	7	2
Other communication[c]	10	6	5	5	24	28	6	4	20	15	29	25
Other days	13	49	10	40	5	12	3	59	18	39	9	22

(a) The data for the euro area start on 1 January 1999 and for NZ on 17 March 1999.
(b) Foreign interest rate futures move almost on a daily basis. For this analysis we therefore concentrate on 'large' or 'important' moves which we define to be any moves that are larger than one standard deviation of the series over the entire sample period.
(c) 'Other communication' excludes any communication released jointly with a policy decision.

We can make two observations from these results. First, all four news categories are over-represented on the days with the largest 100 changes in interest rate futures, compared with their overall share in the sample. Second, most of the days with large changes are also days when foreign interest futures changed significantly or when domestic macroeconomic data surprises occurred. However, the methodology used in Table 3 has an obvious drawback. Different types of news can arrive on the same day, and therefore changes in interest rate expectations can be attributable to either or both. In fact, in large economies such as the United States, barely a day passes without the release of new data. To disentangle – and possibly quantify – the effect of different news, an econometric model needs to be estimated. In the remainder of this section we estimate two very simple equations with the aim of disentangling the contributions of the different news categories.

The simple model of Equation (1) explains the change in 90-day interest rate futures Δf_t with a range of factors, such as monetary policy surprises ps_t, domestic macroeconomic data surprises $news_{b,t}$, foreign data surprises Δf^{OS}, and different types of communication by the central bank $com_{w,t}$. As mentioned above, a number of variables, $Other_{d,t}$, control for time-specific events. We also include lags of futures rates to control for autoregressive behaviour in the futures markets.

$$\Delta f_t = \alpha_0 + \sum_{a=1}^{j} \alpha_a \Delta f_{t-a} + \beta_0 ps_t + \sum_{b=1}^{k} \beta_b news_{b,t} + \sum_{c=0}^{m} \gamma_c \Delta f^{os}_{t-c} + \sum_{w=1}^{n} \phi_w com_{w,t} + \sum_{d=1}^{7} \delta_d Other_{d,t} + \varepsilon_t \quad (1)$$

From this model the relative contributions of the different types of news in explaining changes in interest rate expectations can be calculated based on an ANOVA analysis.[8] Columns (1) in Table 4 show the results for each economy. An initial observation is that the unexplained residual is by far the largest component. This means that a large share of the variation in daily interest rate futures cannot be explained by simple regression on unexpected macroeconomic and monetary policy news, domestic or foreign. However, some conclusions can be drawn from the part that can be explained by the model. The pattern for Australia is illustrative for all economies: foreign market movements[9] and domestic macroeconomic news are the largest source of variation. Their effect is prominent for interest rate futures

8. The contributions based on an ANOVA analysis can be thought of as the differences in (unadjusted) R-squared from a regression with and without the variable (or set of variables) in question. Since this measures only the marginal contribution of this variable, the order in which the contributions are calculated can matter if the variable is correlated with the variables already contained in the model. In our model, we have included the communication variable last, thereby assuming that any change in interest rate futures that could be attributed to either communication or another news event, is attributed to the latter. While this might explain the low contribution of communication in all regressions, an ordering in which communication was included first, yielded similar results, with a contribution from communication of around 1 to 2 per cent in most cases.

9. Foreign market movements are modelled for all economies, except for the US, as changes in US interest rate futures. For New Zealand, changes in Australian interest rate futures are also included.

over the entire time horizon considered (Table 4 contains only the results for the 4th contract, but the results for all contracts are consistent with those in Section 4.2 and are available from the authors). In contrast, monetary policy surprises appear to affect interest rate expectations mainly in the very short term.

Finally, communication by the central bank explains changes in interest rate expectations only to a small degree. This might suggest that central bank communication provides some information to markets, but interest rate expectations mostly get revised after macroeconomic data surprises or unexpected monetary policy decisions. This conclusion is, however, partly complicated by our measure of communication events as a dummy. As it is difficult to quantify the information contained in central bank communication, we have identified each type of communication event only by whether or not it happens on a specific day. The estimated coefficient underlying the ANOVA analysis in Table 4, on the other hand, measures the average impact of all communication events of a specific type. If this type of communication has, on average, equally often 'upward' and 'downward' impacts, we would expect to estimate a zero impact of a communication dummy in this analysis.

Table 4: Contributions of Different Types of News – ANOVA Results
4th contract, 1 January 1997–17 June 2004
Per cent of total variation in daily interest rate futures

	Australia		**Canada**		**Euro**		**NZ**		**UK**		**US**	
Regression	(1)[(a)]	(2)[(b)]	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Explained	35.9	22.4	62.4	46.6	44.2	26.2	55.8	44.8	31.3	18.4	18.1	22.9
Due to news from:												
Foreign market movements	27.8	11.8	52.8	33.4	36.3	14.3	48.0	28.0	20.3	6.8	–	–
Unexpected macroeconomic news	4.6	2.1	3.1	1.4	4.5	4.1	1.9	1.3	6.6	3.3	16.6	10.5
Monetary policy surprises	2.1	2.0	5.0	4.4	0.6	0.8	2.7	3.8	2.9	2.9	0.1	0.5
Central bank communication	0.3	0.4	0.3	0.2	1.3	1.3	0.5	3.9	0.1	0.7	0.5	2.9
Other variables	1.1	6.1	1.2	7.2	1.5	5.7	2.7	7.8	1.4	4.7	0.9	9.0
Unexplained residual	64.1	77.6	37.6	53.4	55.8	73.8	44.2	55.2	68.7	81.6	81.9	77.1

(a) Based on Equation (1), a regression of changes in interest rate futures on news in the four categories and some time-specific controls.
(b) Based on Equation (2), which uses absolute values for the model estimated in Equation (1).
(c) ANOVA contributions are marginal contributions, that is they depend on the ordering. Alternative orderings, however, did not materially affect these results. Data for the euro area start on 1 January 1999 and for NZ start on 17 March 1999.

An alternative is to estimate a model that uses absolute values only, such as Campbell and Lewis (1998). Taking absolute values of the impact would avoid the 'averaging out' of upward and downward impacts. We consequently estimated Equation (1) in absolute value form, as follows:

$$\left|\Delta f_t\right| = \alpha_0 + \sum_{a=1}^{j} \alpha_a \left|\Delta f_{t-a}\right| + \beta_0 \left|ps_t\right| + \sum_{b=1}^{k} \beta_b \left|news_{b,t}\right| + \sum_{c=0}^{m} \gamma_c \left|\Delta f_{t-c}^{os}\right| + \sum_{w=1}^{n} \phi_w com_{w,t} + \sum_{d=1}^{7} \delta_d Other_{d,t} + \varepsilon_t \quad (2)$$

Columns (2) in Table 4 show the ANOVA contributions from this regression. The results confirm our earlier findings: domestic macroeconomic news and especially foreign market movements explain a much larger share of changes in interest rate futures than monetary policy surprises and central bank communication. The contribution of central bank communication remains relatively low, suggesting that the 'averaging' effect is not very strong. However, compared with the results for Equation (1) the contribution of foreign market movements is much lower, which may be due to the loss of information in the absolute value equation (as indicated by the lower R-squared of Equation 2). Many foreign market movements happen on the same day as monetary policy decisions or macroeconomic news. The econometric estimation has difficulties attributing these correctly as we have given up the information on 'direction' of all news variables.

Taken together, these results indicate that movements in foreign markets and domestic macroeconomic data surprises affect interest rate expectations to a much larger degree than central bank communication. Of course, the latter can still affect the standard deviation of the interest rate futures on the day of the communication event. Due to the nature of the communication variables (neither direction nor strength is modelled) compared with the other 'news variables', a different approach is needed to assess the effect of individual types of news events on interest rate expectations. The econometric model employed in Section 4 provides such an estimation technique, modelling the mean and the standard deviation of the change in interest rate futures jointly.

4. Measuring the Impact of News on Interest Rates: A Cross-country Study

Empirical modelling of financial time-series data usually needs to take account of changing asset return variance, whereby periods of low and high volatility tend to be clustered. This phenomenon can be captured by employing models of conditional heteroskedasticity such as the ARCH (autoregressive conditional heteroskedasticity) and GARCH (generalised ARCH) models suggested by Engle (1982) and Bollerslev (1986). As mentioned above, such an approach allows us to deal with the different nature of the central bank communication variable compared with macroeconomic and monetary policy surprises. It does so by simultaneously estimating the mean equation for interest rate futures and the variance of the residuals from the mean equation.

The next section briefly describes the specific model estimated, using the data described in Section 3.1. In Section 4.2 and Section 4.3 we present the empirical results for the effect of different types of news: domestic macroeconomic data releases, foreign market movements, monetary policy surprises, and different channels of central bank communication. Comparing the results across different economies also allows us to assess the effectiveness of these channels across different monetary policy frameworks.

4.1 The econometric model

The econometric model underlying our analysis of interest rate futures is an EGARCH (exponential generalised autoregressive conditional heteroskedasticity) model suggested by Nelson (1991). The exponential form allows for asymmetry in the response of interest rate futures following positive or negative shocks. It has the added advantage of guaranteeing that the estimated daily conditional variance is always positive.[10]

4.1.1 The mean equation

The mean equation for changes in 90-day bank bill futures rates, Δf_t, is specified for each economy as in Equation (1), but we exclude central bank communication events:

$$\Delta f_t = \alpha_0 + \sum_{a=1}^{j} \alpha_a \Delta f_{t-a} + \beta_0 ps_t + \sum_{b=1}^{k} \beta_b news_{b,t} + \sum_{c=0}^{m} \gamma_c \Delta f^{os}_{t-c} + \sum_{d=1}^{6} \delta_d Other_{d,t} + \varepsilon_t \quad (3)$$

4.1.2 The variance equation

To explicitly model ARCH effects, we assume that the residuals from the mean Equation (3) can be modelled as a function of the standard deviation of the residuals h_t, and an independently and identically distributed term v_t:

$$\varepsilon_t = v_t h_t \sim \left(0, h_t^2\right) \quad (4)$$

v_t are also known as the standardised residuals:

$$v_t = \frac{\varepsilon_t}{h_t} \sim iid(0,1) \quad (5)$$

The variance of the residuals, h^2_t, is modelled as a function of its own past values, past errors from the mean equation and other factors which may be influencing the conditional variance.[11] In our EGARCH(x,y) framework, we assume that the logged variance $\ln(h^2_t)$ of the residuals can be modelled as:

10. For an accessible exposition of ARCH and GARCH models, see McKenzie and Brooks (1999).

11. GARCH models of short rates often require the inclusion of the *level* of the interest rate in the variance equation (we would like to thank Adrian Pagan for drawing our attention to this). In our model we find that this term is insignificant (or negative) over almost all horizons for all the countries studied. One possible explanation is that this term serves to model differences in the magnitude of policy changes under high and low inflation, but for the period we studied inflation was always low.

$$\ln h_t^2 = \phi_0 + \sum_{w=1}^{q} \phi_w com_{w,t} + \sum_{x=1}^{n} \left(\varpi_x v_{t-x} + \theta_x \left| v_{t-x} \right| \right) + \sum_{y=1}^{p} \lambda_y \ln h_{t-y}^2 + \sum_{z=1}^{7} \varphi_z Other_{z,t} \quad (6)$$

where $com_{w,t}$ denotes a dummy for monetary policy communication channel w.[12] ARCH in the residuals is addressed by including lags of the absolute value standardised residuals $|v_{t-x}|$, and lags of the logged conditional variance terms $\ln(h^2_{t-y})$. Asymmetric responses to shocks can be addressed by including lags of the standardised residuals v_{t-x}. Days to rollover for each futures contract are captured by the variable $Other_{7,t}$. Finally, as in the mean equation, we include time-specific dummies. Identifying the effect of the economic commentary on days of monetary policy decisions is a particular challenge, since there can also be a policy rate surprise on these days. We attempt to do this by controlling for the surprise in the mean equation. Therefore, the communication dummies in the variance equation should only reflect effects not captured by the interest rate surprises modelled in the mean equation.[13]

We estimate the model in Equations (3) and (6) for Australia, Canada, the euro area, New Zealand, the UK and the US, and for a panel of these economies, using fixed effects in both the mean and variance equations.[14] The equations are estimated for each of the first eight 90-day futures contracts, which measure interest rate expectations from the 3-month to 2-year horizon. We first estimated Equation (3) for each economy with all the available explanatory variables using OLS to obtain a more parsimonious model by excluding insignificant macroeconomic releases. GARCH models are estimated by the method of maximum likelihood using an iterative algorithm, since the conditional variance appears in a non-linear way in the likelihood function. We estimated the EGARCH model using a general-to-specific modelling approach, by excluding insignificant variables in a number of iterations. Similarly, we tested the appropriate dimensions of the EGARCH model for each economy separately. Interestingly, the lagged conditional variance terms in the variance equation were insignificant, except for the US, thus reducing our models to an ARCH specification. Economically, this implies that an increase in the conditional variance of interest rate futures as a result of communication does not lead to increased variance on subsequent days. Table 5 summarises the specifications and diagnostics of the final models. The overall fit of the equations are reasonable, with R-squared values of between 0.14 and 0.61.[15]

12. As suggested by the results in Section 3, if the communication events are included in the mean equation their average effect is insignificant. This result, however, may be due to the measurement of these variables, which does not include 'direction' of the information and therefore 'upward' and 'downward' movements may be netted out. Changes in the mean also affect the variance on the day of the news event, but the effect on the variance abstracts from the direction of the effect. Therefore, in our framework, the coefficient in the variance equation captures both (non-directional) changes in the mean and possible additional effects on the variance.

13. In principle, macroeconomic and monetary policy surprises could affect both mean and variance. However, the inclusion of these variables in the variance equation yields mostly insignificant effects, suggesting that most of their effect has been absorbed by the mean equation.

14. We estimated our GARCH model with EViews, version 3.1. The panel regression with GARCH followed the example in Grier and Cermeño (2001).

15. A significant portion of this explanatory power comes from the 'foreign rates' variable, which helps to explain why the fit is lowest for the US.

Table 5: Specification and Diagnostics for EGARCH Model
4th contract, January 1997–June 2004

	Australia	Canada	Euro	NZ	UK	US	Panel
EGARCH (*x*,*y*)	(3,0)	(5,0)	(4,0)	(5,0)	(4,0)	(5,1)	(5,0)
Overseas effects	US	US	US	US, Aus	US	–	US
Diagnostics							
R^2	0.34	0.61	0.40	0.54	0.30	0.14	0.35
ARCH LM (5)	{0.79}	{0.81}	{0.65}	{0.58}	{0.92}	{0.86}	{0.62}
Excess kurtosis	2.24	2.25	0.71	2.88	1.04	1.59	1.52

Notes: Numbers in braces are *p*-values. Estimates for the euro area and the panel start from 1 January 1999, and for NZ from 17 March 1999. In the variance equation, *x* is the number of lagged standardised residuals and *y* is the number of lags of the logged conditional variance (see Equation 6).

The variance equations for each economy include an EGARCH specification sufficient to account for any ARCH remaining in the standardised residuals. This is confirmed using ARCH LM tests. While the excess kurtosis of the interest rate futures has been greatly reduced by the EGARCH model, there is still some evidence of excess kurtosis, indicating non-normality of the standardised residuals. Therefore, Bollerslev and Wooldridge (1992) heteroskedasticity consistent standard errors are reported.[16] We now turn to specific results these estimations yielded. For brevity, we will only show the results for the 4th contract for interest rate futures in the tables, however, the figures show the results across all eight contracts. More detailed results can be found in Connolly and Kohler (forthcoming).

4.2 The effect of macroeconomic news and monetary policy surprises

The results of the mean equation can tell us which macroeconomic news releases are most important for interest rate expectations. As mentioned above, we included a large number of macroeconomic surprise variables. For instance, there were 801 Australian news releases during the period, made up of 16 different types of releases, of which half significantly influenced interest rate expectations. Table 6 shows which economic releases were found to be significant in the mean equation for the change in interest rate futures (4th contract).

For Australia, activity indicators such as retail sales, building approvals and GDP are significant along with prices and labour market indicators such as the CPI and employment. These results are consistent with those found by Campbell and Lewis (1998) and Silvapulle, Pereira and Lee (1997). While not included in Table 6, US data surprises – measured through their impact on US interest rate

16. This approach, which uses quasi-maximum likelihood estimation, is standard in the literature; see McKenzie and Brooks (1999, p 24) and Jansen and de Haan (2003).

Table 6: Economic Releases which Significantly Influence Interest Rate Expectations (Mean Equation)

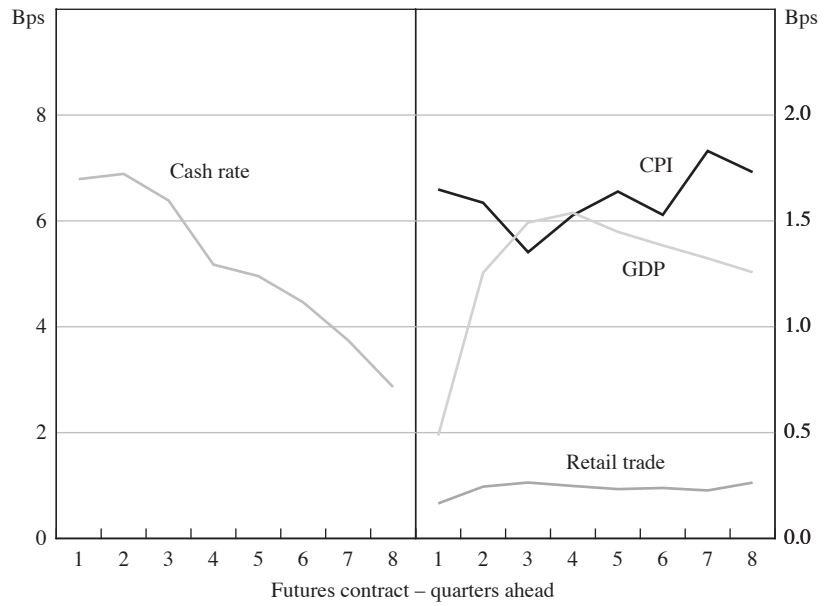
	Australia	Canada	Euro area	NZ	UK	US
Prices	CPI	CPI	PPI (euro area)	CPI	Input PPI	CPI
			CPI (France)	Core CPI	Output PPI	GDP deflator
			Core CPI (Spain)	Input PPI	RPIX	
Labour market	Employment	Employment	Unemployment (France)	Unemployment rate	Average earnings	Average hourly earnings
	Unemployment rate	Unemployment rate				Non-farm payrolls
						Employment cost
						Initial jobless claims
Activity	GDP	GDP	GDP (euro area)	GDP	GDP	Advance retail sales
	Building approvals	Industrial production	Industrial production (euro area)	Retail sales	Industrial production	Capacity utilisation
	Trade balance	Manufacturing shipments	Consumer spending (France)		Consumer credit	Chicago purchasing managers' business barometer
	Inventories	Retail sales excl autos	GDP (France)		Retail sales	Consumer confidence
	Investment		Production outlook (France)		Trade balance	Durable goods excl transport
	Retail sales		IFO (Germany)			Empire manufacturing
			Industrial output (Germany)			Existing home sales
			GDP (Italy)			ISM manufacturing
			GDP (Spain)			ISM non-manufacturing
						Philadelphia Fed Outlook Survey
						Michigan confidence
						Wholesale inventories

futures – explain a large share of movements in Australian interest rate futures. This result has been confirmed by earlier studies, such as Kim and Sheen (2000). The results for other economies are also in line with those found by previous country-specific studies, where available. For example, for the US, Kohn and Sack (2003) find that announcements of 13 economic data releases affect the Federal funds futures significantly; almost all of these are included in our list of 18 significant macroeconomic releases for the US. For Canada, Gravelle and Moessner (2001) single out surprises in the PPI, employment and US data, comparable to our results. Across economies, a number of similar releases can consistently be found to be significant. These are not surprising: CPI in the category of important price releases, unemployment in the labour market category and GDP and retail sales in the economic activity category.

The results for the mean equations can also show whether market participants view surprises in monetary policy decisions as shocks to the short-term or medium-term outlook. For Australia, interest rate futures which expire within three months (the 1st contract) respond quite strongly to monetary policy surprises, rising by around 6 basis points in response to an *unexpected* cash rate increase of 10 basis points (Figure 1). This response falls steadily as the settlement date becomes more distant. This suggests that market participants view monetary policy surprises as containing more short-run than medium-run information. In contrast, macroeconomic surprises such as GDP, the CPI or retail trade have a relatively consistent effect on interest rate expectations out to the two-year horizon. This suggests that they are viewed as relevant to the medium-term outlook. This is consistent with the findings of Campbell and Lewis, who report that monetary policy news has more

Figure 1: Macroeconomic and Policy Surprises – Australia

Same-day response of 90-day interest rate futures to 10 basis points surprise



often been associated with a large move in bill yields (that is, the short end of the futures market) while macroeconomic surprises also affected bond yields (that is, the long end of the market).

Overall, the profile for the interest rate futures response to monetary policy surprises for Australia is reasonably representative for those of the other economies, with an impact of between 5 and 8 basis points on the 1st contract, which steadily declines for the contracts further ahead. We do not report these results in more detail, since they are in line with those found by a number of other studies (see, for example, Kohn and Sack 2003 for the US, Gravelle and Moessner 2001 for Canada, and Chadha and Nolan 2001 for the UK). It is worth noting, however, that the results for New Zealand seem to have a less smooth profile, possibly because of the lower liquidity of the New Zealand futures market, especially for the longer-dated contracts.

4.3 The effect of monetary policy communication

One of the motivations of our study is to estimate the effectiveness of different channels of central bank communication, and to analyse whether we can detect consistent patterns across different economies. For this, we now turn our attention to the results from the variance equation. As stressed earlier, due to the nature of our communication variables (it is difficult to objectively measure news contained in communication events), we interpret a positive statistically significant result as 'effective' since it appears to have provided information to the markets.[17] We cannot, however, measure whether the information extracted by the markets is the information the central bank intended to convey.

In Table 7, the communication results from the variance equation are presented for each economy and the panel. Some types of communication, such as publishing minutes of meetings, are used only by some central banks and therefore some values are missing from this table. Other events do not occur often (such as unscheduled rate moves). We would expect such events to have a significant effect on markets precisely because they are rare. However, estimated coefficients for these events should be treated with caution since they are based on very few observations. Any coefficient based on 10 or less events is reported in braces. Again, the results are presented for the 4th futures contracts.

Across all economies – given the size and significance of the coefficients – the most important channels of monetary policy communication are the economic commentary accompanying rate moves, parliamentary hearings and monetary policy reports; minutes of meetings and speeches are much less important. As discussed in Section 4.1, identifying the effect of the economic commentary on days of monetary policy decisions is a particular challenge, due to the concurrent policy decision. In this respect, the results in Table 7 are comforting, since policy decisions without commentary are insignificant for almost all conditional variance regressions. This

17. Significant, but negative coefficients in the variance equation imply that on the day of the event the variance of the interest rate future is typically lower than on days without such events. Therefore, we are primarily interested in results when the coefficient is significantly positive.

Table 7: Effect of Central Bank Communication on Interest Rate Futures (Variance Equation)
4th contract, January 1997–June 2004

	Australia	Canada	Euro area	NZ	UK	US	Panel
Commentary with rate decisions							
Scheduled rate moves	0.46	1.09***	1.42***	0.32	1.34***	1.03***	1.09***
	(0.36)	(0.30)	(0.29)	(0.31)	(0.25)	(0.26)	(0.13)
Unscheduled rate moves	{1.87***}	0.76	{3.75***}		{–18.81}	{1.21**}	1.38
	(0.33)	(0.69)	(0.25)		(0.99)	(0.53)	(1.38)
'No move' decisions		0.25	0.71***	1.43***	{–1.28}	1.18***	0.93***
		(0.31)	(0.25)	(0.50)	(0.59)	(0.34)	(0.16)
Rate decisions without commentary							
Rate moves					{0.98***}		{1.28***}
					(0.35)		(0.37)
'No move' decisions	–0.47		–0.18	{–1.30}	0.49***	–1.20	-0.03
	(0.26)		(0.21)	(0.49)	(0.18)	(0.24)	(0.12)
Reports	0.80***	0.63*	0.00	1.58***	0.18	1.88***	0.47***
	(0.27)	(0.39)	(0.17)	(0.53)	(0.22)	(0.21)	(0.12)
Parliamentary hearings							
Post-reports	1.25**	0.33		1.40**	1.15*	1.88***	1.15***
	(0.53)	(0.45)		(0.66)	(0.68)	(0.21)	(0.29)
Other			0.08			0.59*	–0.08
			(0.23)			(0.32)	(0.17)
Minutes of meetings					0.56***	0.04	0.37***
					(0.15)	(0.18)	(0.14)
Speeches	0.46**	0.40	–0.24	0.18	0.01	0.13	0.07
	(0.22)	(0.33)	(0.10)	(0.19)	(0.12)	(0.10)	(0.06)

Notes: Numbers in brackets are Bollerslev-Wooldridge (1992) heteroskedasticity consistent standard errors. ***, **, * indicate positive coefficients are significant at the 1, 5 and 10 per cent levels, respectively. Estimates in braces { } are based on 10 or less events and should therefore be treated with caution. The model for the euro area and the panel was estimated from 1 January 1999 and for NZ from 17 March 1999. The US Fed's monetary policy report and testimony occur simultaneously, so the same coefficient is reported for both.

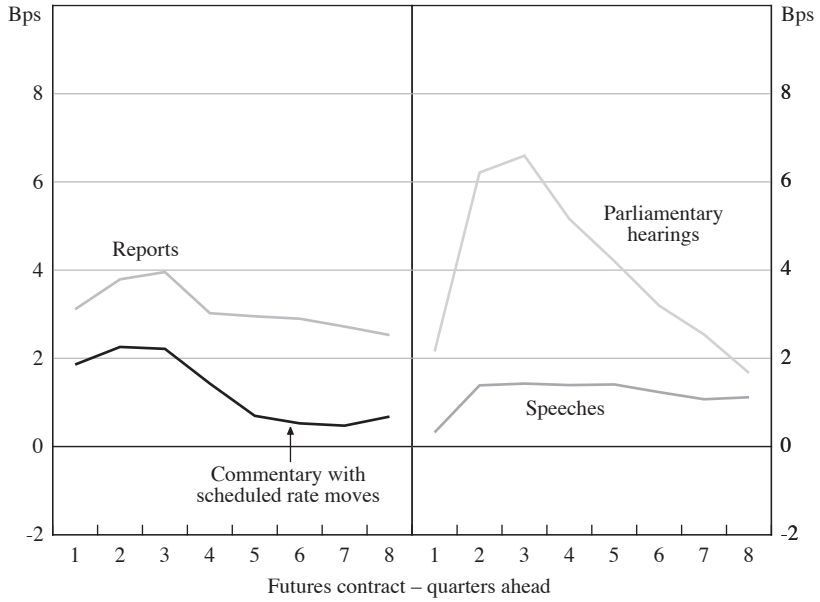
suggests that the policy surprise effect is well captured by the mean equation, allowing us to identify the communication effect through the variance equation.

It is not straightforward to interpret the magnitude of the coefficients and compare them across economies, since the dependent variable of the variance equation is the logged conditional variance. To make interpretation easier, in the following figures we have transformed the coefficients in Table 7 such that they represent the average effect in basis points on the standard deviation of policy expectations for all horizons.[18] These transformed coefficients measure the change, in basis points, of the standard deviation of the interest rate futures on average on the day when a specific communication event occurs.

Figure 2 shows these transformed coefficients for Australia over all eight futures contracts. The results indicate that parliamentary hearings have the largest impact on interest rate expectations among the various communication channels. On average, parliamentary hearings shifted the standard deviation of interest rate expectations by around 2 to 6 basis points, with the largest effect on expectations of rates in two to three quarters' time. Other channels of communication that also have an effect are the quarterly *Statement on Monetary Policy* (reports), the commentary accompanying scheduled rate moves and speeches. Each of these has an average

Figure 2: Communication – Australia

Same-day increase in standard deviation – variance equation



18. We take the average difference between the standard deviation of the errors in our regressions and those that would result if we assumed (in turn) that each channel of communication did not exist, where n is the number of communication events in the sample:

$$\frac{1}{n}\sum_{g=1}^{n}\left(h_g - \frac{h_g}{\sqrt{e^{\phi_{w,g}com_{w,g}}}}\right)$$

effect of around 1 to 4 basis points on rates, with the largest response at the two- to three-quarter horizon.

The channels of communication which have the greatest effect on Australian interest rate expectations are also among the most important for the other central banks in our sample. We will discuss these specific results in more detail in the remainder of the section.

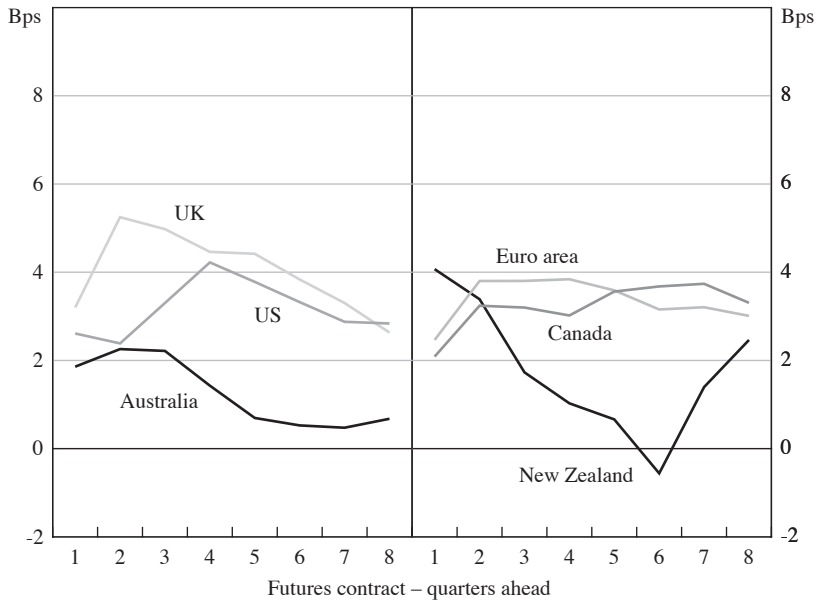
4.3.1 Commentary with monetary policy decisions

The commentary accompanying rate moves influences policy expectations significantly in all economies for the first year ahead (Table 7 and Figure 3), while 'no move' decisions with commentary are positive and significant in the euro area, New Zealand and the US. In contrast, 'no move' decisions without commentary are positive and significant only for the UK, with the panel result showing insignificance.

These results suggest that markets' interest rate expectations are influenced by the commentary accompanying rate decisions, and not just the decision itself. This is consistent with the results of Kohn and Sack (2003) for the US, and the close scrutiny given to press releases and press conferences by market participants and the media.

As noted earlier, these results cannot be used to determine whether the response of the markets was consistent with the intentions of the central bank. In the US in particular, there has been debate over whether the FOMC policy statements should

Figure 3: Commentary with Scheduled Rate Moves
Same-day increase in standard deviation – variance equation



be signalling future policy intentions. For instance, in August 2003, William Poole, President of the St. Louis Fed, argued that narrower language should have been used in the FOMC statement in May 2003 that warned of deflation, thereby contributing to a decline in bond rates (see Poole 2003).

4.3.2 Monetary policy reports and parliamentary hearings

Policy reports and post-report parliamentary hearings appear to be the most important channels of communication outside of rate decisions (Figures 4 and 5). The magnitude of response is largest in the US, Australia and New Zealand, where the average effect on the standard deviation of expectations is around 4–10 basis points.

Parliamentary hearings in Australia, New Zealand, the UK and the US significantly affect the markets. Notably, the US post-report hearing, the Humphrey-Hawkins testimony, has a much larger effect than other US testimonies. Two factors are likely to play a role in this: the Humphrey-Hawkins testimony coincides with the release of the monetary policy report – so we cannot disentangle the two effects – and it occurs less frequently than the other testimonies. The results for New Zealand are also significant, but since parliamentary hearings, monetary policy reports and rate decisions often happen on the same day, the magnitudes of individual effects are harder to disentangle. Moreover, the futures market in New Zealand is less liquid than in the other economies considered here, which might explain why most of the results for New Zealand appear less 'smooth' across the different futures contracts.

Figure 4: Parliamentary Hearing
Same-day increase in standard deviation – variance equation

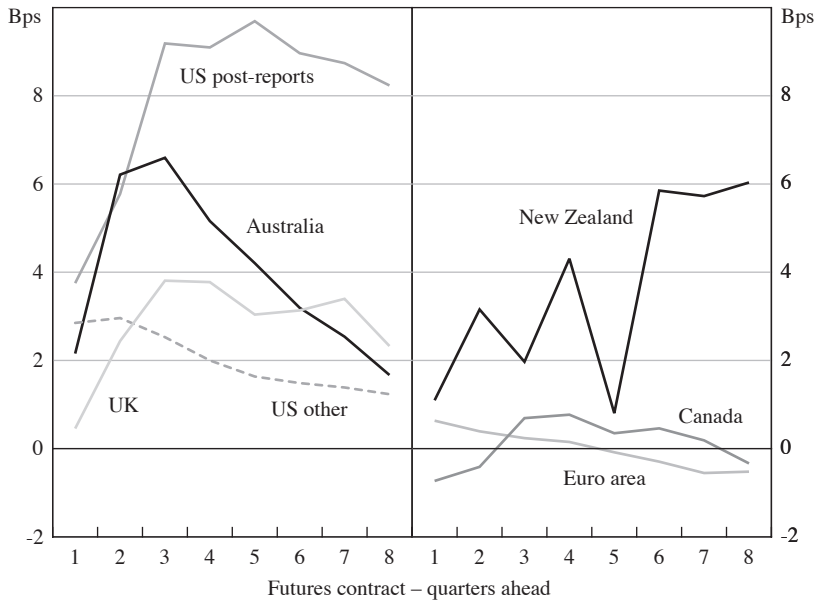
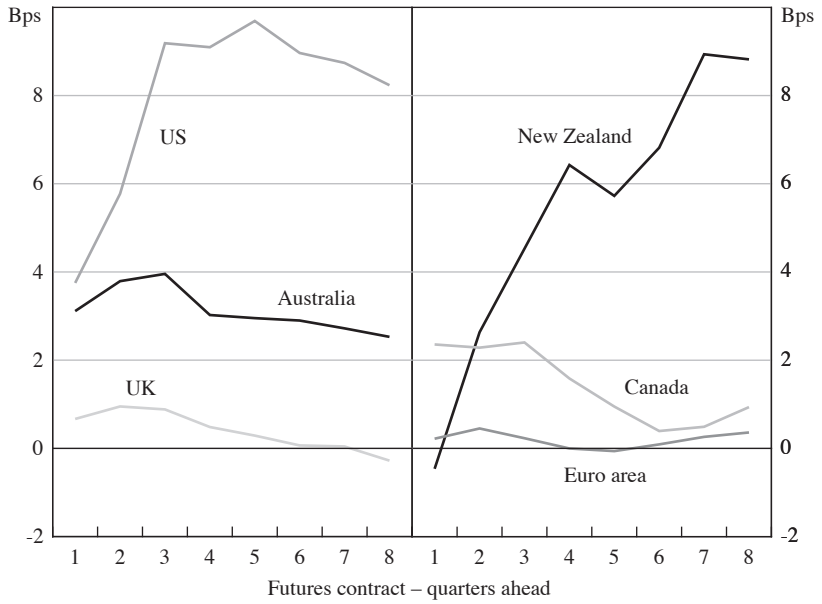


Figure 5: Monetary Policy Report
Same-day increase in standard deviation – variance equation



The monetary policy reports in Australia, Canada, New Zealand and the US provide information that significantly affects the markets. For the US, this effect also incorporates any effects of the parliamentary testimony that coincides with the report, which might explain the relatively large effect. The Bank of England's *Inflation Report* did not significantly influence market expectations of future rates. This result is consistent with Chadha and Nolan (2001), who also found that the *Inflation Report* did not significantly influence interest rates. The ECB's analysis of 'Economic and Monetary Developments' is also insignificant. The ECB's report is published more frequently, as part of the monthly *Bulletin*, while most other central banks' reports are published on a quarterly or semi-annual basis. The high frequency of these reports might be one reason why the effect of an individual monetary policy report for the euro area is relatively small.

4.3.3 Minutes of meetings and voting records

Only two economies in our sample (the UK and the US) release minutes of their monetary policy committee meetings (and voting records). Only the coefficient for the UK is significant, while that for the US is insignificant and close to zero for all futures contracts. The UK minutes are significant at all horizons, in contrast with the results by Chadha and Nolan (2001) who find an insignificant effect for the UK. Given that the UK minutes are released monthly, two weeks after policy decisions, this may help to explain why the Bank of England's quarterly *Inflation Report* has little effect on expectations.

There are several explanations for the relative unimportance of the US minutes. First, the minutes are released with a lag of 6–8 weeks by the Fed on the day after the *following* FOMC meeting, which reduces their relevance for forward-looking analysis. It is also unclear whether the Fed is intending to influence expectations with the minutes. In 1997, the FOMC was concerned that the minutes were not receiving enough press, and shifted the timing of the release to try to maximise reporting in the Friday papers.The associated debate regarding the target audience of the minutes – whether it is the media, the markets or Congress – suggests that the FOMC was more concerned about how the minutes were viewed by the press and Congress than whether they are a tool to influence markets' expectations (see FOMC 1997).

These results highlight another aspect of our study. 'Having' a certain channel of communication is not necessarily the decisive factor. Markets will attach importance to a specific channel only if new information is conveyed. However, the same information can, in principle, be conveyed through other communication events. Consequently, the difference in results for specific communication channels across economies can often be explained by looking at the entire communication structure. For instance, minutes for the UK are released two weeks after the meeting, and are therefore likely to be one of the first communication events that convey the views of the central bank after a meeting of the Monetary Policy Committee. In contrast, the minutes of the Federal Reserve are not released until after the next meeting has taken place. In the meantime, a number of different communication events will have happened which allows the central bank to explain its views on current conditions for monetary policy.

4.3.4 Speeches

While we find that speeches have a significant positive coefficient for Australia and – at an 80 per cent significance level – also for the US, this effect is not systematic across all the central banks in our sample. One explanation could be that speeches occur relatively frequently and, therefore, information tends to be conveyed more gradually. However, this result may also be a reflection of our methodology, rather than a general statement on whether speeches are used to convey important information in these other economies. We do not subjectively choose speeches that are more likely to influence expectations. Instead, all speeches published on the websites of the central banks are included in our sample. Some of these may be speaking engagements dealing with other central bank responsibilities unrelated to monetary policy. For the economies with an insignificant overall effect, the inclusion of these speeches is likely to hide the effect of speeches that are deliberately designed to influence expectations.[19] Even if we were able to single out these speeches, we

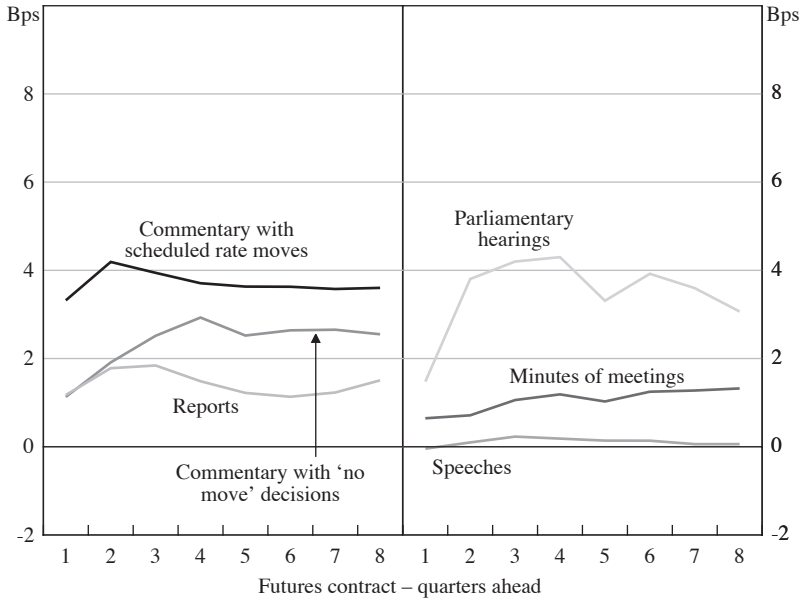
19. Some evidence that this factor plays a role is provided by a robustness test where we decided whether a speech dealt with monetary policy based on its title. Using this split in our regressions, we find that speeches in the 'Monetary policy' category are significant for the euro area, the US and – for horizons up to one year – New Zealand, while those in the 'Other' category tend to be insignificant.

would still be left with the problem that in some instances information may be conveyed during a question and answer session following a speech.

4.3.5 Panel results

Our panel, which estimates the effect across all central banks, can provide some insights into the common factors of the communication strategies of the six central banks (Figure 6). The results suggest that across the six economies, central banks have used parliamentary hearings, commentaries with policy decisions and monetary policy reports to influence interest rate expectations. These channels of communication affect the outlook for policy in both the short and medium term. Minutes of meetings are significant, but are entirely driven by the results for the UK, while speeches do not have a significant effect.

Figure 6: Communication – Panel of Central Banks
Same-day increase in standard deviation – variance equation



5. Conclusions

In this paper we have analysed the effect of news relating to the expected path of monetary policy on interest rate futures. We consider four types of news: domestic macroeconomic news, foreign news, monetary policy surprises and central bank communication. The effect of these types of news on daily changes in interest rate futures was estimated using an EGARCH model for a panel of economies. We find that interest rate expectations respond to both macroeconomic (domestic and foreign) and policy news, although the response to macroeconomic news is larger, especially once we include foreign news. Overall, the results suggest that the impact

of the RBA's communication policy is in line with other major central banks, and significantly influences (and informs) expectations of future monetary policy.

Previous work has found that the predictability of monetary policy is very similar for major central banks including the RBA, despite differences in the communication frameworks (see Coppel and Connolly 2003). This implies that central banks provide information on the future path of monetary policy to a very similar extent. Our study could shed light on some factors underlying this similarity.

The channels of communication that are found to most influence expectations – commentary with rate decisions, monetary policy reports and parliamentary hearings – tend to be used by all the central banks in our study. Interestingly, communication events that occur more frequently tend to have less effect on expectations of future policy. However, this is consistent with the view that more frequent channels allow the central bank to convey information gradually, at the same time as it learns about changes in current and expected future conditions for monetary policy.

The individual economy results reflect small differences in the structures of central bank communication policies. Some channels, such as minutes of meetings, have significant effects in some economies but not in others. However, these results do not imply that some central banks convey 'more' information than others. They merely suggest that central banks can use different channels to convey the same information.

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