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The differential impact of monetary policy announcements and explanatory minutes releases on the Australian interest rate futures market

Bronwyn McCredie*

Paul Docherty

Steve Easton

Katherine Uylangco

Newcastle Business School, University of Newcastle, NSW 2308, Australia

*Corresponding Author

Bronwyn McCredie, Newcastle Business School, University of Newcastle, NSW 2308,
Australia Tel +61 2 4921 8722 Email Bronwyn.McCredie@newcastle.edu.au

The differential impact of monetary policy announcements and explanatory minutes releases on the Australian interest rate futures market

Abstract

Unlike US and Continental European jurisdictions, Australian monetary policy announcements are not followed promptly by projections materials or comprehensive summaries that explain the decision process. This information is disclosed two weeks later when the explanatory minutes of the Reserve Bank board meeting are released. This paper is the first study to exploit the features of the Australian monetary policy environment in order to examine the differential impact of monetary policy announcements and explanatory statements on the Australian interest rate futures market.

We find that both monetary policy announcements and explanatory minute releases have a significant impact on the implied yield and volatility of Australian interest rate futures contracts. When the differential impact of these announcements is examined using the full sample, no statistically significant difference is found. However, when the sample is partitioned based on stable periods and the Global Financial Crisis, a differential impact is evident. Further, contrary to the findings of Kim and Nguyen (2008), Lu et al. (2009), and Smales (2012a), the response along the yield curve, is found to be indifferent between the short and medium terms.

Keywords: Monetary policy announcement; interest rate futures market; explanatory minutes; Global Financial Crisis.

JEL codes: E52, E32, G01, G14, D03

1. Introduction

In the US and Continental European jurisdictions, monetary policy announcements that disclose a target interest rate for overnight loans are followed within a period of less than two hours by statements that explain the decision behind those announcements. For example, the announcement of the setting of the Federal Funds rate by the release of the US Federal Open Market Committee statement is followed 90 minutes later by the release of so-called “Projections Material”. Similarly the European Central bank announces its rates decision and 45 minutes later releases a comprehensive summary of its stance on monetary policy.

In Australia, these events occur separately, with the announcement of the monthly target cash rate for overnight loans being provided two weeks before the release of the explanatory minutes of the Board meeting that decided the rate outcome. This paper exploits this feature of the Australian monetary policy environment to examine the differential impact of monetary policy announcements and explanatory statements on the Australian interest rate futures market¹.

The impact of Australian monetary policy announcements has been examined. For example, Kim and Nguyen (2008) examined the impact of the Reserve Bank of Australia and US Federal Reserve target rate announcements on Australian financial markets, reporting a stronger (weaker) impact on short (long) term contracts based upon the magnitude of the

¹ The US Federal Open Market Committee also releases minutes of their regularly scheduled meetings three weeks after the monetary policy announcement. However the information content of these minutes may be mitigated by the previous release of “projections materials”. Further, since October 1998 the Bank of England has published the monetary policy committee minutes on the Wednesday of the second week after the formative meeting.

coefficients in the regression model employed. Lu et al. (2009) confirm these findings using intraday data². More recently Smales (2012a), using the methodology of Guraynak et al. (2005), sought to disaggregate the impact of the monetary policy announcement into target and path surprise factors by employing a two-factor regression model³. However, no Australian study has addressed the impact of the explanatory minutes.

International studies have examined the impact of the explanatory minutes in England (Reeves and Sawicki, 2007) and in the US (Jubinski and Tomljanovich, 2013; Rosa, 2013) by comparing the volatility and / or returns on announcements days with non-announcement days. These studies use a non-market-based measure for surprise such as survey data⁴. Further, no examination has been undertaken as to whether there is any differential impact between monetary policy announcements and explanatory minute releases.

This study is motivated by the segregation of the Australian monetary policy announcement and explanatory minutes release. This segregation allows the calculation of the information content of these events to be separately estimated and for their impacts to be

² Lu et al. (2009) used intraday data following Bernanke and Kuttner (2005) reporting that the use of daily data engenders issues of endogeneity and simultaneity. Endogeneity in this context refers to the interdependent nature of monetary policy and financial asset pricing whilst simultaneity refers to the joint response problem, the contemporaneous response of both monetary policy and interest rates to exogenous news.

³ The target factor, proxied by the daily change in the front 30-day interbank cash rate futures contract, was used to measure the impact of the target cash rate announcement, whilst the path factor, proxied by the daily change in the 1-year ahead 90-day bank bill futures contract, was used to indicate the information content of any accompanying statements. An alternative model employed by Rosa and Verga (2008) and Rosa (2011a, b) uses a narrative approach to indicate the tone and information content of any accompanying statements. This approach, as stated by Romer and Romer (1989), involves “the identification of monetary shocks through non-statistical procedures” (pg. 122).

⁴ Reeves and Sawicki (2007) calculate surprise as the target rate decision less its expected value as determined by Money Market Services International (MMS) survey data.

independently assessed. It also allows for their differential impacts to be examined: in general; and along the yield curve.

A wide literature also demonstrates the influence of economic states on the impact of macroeconomic announcements. For example McQueen and Roley (1993) demonstrate that allowing for different stages of the business cycle influences the impact of several macroeconomic announcements⁵. Whilst no study has considered the differential impact of monetary policy announcements and the release of explanatory statements across different economic states, this is of particular interest to policy makers, who need to ensure that they deliver effective direction during periods of crisis, when monetary policy is particularly important. We therefore consider the influence of the Global Financial Crisis on the impact of monetary policy announcements and explanatory minute releases on the Australian interest rate futures market.

Using a sample period from October 2003 to July 2012 we find that both monetary policy announcements and explanatory minute releases have a significant impact on the implied yield and volatility of Australian interest rate futures contracts. When the differential impact of these announcements is examined using the full sample, no significant difference is found. However, when the sample is partitioned based on the Global Financial Crisis, a differential impact is exposed. Further, contrary to the findings of Kim and Nguyen (2008),

⁵ Further, Jensen et al. (1996) and Andersen et al. (2007) report that the monetary environment (restrictive or expansive) and the state of the economy respectively, affect the response of US stock and bond returns to macroeconomic news.

Lu et al. (2009), and Smales (2012a), the response along the yield curve, is found to be indifferent between the short and medium terms.

The paper proceeds as follows. Section 2 presents the data and research design. Section 3 presents the results. Section 4 summarises the paper.

2. Data and Research Design

2.1 Data

Monetary policy announcement data was obtained from the Reserve Bank of Australia (RBA) for the period October 2003 to July 2012⁶. The monetary policy announcement is the announcement of the RBA's monthly target interbank cash rate. This is currently released at 2:30 pm on the first Tuesday of the month (excluding January when the board does not meet), following the RBA's monthly board meeting⁷. Consequently, our sample consists of 96 monetary policy announcements: 27 occasions when the target cash rate was changed (17 rate increases and 10 rate decreases) and 69 occasions where no change was recorded.

⁶ We begin our analysis in October 2003 to coincide with the commencement of the 30-day interbank cash rate futures contract on the Sydney Futures Exchange which was introduced in September 2003. Further, the period enables the examination of the influence of the Global Financial Crisis on the impact of monetary policy announcements and explanatory minute releases.

⁷ This practice has not always been the case. From August 1990 (when rate targeting began) to November 1998, monetary policy announcements occurred at 9:30 am on the day of the cash rate change, this was not necessarily the day after the RBA board meeting. Further, if there was no change in the cash rate, no statement was released. From December 1998, statements indicating a change were always released the day after the board meeting, but it was not until September 2002 that the RBA began releasing a statement after a no-change announcement.

The explanatory minutes release is the release of the minutes of the monthly RBA board meeting. Since December 2007 these minutes have been released two weeks after the RBA board meeting (that is, the third Tuesday of the month except January). To facilitate a meaningful announcement at this time the RBA holds a media lock-up beginning at 10:30 am. This gives the media the opportunity to review the minutes and prepare a statement for public release when the embargo is lifted at 11:30 am. Covering December 2007 to July 2012, our sample consists of 50 explanatory minute releases.

Intraday data for the 30-day interbank cash rate, 90-day bank accepted bill, 3 and 10-year treasury bond futures was obtained from SIRCA's Thomson Reuters Tick History database. This data is reported tick by tick, with the contract price being the average of the last quoted bid and ask price.

2.2 Modelling the response to unexpected monetary policy announcements and explanatory minutes releases

2.2.1 *Impact on implied yields*

We begin our analysis by examining the reaction of Australian interest rate futures to monetary policy announcements and explanatory minute releases, using the following equation⁸:

⁸ This methodology is consistent with Bernanke and Kuttner (2005); Kim and Nguyen (2008); and Smales (2012a).

$$Y_t = \alpha + \beta \Delta i_t + \varepsilon_t \quad (1)$$

where Y_t represents the percentage change in the implied yield of the interest rate futures contract⁹ using ten minute intervals from t_{-10} to t and Δi_t represents the unexpected component of a monetary policy announcement or explanatory minutes release. Consistent with Smales (2012a), we only include the most liquid interest rate futures contracts in our analysis, determined by average daily volume, namely: the front-contract of the 3 and 10-year treasury bonds; and the second-contract of the 90-day bank accepted bill futures¹⁰.

To control for endogeneity and simultaneity, this regression is performed using a narrow event window¹¹. This window, designed to ascertain the speed of the transmission and detect any variation in the response, covers ten minutes before and sixty minutes after the event (t_{-10} to t_{+59} , where $t_{0,9}$ is the interval in which the event occurs).

Due to the quotation specifications of the Australian Stock Exchange (ASX), the price of all interest rate futures contracts is calculated by subtracting the yield from 100. The yield implied by the futures contract, is therefore determined by averaging the last contributed bid and ask price every ten minutes, then subtracting that price from 100. Our use of

⁹ The percentage change in implied yield was used to normalise the data and allow comparability of the results over time. This analysis was also run using the change in implied yield which produced results substantively the same.

¹⁰ This analysis was also conducted using the front 90-day bank bill futures contract which yielded results that were substantively similar.

¹¹ By restricting the size of the event window we limit the possibility of other information or announcements impacting our analysis. Further, given Australia's monetary policy announcement protocol, where monetary policy decisions are made prior to announcement, the event window will not contain interest rate movements that influence policy decisions.

aggregated data is advocated by Danielsson and Payne (2002) who assert that quote data sampled every 5-10 minutes form suitable proxies for traded prices. Further, to ensure the timeliness and accuracy of our data, we screen for stale prices by cross-referencing price and volume data. Consequently quoted bid and ask price observations with no recorded volume are deemed invalid and excluded from the sample. The remaining observations constitute our screened sample¹². Finally, we control for heteroskedasticity in all OLS regressions by employing the White test and trim outliers from the data by excluding any percentage change in the implied yield of the 30-day interbank cash rate futures contract greater than three standard deviations from the mean change¹³.

Consistent with international literature (Kuttner, 2001; Bernanke and Kuttner, 2005) we calculate the unexpected component of the monetary policy announcement using the 30-day interbank cash rate futures contract, *a priori* the superior proxy for the interbank cash rate¹⁴. This calculation is the percentage difference between the first traded price of the current 30-day interbank cash rate futures contract following the announcement and the last traded price prior to the announcement.

¹² Our screened sample for the 90-day bank bill, 3-year treasury bond, and 10-year treasury bond futures contract consists of 78, 94 and 96 observations respectively for monetary policy announcements and 45, 46 and 46 observations respectively for explanatory minute releases.

¹³ The impact of trimming data is minimal with 2 observations in each of the 90-day bank accepted bill, 3-year treasury bond and 10-year treasury bond futures contracts removed from the monetary policy announcement sample and 1, 2 and 2 observations respectively removed from the explanatory minutes release sample.

¹⁴ Kuttner (2001) and Bernanke and Kuttner (2005) highlight the importance of using intra-day Fed funds futures contract data to calculate the surprise variable. An equivalent futures contract is not traded in the UK market.

The unexpected component of the explanatory minutes release is calculated in the same way as the monetary policy announcement except that we use the following month's contract (the second contract) in the 30 day interbank cash rate futures instead of the current month's contract. The second contract was used due to liquidity issues as once the RBA releases the monthly cash rate target (on the first Tuesday of the month), trading in the current contract is virtually and sometimes literally non-existent. This is due to the absence of profitable trading opportunities after the RBA announces the current months' target interbank cash rate and the market has adjusted to the new theoretical settlement price (Smales, 2012b)¹⁵.

2.2.2 Impact on volatility

Due to the skewed and leptokurtic distribution of Australian interest rate futures implied yield changes, we employ an exponential general autoregressive conditional heteroskedastic (EGARCH) model to study the volatility response of the Australian interest rate futures market to monetary policy announcements and explanatory minute releases¹⁶. This model is advocated in the literature (for example Nelson, 1991) due to its ability to model conditional variances using non-normal distributions, reporting not only the magnitude of a shocks impact on volatility, but any extant asymmetry between positive and

¹⁵ Smales (2012b) reports that this process takes less than 5 minutes.

¹⁶ Indicative of a non-normal distribution, the Jarque Bera statistic for the distribution of changes in the 90-day bank bill, 3-year treasury bond and 10-year treasury bond futures contract implied yields are 8.79E+08 (p-value 0.00), 1.09E+08 (p-value 0.00) and 6.70E+07 (p-value 0.00) respectively. Further, the Anscombe Glynn statistic is 232.5597 (p-value 0.00), 213.9346 (p-value 0.00) and 209.4305 (p-value 0.00), respectively.

negative innovations¹⁷. Further, the duration of a shocks impact on volatility, persistent or transitory, is identified.

The EGARCH (1,1) model is specified by the following conditional mean and variance equations:

$$Y_t = \alpha_c + \alpha_1 Y_{t-1} + \alpha_2 (d_t \times \Delta i_t) \quad (2a)$$

$$\log(\sigma_t^2) = \beta_c + \beta_{\varepsilon 1} (|\varepsilon_t - 1| / \sqrt{\sigma_t^2} - 1) + \beta_{\varepsilon 2} (\varepsilon_t - 1 / \sqrt{\sigma_t^2} - 1) + \beta_\sigma (\log(\sigma_t^2) - 1) + \beta_1 (d_t) \quad (2b)$$

where Y_t represents the percentage change in the implied yield of the interest rate futures contract using ten minute intervals from $t-10$ to t , Y_{t-1} represents the ten-minute lagged percentage change in the implied yield and Δi_t represents the unexpected component of the monetary policy announcement or explanatory minutes release. The dummy variable d_t , only applied in a narrow event window covering ten minutes before and sixty minutes after the announcement/release, is represented by one at the ten minute interval t (from t_{-10} to t_{+60}), and zero otherwise. Consequently, the interaction of d_t and Δi_t allows us to the measure the magnitude of the mean response to unexpected announcements / releases, whilst the dummy variable, in isolation, allows us to examine the timing of the volatility response.

¹⁷ Volatility was also modelled using an ARCH (1), GARCH(1,1) and TGARCH specification. Comparison of the Akaike information criterion, Schwarz criterion and log likelihood function supports the use of the EGARCH model. Further, the distribution of the error terms in the EGARCH model, whilst not qualitatively sensitive to alternate distributional assumptions, are closer to normal as indicated by a reduction in the Jarque Bera and Anscombe Glynn statistic for the 90-day bank bill, 3-year treasury bond and 10-year treasury bond futures contract implied yields.

The significance and sign of the coefficients of the two ARCH terms denote the magnitude ($\beta_{\varepsilon 1}$) and possible asymmetrical volatility response ($\beta_{\varepsilon 2}$) to unexpected announcements / releases. Specifically, a significant negative (positive) coefficient on ($\beta_{\varepsilon 2}$) indicates that more volatility is generated when yields unexpectedly fall (rise)¹⁸. Further, the significance and coefficient of the GARCH term (β_{σ}) indicates the presence and degree (respectively) of persistence.

2.3 Modelling the differential impact of unexpected monetary policy announcements and explanatory minute releases

2.3.1 *Differential impact of unexpected monetary policy announcements and explanatory minutes releases*

To determine whether unexpected monetary policy announcements and explanatory minutes releases have a differential impact on Australian interest rate futures we combine all observations into a single sample, for each contract, and add a dummy variable to identify the event type (monetary policy announcement or explanatory minutes release).

Differential impact is tested for using the following equation:

$$Y_t = \alpha + \beta_1 \Delta i_t + \beta_2 (d_{EMR}) + \beta_3 (\Delta i_t \times d_{EMR}) + \varepsilon_t \quad (3)$$

where d_{EMR} is set to one for an explanatory minutes release and zero for a monetary policy announcement. We calculate the percentage change in the implied yield of the interest rate

¹⁸ According to Nelson (1991) a negative coefficient on the EGARCH asymmetry term ($\varepsilon_{t-1}/\sqrt{\sigma_{t-1}^2}$) indicates that “volatility tends to rise (fall) when return surprises are negative (positive)” (p.358).

futures contract, Y_t , using ten minute intervals ($t_{0,9} - t_{10,-1}$) to allow us to clearly detect any variation in β_2 and β_3 .

2.3.2 *Differential impact during crisis and non-crisis periods*

Previous studies have demonstrated that the impact of macroeconomic announcements is affected by the state of the economy (McQueen and Roley, 1993; Jensen et al., 1996; Andersen et al., 2007). Consequently, we consider the influence of the Global Financial Crisis on the impact of monetary policy announcements and explanatory minute releases on Australian interest rate futures implied yields.

To examine the differential impact of unexpected monetary policy announcements and explanatory minute releases on Australian interest rate futures implied yields between crisis and non-crisis periods, we partition our sample based on the Global Financial Crisis.

Consistent with the Australian Bureau of Statistics (2013), we define the Global Financial Crisis period as July 2008, when the Australian dollar began to depreciate substantially, to March 2009, when the foreign exchange and equity market began to show signs of recovery. We then re-run equation (3) using our partitioned samples.

If crisis periods are demonstrated to have a differential effect on the impact of unexpected monetary policy announcements and explanatory minute releases on interest rate futures implied yields when compared to non-crisis periods, significance should be found for the coefficients β_2 and / or β_3 in our crisis period sample.

2.3.3 Differential Impact along the Yield Curve

Several studies have inferred, from the magnitude of the coefficients that the impact of unexpected monetary policy announcements decreases with contract maturity (Kim and Nguyen, 2008; Lu et al., 2009; Smales, 2012a). We formally test for a differential impact of monetary policy announcements and explanatory minute releases along the yield curve by combining all observations of the 90-day bank accepted bill, 3-year and 10-year treasury bonds and adding three dummy variables to indicate the contract type: d_{90DYBB} , $d_{3YRBOND}$ and $d_{10YRBOND}$. A differential impact is then tested for using the following two equations:

$$Y_t = \alpha + \beta_1 \Delta i_t + \beta_2 (d_{90DYBB}) + \beta_3 (d_{3YRBOND}) + \beta_4 (\Delta i_t \times d_{90DYBB}) + \beta_5 (\Delta i_t \times d_{3YRBOND}) + \varepsilon_t \quad (4a)$$

where β_2 and β_4 signify the differential impact of the 10-year treasury bond and the 90-day bank accepted bill and β_3 and β_5 signify the differential impact of the 10-year and 3-year treasury bond.

$$Y_t = \alpha + \beta_1 \Delta i_t + \beta_2 (d_{3YRBOND}) + \beta_3 (d_{10YRBOND}) + \beta_4 (\Delta i_t \times d_{3YRBOND}) + \beta_5 (\Delta i_t \times d_{10YRBOND}) + \varepsilon_t \quad (4b)$$

where β_2 and β_4 signify the differential impact of the 90-day bank accepted bill and the 3-year treasury bond and β_3 and β_5 signify the differential impact of the 90-day bank accepted bill and the 10-year treasury bond. We again calculate the percentage change in the implied yield of the interest rate futures contract, Y_t using ten minute intervals ($t_{0,9} - t_{-10,-1}$) to clearly detect any difference.

3. Results

This section is divided into two parts. First, the impact of unexpected monetary policy announcements and explanatory minute releases on Australian interest rate futures implied yields is examined in Section 3.1. Secondly, in Section 3.2 we test whether there is a differentiable impact between these two events.

3.1 Response to unexpected monetary policy announcements and explanatory minutes releases

3.1.1 *Impact on implied yields*

It is evident from the results presented in Table 1 that the impact of unexpected monetary policy announcements and explanatory minute releases on Australian interest rate futures implied yields is immediate (within ten minutes) and significant. Further, consistent with extant literature (Kim and Nguyen, 2008; Lu et al., 2009; Smales, 2012a) the magnitude of the impact tends to decline with contract maturity.

<Insert Table 1 here>

Specifically, an unexpected 100 basis point tightening of the target cash rate leads to a 0.943%, 0.682% and 0.300% increase in the implied yield of the 90-day bank bill, 3-year and 10-year treasury bond futures contracts respectively. As the RBA generally increases or decreases the cash rate in 25 basis point increments, this result may be contextualised as an unexpected 25 basis point tightening prompting a 0.236%, 0.170% and 0.075% increase in the implied yields of the 90-day bank bill, 3-year and 10-year treasury bond futures

contracts respectively. Similarly, an unexpected 100 basis point increase, derived from the information content of the explanatory minutes, leads to a 1.201%, 0.945% and 0.405% increase in the implied yields of the 90-day bank bill, 3-year and 10-year treasury bond futures contracts respectively.

These results suggest that the unexpected information content of an explanatory minutes release elicits a larger response from the Australian interest rate futures market than an unexpected monetary policy announcement. This finding is confirmed by examining the mean response of the 30-day interbank cash rate futures contract implied yield to the monetary policy announcement (0.053% change in implied yield) and explanatory minutes release (0.085% change in implied yield).

3.1.2 *Impact on Volatility*

Having identified that the response to monetary policy announcements and explanatory minute releases occurs within the first ten minutes, the mean equation of the EGARCH model can be accurately specified, as reported in Table 2.

<Insert Table 2 here>

These results indicate a significant volatility response to monetary policy announcements and explanatory minute releases. The magnitude of this response (like our mean results) tends to decline with contract maturity as denoted by $\beta_{\varepsilon 1}$, whilst the persistence of the response, denoted by the GARCH term β_{σ} , tends to increase with maturity.

Further, the significance and sign of $\beta_{\varepsilon 2}$ denotes that the volatility response is asymmetric, stronger to negative innovations (falling yields) than positive innovations (rising yields). This asymmetry however is only found in the 3-year and 10-year treasury bond futures contracts. The absence of significance in this variable, using the 90-day bank bill futures contract, indicates that the response to these announcements / releases, in the short-term, is symmetrical.

The timing of the volatility response, as indicated by the sign and significance of the dummy variable d_t , is shown to vary between the two events. Specifically, volatility rises in the ten minutes prior to the monetary policy announcement, remains elevated for up to 20 minutes, then drops significantly, returning to pre-announcement levels. Whilst volatility surrounding the explanatory minutes release, does not peak until announcement time ($t_{0,9}$) and only gradually returns to pre-release levels, taking up to 40 minutes.

3.2 Differential impact of unexpected monetary policy announcements and explanatory minute releases

3.2.1 *Differential impact of unexpected monetary policy announcements and explanatory minutes releases*

The differential impact of monetary policy announcements and explanatory minutes releases on Australian interest rate futures implied yields, previously only inferred by the size of the coefficients (see Section 3.1.1), is reported in Table 3.

<Insert Table 3 here>

Consistent with the results reported by Smales (2012a) in his analysis of monetary policy announcements, the intercept term is negative and statistically significant for all three futures rate contracts. While these negative intercept terms indicate that implied yields on interest rate futures contracts on average decrease at the time of monetary policy announcements, their small magnitude, between 0.2 and 0.4 basis points, suggests that this decrease could not be economically exploited. The significant positive coefficients on the intercept dummies (β_2) indicate that the release of explanatory minutes does not elicit the same systematically negative response in implied yields.

In conclusion, when the full sample is used there is no significant difference between the market's reaction to monetary policy announcements and explanatory minute releases. The coefficient on the slope dummy (β_3) is not significantly different from zero in all three models.

3.2.2 Differential impact of crisis and non-crisis periods

Although there was no differential impact between monetary policy announcements and explanatory minute releases on interest rate futures implied yields when the full sample was used (see section 3.2.1), partitioning the sample based on the Global Financial Crisis demonstrates differential impacts. While no difference is reported in non-crisis periods (see Panel A), the results reported in Panel B of Table 4 show that during the Global Financial Crisis, an unanticipated 100 basis point tightening of the target interbank cash rate leads to an increase of 1.160%, 0.604% and 0.306% in the implied yields of the 90-day bank bill, 3-year and 10-year treasury bond futures contracts respectively. However, the impact of explanatory minute releases on interest rate futures yields is significantly reduced. This is

denoted by the statistically significant negative coefficients for β_3 in all three regressions reported in Panel B.

<Insert Table 4 here>

These results indicate that during periods of crisis subtler monetary policy mechanisms, such as the release of the explanatory minutes, are not as effective as direct actions, such as the monetary policy announcement.

3.2.3 *Differential impact along the yield curve*

The differential impact of monetary policy announcements and explanatory minute releases along the yield curve of Australian interest rate futures contracts is reported in Table 5.

<Insert Table 5 here>

It is evident from the results reported in Panel A that the response of 10-year treasury bond implied yields to unexpected monetary policy announcements and explanatory minute releases is significantly weaker than the response of 90-day bank bill and 3-year treasury bond implied yields. This is indicated by the positive and significant coefficients of β_4 and β_5 that represent the differential response of these yields (respectively) when compared to 10-year treasury bond implied yields. Specifically, the response of 90-day bank bill (3-year treasury bond) implied yields to an unexpected 100 basis point tightening of the target cash rate is 0.643% (0.382%) larger than the response of 10-year treasury bond implied yields (0.300%). Similarly, the response of 90-day bank bill (3-year treasury bond) implied yields to

an unexpected 100 basis point increase, derived from the information content of the explanatory minutes, is 0.796% (0.540%) larger than the response of 10-year treasury bond implied yields (0.405%).

In Panel B however the difference between 90-day bank bill and 3-year treasury bond implied yields are insignificant (β_4), which indicates that the responses of these two contracts yields are not statistically different. This result is contrary to existing findings (Kim and Nguyen, 2008; Lu et al., 2009; Smales, 2012a) regarding the impact of monetary policy announcements along the yield curve.

4. Summary

Unlike US and Continental European jurisdictions, Australian monetary policy announcements are not followed promptly by projections materials or comprehensive summaries that explain the decision process. This information is disclosed two weeks later when the explanatory minutes of the RBA board meeting are released. This paper exploits this feature of the Australian monetary policy environment to examine the differential impact of monetary policy announcements and explanatory statements in the Australian interest rate futures market.

Using data from October 2003 to July 2012 we find that both monetary policy announcements and explanatory minute releases have a significant impact on the implied yield of Australian interest rate futures contracts. Specifically, an unexpected 100 basis point tightening of the target cash rate leads to a 0.943%, 0.682% and 0.300% increase in the

implied yields of the 90-day bank bill, 3-year and 10-year treasury bond futures contracts respectively. Similarly, an unexpected 100 basis point increase, derived from the information content of the explanatory minutes, leads to a 1.201%, 0.945% and 0.405% increase in the implied yields of the 90-day bank bill, 3-year and 10-year treasury bond futures contracts respectively.

Further, the size of the volatility response to monetary policy announcements and explanatory minute releases is significant and tends to decrease with contract maturity. Notably, this response is demonstrated to be asymmetric, stronger to negative innovations (falling yields) than positive innovations (rising yields) in all contracts except for the 90-day bank bill futures contract, where no asymmetry in response is observed. Additionally, the persistence of volatility is shown to increase with contract maturity (demonstrated by the GARCH term), particularly following an explanatory minutes release.

When the differential impact of these announcements is examined using the full sample, no statistically significant difference is found. However, when the sample is partitioned based on the Global Financial Crisis, a differential impact is evident. Additionally, when the impact of these events is tested along the yield curve, the response of 10-year treasury bond implied yields compared to 90-day bank bill and 3-year treasury bond implied yields are found to be significantly different, but the response of 90-day bank bill implied yields compared to 3-year treasury bond implied yields are not.

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Appendix A – Tables

Table 1

The impact of unexpected monetary policy announcements and explanatory minute releases on Australian interest rate futures implied yields

Time to Announcement	Monetary Policy Announcement			Explanatory Minutes Release		
	90-day Bank Bill	3-year Bond	10-year Bond	90-day Bank Bill	3-year Bond	10-year Bond
$\beta \Delta i_{t(-10,-1)}$	0.023	-0.012	-0.047	-0.057	0.051	0.002
$\beta \Delta i_{t(0,9)}$	0.943**	0.682**	0.300**	1.201**	0.945**	0.405**
$\beta \Delta i_{t(10,19)}$	-0.014	0.020	0.024	0.218*	0.094	0.120
$\beta \Delta i_{t(20,29)}$	0.084	0.064	0.044*	0.034	-0.020	-0.005
$\beta \Delta i_{t(30,39)}$	0.091**	0.081*	0.049*	-0.285	-0.228*	-0.229*
$\beta \Delta i_{t(40,49)}$	-0.026	0.012	0.008	-0.226*	-0.112	0.020
$\beta \Delta i_{t(50,59)}$	0.025	0.018	0.010	-0.068	-0.046	-0.008
<i>N</i>	76	92	94	44	44	44

Note: *, ** denotes significance at 5% and 1% respectively and *n* denotes sample size.

Results reported are the coefficients derived from the OLS model described in equation (1):

$$Y_t = \alpha + \beta \Delta i_t + \varepsilon_t \quad (1)$$

where Y_t represents the percentage change in the implied yield of the interest rate futures contract using ten minute intervals from t_{-10} to t and Δi_t represents the unexpected component of the monetary policy announcement or explanatory minutes release.

The period covered is from October 2003 to July 2012, for the monetary policy announcement; and December 2007 to July 2012, for the explanatory minutes release.

Table 2

The impact of unexpected monetary policy announcements and explanatory minute releases on Australian interest rate futures volatility

	Monetary Policy Announcement			Explanatory Minutes Release		
	90-day Bank Bill	3-year Bond	10-year Bond	90-day Bank Bill	3-year Bond	10-year Bond
Mean Equation						
α_c	0.000**	0.000*	0.000	0.000**	-0.000**	0.000*
$\alpha_1 Y_{t-1}$	-0.104**	-0.124**	-0.061**	-0.108**	0.085	-0.024**
$\alpha_2(\Delta i_t \times d_{t(0,9)})$	0.725**	0.546**	0.223**	1.386**	1.294**	0.531**
Volatility equation						
β_c	-0.037**	-0.007**	-0.002**	-0.036**	-0.009**	-0.012**
Magnitude $\beta_{\varepsilon 1}(\varepsilon_{t-1} /\sqrt{\sigma_{t-1}^2})$	0.032**	0.005**	0.001**	0.033**	0.008**	0.008**
Asymmetry $\beta_{\varepsilon 2}(\varepsilon_{t-1}/\sqrt{\sigma_{t-1}^2})$	-0.004	-0.008**	-0.007**	-0.002	-0.009**	-0.005*
Persistence $\beta_{\sigma}(\log(\sigma_{t-1}^2))$	0.998**	1.000**	1.000**	0.998**	1.000**	0.999**
$\beta(d_{t(-10,-1)})$	0.973**	1.359**	0.131	-0.747**	-0.957**	-0.849**
$\beta(d_{t(0,9)})$	2.245**	1.331*	1.880**	2.167**	2.413**	0.938*
$\beta(d_{t(10,19)})$	-1.742**	-2.016**	-1.751**	-1.912**	-1.357**	-0.039
$\beta(d_{t(20,29)})$	-0.457	-0.405	-0.377	0.633*	-0.877**	-0.949**
$\beta(d_{t(30,39)})$	-0.620*	-0.456	-0.382	-0.840*	-0.033	0.223
$\beta(d_{t(40,49)})$	0.705	0.307	0.190	0.437	0.124	-0.732*
$\beta(d_{t(50,59)})$	-0.623	0.112	0.469*	-0.330	0.325	1.161**

Note: *, ** denotes significance at 5% and 1% respectively.

Results are derived from the quasi-maximum likelihood estimates of the EGARCH model described in equation (2a) and (2b):

$$Y_t = \alpha_c + \alpha_1 Y_{t-1} + \alpha_2(d_t \times \Delta i_t) \quad (2a)$$

$$\log(\sigma_t^2) = \beta_c + \beta_{\varepsilon 1}(|\varepsilon_{t-1}|/\sqrt{\sigma_{t-1}^2}) + \beta_{\varepsilon 2}(\varepsilon_{t-1}/\sqrt{\sigma_{t-1}^2}) + \beta_{\sigma}(\log(\sigma_{t-1}^2)) + \beta(d_t) \quad (2b)$$

where Y_t represents the percentage change in the implied yield of the interest rate futures contract using ten minute intervals from t_{-10} to t , Y_{t-1} represents the ten-minute lagged percentage change in the implied yield and Δi_t represents the unexpected component of the monetary policy announcement or explanatory minutes release. The dummy variable d_t is equal to one at each ten minute interval t (from t_{-10} to t_{+60}), or zero otherwise.

Table 3

Differential impact of unexpected monetary policy announcements and explanatory minutes releases on the Australian interest rate futures market

	α	$\beta_1 \Delta i_t$	$\beta_2 (d_{EMR})$	$\beta_3 (\Delta i_t \times d_{EMR})$
90-day Bank Bill	-0.004 (-3.28**)	0.943 (7.20**)	0.003 (1.98*)	0.258 (0.92)
3-year Bond	-0.004 (-4.10**)	0.682 (5.72**)	0.003 (2.65**)	0.263 (1.08)
10-year Bond	-0.002 (-3.43**)	0.300 (4.80**)	0.001 (1.97*)	0.105 (0.86)

Note: *, ** denotes significance at 5% and 1% respectively.

Results reported are derived from the OLS model described in equation (3):

$$Y_t = \alpha + \beta_1 \Delta i_t + \beta_2 (d_{EMR}) + \beta_3 (\Delta i_t \times d_{EMR}) + \varepsilon_t \quad (3)$$

where Y_t represents the percentage change in the implied yield of the interest rate futures contract using ten minute intervals ($t_{0,9} - t_{10,-1}$), Δi_t represents the unexpected component of the monetary policy announcement or explanatory minutes release and the dummy d_{EMR} is set to one for an explanatory minutes release and zero for a monetary policy announcement.

Table 4

Differential impact of unexpected monetary policy announcements and explanatory minute releases on the Australian interest rate futures market during non-crisis periods and the Global Financial Crisis.

Panel A - Differential impact during non-crisis periods				
	α	$\beta_1 \Delta i_t$	$\beta_2(d_{EMR})$	$\beta_3(\Delta i_t \times d_{EMR})$
90-day Bank Bill	-0.005 (-4.98**)	0.798 (10.16**)	0.003 (2.75**)	0.400 (1.48)
3-year Bond	-0.004 (-4.43**)	0.677 (7.92**)	0.002 (2.13*)	0.191 (0.82)
10-year Bond	-0.002 (-3.51**)	0.263 (4.64**)	0.001 (1.56)	0.106 (0.87)
Panel B - Differential impact during the Global Financial Crisis				
	α	$\beta_1 \Delta i_t$	$\beta_2(d_{EMR})$	$\beta_3(\Delta i_t \times d_{EMR})$
90-day Bank Bill	0.003 (0.24)	1.160 (4.94**)	-0.004 (-0.26)	-0.766 (-3.04*)
3-year Bond	-0.006 (-0.68)	0.604 (3.91**)	0.009 (1.05)	-0.743 (-2.51*)
10-year Bond	0.001 (0.39)	0.306 (7.63**)	0.001 (0.48)	-0.434 (-4.71**)

Note: *, ** denotes significance at 5% and 1% respectively.

Results reported are derived from the OLS model described in equation (3):

$$Y_t = \alpha + \beta_1 \Delta i_t + \beta_2(d_{EMR}) + \beta_3(\Delta i_t \times d_{EMR}) + \varepsilon_t \quad (3)$$

where Y_t represents the percentage change in the implied yield of the interest rate futures contract using ten minute intervals ($t_{0,9} - t_{10,-1}$), Δi_t represents the unexpected component of the monetary policy announcement or explanatory minutes release and the dummy d_{EMR} is set to one for an explanatory minutes release and zero for a monetary policy announcement. Panel A (B) reports the results of this regression during non-crisis periods (the Global Financial Crisis). The Global Financial Crisis period is defined as July 2008 to March 2009.

Table 5

Differential impact of unexpected monetary policy announcements (MPA) and explanatory minute releases (EMR) along the yield curve of the Australian interest rate futures market

Panel A – Impact compared to 10-year Treasury Bond						
	α	$\beta_1 \Delta i_t$	$\beta_2(d_{90DYBB})$	$\beta_3(d_{3YRBOND})$	$\beta_4(\Delta i_t \times d_{90DYBB})$	$\beta_5(\Delta i_t \times d_{3YRBOND})$
MPA	-0.002 (-3.44**)	0.300 (4.81**)	-0.003 (-1.97*)	-0.002 (-2.20*)	0.643 (4.45**)	0.382 (2.85**)
EMR	-0.000 (-1.26)	0.405 (3.81**)	-0.001 (-1.18)	-0.000 (-0.29)	0.796 (2.93**)	0.540 (2.26*)
Panel B – Impact compared to 90-day Bank Bill						
	α	$\beta_1 \Delta i_t$	$\beta_2(d_{3YRBOND})$	$\beta_3(d_{10YRBOND})$	$\beta_4(\Delta i_t \times d_{3YRBOND})$	$\beta_5(\Delta i_t \times d_{10YRBOND})$
MPA	-0.004 (-3.30**)	0.943 (7.24**)	0.000 (0.25)	0.003 (1.97*)	-0.261 (-1.48)	-0.6430 (-4.45**)
EMR	-0.001 (-1.95)	1.201 (4.80**)	0.001 (0.66)	0.001 (1.18)	-0.256 (-0.78)	-0.796 (-2.93**)

Note: *, ** denotes significance at 5% and 1% respectively.

Results reported are derived from the OLS model described in equations (4a) and (4b):

$$Y_t = \alpha + \beta_1 \Delta i_t + \beta_2(d_{90DYBB}) + \beta_3(d_{3YRBOND}) + \beta_4(\Delta i_t \times d_{90DYBB}) + \beta_5(\Delta i_t \times d_{3YRBOND}) + \varepsilon_t \quad (4a)$$

$$Y_t = \alpha + \beta_1 \Delta i_t + \beta_2(d_{3YRBOND}) + \beta_3(d_{10YRBOND}) + \beta_4(\Delta i_t \times d_{3YRBOND}) + \beta_5(\Delta i_t \times d_{10YRBOND}) + \varepsilon_t \quad (4b)$$

where Y_t represents the percentage change in the implied yield of the interest rate futures contract using ten minute intervals ($t_{0.9} - t_{10-1}$), Δi_t represents the unexpected component of the monetary policy announcement or explanatory minutes release and the dummy variables: d_{90DYBB} , $d_{3YRBOND}$ and $d_{10YRBOND}$ are set to one if it is the contract in question and zero otherwise.