Enhancing central bank communication: The case of the Federal Reserve's first two-stage monetary policy announcement

by

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Central banks are now increasingly open about their monetary policy stance, because communication about policy intentions could potentially be used as a tool to achieve policy objectives by influencing financial market expectations. This paper investigates the impact of the Federal Reserve's monetary policy communication on market expectations and, *specifically, presents findings from a quantitative case study focusing on investor reactions to the first two-stage monetary policy announcement. Using data on US financial market transactions, it is found that trading volume and price variability are relatively high after the monetary policy statement and, more importantly, during the subsequent press briefing. In the press briefing, especially the answers pertaining to future monetary policy and the state of the economy are found to be important for the markets. From an investor's viewpoint, these findings imply that the newly introduced press briefing on monetary policy provides important additional information that is not included in the monetary policy statement. Therefore, the results are in line with the clarification objective of the Federal Reserve's new communication policy.*

Keywords: Monetary policy, Federal Reserve, financial markets, press briefing, communication

1. INTRODUCTION

In April 2011, the Federal Reserve ("Fed") introduced a new strategy for its monetary policy communication. An essential feature of the new strategy is a press briefing that is held four times per year after the usual monetary policy statement. The press briefing is intented to provide additional context for the policy statement and it comprises two elements. First, the chairman of the Federal Open Market Committee reviews the monetary policy statement in detail and presents the latest economic projections. Then, the members of the media are allowed to ask clarifying questions about the Fed's monetary policy intentions.

By adopting a press briefing as a way of explaining monetary policy decisions, the Federal Reserve follows other central banks in an attempt to enhance the clarity and timeliness of monetary policy communication. Communication has become an increasingly important aspect of monetary policy, because it is now widely believed that the ability of a central bank to affect the economy depends critically on its ability to influence financial market expectations (see Blinder, Ehrmann, Fratzscher, De Haan, and Jansen, 2008, for a detailed discussion). In financial markets, better communication by the central bank tends to resolve investors' uncertainty about future monetary policy and improve the accuracy of market prices (Blinder et al., 2008).

The objective of this paper is to assess what is "better communication" by analyzing how the Federal Reserve's monetary policy announcement affects investor behavior, and especially focus on the investor adaptation to the Fed's first press briefing on monetary policy. The impact of the press briefing is characterized through a minute-by-minute examination of investors' trading in

money, bond, and stock markets, with the intention to measure the significance and the economic interpretation of the information flow. The purpose of the analysis is to find out whether the information provided in the press briefing is relevant to investors, and hence evaluate the role of the press briefing as an information channel complementing the monetary policy statement.

This paper contributes to the theory and practice of central bank communication by providing the first piece of evidence on the market impact of the Federal Reserve's changed monetary policy announcement and especially the effect of the new press briefing. In a more general context, the results of this paper provide central banks with new information on what kinds of communication are most effective for achieving the benefits of increased transparency.

2. MATERIAL AND METHODS

The Federal Reserve scheduled the implementation of the new two-stage monetary policy announcement for the Committee meeting in April 2011. The new announcement comprises the release of the monetary policy statement at 12:30 PM, followed by the press briefing at 14:15 PM. The original press release describing the new announcement procedure is included in Appendix A.

The publication of the new announcement procedure received considerable media attention; for example, investment banks circulated speculations about the content of the forthcoming press briefing that were later reported in the financial press. A leading business newspaper described the event as "a very rare news conference that actually makes news before it happens". The

novelty, investor awareness, and media coverage of the event offer an exceptional set of circumstances that guide the design of the empirical analysis of this study.

The analysis is quantitative and focuses on April 27th 2011, when the Fed used the new announcement procedure for the first time. The uniqueness and originality of the event motivates the choice of a single-case research design as a methodological approach. A single-case research design is often used in social sciences to evaluate the effect of particular intervention, here the monetary policy communication of the Fed. The advantage of the single-case approach in this context is that it provides insights on investors' spontaneous responses to the new communication strategy, free of learning and habitation effects that would influence investor behavior in the subsequent announcements. It is acknowledged that focusing only on one event could potentially limit the generalizability of the empirical results, but the first new announcement is considered to be a critical case that is particularly revealing about investor behavior and responses to a new channel of communication. In addition, the empirical results can be interpreted more generally because of the understanding of the circumstances around the event.

The responses to the new monetary policy announcement are identified by continuously assessing investors' trading patterns over the course of the event day. The sequence of events during the day follows an A-B-A-B-A pattern, where the B's represent the monetary policy statement (released at 12:30 PM EST) and the press briefing (starting at 2:15 PM), respectively. The A-periods serve as control periods for assessing investors' baseline in the absence of monetary policy communication. Under the null hypothesis of uninformative communication,

investors' baseline behavior (A) would match their behavior in the announcement phases (B). Under the alternative hypothesis of informative communication, investors would behave more dynamically during the announcement period (B > A) as they respond to new information.

Investor behavior is inferred from the flow of transactions. The transaction data include the time, price, and quantity of futures contracts traded in the Chicago Mercantile Exchange's three-month Eurodollar, ten-year Treasury note, and S&P 500 E-mini futures markets. These main markets are used to price the future levels of the US money, bond, and stock markets, respectively. The monetary policy statement and the recording of the press briefing were obtained from the Federal Reserve's Web site (www.federalreserve.gov).

3. CALCULATION

The investors' response to the Fed's new announcement procedure is gauged by the volatility of price changes and the trading volume of contracts over one-minute intervals. A one-minute interval is chosen, because observing investor responses at a high frequency is critical for the identification of information that impacts the market. Correspondingly, the response variables are chosen on the basis of their sensitivity to the arrival of new, relevant information. For example, Ross (1989) argues that the volatility of price changes equals the rate of information flow, because, loosely speaking, the prices conditional on old and new information are not equal. In addition, He and Wang (1995) show that trading volume is closely related to investors' adjustment to public news announcements. Intuitively, if the Fed's new two-stage announcement

delivers relevant information, it would affect the price expectations of financial assets, and show up as higher price volatility and trading volume.

The trading volume is measured by the number of contracts traded in each futures market. The volatility of price changes is proxied by the absolute one-minute change in the logarithmic futures price, where the futures price is a volume-weighted average of all futures prices in each market. The volume-weighted average price is used to better capture the market-wide response to new information. A mathematical representation of the variables is provided in Appendix B. The data span from 9:00 AM to 5:00 PM, capturing the most active trading period of the day with a total of 480 observations per futures market. For illustrative purposes, a video of the evolution of price volatilities and trading volume during the event day is available on Youtube Web site (www.youtube.com/watch?v=weVoRSUZkhA).

The empirical analysis begins with a visual inspection of the variation in the response variables around the new monetary policy announcement, with the intention to find distinct patterns that can be linked to the arrival of new information. Also, a regression analysis is applied to find the sensitivities of the response variables to different phases of the announcement. The volatility of price changes, for example, might be lower during the press briefing, because it is held approximately two hours after the release of the monetary policy statement. The time lapse gives potentially enough time to find new market equilibrium on the basis of the statement, which makes the press briefing purposeless if the statement already delivers all the relevant information about the Fed's monetary policy stance. In previous studies using high-frequency data, the Federal Reserve's monetary policy statements have been documented to deliver substantial

amount of information to the market (e.g. Andersson, 2010; Gürkaynak, Sack, and Swanson, 2005). In this case, the volatility of prices during the press briefing is not expected to be statistically different from its baseline level. In contrast, if the press briefing delivers substantial information beyond that contained in the statement, there would be new price discovery processes in the market that would also increase the rate of price changes and volatility. Such finding would be interpreted as evidence of the press briefing serving as a communication channel.

Then, the correlations of consecutive price changes are compared between different phases of the event day. Ehrmann and Fratzscher (2009) note that the arrival of new information causes earlier prices to be confirmed (no serial correlation, consecutive prices changes are random), reinforced (positive serial correlation, consecutive prices changes have a same sign), or reconsidered (negative serial autocorrelation, consecutive price changes are offsetting). The serial correlations of the price changes are examined to find out how the Fed's new monetary policy announcement, and especially the press briefing part, affect investors' expectations of the future.

Finally, a statistical approach is adopted to find out how investors react to specific topics discussed in the press briefing. The press briefing is broadcasted live, which makes the chairman's words subject to a real-time rhetorical analysis by the investors. The investors may draw different price implications from the bits of information forwarded by the chairman, which would induce trading and possible price revisions. Therefore, mapping the topics discussed in the press briefing onto synchronous transaction data allows to identify the exact issues in the press briefing that are perceived to be the most relevant by the investors.

4. RESULTS

The results section begins with a visual inspection of the response variables. Figures 1 to 3 show the intraday evolution of price volatility and trading volume in the money, bond, and stock market, respectively. In each frame, the box in the upper-left corner shows the daily average and standard deviation, and the thicker line represents a five-minute moving average.

INSERT FIGURES 1-3 AROUND HERE

Focusing first on volatilities on the left, all markets experience a jump after the release of the monetary policy statement at 12:30 PM. Immediately after the release, volatilities are 8 to 12 times the daily average but fall in half within few minutes. A high rate of price changes after the statement reflects significant adjustments to new information. The volatilities remain from two to three hundred percent higher than average for another 30 to 45 minutes.

The decay of volatilities after the release of the statement seems to be consistent with the speed of information revelation rule proposed by Vives (1995), which postulates that investors trade on new information so that the market price converges to its new equilibrium level as an inverse square-root function of trading rounds. In this case, the Vives (1995) rule implies that three (thirty) minutes of trading on new information reduces the volatility of the market price by 50 (82) percent, which roughly corresponds to the patterns observed in the Figures.

The price volatilities rise again after the beginning of the press briefing at 2:15 PM, but this time they rise differently: sudden peaks are absent, and volatilities just shift up to a higher regime and remain there approximately until the end of the press briefing. A prolonged period of relatively high volatility indicates continuous but somewhat smaller price changes as a result of investors' responses to a flow of new information.

Trading volume seems to follow a similar intraday pattern, peaking at 12:30 AM and then remaining above the daily average for 30 to 45 minutes. In addition, trading volume seems to rise after 2:15 PM as do volatilities, although this increase is indistinguishable in the stock market after taking the typical U-shaped intraday pattern into account (Jain and Joh, 1992). The observed positive correlation between volatility and volume is a well-established empirical finding after important public news events. It is often associated with an environment where investors trade on the basis of their own interpretations of a public news announcement as well as past prices (He and Wang, 1995).

Table 1 provides statistical confirmation for the findings of the visual inspection. The table presents the results of a regression of logarithmic volatilities and volumes on intraday dummy variables. The dummy variables are used to distinguish different phases, or time periods, in the monetary policy announcement process. For example, the dummy variable for the release of the monetary policy statement ("RLSE") extends from 12:30 PM to 12:59 PM, the intermediate period ("INTERM") from 1:00 to 2:14 PM, the press briefing period ("PRESS") from 2:15 to 3:12 PM, and the post-briefing period ("POST") from 3:13 to 5:00 PM. The morning period from 9:00 AM to 12:30 PM is reserved as a benchmark. With this regression specification, the

estimated coefficients can be interpreted as mean percentage changes in the dependent variable from its baseline level.

INSERT TABLE 1 AROUND HERE

The coefficients in Table 1 indicate that the price volatility and trading volume levels increase after the release of the monetary policy statement as well as during the press briefing, subsequently returning to their baseline levels or below. This finding is statistically verified by a Wald test for the null hypothesis that the parameter values in each column are on average zero. The test statistic has a chi-square distribution with one degree of freedom and a critical value of 3.84 at a five per cent significance level. The Wald statistics in the bottom line of the table show that the average effects of the release and the press briefing (RLSE and PRESS) are statistically speaking well above zero, which indicates that the two events have a statistically significant and a net positive effect on volatility (110 %) and volume (60 %). In contrast, the set of parameters representing volatility and volume levels during the interim period (INTERM) are not on average distinguishable from zero, meaning that the market activity after the release and before the press briefing returns to its baseline level. After the monetary policy press briefing (POST), the overall market activity drops well below the baseline level (-31 %), reflecting the end of the events for the day.

The *F*-statistic in the last column of Table 1 measures how well the estimated regression model with various intraday phases performs against a baseline, constant model. Thus, a higher *F*-statistic indicates that the intraday effects in the dependent variable are strong, and lends support

to the A-B-A-B-A characterization of information arrival. The critical *F*-statistic for statistically significant intraday effects is 5.64 at the five per cent level. The strongest intraday effects (according to the *F*-statistic) can be seen in the money market regression, where the statement and the press briefing increase volatility by 63 and 10 percent and volume by 115 and 61 percent, respectively. The volatility effects in the money market are at least partly attenuated by high volatility in the morning, and are better measured by *changes* in the coefficients; expressed so, the money market volatility increase by 92 and 87 percent during the statement and the press briefing, respectively. In the bond and stock markets the effects of communication are approximately equally significant. Both markets show strong variation in the volatility and volume levels according to information flow from the Fed. Specifically, the monetary policy statement and the press briefing at least double the volatility in both markets, with positive but milder effects in trading volume.

To put these results in context, Andersson (2010) provides a benchmark in his comparison of the volatility responses to different types of monetary policy announcements. Specifically, Andersson (2010) compares the volatility effects of the Fed's former one-stage announcement to the two-stage announcement practice followed by the European Central Bank (ECB). Compared to Andersson's (2010) results, the volatility responses to the Fed's monetary policy statement are now milder in the bond and stock markets than those experienced after the Fed's old announcements. With respect to the money market, Ehrmann and Fratzscher's (2009) study of the ECB's monetary policy announcement effects to the volatility and volume of the Euribor futures market allows a similar comparison. Again, a comparison of the results shows that, with equally peaking volatilities and surging volumes, the US and European money markets remind

each other in their responses to the release of the policy statement and the press briefing. Ehrmann and Fratzscher (2009) identified the market response to the press briefing as a result of *clarification* of the ECB's monetary policy stance.

4.1 Serial correlation analysis

In the European markets, Ehrmann and Fratzscher (2009) hypothesize that the ECB's press briefing either confirms, reinforces, or causes re-evaluation of earlier prices, and show that market turns are indeed more likely during press briefings. The price adjustments during the press briefings are especially strong if the preceding policy statement has been ambiguous. Thus, a logical next step is to find out whether the Fed's new press briefing served a similar clarification role. Some tentative evidence on this matter can be inferred from the serial correlations of consecutive price changes.

Figure 4 presents the serial correlation coefficients for the different phases in the Fed's new monetary policy announcement. As can be seen from Figure 4, the serial correlations before and at the time of the statement release are negative across asset classes, indicating partial reversals of earlier prices and hence difficulties in finding a market equilibrium. Then, during the intermediate period after the release, the correlation levels move closer to zero and the market prices behave more like a random walk again, which suggests that investors accept and confirm the new equilibrium price levels. But once the press briefing starts, the correlation levels diverge. The money market prices exhibit a negligible increase in the level of serial correlation, whereas the stock market correlation dips to -0.35, indicating quite strong re-evaluation of the past prices.

The bond market prices have a serial correlation coefficient between the two extremes. After the press briefing, the correlation levels converge towards zero again, indicating confirmation.

INSERT FIGURE 4 AROUND HERE

4.2 Trading flow analysis

The key observation in the serial correlation analysis is the divergence of price processes in the money, bond, and stock markets during the press briefing. Supposedly, the observed divergence is not random but reflects different asset-class sensitivities to the chairman's positive and negative comments about the economy. For example, it is possible that a hint of contractionary monetary policy by the chairman (e.g. future interest rate hikes) increases the value of the stock market as a signal of the Fed's optimistic economic outlook and, at the same time, decreases money and bond market prices (because they move inversely to interest rate levels). In order to investigate this possibility, a closer look is taken on the price and volume reactions to different topics discussed in the press briefing. The topics that influence investor expectations are identified by examining the variation in the product of price changes and trading volume in each market. For example, an average one-minute change in the money, bond, and stock market values corresponds to tens of thousands worth of trading flow in dollar terms.

Hypothetically, any particular content in the chairman Bernanke's answers that is considered to be unexpected or important by the investors is expected initiate trading and increase trading volume. To the extent that the investors trade at the margin, increased trading volume would be accompanied by a change in price. In this study and especially here, it is emphasized that

observing prices and trades at a high frequency is critical for the identification of information that impacts the markets. Negatively correlated trading flow between interest rate and the stock market could be used to further affirm the deterministic behavior of the trading, because new information indicative of faster growth and inflation expectations and future interest-rate hikes would cause opposite price effects in the interest rate and stock markets.

Figures 5a to 5c present the results for each market. In each figure, the topics discussed in the press briefing are listed in chronological order from top to bottom on the vertical axis, plotted against the mean response in the trading flow on the horizontal axis (in thousands of dollars). Looking at the market responses, there is a clear negative reaction in the money and bond markets at the beginning of the press briefing, and, at the same time, a distinct positive reaction in the stock market. These particularly strong reactions coincide with the chairman Bernanke's answer about the Fed's monetary policy intentions (MP), and are most likely driven by the investors' changed expectations about future monetary policy. Other strong market responses can be seen during the chairman's answers about the growth prospects of the economy ("ECON") and the ending of the second round of the quantitative easing (QE2), which seem attract the most attention in the stock and bond markets, respectively.

INSERT FIGURE 5 AROUND HERE

The strong and opposite market responses to Bernanke's answers in the interest rate and stock markets are compatible with asset pricing theory, and therefore lend support for the information motive of the trading flow. Asset pricing studies have shown that higher future interest rate

expectations (which lower bond prices) are considered good news in the stock market during poor economic conditions (Andersson, Krylova, and Vähämaa, 2007). Thus, stock prices should be negatively correlated with money and bond prices in a low interest rate environment such as in 2011. For example, studentized responses to Bernanke's answer about the Fed's future interest-rate hike are -3.37, -1.53, and 2.31 for the money, bond, and the stock markets, respectively. Thus, it seems that higher perceived likelihood of interest-rate hikes as a result of Bernanke's explanation triggered trading that lowered bond prices and increased stock prices as a signal of economic recovery. Such opposite responses reflect a more general pattern in the data: the studentized trading flows in the interest-rate and stock markets are strongly negatively correlated (from -0.46 to -0.54) during the first 30 minutes of the press briefing, when the most important topics (in economic sense) were discussed. Systematically opposite changes in the trading flows imply rational investor responses to new information conveyed by Bernanke's answers.

5. CONCLUSIONS

In recent years, many central banks have sought to increase the openness and transparency of their monetary policy decisions. Accordingly, the Federal Reserve changed its monetary policy announcement practices in April 2011. The new announcement proceeds in two stages. In the first stage, the usual monetary policy statement is released. In the second stage, the chairman of the Federal Open Market Committee holds a press briefing, where he explains the monetary policy decision in detail and then interacts with the members of the financial press.

This paper investigates the event of the first new monetary policy announcement and provides the first piece of evidence on the investor adaptation to the Federal Reserve's changed communication. In particular, the market impact of the new two-stage announcement is assessed by analyzing synchronous financial market transactions, with the intention to measure the economic significance and interpretation of the information flow. The purpose of the analysis is to find out whether the information provided in the press briefing is relevant to investors, and hence evaluate the role of the press briefing as an information channel complementing the monetary policy statement.

A quantitative case study focusing on the day of the implementation of the new communication strategy yields interesting insights of the investor responses. The findings indicate that both the release of the policy statement and the press briefing are important information events but differ in dynamics. Whereas the market response to the former is more short-lived and extreme, the press briefing introduces longevity in the market adjustment process by stimulating new waves of trading after any further clarification of monetary policy intentions. Prolonged market activity during the press briefing implies increased investor attention to the dialogue between the chairman and the members of the press. Specifically, the chairman's answers pertaining to future monetary policy, economic growth prospects, and quantitative easing seem to be especially important for the investors, triggering simultaneous but opposite reactions in bond and stock markets. Based on asset pricing theory, it is argued that opposite trading flows are deterministic and rational responses to new information, which highlights the role of the press briefing as a vehicle for clarifying monetary policy intentions.

Based on the empirical findings of the paper, it is concluded that the press briefing provides important additional information to the investors that is not included in the monetary policy statement. Therefore, the choice of having a press briefing after the statement meets the Federal Reserve's objective for enhanced clarity and timeliness of monetary policy communication. Moreover, the enhanced clarity works both ways: the paper shows that by examining the trading flow during the press briefing, the Federal Reserve can now find out which particular topics draw the most attention in the financial markets and evaluate to what extent its communication induces the intended market effects.

APPENDIX A. A press release from the Federal Reserve.

Release Date: March 24, 2011

For immediate release

Chairman Ben S. Bernanke will hold press briefings four times per year to present the Federal Open Market Committee's current economic projections and to provide additional context for the FOMC's policy decisions.

In 2011, the Chairman's press briefings will be held at 2:15 p.m. following FOMC decisions scheduled on April 27, June 22 and November 2. The briefings will be broadcast live on the Federal Reserve's website. For these meetings, the FOMC statement is expected to be released at around 12:30 p.m., one hour and forty-five minutes earlier than for other FOMC meetings.

The introduction of regular press briefings is intended to further enhance the clarity and timeliness of the Federal Reserve's monetary policy communication. The Federal Reserve will continue to review its communications practices in the interest of ensuring accountability and increasing public understanding.

APPENDIX B. A mathematical representation of the response variables.

The response variables in the empirical analysis are trading volume, price volatility, and trading flow. The overall trading volume in the market is calculated as the sum of all individual contracts *i* traded at minute *t*:

$$Q_t = \sum_i Q_{i,t} \qquad \text{Eq. (A.1)}$$

An average futures price in the market is calculated by weighting the individual futures prices by the trading volume:

$$\overline{P}_t = \sum_i P_{i,t} Q_{i,t} Q_t^{-1} \qquad \text{Eq. (A.2)}$$

The volatility of price changes is proxied by the absolute one-minute change in the logarithmic average futures price:

$$V_t = 100 \times \left| \ln \overline{P}_t - \ln \overline{P}_{t-1} \right|, \qquad \text{Eq. (A.3)}$$

The trading flow is proxied by the change in the average futures price times the trading volume:

$$TF_t = \left(\overline{P}_t - \overline{P}_{t-1} \right) \times Q_t, \qquad \text{Eq. (A.4)}$$

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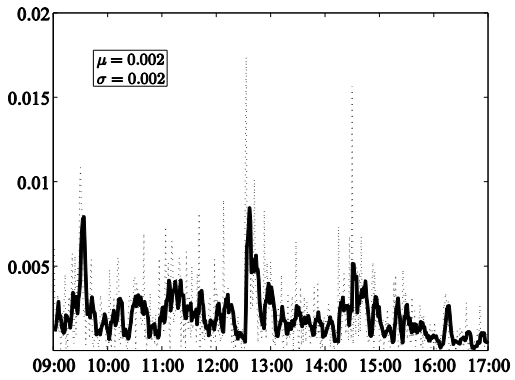
Table 1. Volatility and volume regressions on intraday dummy variables.

ln Variable (*N*)	RLSE (*t*-stat)	INTERM (*t*-stat)	PRESS (*t*-stat)	POST (*t*-stat)	*F*-stat
		Money market			
Volatility (478)	0.63 (2.78)	-0.29 (-2.06)	0.10 (0.56)	-0.77 (-4.54)	13.87
Volume (479)	1.15 (4.82)	-0.25 (-1.23)	0.61 (3.19)	-0.89 (-3.22)	24.06
		Bond market			
Volatility (453)	1.59 (4.63)	0.66 (2.49)	1.04 (4.35)	-0.13 (0.51)	7.31
Volume (454)	1.06 (4.12)	0.03 (0.19)	0.57 (2.83)	-1.33 (-3.75)	26.13
		Stock market			
Volatility (405)	1.23 (1.88)	-0.12 (-0.22)	1.03 (2.03)	0.37 (0.88)	1.66
Volume (405)	0.39 (1.66)	-0.46 (-3.15)	0.23 (1.74)	0.64 (2.87)	15.61
Average Wald stat.	1.10 [15.10]	-0.07 [0.24]	0.60 [17.17]	-0.31 [3.90]	

Note: constant terms included but not tabulated. The standard errors are robust to Heteroscedasticity and AutoCorrelation ("HAC").

Figure 1. Intraday variation in the money market.

(a) Volatility



(b) Volume

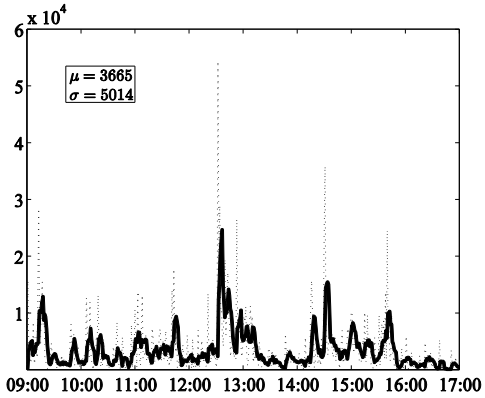
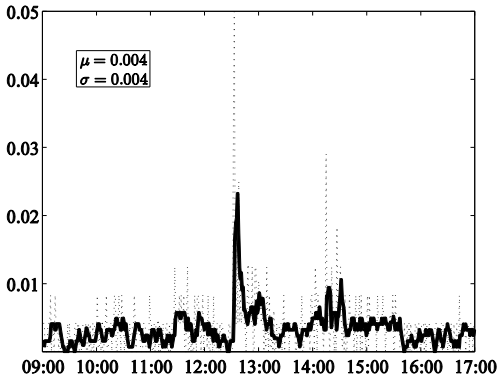


Figure 2. Intraday variation in the bond market.

(a) Volatility



(b) Volume

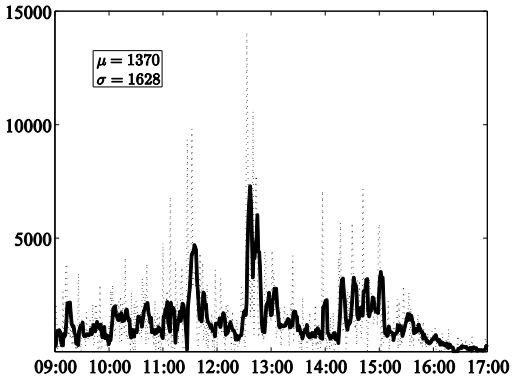
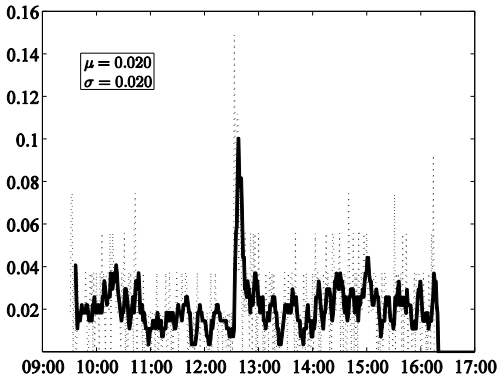


Figure 3. Intraday variation in the stock market.

(a) Volatility



(b) Volume

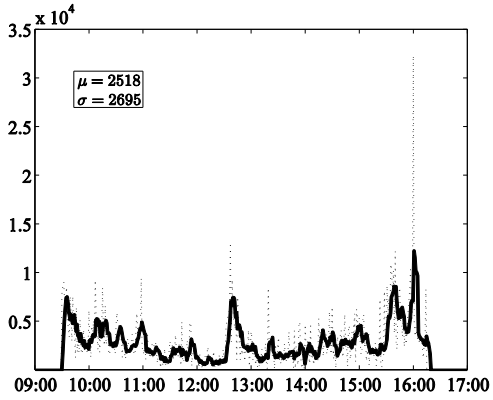
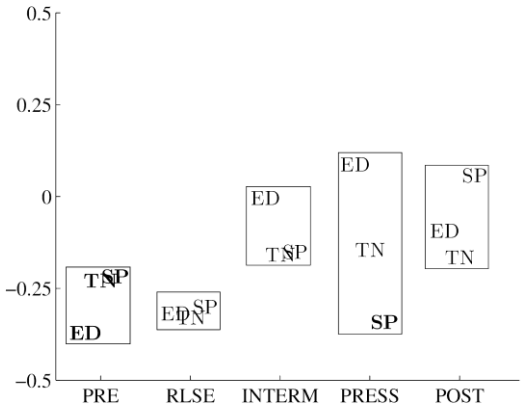
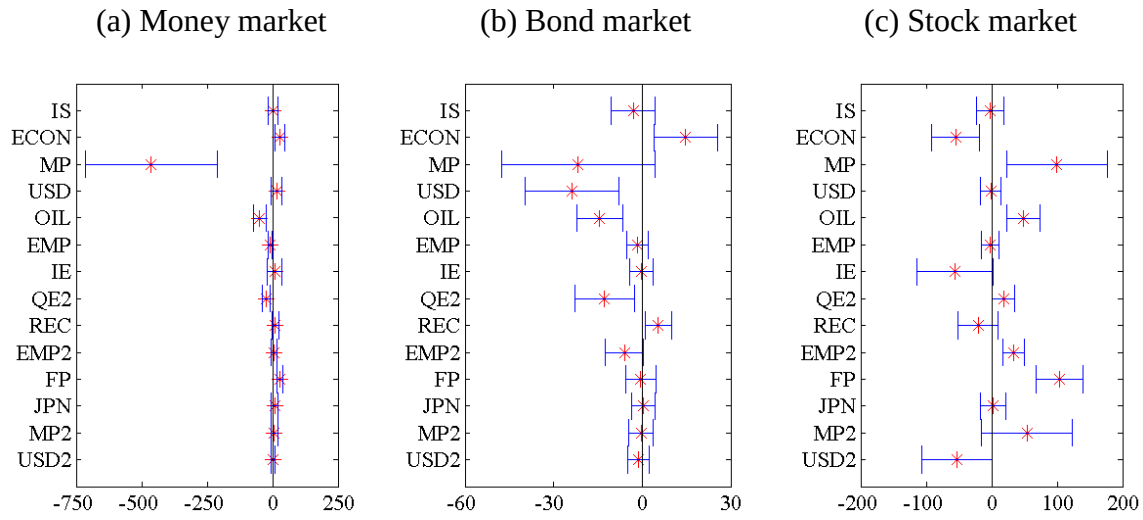


Figure 4. First-order autocorrelations during the Fed's announcement process.



Note: boldfaced abbreviations denote statistical significance at the five percent level, based on HAC standard errors. Rectangles are for illustrative purposes.

Figure 5. The trading flow topic-by-topic during the Fed press briefing.



Note: START = beginning of the press briefing; IS = introductory statement; ECON = economic outlook; MP = monetary policy; USD = US Dollar; OIL = oil price; EMP = unemployment; IE = inflation expectations; QE2 = second round of quantitative easing; REC = economic recovery; FP = fiscal policy; JPN = economic impact of the Fukushima disaster; PRESS = first press briefing; ROLE = Fed's role in economic recovery. The stars represent period means in thousands of US dollars and the whiskers 95 percent confidence intervals based on HAC standard errors.