

Shivers and Shrugs in Financial Markets: The Case of the First FOMC Press Conference on Monetary Policy

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Abstract

This note examines US interest rate and stock market reactions throughout the day of the first Federal Open Market Committee (FOMC) press conference on its monetary policy. Market reactions to the FOMC's new communication framework and its information content are gauged by the level of volatility and trading volume. For this purpose, intraday data on the Eurodollar, T-note, and E-mini futures markets are used. I find a strong upsurge in volatility and volume at the time of the monetary-policy release, followed by an intermediate phase. Less pronounced but more lasting volatility and volume effects are observed during the press conference. When analyzed minute-by-minute, market responses during the press conference are found to be deterministic and root from questions and answers pertaining to future monetary policy and state of the economy. These findings are in line with the clarification objective of the new framework.

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1 Introduction

In April 2011, the Federal Open Market Committee (FOMC) of the United States' Federal Reserve System changed the way it communicates about monetary policy. In the new framework, similar to that of the European Central Bank (ECB), the monetary policy statement announced after every FOMC meeting is now four times per year followed by a press briefing held by the Chair of the Committee. In the briefing, the Chair gives a detailed statement of Committee's monetary policy stance and presents its latest economic projections, and then allows members of the media to ask clarifying questions about monetary policy issues. According to the Federal Reserve, the new framework is adopted in order to enhance the clarity and timeliness of monetary policy communication. In financial markets, better communication by the central bank tends to resolve (costly) uncertainty about future monetary policy actions and improve the process of price discovery.

Using a wide set of intraday data on US futures markets, this note aims to provide the first piece of evidence on the form of market adaptation to the Fed's changed way of communication. Specifically, the way market participants respond to the new communication framework is inferred from (changed) patterns in intraday trading volumes and price volatilities. Furthermore, the two-stage structure of the new framework allows to disentangle market reactions to information about current policy rates from those concerning future rates and macroeconomic states, and to pin down the exact issues in the current economy that are perceived to be the most relevant in determining its future direction.

2 Data and methodology

The analysis focuses on one particular day, April 27th 2011, when the Fed used its new communication framework for the first time. The financial data consist of intraday observations of the most active segments of the US futures markets. In particular, volumes and traded prices from the Chicago Mercantile Exchange's Globex system were collected at one-minute frequency for the whole maturity spectrum of three-month Eurodollar, ten-year Treasury note, and S&P 500 E-mini futures contracts. These data span from 9:00 to 17:00 EDT, capturing the most active trading period of the day with a total of 480 observations per contract.

Information and live footage on the FOMC monetary policy statement (released at 12:30) and the press briefing (held at 14:15) were obtained from the Fed web site (www.federalreserve.gov) and MarketWatch.com. Both events were prescheduled by the Fed. The latter source provides time-stamped news feed on the topics discussed during the press conference, which are cross-checked against the original broadcast to correct for er-

aneous topic, content, or time stamp. The market reactions to these news are gauged by price volatility and trading volume, both highly sensitive to the arrival of new information. The intraday volatility in a specific futures market at minute t , V_t , is measured by the absolute one-minute change in the log of volume-weighted average price (VWAP), $\{\bar{p}\}$:

$$V_t = 100 \times |\bar{p}_t - \bar{p}_{t-1}|,$$

where

$$\bar{p}_t = \log \left(\sum_i p_{i,t} q_{i,t} Q_t^{-1} \right).$$

In similar a fashion, aggregate trading volume in specific market, Q_t , is the total of individual contract i volumes in that market, $q_{i,t}$. Aggregated series are used in an effort to reduce the effects of microstructure noise, and to better capture the market-wide responses to new information.

In the European context, Ehrmann and Fratzscher [2009] find that the market response to the press briefing by the ECB is related to the novelty of its preceding policy statement. For this reason, it is necessary to evaluate the information content of the FOMC statement in question before turning to empirical findings. As expected, the statement noted no change in monetary policy: the FOMC announced to keep its target range for the federal funds rate at the minimum level and to complete its second round of quantitative easing (QE2) as scheduled. However, the FOMC downgraded slightly its general assessment of the economy, but in overall the impact of the FOMC statement on asset prices was mildly positive.

3 Results

Figures 1, 2, and 3 show the intraday evolution of trading volumes and price volatilities for the day of the events. In each frame, the box in the upper-left corner shows the market average and standard deviation, and the thicker line represents a five-minute moving average.

[Insert Figures 1, 2, and 3 around here.]

Focusing first on volatilities on the left, all markets experience a jump at 12:30, when the FOMC statement is released. Immediately after the release, volatilities are from 8 to 12 times the market average but halve in few minutes. Given that the FOMC’s interest rate decision was well anticipated by the market, the apparent surge in volatilities can be attributed to changed views on the expected path of future policy rates, or “a path surprise”. After peaking, the volatilities remain elevated for another 30 to 45 minutes, depending roughly on the interest-rate sensitivity of the market. Actually,

the speed of information revelation rule by Vives [1995], $n^{-1/2}$, describes the post-release decay of volatilities surprisingly accurately. Volatilities rise again after two o'clock when the FOMC press briefing begins, 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 briefing.

Volumes seem to follow a similar intraday pattern, peaking at 12:30 and then remaining above the market average for 30 to 45 minutes. In addition, volumes seem to rise after 14:15 as volatilities do, although this increase is indistinguishable for the E-mini market after taking the normal U-shaped intraday pattern into account. Positive correlation between volatility and volume is a well-established empirical finding after public news events and is often associated with a noisy rational expectation environment, where investors trade informatively on the basis of their own interpretations of the news as well as past prices [eg. He and Wang, 1995].

Table 1 confirms the findings of the graphical analysis. It presents the results of regressing the logs of volatilities and volumes on intraday dummy variables. Each dummy variable represents a phase in the FOMC communication process: the release period (“RLSE”) extends from 12:30 to 13:00, the intermediate period (“INTERM”) from 13:00 to 14:14, the press briefing period (“PRESS”) from 14:15 to 15:12, and the post-briefing period (“POST”) from 15:13 to 17:00. The morning period from 9:00 to 12:30 is set as a baseline level. In this way a regression coefficient can be interpreted as a mean percentage change in the dependent variable relative to its level in the morning.

[Insert Table 1 around here.]

Inspection of coefficient signs in Table 1 tell that volatility and volume levels increased after the release of the policy statement and during the press briefing, subsequently returning to the baseline levels or below. This finding is statistically verified using a Wald test for the null hypothesis that a sum of a set of coefficients is zero. The Wald statistics on the bottom line show that the sum of RLSE and PRESS coefficients are in fact well above zero (positive effect on volatility and volume), whereas INTERM and POST are zero or below (no or negative effect on volatility and volume).

The F -statistics in the rightmost column indicate that strongest intraday effects were seen in the Eurodollar market, where the statement and the briefing increased volatility, respectively, by 63 and 10 percent, and volume by 115 and 61 percent. The volatility effects are partly overwhelmed by high volatility in the morning, and may be better measured by *changes* in the coefficients; expressed this way, the Eurodollar volatility increased 92 and 87 percent during the statement and the briefing, respectively.

The effects of FOMC communication are no less significant in T-note or E-mini markets; both show strong variation in volatility and volume levels

according to information flow from the Fed. Indeed, the FOMC statement and the press briefing at least doubled the volatility in both markets, with positive but milder effects in volumes as well.

To put these results in context, Andersson [2010] provides an excellent benchmark in his comparison of volatility responses to monetary policy statement under the Fed's former one-stage communication framework and the two-stage one currently followed by the ECB. Compared to the results of Andersson [2010], volatility responses to the policy statement are now milder in the T-note and E-mini markets than those experienced under the Fed's old framework. In addition, in their pattern and magnitude, the T-note and E-mini volatilities seem like a hybrid of European stock and bond market responses to a statement *with* a policy change, and US market responses *without* one. This last notion requires elaboration: seemingly, an ECB policy statement is much less informative than the Fed's, and opposite to a Fed statement, only a change in policy rates induces a market reaction. But when it does, the volatility pattern is similar to that observed in the Figures 2a and 3a.

Ehrmann and Fratzscher's (2009) study on the volatility and volume effects of ECB communication on the Euribor futures market enables a similar comparison as regards the Eurodollar market. Again, a comparison of the results show that, with equally peaking volatilities and surging volumes, the two markets remind each other in their responses to policy statements and press briefings. Ehrmann and Fratzscher [2009] identified the market response to the latter event as a product of "clarification" of ECB's monetary policy stance. They hypothesize that the press briefing either confirms, reinforces, or causes re-evaluation of the initial market reaction, and show that market turns are indeed more likely during press briefings, especially if the information content of the policy statement is low.

Thus, a logical next step is to find out whether the FOMC's first press briefing on its monetary policy served a similar clarification role. Some tentative evidence on this matter can be inferred from first-order autocorrelations: Ehrmann and Fratzscher [2009] note that once new information arrives, earlier price changes are either confirmed (no autocorrelation), reinforced (positive autocorrelation), or reconsidered (negative autocorrelation). As can be seen from Figure 4, autocorrelations before and at the time of the policy release are negative across asset class, indicating partial reversal of earlier price changes and thus difficulties in finding the new equilibrium price. Then, some time after the release, return autocorrelations shift up towards zero and prices behave more like a random walk. But once the press conference starts, autocorrelations diverge: the instrument having the smallest duration, namely the Eurodollar contract, exhibits a small increase in the level of autocorrelation. On the other hand, the E-mini contract (having the largest duration) dips to -0.35 in first-order autocorrelation, indicating quite strong re-evaluation of past price changes. The T-note contract with inter-

mediate duration exhibits, accordingly, a level of autocorrelation in between of the two extremes. After the press conference, autocorrelations converge towards zero again.

[Insert Figure 4 around here.]

The key observation in the autocorrelation analysis is the divergent price-process behavior during the press conference. If indeed the observed divergence is not random but reflects different asset-class sensitivity to good and bad news about the economy, one would expect to see negative returns for interest-rate futures in response to news indicative of faster economic growth, higher inflation, and future interest-rate hikes. At the same time, such news would have quite the opposite effect on stock (index) values insofar as increased cash-flow expectations dominate the discount rate effect.

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. Whether or not the Chair's discourse on economic issues cause price adjustments is identified by the variation in the product of minute-by-minute price changes and volumes. Should any particular content in Bernanke's answers strike some market participant as unexpected or important, one would expect him or her to trade on that piece of information, resulting in an increase in traded volume. To the extent that the participant trades at the margin, increased volume is accompanied by a change in price. Negatively correlated order flow between interest-rate and equity index futures would further affirm the deterministic behavior of the market participants.

Figures 5a, 5b, and 5c present the results for each market. In each Figure, the subjects discussed in the press briefing are listed in chronological order on the y -axis, plotted against the mean response in the order-flow proxy (x -axis, scaled by dollar tick size). Looking at the market responses, there is a clear negative reaction at the very beginning of the press conference. This peculiar and particularly strong reaction is was not driven by new information from Bernanke's talk since he was not yet speaking, but may reflect the excitement caused by the novel situation. Another strong responses are seen during Bernanke's answers about the timing of the next interest-rate hike ("MP") and the growth prospects of the US economy ("ECON"), the latter of which attracted the most attention in the E-mini markets.

[Insert Figures 5a, 5b, and 5c around here.]

Another regularity in the market responses is their support for the hypothesized negative correlation between asset classes. For example, studentized responses to Bernanke's answer about the Fed's future interest-rate hike are -3.51, -1.70, and 2.58 for the Eurodollar, T-note, and the E-mini contracts, respectively. Seemingly, perceived increase in the likelihood of

interest-rate hikes caused trading that lowered bond prices and increased expected equity prices as a signal of economic recovery. Contrary responses actually reflect the general pattern during the press conference: once the initial reaction (“START”) is dropped, the interest-rate/equity correlation in studentized order flow is negative for both the Eurodollar (-0.16) and the T-note market (-0.54).

4 Concluding remarks

The subject of this note is the FOMC’s new two-stage framework for announcing its monetary-policy decision. In the first stage, the policy statement is released; in the second, the Chair of the Committee provides background information and interacts with the members of financial press.

A case study focusing on the day of the first two-stage announcement yields interesting insights concerning market adaptation to the new framework. The findings indicate that both the release of the policy statement and the press briefing are important market 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 adjustment process by stimulating new waves of price discovery after any further clarification of the monetary-policy stance. Especially the Chair’s answers pertaining to future monetary policy and economic growth prospects seem to trigger simultaneous but opposite reactions in bond and equity futures prices, which is to be expected when discount-rate and cash-flow expectations conflict.

In the light of these findings, it seems that the press briefing meets the FOMC’s objective for enhanced clarity and timeliness of monetary policy communication. Moreover, the enhanced clarity works both ways; the central bank can now find out which particular topics draw the most attention in financial markets.

References

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Figure 1: Eurodollar futures

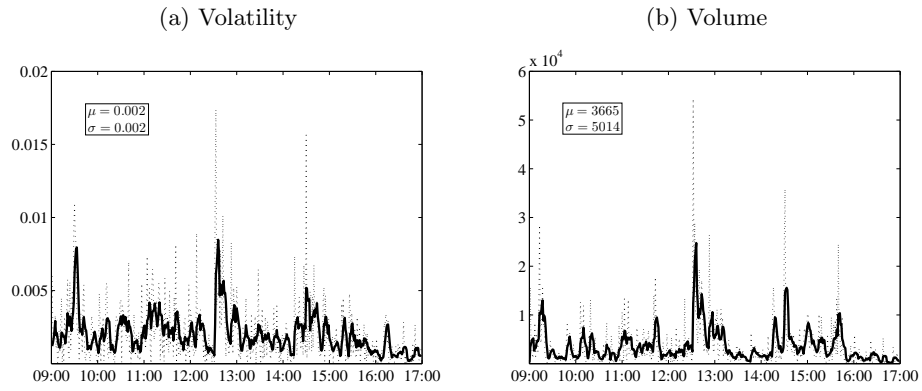


Figure 2: Ten-year treasury note futures

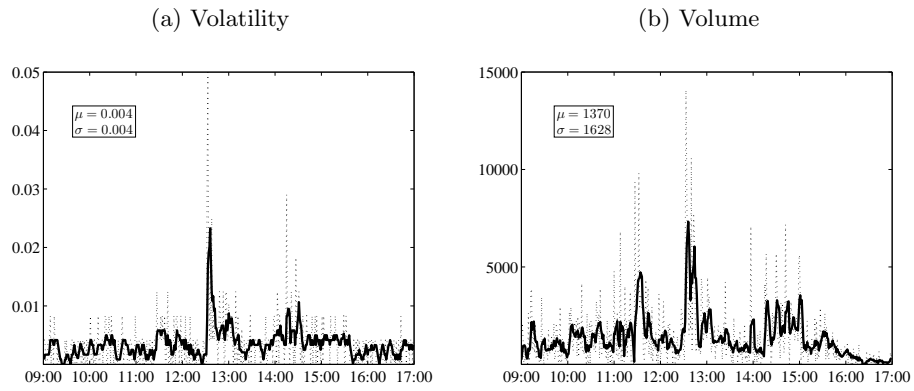


Figure 3: S&P 500 E-mini futures

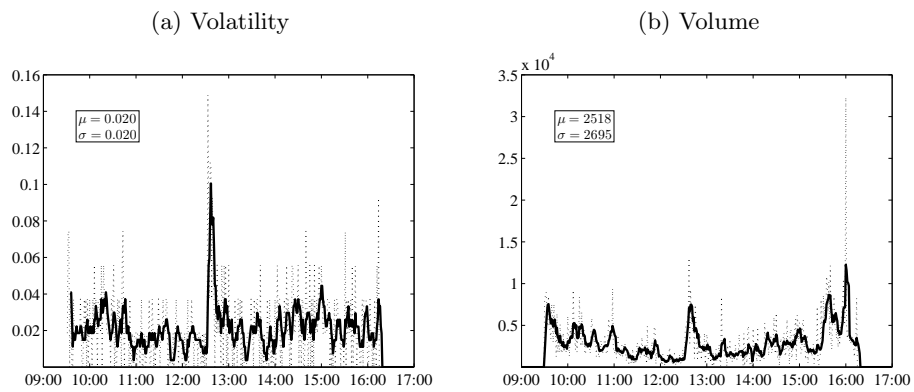
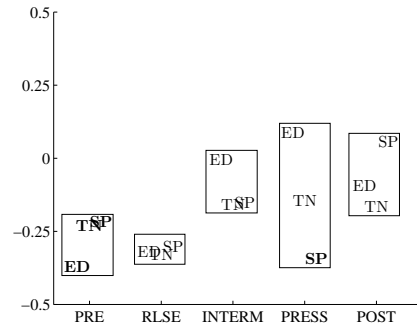
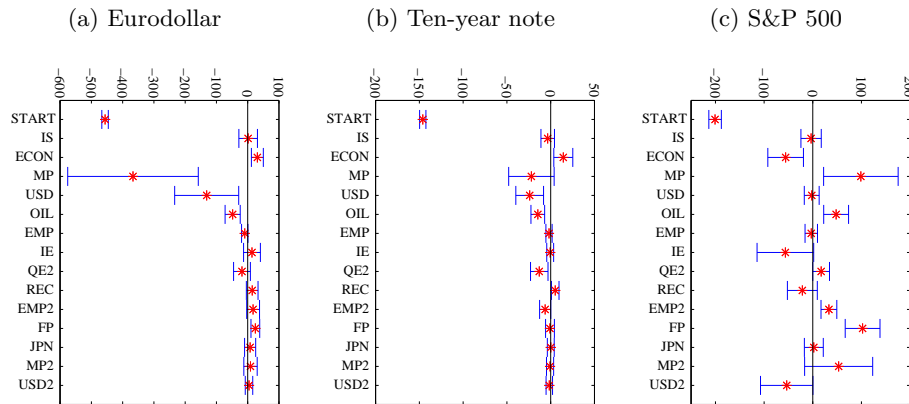


Figure 4: First-order autocorrelations of one-minute VWAP returns during different steps of FOMC's communication process.



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

Figure 5: The press briefing by topic: VWAP change times volume.



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 = impact of Fukushima earthquake; PRESS = first press conference; ROLE = Fed's role in economic recovery. Stars represent period means in thousands of US dollars and whiskers their 95 percent confidence intervals based on HAC standard errors.

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

log Variable (N)	RLSE (t -stat)	INTERM (t -stat)	PRESS (t -stat)	POST (t -stat)	F -stat DW
Eurodollar V_t (478)	0.63 (2.78)	-0.29 (-2.06)	0.10 (0.56)	-0.77 (-4.54)	13.87 1.83
Eurodollar Q_t (479)	1.15 (4.82)	-0.25 (-1.23)	0.61 (3.19)	-0.89 (-3.22)	24.06 1.36
T-note V_t (453)	1.59 (4.63)	0.66 (2.49)	1.04 (4.35)	-0.13 (0.51)	7.31 1.91
T-note Q_t (478)	1.06 (4.12)	0.03 (0.19)	0.57 (2.83)	-1.33 (-3.75)	26.13 1.64
E-mini V_t (405)	1.23 (1.88)	-0.12 (-0.22)	1.03 (2.03)	0.37 (0.88)	1.66 2.09
E-mini Q_t (405)	0.39 (1.66)	-0.46 (-3.15)	0.23 (1.74)	0.64 (2.87)	15.61 1.48
Wald $\sum_i \beta_i = 0$	6.87 [18.37]	0.39 [0.19]	4.38 [23.09]	-3.62 [6.48]	

Constant terms included but not tabulated. HAC standard errors.