Relief Rallies after FOMC Announcements as a Resolution of Uncertainty

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Abstract

We find substantial positive average stock returns after FOMC announcements accompanied by

We show that FOMC announcements with SEP and press conference give rise to significant positive average stock returns. These rallies are substantial: During the first hour after such announcements, the U.S. stock prices increase on average by approximately 49 basis points. These returns are not driven by good news about monetary policy or outliers. A trading strategy of buying the E-mini S&P 500 futures contracts five minutes before the FOMC announcements with SEP and press conference and closing the position 55 minutes after the announcement would have earned an annualized Sharpe ratio of 1.78.

We examine what drives the high average post-announcement returns. In classical asset pricing theory, positive expected excess returns represent compensation for systematic risk. However, recent literature shows that uncertainty also influences asset prices. For example, Bansal and Yaron (2004) show theoretically that the equity premium contains a component driven by fluctuations in economic uncertainty; a d92 -2.3 T4WMfly i (ly i (ly i] ly i (lc)4 (om)-2 (pe)4 (ns)-1

decline after FOMC announcements without SEP and press conference. We then conduct an analysis to relate the magnitude of the E-mini S&P 500 index positive unconditional average returns to the amount of uncertainty resolved around these FOMC announcements. We measure the amount of uncertainty resolved by changes in the VIX. Because the changes in VIX cannot be assumed to be exogenous, we use the two-stage least squares regression where the instrumental variable is the one-day lag of the VIX. We show that the positive unconditional stock returns after the FOMC announcements with SEP and press conference disappear after controlling for the change in VIX, supporting the conclusion that these returns are related to the resolution of uncertainty.

We complement this aggregate analysis by a disaggregated analysis of individual stocks. Building on Ang, Hodrick, Xing and Zhang (2006), Chang, Christoffersen and Jacobs (2013), and Cremers, Halling and Weinbaum (2015) who estimate models that include a volatility factor, we estimate a two-factor model and show that stocks that are more sensitive to volatility shocks have higher returns on FOMC announcement days with SEP and press conference. This finding is

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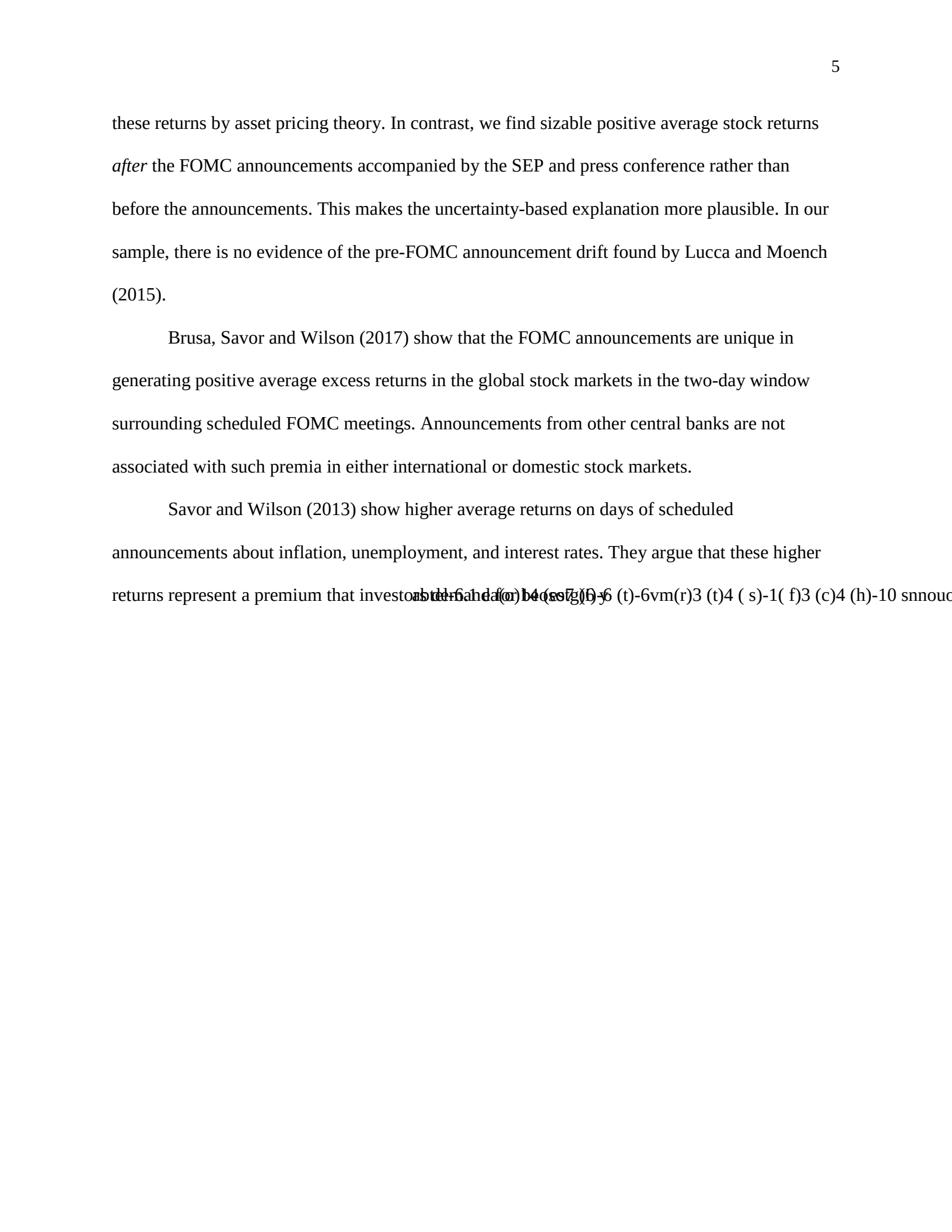
these returns by asset pricing theory. In contrast, we find sizable positive average stock returns *after* the FOMC announcements accompanied by the SEP and press conference rather than before the announcements. This makes the uncertainty-based explanation more plausible. In our sample, there is no evidence of the pre-FOMC announcement drift found by Lucca and Moench (2015).

Brusa, Savor and Wilson (2017) show that the FOMC announcements are unique in generating positive average excess returns in the global stock markets in the two-day window surrounding scheduled FOMC meetings. Announcements from other central banks are not associated with such premia in either international or domestic stock markets.

Savor and Wilson (2013) show higher average returns on days of scheduled announcements about inflation, unemployment, and interest rates. They argue that these higher returns represent a premium that investors demand for bearing



In a concurrent independent study, Boguth, Gregoire and Martineau (2018) analyze the economic consequences of the Fed's practice to hold press conferences after every other FOMC meeting. They provide evidence that this communication policy has unintended consequences.

January 2012 because that is when the FOMC started releasing individual members' assessments of the appropriate future levels of the federal funds target rate.

Plosser (2012) argues that adding the information about the appropriate future levels of the federal funds target rate was a major enhancement because it helps market participants establish a connection between expected economic conditions discussed in the SEP and future monetary policy, which conveys information about the Fed's reaction function.[7] Furthermore, by providing information about the full range of views of appropriate policy, the "dot plots" help investors quantify and therefore reduce uncertainty about the future monetary policy.

2.2. Data and Summary Statistics

We measure stock returns as continuously compounded (log) returns computed using five-minute data for the nearby E-mini S&P 500 index futures contracts. The nearby contract liquidity declines in its last few days of trading. Therefore, the next closest contract is used when its daily trading volume exceeds the nearby contract volume. Summary statistics for stock returns in two intraday windows around the FOMC announcements are shown in Panels A and B of Table 1. To highlight characteristics of FOMC announcements with SEP and press conference, the statistics are computed separately for FOMC meetings with and without SEP and press conference. The table also shows the average realized volatility and trading volume around the announcements. The realized variance is computed as the sum of squared five-minute returns because this measure represents a more accurate measure of ex-post return variation than the more traditional sample variance.[8]

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were four FOMC announcements with the SEP and press conference; the FOMC statement and the SEP were released simultaneously at 2:00 p.m. Before January 2013, press conferences started at 2:15 p.m. Since then, the press conferences were scheduled to start at 2:30 p.m., 30 minutes after the release of the FOMC statements.

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Lucca and Moench (2015) document large positive stock returns in the 24 hours before scheduled FOMC announcements. They find that the one-year rolling average of pre-FOMC stock returns is positive for most of their 1980-2011 sample period.

earned after FOMC announcements with SEP and press conference, the cumulative average returns after

used in Wright (2012) and Glick and Leduc (2012). Figure 4 shows that the announcements with SEP and press conference exhibit a negative relation between returns and monetary surprises. However, even most announcements that result in upward revision of rate expectations are accompanied by positive stock returns. In contrast, returns after FOMC announcements without SEP and press conference are not related to monetary surprises, and the average stock return after such announcements is close to zero. Monetary surprises on days with SEP and press conference are often larger than those on days with other FOMC announcements.

[Insert Figure 4 here]

In addition to providing visual evidence, we regress post-announcement stock returns on monetary policy shocks. To examine whether the average return after the FOMC announcements with SEP and press conference is statistically different from that after the announcements without SEP and press conference, we estimate the following event study regression with OLS:

$$= {}_0 + {}_0 \quad + {}_0\Delta \quad + \quad , \tag{1}$$

where is the E-mini S&P 500 index futures contract return,[13] is a dummy variable equal to one for announcements with SEP and press conference and zero otherwise, and Δ is the change in the rate of Eurodollar futures with 8-9 quarters to expiration. and Δ are measured over intraday event windows around FOMC announcements starting five minutes before the announcement and ending 55 minutes and 100 minutes after the announcement; the wider window ends 100 minutes after the announcement because several FOMC announcements in our sample occurred at 2:15 pm and intraday VIX data used in subsequent analysis is not available after the 4 p.m. stock market close. The constant ${}_0$ captures the average unconditional mean

[13] The results in Table 2 are almost identical when we use returns on the spot S&P 500 index.

returns earned after the announcements without SEP and press conference. The coefficient $_0$ is the mean return differential for announcements with SEP and press conference.

Panel A of Table 2 reports estimates of a baseline regression without the SEP dummy. Consistent with previous literature, we show that the stock market significantly and negatively reacts to the monetary policy shocks. Using the 60-minute window, a hypothetical 25-basis-point decline in the expected short-term interest rate two years ahead is on average associated with a 1.08% increase in the stock market. Importantly, the intercept estimate that captures the unconditional mean return is positive and statistically significant, suggesting that the monetary policy shocks contribute a

$$= {}_0 + {}_0 \quad + {}_0(1 - \quad)\Delta \quad + {}_1 \quad \Delta \quad + \quad . \qquad (2)$$

While the coefficient ${}_0$ in the Panel B regression measures the average response to the interest rate shocks for all announcements, this regression measures the response separately for announcements accompanied by SEP and press conference (measured by ${}_1$) and those without SEP and press conference (measured by ${}_0$). Panel C of Table 2 shows the results. The positive average post-announcement returns still exist only after announcements with SEP and press conference. The other FOMC announcements do not show a significant response of the stock market to changes in interest rate expectations. This difference between SEP announcements and other FOMC announcements is likely due to two reasons. First, the monetary surprises are lower around announcements without SEP than announcements with SEP as shown in Figure 4. For example, in the (-5 min, +55 min) window, the standard deviations of the monetary surprises are 0.100 and 0.038 around SEP and other FOMC announcements, respectively. Since other FOMC announcements have smaller monetary surprises, they carry less relevant information. Second, investor attention may differ. Boguth et al. (2018) argue that investors pay less attention to the FOMC announcements without press conferences. DellaVigna and Pollet (2009) and Hirshleifer, Lim and Teoh (2009) show that investor inattention and distraction by extraneous news events increase underreaction of prices to earnings announcements. Chen, Liu, Lu and Tang (2016) and Benamar, Foucault and Vega (2018) provide evidence that when investors pay less attention to

presented in Table 2 to different measures of monetary shocks. Section 3.2.3 addresses potential endogeneity.

3.2.1. Sample Size

Our five-year sample period contains 40 FOMC announcements. To address a potential concern about the effect of a small sample on inferences, we conduct two robustness checks. First, to make sure that the OLS regression results in Table 2 are not driven by a small number of outliers, we use the weighted least squares procedure of Yohai (1987). This so-called MM estimator is robust in the presence of outliers. Table 2 shows that the robust regression results are essentially the same as the OLS results.[14]

Second, we perform a bootstrapping exercise similarly to Lucca and Moench (2015). We draw with replacement 1,000 samples of returns and interest rate shocks from policy announcements with and without SEP and press conference. Each random sample contains 21 FOMC announcements with SEP and press conference and 19 announcements without SEP and press conference. We then estimate equation (1) for each random sample and examine the empirical distribution of the coefficient estimates. Table 3 shows that the mean and standard deviation of the estimated coefficient of the SEP dummy are almost identical to the corresponding estimates in Table 2.

[Insert Table 3 here]

[14]

3.2.2. Alternative Measures of Monetary Shocks

In Table 2, we measured the monetary surprise as the change in the rate of Eurodollar futures with 8-9 quarters to expiration. In this section, we test robustness of the results to three other measures of monetary shocks. First, we use the rate of the nearby (one quarter to expiration) Eurodollar futures to measure news about current short-term interest rates. The results are similar to the results in Table 2, although the R^2 is lower. Second, following Rogers, Scotti and Wright (2018), we measure the monetary shocks using the price changes in the five-year U.S. Treasury futures. The results are again similar to those in Table 2. Third, we attempt to account for two dimensions of monetary policy: changes in the Fed's forward guidance, proxied by the change in the rate of Eurodollar futures with 4-5 quarters to expiration, and news about bond purchases under the quantitative easing programs, proxied by the change in the ten-year U.S. Treasury yield. When both of these policy factors are included in the model instead of the single monetary shock, the coefficient estimates of the SEP dummy are essentially unchanged.[15] We conclude that good news about monetary policy does not explain the positive avw po5 6n

regression for all days in the sample rather than only for the FOMC announcement days. Interest rate changes on non-FOMC days are used to control for the relation between expectations of monetary policy and asset returns due to incoming economic news. We implement this approach by estimating the following regression:

$$= {}_0 + {}_1 \quad + {}_2 \quad - \quad + {}_3 \quad + {}_0\Delta \quad + {}_1\Delta \quad + {}_2\Delta \quad - \quad + \quad , \quad (3)$$

where is the daily return on the S&P 500 index, is a dummy variable for the FOMC announcement days with SEP and press conference, - is a dummy variable for the FOMC announcement days without SEP and press conference, is a dummy variable for days with Producer Price Index (PPI) and unemployment rate announcements, and Δ is the daily change in the rate of Eurodollar futures with 8-9 quarters to expiration.

This regression uses data for all days in the sample period. Coefficients $_1$ and $_2$ capture unconditional stock returns on FOMC announcement days with and without SEP and press conference, respectively. Coefficient $_3$ represents additional return earned on days of PPI and unemployment rate announcements. A positive and significant estimate of this coefficient would indicate that the average stock returns on such days are higher as suggested by Savor and Wilson (2013).[16] Coefficient $_0$ measures the "normal" relation between stock returns and interest rate changes. This relation is driven by the response of stock prices and monetary policy expectations to economic developments and possibly by the reaction of monetary policy to the stock market. Coefficients $_1$ and $_2$ capture the changes in this relation associated with monetary policy decisions on FOMC announcement days with and without SEP and press conference, respectively.

[16] PPI and unemployment rate announcements occur monthly. The corresponding dummy variable is equal to one on 120 days in our sample period.

The results reported in Table 4 are generally consistent with the intraday event study regression results in Table 2.

annualized Sharpe ratio of approximately 1.78.[17] For comparison, Lucca and Moench (2015) report an annualized Sharpe ratio of 1.14 for a trading strategy designed to capture the pre-FOMC announcement drift.

[Insert Table 5 here]

4. Positive Returns after FOMC Announcements as a Resolution of Uncertainty

This section relates the positive unconditional average returns after FOMC announcements to changes in uncertainty. We proceed in three steps. In Section 4.1, we show that SEP and press conference contain market-moving information. In Section 4.2, we show that uncertainty decreases after

First, SEPs contain FOMC members' projections of three macroeconomic indicators: real GDP growth, unemployment rate, and inflation. For each SEP and each of the three economic indicators, we calculate the change in the median projection since the previous SEP. We then use the first principal component of these changes to proxy for the macroeconomic information contained in the SEP released on day *t*. We use an event study regression to test whether this variable explains some of the changes in interest rate futures prices after the SEP release. The dependent variable of the regression is the change in the 8-9 quarters ahead Eurodollar futures rate from five minutes before to 55 and 100 minutes after the SEP release. The results in Panel A of Table 6 show that economic projections included in the SEP contain new information influencing expectations of future interest rates.

[Insert Table 6 here]

Second, we test whether the SEP conveys new information about future monetary policy. We regress the change in the 8-9 quarters ahead Eurodollar futures rate on the change in the median projection of the federal funds rate for year + 2 contained in the SEP. The results in Panel B of Table 6 provide evidence that expectations of future short-

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number of words considered positive by the lexicon and measure the press conference tone using the percentage of positive words in the transcripts.[19] We regress the change in the 8-9 quarters ahead Eurodollar futures rate in the event windows from five minutes before to 55 and 100 minutes after the beginning of the press conference on this tone variable. Panel C of Table 6 shows that there is a statistically significant relation between the press conference tone and expectations of future short-term interest rates. We then follow with the Sentiment and Emotion Lexicons compiled by the National Research Council Canada (NRC hereafter). Panel D of Table 6 reports the results. The results agree with Panel C although at a lower statistical significance level, which is not surprising since the Loughran and McDonald (2011) lexicon is designed specifically for financial texts (such as 10-K reports in Loughran and McDonald, 2011) whereas the NRC lexicon is designed for texts in general.[20]

Overall, the results in Table 6 suggest that both the SEPs and press conferences contain information that affects the interest rate futures market. Therefore, FOMC meetings accompanied by these communications are likely to be associated with increased uncertainty.

4.2. Uncertainty around FOMC Announcements

This section examines what happens to uncertainty around FOMC announcements. Since uncertainty can be measured in multiple ways, we use five measures to capture various types of uncertainty (VIX and S&P 500 options trading as measures of market uncertainty, and TYVIX,

[19] Garcia (2013) uses a similar methodology to examine the effect of news sentiment on the stock market.
[20] Sharpe, Sinha and Hollrah (2017) propose another word list in their analysis of the Federal Reserve Board Greenbooks tone. Applying this word list to the press conference transcripts does not yield significant results possibly for two reasons. First, because the Sharpe et al. (2017) word list is short (approximately 200 positive wor doxs la[(G)5.1 (r)1

interest rate options trading, and Google searches for “fed meeting” as measures of monetary policy uncertainty) to ensure that our results are not driven by one specific definition of uncertainty. Our analysis of these measures shows that uncertainty decreases after the FOMC announcements accompanied by SEP and press conference.

First, Ederington and Lee (1996) argue that the release of prescheduled news leads to the

controlling for macroeconomic announcements with a dummy variable for days with Producer

with Beber and Brandt (2009), this indicates that FOMC announcements with SEP and press conference resolve market uncertainty.

Third, the FOMC statements contain information about future monetary policy and have a direct effect on returns of Treasury securities. One can measure monetary policy uncertainty using implied volatilities of options on Treasury security futures.[24] Therefore, we use the CBOE/CBOT 10-year U.S. Treasury Note Volatility Index (TYVIX) derived from the prices of options on the 10-year U.S. Treasury futures as a measure of monetary policy uncertainty.[25] Figure 6 depicts the median daily TYVIX values around FOMC announcements with and without SEP and press conference. TYVIX is significantly higher before FOMC announcements with SEPs than FOMC announcements without SEP and press conference. In addition to providing this visual evidence, we estimate a daily time-series regression of the TYV6eoEV6 wP2 (e)egof ailiaT

offer such trading opportunities based on the mid-range of the yield curve.[26] Panel C of Table 8 reports changes in the Eurodollar Mid-Curve option volume on the announcement day relative to the average daily level in the week before the FOMC meeting. Relative to FOMC announcement days without SEP and press conference, announcements with SEP and press conference are associated with significantly greater abnormal trading volume in this market. As in the S&P500 index options, the trading activity in the Eurodollar Mid-Curve options is consistent with higher uncertainty associated with FOMC announcements accompanied by SEP and press conference.

[Insert Table 8 here]

Fifth, agents mitigate uncertainty about economic fundamentals by acquiring information

$$= {}_0 + {}_1 {}_{,-1} + {}_2 {}_{,-1} + {}_0 + {}_1 {}_{,-1} + {}_2 {}_{,-1} + {}_0 + {}_1 {}_{,-1} + {}_2 {}_{,-1} \Delta + \quad , \tag{5}$$

where is the daily return of individual stocks in the S&P 500 index on FOMC announcement days, and $_{,-1}$ and $_{,-1}$ are the 126-trading-day rolling market and VIX factor loadings one day before the FOMC announcement, respectively. As in equations (1) through (4), is a dummy variable equal to one for FOMC announcements with SEP and press conference, and Δ is the change in the 8-9 quarters ahead E,,odd:lMfžâi© Aè NLover the Ò wiÄ ðSö ¤Ú!¤

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Table 1

Table 2

Table 3
Empirical distribution of the estimated SEP dummy coefficient

	(-5 min, +55 min) window		(-5 min, +100 min) window	
	Mean	Standard Deviation	Mean	Standard Deviation
Panel A. Model with intercept dummy				
SEP dummy ($_0$)				

Table 4
Daily time series regression

Intercept (

Table 5
Sharpe ratios

	(-5 min, +55 min) window		(-5 min, +100 min) window	
	Sharpe Ratio	Annualized Sharpe Ratio	Sharpe Ratio	Annualized Sharpe Ratio
Panel A. E-mini S&P 500 Index Futures				

Table 6
Information content of the SEP and press conference

	(-5 min, +55 min) window	(-5 min, +100 min) window
Panel A. Effect of macroeconomic projections on interest rate futures		
Intercept	-0.009 (0.020)	-0.011 (0.024)
Economy	0.028 (0.014)*	0.037 (0.017)**
N	21	21
^{2}	0.079	0.102
Panel B. Effect of federal funds target rate projections on interest rate futures		
Intercept	-0.017 (0.021)	-0.023 (0.024)
Δ	0.078 (0.033)**	0.105 (0.040)**
N	20	20
^{2}	0.124	0.160
Panel C. Effect of press conference tone on interest rate futures analyzed using the McDonald lexicon		
Intercept	0.112 (0.041)**	0.113 (0.044)**
Tone	-0.090 (0.032)**	-0.088 (0.034)**
N	21	21
^{2}	0.149	0.111
Panel D. Effect of press conference tone on interest rate futures analyzed using the National Research Council Canada Sentiment and Emotion Lexicons		
Intercept	0.245 (0.126)*	0.279 (0.136)*
Tone	-0.036 (0.018)*	-0.040 (0.020)*
N	21	21
^{2}	0.107	0.105

Table 7
Daily time series regression for uncertainty measures

	VIX	TYVIX
Intercept ($_0$)	0.18 (0.20)	0.30 (0.12)**
SEP dummy ($_1$)	-7.26 (1.59)***	-5.98 (1.32)***
Non-SEP dummy ($_2$)	1.65 (1.41)	-0.61 (0.59)
Macroeconomic news dummy ($_3$)	-1.37 (0.72)*	-2.20 (0.60)***
N	1,257	1,257
^{2}	0.019	0.044

The table reports estimates for the following model:

$= {}_0 + {}_1 + {}_2 {}^{-} + {}_3 + $, where is the daily log difference of the VIX index and the TYVIX index multiplied by 100 in the first and second columns, respectively, is a dummy variable for the FOMC announcement days with SEP and press conference, $^{-}$ is a dummy variable for the other FOMC announcement days, and is a dummy variable for days with Producer Price Index (PPI) and unemployment rate announcements. The sample period is from January 2012 through December 2016. The regression is estimated using OLS regression with the Newey-West (1987) standard errors. Standard errors are shown in parentheses. *, **, *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

Table 8
Option trading volume on FOMC announcement days

	Announcements without SEP (N=19)	Announcements with SEP (N=21)	Difference (with SEP – without SEP)
Panel A. S&P 500 index option average volumes			
Total volume	823,952	1,116,826	292,874***[a]
Put option volume	499,578	692,484	192,906***[a]
Call option volume	324,374	424,342	99,967**[b]
Panel B. S&P 500 index option average abnormal volumes			
Total volume	-30,520		

Table 9
Daily time series regression results controlling for VIX changes

	2SLS	OLS
Intercept ($_0$)	0.05 (0.01)***	0.05 (0.01)***
SEP dummy ($_1$)	0.08 (0.14)	-0.15 (0.10)
Non-SEP dummy ($_2$)	-0.13 (0.11)	-0.06 (0.10)
Macroeconomic news dummy ($_3$)	-0.04 (0.06)	-0.09 (0.05)*
Rate change ($_0$)	2.73 (0.73)***	1.33 (0.39)***
Rate change × SEP dummy ($_1$)	-5.79 (1.35)***	-3.76 (0.99)***
Rate change × Non-SEP dummy ($_2$)	1.85 (1.77)	1.82 (1.52)
Change in VIX ($_0$)	-5.63 (1.21)***	-8.88 (0.29)***
N	1,257	1,257
^{2}	0.61	0.70

The table reports estimates for the following model:

$= {}_0 + {}_1 + {}_2 - + {}_3 + {}_0\Delta + {}_1\Delta + {}_2\Delta - + c_0\Delta + ,$

where is the daily return on the S&P 500 index, is a dummy variable for the FOMC announcement days with SEP and press conference, - is a dummy variable for the other FOMC announcement days, is a dummy variable for days with Producer Price Index (PPI) and unemployment rate announcements, Δ is the daily change in the rate of Eurodollar futures with 8-9 quarters to expiration, and Δ is the daily log difference of the VIX index. The sample period is from January 2012 through December 2016. The regression is estimated using two-stage least squares regression with Newey-West (1987) standard errors and OLS with the Newey-West (1987) standard errors in the first and second columns, respectively. The instrumental variable in the two-stage least squares regression is the one-day l

Table 10
Event study regression for daily disaggregated stock returns

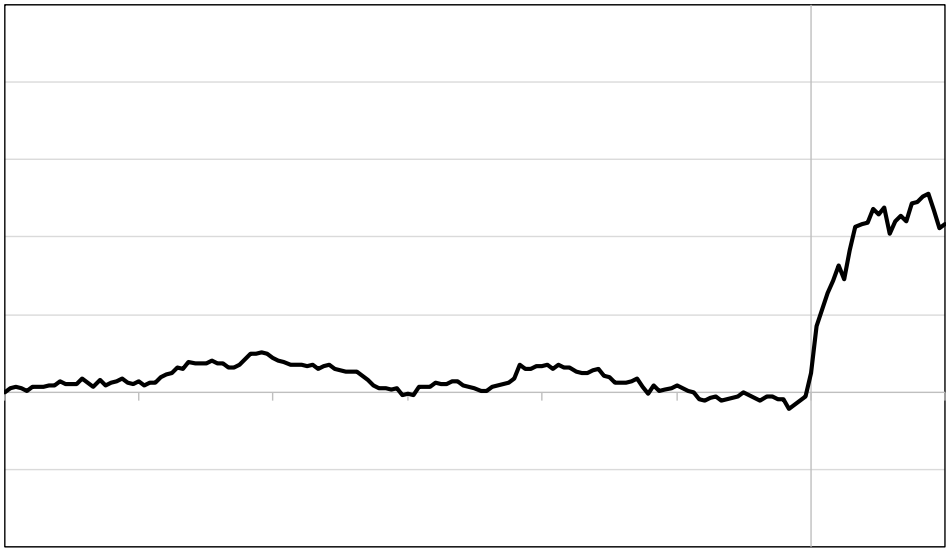
Intercept ($_0$)	-0.26 (0.02)***
Market beta ($_1$)	0.03 (0.03)
VIX beta ($_2$)	-0.07 (0.03)**
SEP dummy ($_0$)	0.77 (0.03)***
SEP dummy×Market beta ($_1$)	0.13 (0.04)***
SEP dummy×VIX beta ($_2$)	0.17 (0.04)***
Monetary surprise ($_0$)	-4.36 (0.17)***
Monetary surprise × Market beta ($_1$)	-0.53 (0.27)**
Monetary surprise × VIX beta ($_2$)	0.32 (0.27)
N	19,000
^{2}	0.09

The table reports estimates for the following model: $= _0 + _1 _{,-1} + _2 _{,-1} + _0 + _1 _{,-1} + _2 _{,-1} + _0 + _1 _{,-1} + _2 _{,-1} \Delta + $, where is the daily return of individual stocks in the S&P 500 index on FOMC announcement days, Δ is the change in the 8-9 quarters ahead Eurodollar futures rate computed over the window from five minutes before to 55 minutes after the release of the FOMC statement, is a dummy variable equal to one for FOMC announcements with SEP and press conference, and $_{,-1}$ and $_{,-1}$ are the 126-trading-day rolling market and VIX betas one day before FOMC announcement, respectively. The market and VIX betas are estimated by regressing returns of stocks in the S&P 500 index on daily market excess returns and daily log-changes in the VIX ---

Figure 1. Kernel densities of post-announcement returns

This figure plots kernel densities of continuously compounded returns of the E-mini S&P 500 futures. The

Figure 2. Cumulative average returns
Panel A. FOMC announcements with SEP

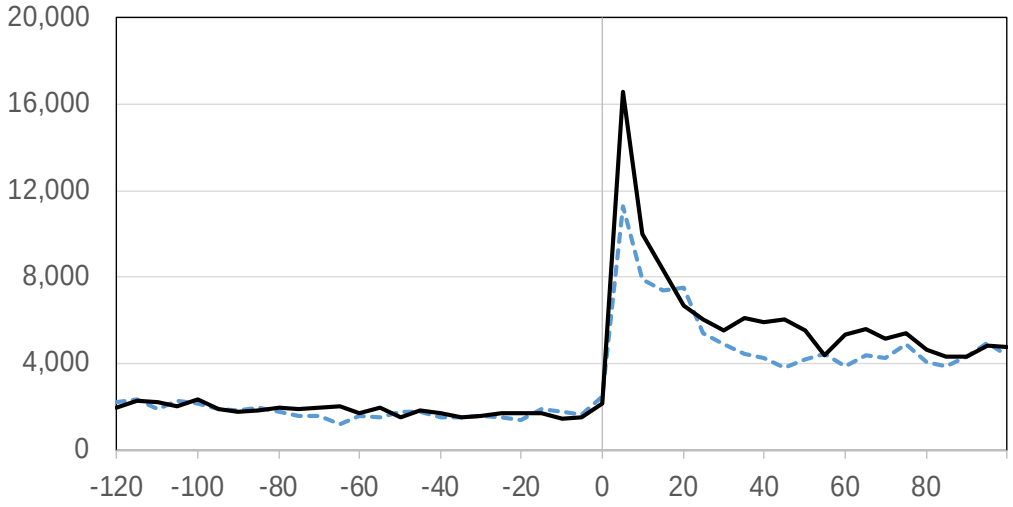


Panel B. FOMC announcements without SEP

This figure shows the average cumulative returns of the E-mini S&P futures around the FOMC announcements. The event window is from twelve hours before to two hours after the release of FOMC statements. The solid lines in Panels A and B are for the cumulative average returns on policy days with and without SEP and press conference, respectively. The dashed lines represent 95% confidence intervals computed by assuming that the average cumulative returns follow the asymptotic normal distribution. The sample period is from January 2012 through December 2016 and contains 40 FOMC announcements, including 21 announcements with SEP and press conference.

Figure 3. Trading volume and return volatility

Panel A. Average trading volume



Panel B. Standard deviation of returns

Panel A shows the average per-minute trading volume of the E-mini S&P 500 futures. Panel B shows the standard deviation of five-minute returns of the E-mini S&P 500 futures. The event window is from 120 minutes before to 100 minutes after the release of FOMC statements. The solid and dashed lines represent policy announcements with and without SEP and press conference, respectively. The sample period is from January 2012 through December 2016 and contains 40 FOMC announcements, including 21 announcements with SEP and press conference.

Figure 4. Monetary surprises and post-announcement stock returns

This figure plots post-announcement returns of the E-mini S&P 500 futures against monetary surprises. The event window is from five minutes before to 55 minutes after the release of the FOMC statement. The monetary surprise is computed as the change in the 8-9 quarters ahead Eurodollar futures rate. The dashed and dotted lines represent the regression lines for the FOMC announcements with and without SEP and press conference, respectively. The sample

Figure 6. CBOE/CBOT 10-year U.S. Treasury Note Volatility Index

The figure shows median daily values of CBOE/CBOT 10-year U.S. Treasury Note Volatility Index. The solid line represents policy announcements with SEP and press c a