The Market Impact of Fed Communications: The Role of the Press Conference

Erratum

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The version of our paper from October 24, 2024 contained an error in the timing of four press conferences. In our press conference sample listed in Appendix Table A1, the start and end times for the press conferences on 3/20/13, 6/19/13, 9/18/13, and 12/18/13 were shifted forward by fifteen minutes. The correct start time for the four conferences is 14:30.

An updated version of our paper from January 6, 2026 updates all exhibits and analyses to incorporate the correct start and end times for these conferences.

The Market Impact of Fed Communications: The Role of the Press Conference*

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Abstract

We document a shift in the market impact of the press conference given by the Federal Reserve Chair at the close of FOMC meetings. Using intraday trading data, we find that market volatility is more than three times higher during press conferences given by Chair Jerome Powell than during press conferences by his predecessors Janet Yellen and Ben Bernanke. Press conferences since the start of Covid-19 are largely responsible for the heightened market volatility during Chair Powell's conferences. During this period, we find that markets tend to move in the opposite direction during the press conference compared to their movements following the release of the FOMC statement. In contrast, press conferences by Chairs Bernanke and Yellen tended to reinforce the markets' initial reactions to the FOMC statement. Text analysis of press conferences transcripts suggests that Chair Powell's choice of language during the press Q&A correlates with these market movements. We find that Fed communications during this period have been less effective in reducing forward-looking interest rate uncertainty.

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1 Introduction

Financial markets react sharply and instantaneously to communications from the Federal Reserve (Fed) (Fleming and Remolona, 1999). New evidence suggests that investors learn not just about the nominal short-run interest rate, which is set by the Federal Open Market Committee (FOMC), but also change their views about long-run macroeconomic conditions in response to Fed communications (Hillenbrand, 2022). Consequently, the Fed has become increasingly transparent over time about both the information it has about the economy and its views on the forward path of monetary policy (Nelson, 2021).

Starting in April 2011, Chair Bernanke redoubled this commitment to transparency by holding a press conference after the release of the FOMC statement. In this inaugural conference, he stated his intention was to "[...] reflect the consensus of the Committee, while taking note of the diversity of views as appropriate." Since its introduction, the press conference has become a highly-anticipated part of the Fed's communications with the public. Recent events highlight the impact that the press conference can have on markets: during six FOMC press conferences in 2022, the S&P 500 lost or gained over 1 percent—$300 billion—in value.[1]

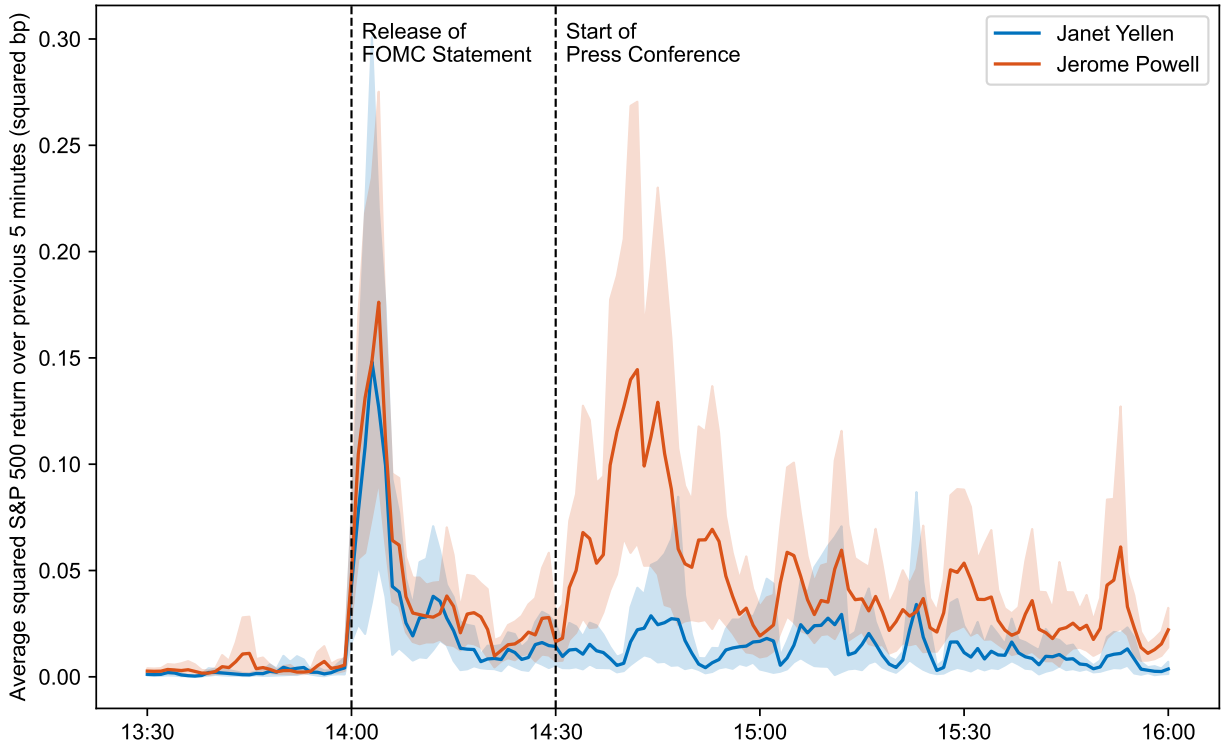
In this paper, we document a significant departure in the nature of market reactions to press conferences under the tenure of Chair Jerome Powell. While Fed press conferences have been associated with heightened market volatility since their inception (De Pooter 2021, Gómez-Cram and Grotteria 2022), we document a sharp increase in market volatility during Chair Powell's conferences. Figure 1 illustrates the heightened volatility during Chair Powell's press conferences as compared to his predecessor, Chair Yellen. While market volatility—measured as squared returns on the S&P 500 index—is similar for both Chairs following the release of the FOMC statement at 14:00, the degree of market volatility during the press conference starting at 14:30 is much higher for Chair Powell.

Specifically, we find that squared returns on market indices over Chair Powell's press conferences are three times higher on average than during press conference by Chairs Bernanke and Yellen. This heightened volatility does not appear to be due to higher baseline market volatility or more volatility around Fed communications at large. We find that market volatility following the FOMC statement release and during placebo windows in weeks prior to the press conference are similar across all chairs. Meetings taking place since the start of the Covid-19 pandemic (i.e., since March 2020) are largely responsible for the heightened market volatility during press conferences during Chair Powell's tenure.

In addition to heightened market volatility, we find that press conferences under Chair Powell's

[1]There are no instances of the S&P 500 losing or gaining over 1 percent in value in windows on the same day and time as the 73 press conferences in our sample but one, two, or four weeks prior.

Figure 1: Market volatility on FOMC press conference days under Chairs Yellen and Powell.



Note: Average squared returns on the S&P 500 index (proxied by the SPY ETF) over five-minute periods on days of regularly-scheduled Fed press conferences. Dashed lines indicate the FOMC statement release time (14:00) and press conference start time (14:30 PM). The figure does not show conferences by Chair Bernanke since the timing of the FOMC statement release and press conference differed under his tenure. Shaded areas are bootstrapped 95 percent confidence intervals.

tenure have tended to reverse initial market reactions to the FOMC statement. While press conferences given by former Chairs Bernanke and Yellen tended to reinforce the FOMC statement, generating a positive correlation between the initial market reaction to the FOMC statement and the market reaction to their press conferences (as previously documented by Gómez-Cram and Grotteria 2022), Chair Powell's press conferences tend to trigger *opposite* moves in both equity and Treasury markets. These market reversals are concentrated during press conferences since the beginning of Covid-19, suggesting a shift in the market impact of Fed communications under Chair Powell during a period of heightened macro uncertainty.

One explanation for the shift in the market impact of Fed press conferences is that the market has become overreactive to Fed communications, with little change in the underlying nature or content of the communications themselves. By analyzing text transcripts of Fed press conferences, we instead find that the patterns of heightened market volatility and reversals are connected to the language used during the question-and-answer (Q&A) portion of Chair Powell's press conferences.

Our approach is to build a corpus of words used in FOMC statements and assign a "valence" to each word using the reaction to FOMC statements containing that word. We then use this corpus to measure the valence of language used during the opening remarks and Q&A portions of press conferences. While the valence of language used during the press conference Q&A by Chairs Bernanke and Yellen tended to echo the valence of the FOMC statement and the market reaction to the FOMC statement's release, we find that this relationship is essentially flat or even reversed under Chair Powell. Moreover, departures in Chair Powell's language from the valence of the FOMC statement are predictive of both the direction of market movements during the press conference and heightened market volatility during the press conference.

Our analysis suggests that the press conference has played a more important role in determining market prices and expectations since the start of the Covid-19 pandemic, and that at least part of this shift can be attributed to changes in the content of communications. Of course, this shift in the role of the press conference may be meant to serve many different goals. We discuss explanations ranging from making space for nimble Fed policy to Chair Powell using the press conference to get out ahead of other FOMC members to manage dissent (thereby disciplining the communications "arms race" documented by Vissing-Jorgensen 2019). Ultimately, we evaluate this shift in communication strategy along one dimension—namely, its effectiveness in reducing uncertainty about the path of future interest rates. Following Sinha (2015) and Cremers et al. (2021), we use implied volatility from at-the-money options on short- and long-term Treasury futures as a proxy for interest rate uncertainty and study how this measure of interest rate uncertainty changes around FOMC press conferences.[2] We find that press conference dates during Chair Powell's tenure have been less effective in reducing forward-looking uncertainty on both short- and long-term interest rates. While this is by no means a comprehensive assessment of the success of this shift in communication, our analysis cautions that elevating the role of press conference communications may be at odds with the Federal Reserve's goal of increasing the predictability of monetary policy.

2 Related Literature

Our analysis relates to a vast literature that uses high-frequency data to document the effect of Fed actions on financial markets, including Kuttner (2001), Cochrane and Piazzesi (2002), Gürkaynak et al. (2005), Bernanke and Kuttner (2005), Hanson and Stein (2015), Gertler and Karadi (2015), Nakamura and Steinsson (2018), Cieslak and Schrimpf (2019), Miranda-Agrippino and Ricco (2021), Bauer and Swanson (2023a, 2023b) and Hillenbrand (2022), among many others. One

[2]Bauer et al. (2022) study a related measure of short-rate uncertainty constructed from prices of out-of-the-money LIBOR options. Consistent with our results, they find that this measure of interest rate uncertainty drops on the rate of FOMC meetings and attribute particularly steep declines in uncertainty to forward guidance announcements.

important finding in this literature is that Fed communications beyond immediate rate changes can impact markets. For example, Gürkaynak et al. (2005) show that markets react immediately to monetary policy announcements even when there is no change in the actual policy rate, and Nakamura and Steinsson (2018) and Hillenbrand (2022) argue that markets react to Fed actions and communications—beyond what is justified by policy changes alone—because they learn about the underlying state of the economy from Fed actions.

Most closely related to our analysis of Fed press conferences are De Pooter (2021), Gómez-Cram and Grotteria (2022), and Parle (2022). De Pooter (2021) finds that average absolute returns in the stock and bond markets are higher during Fed press conferences than during non-event windows, consistent with the release of market-relevant information during these press conferences. He documents that the language used by Fed Chairs during the press conference scores lower on a complexity index than language used in the FOMC statement and speculates that the clarity in press conference language may contribute to their impact on markets.[3] We build on De Pooter (2021) by documenting a shift in the market impact of Fed press conferences over time, documenting the increased frequency of market reversals during press conferences since the onset of Covid-19, and attempting to understand the affect of this shift on forward-looking uncertainty.

Gómez-Cram and Grotteria (2022) document a positive correlation between market reactions to FOMC statements and to the subsequent press conference and, by aligning press conference transcripts to high-frequency financial data, attribute this positive correlation to moments when the Fed Chair discusses the new policy statement. Their sample of FOMC days ends in January 2020. We also find a positive correlation between market reactions to the FOMC statement and to the press conference before 2020, reaffirming Gómez-Cram and Grotteria (2022). But, importantly, we find that this pattern reverses in the period since Covid-19.

Parle (2022) also studies the role of central bank press conferences, but in the context of press conferences given by the European Central Bank (ECB). Using natural language processing techniques, he finds that markets react to information shared by the ECB during its press conferences that are separate from the initial information shared in its monetary policy decision statement. Our evidence that language used by the Fed Chair during press conferences affects markets beyond the FOMC statement resonates with his findings. Other related work directly studies the nature of Fed communications, for instance by measuring the length, complexity, and sentiment of the FOMC statement (e.g., Hernández-Murillo and Shell 2014; Acosta and Meade 2015; Hansen and McMahon 2016; Josselyn and Meade 2017; Ehrmann and Talmi 2020; Gáti and Handlan 2022), or even by measuring changes in speaking tone (Gorodnichenko et al. 2023) or facial expression (Curti and Kazinnik 2023).

[3]He also shows that Chair Powell tends to use significantly less complex language during press conferences than his predecessors and shows how topics discussed during the press conference Q&A have evolved over time.

Finally, as part of our analysis, we discuss whether the shift in the role of the press conference is a beneficial one. Here, we relate to a large literature that considers the goals and effectiveness of monetary policy communication, surveyed by Blinder et al. (2008) and Coenen et al. (2017). Particularly relevant are Ehrmann and Fratzscher (2007), who question whether communicating the diversity of committee member views enhances the predictability of monetary policy; Stein and Sunderam (2018), who consider how gradualism in monetary policy communication affects market reactions; and Vissing-Jorgensen (2019), who studies the costs and benefits of the "communications arms race" among monetary policymakers.

3 Institutional Background and Data

This section provides a short summary of primary FOMC communications that will be important for our analysis, details how we construct our sample of press conferences dates, and describes our data on market reactions to Fed communications.

Background on key Fed communications tools. Since the 1990s, the Federal Open Market Committee (FOMC) has greatly expanded the ways in which policy decisions and the path of future policy are shared with the public. We briefly summarize the primary FOMC communication tools that will be important for our analysis below; for a more detailed guide to FOMC communications and their history, we refer interested readers to Appendix D of Cecchetti and Schoenholtz (2019).

The FOMC holds eight regularly scheduled policy meetings each year and, since May 1999, has released a statement at the close of each of these meetings announcing the committee's policy decision and economic outlook. We refer to this policy statement as the "FOMC statement" or "statement" in the remainder of this paper. Numerous studies explore changes in the structure and content of the FOMC statement (e.g., Hernández-Murillo and Shell 2014, Acosta and Meade 2015, Hansen and McMahon 2016) as well as market reactions to the FOMC statement over time (e.g., Gürkaynak et al. 2005; Rosa 2011a; Rosa 2011b).

In November 2007, Chair Ben Bernanke announced an expansion of the FOMC's communications on economic projections, releasing the first Summary of Economic Projections (SEP). The SEP includes FOMC participants' projections for GDP growth, the unemployment rate, inflation, and the appropriate Federal Funds rate over the coming years, and since its inception has been released quarterly, after every other FOMC policy meeting.

The practice of holding regularly scheduled press conferences at the close of FOMC meetings was instituted by Chair Bernanke in April 2011. Since their inception, these press conferences have consisted of a short set of opening remarks, during which the Chair typically summarizes the FOMC statement, and then a question-and-answer (Q&A) period with reporters that typically

lasts between forty and fifty minutes. Initially, these press conferences were held four times a year, only at the close of FOMC policy meetings where a SEP was also released. In January 2019, however, Chair Jerome Powell began holding press conference at the close of every FOMC meeting, doubling the frequency of press conferences to eight per year.

Press conference sample. We collect information on press conferences given at the close of FOMC policy meetings. Our sample, listed in Appendix Table A1, contains seventy-three regularly scheduled press conferences, starting with Chair Bernanke's inaugural press conference in April 2011 and ending with the press conference on March 20, 2024, the most recent conference at the time of our analysis. Since our focus is on the role of regularly scheduled press conferences as part of the Fed's portfolio of communications, we exclude three unscheduled and emergency press conferences from our analysis: the March 4, 2014 unscheduled conference call under Chair Yellen, and the emergency Covid-19-related press conferences on March 3 and March 15, 2020 held by Chair Powell.[4]

For each press conference date, we record the time at which the FOMC statement was released, the time at which the Chair's press conference started, and—using videos on the Federal Reserve website—the duration of the press conference.[5] Since the start of Chair Janet Yellen's term in March 2014, press conference days have followed a standardized schedule, with the FOMC statement released at 14:00, followed by the Chair's press conference at 14:30. However, this timing varied during Chair Bernanke's tenure: the FOMC statement was initially released around 12:30, until switching to the 14:00 release time in March 2013.[6] Chair Bernanke's press conferences also started at 14:15, rather than 14:30.

Appendix Table A1 also reports whether a Summary of Economic Projections (SEP) was released alongside the FOMC statement on each meeting date. During the tenures of Chairs Bernanke and Yellen, press conferences were only held on dates when the SEP was also released. However, when Chair Powell doubled the frequency of press conferences from four to eight meetings per year starting in January 2019, the SEP was released in advance of every other press conference (i.e., retaining four SEP releases per year).

[4]We omit these unscheduled / emergency press conferences because they do not follow the timing of regular press conferences—e.g., the emergency press conferences on March 3 and March 15 took place at 10am and 5pm respectively—and because market reactions to these conferences are not representative of press conferences at large.

[5]For example, we collect the length of the press conference in July 2022 from the video at `https://www.federalreserve.gov/monetarypolicy/fomcpresconf20220727.htm`.

[6]As noted in Appendix Table A1, for Chair Bernanke's initial press conferences, the SEP was released just before the press conference rather than alongside the FOMC statement. If anything, this timing should bias us to find more market volatility around press conferences during Chair Bernanke's tenure and would work against our main results on heightened volatility during Chair Powell's press conferences.

Data on market reactions. We collect data on market reactions to Fed communications on press conference days from three sources. First, to measure intraday reactions of equity markets, we collect tick-by-tick data from the NYSE Trade and Quote (TAQ) database on two exchange-traded funds (ETFs) that track the S&P 500 and Dow Jones Industrial indices. The S&P 500 and Dow Jones Industrial are two of the longest-standing and most commonly followed equity indices and track total market capitalization of large, U.S. public companies. The ETFs we use as proxies (SPY and DIA, provided by SPDR) track these underlying indices extremely closely; the correlation of market-close prices for each ETF with each index is over 0.9999. For all analyses, we collapse the tick-by-tick data at the minute level by taking the median mid price for each ticker in each minute.

Second, we collect data on intraday movements in bond yields using `USGG` indices provided by Bloomberg (e.g., the `USGG2YR` index for intraday data on two-year yields). Specifically, we assemble minute-by-minute data on bond yields using the last price for each Bloomberg index in each minute. Since intraday data on these indices is available from Bloomberg starting in 2013, we limit our analysis of movements in Treasury yields to start with Chair Yellen's tenure (i.e., March 2014–Present). Data from these Bloomberg indices aligns closely with daily Treasury yield data from Gürkaynak et al. (2007): from January 2011 to December 2022, the correlation of daily two-year Treasury and ten-year Treasury yields from Bloomberg indices with two- and ten-year par yields from Gürkaynak et al. (2007) is over 0.999.

Finally, we use daily measures of thirty-day implied volatility on at-the-money Treasury options from Bloomberg's LIVE calculation engine. This data source is an alternative to implied volatility measures constructed by the Chicago Board Options Exchange (CBOE), which were discontinued in May 2020. Nevertheless, the two measures are closely correlated: from January 2011 to May 2020, the correlation of daily 30-day implied volatility on at-the-money 10-year Treasury options from Bloomberg's LIVE calculation engine and from the CBOE is over 0.98. Note that the highest frequency data on implied volatility available to us is daily, and hence we are unable to separate the intraday effects of the FOMC statement and the press conference for our analysis of forward-looking uncertainty.

Appendix Table A2 reports summary statistics on the variables we collect from these three sources across all press conferences in our sample.

4 Empirical Evidence: Heightened Volatility and Reversals

In this section, we present two findings. First, we document a sharp increase in market volatility during press conferences under Chair Powell's tenure, consistent with the press conference taking on a more important role in affecting market expectations and prices. Second, we find a pattern of market reversals during Chair Powell's press conferences.

4.1 Heightened Market Volatility

Measuring market volatility. To explore market volatility during Fed press conferences, we measure market movements during three event windows: (1) from one minute before the press conference to the end of the press conference, (2) for the thirty minute window starting one minute before the FOMC statement release,[7] and (3) for the identical window as the press conference but the prior week prior to the conference, which we refer to as the "placebo conference." Our use of the same weekday and event window from the prior week as a placebo window follows Rosa (2013), who constructs such placebo windows for the release of FOMC minutes.

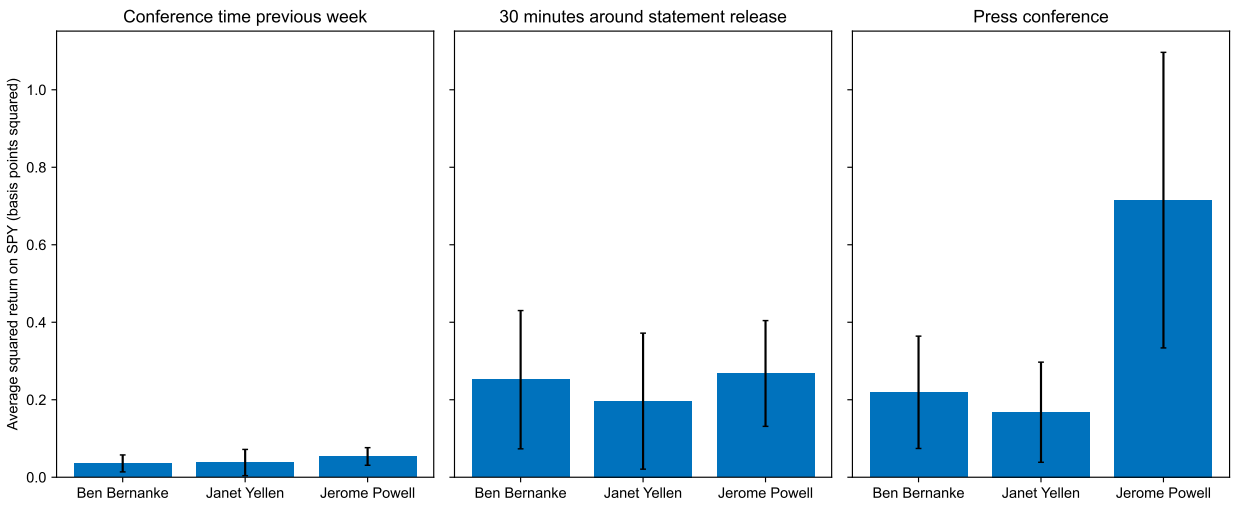
We construct two measures of market volatility over each of these event windows. Our baseline measure of market volatility is squared market returns, measured using returns on the S&P 500 (proxied using the SPY ETF) and Dow Jones Industrial index (proxied by the DIA ETF). Since market returns are measured from the beginning to the end of the event window, this measure captures the net effect of the event on market expectations and asset prices.

As an alternate measure of market volatility, we use the variance of returns measured in five-minute increments over the event window. This measure has the advantage of capturing market swings that take place during the event and is closer to a measure of the "gross" market volatility over the event window. While this measure allows us to compare market volatility across press conferences given by different Fed Chairs, it is less useful for comparing market volatility across different types of events, since the structures of these events differ. For example, the FOMC statement event window starts with a large release of information at the time of the statement publication, while the press conference involves the slow release of information over the course of the event as the Chair responds to reporter questions.

Heightened volatility during Chair Powell's press conferences. Figure 2 compares market volatility, using our baseline measure of squared S&P 500 returns, for the placebo conference, FOMC statement release, and the press conference under Chairs Ben Bernanke, Janet Yellen, and Jerome Powell. Two patterns emerge. First, average market volatility during the window around the FOMC statement release and during the press conference are both significantly higher than market volatility during the placebo period. This observation conforms with previous work by De Pooter (2021) and Gómez-Cram and Grotteria (2022), who document heightened market volatility during Fed press conferences. Second, there is a striking increase in market volatility during Chair Powell's press conferences compared to press conferences given by his predeces-

[7]For four of Chair Bernanke's conferences, the FOMC statement was released just fifteen minutes prior to the press conference. The FOMC statement release windows and press conference windows overlap for these four events in our baseline analysis. In Table 1, we repeat our analyses instead using 15 minute windows after the FOMC statement release, so that the two windows are always non-overlapping. The results are very similar.

Figure 2: Market volatility for placebo conference, FOMC statement release, and press conference under three chairs, measured using squared S&P 500 returns.



Note: The figure shows average squared returns of the S&P 500 index (proxied by the SPY ETF) during press conferences given by Chair Powell, Chair Yellen, and Chair Bernanke. We measure returns from the minute before the press conference starts to the minute it ends.

sors. Squared market returns during Chair Powell's press conferences are three times greater on average than squared returns during press conferences by Ben Bernanke and Janet Yellen. In contrast, squared market returns during the placebo period and in the 30 minutes following the FOMC statement release are similar across all three chairs.

We formally test for differences in market volatility across Chairs in Table 1, using the specification:

$$\text{MarketVolatility}_t = \alpha + \beta \cdot \text{Powell}_t + \varepsilon_t, \tag{1}$$

where t is the event, $\text{MarketVolatility}_t$ is the measure of market volatility during the event window, and Powell_t is an indicator equal to one if the event is during Chair Powell's tenure. We use heteroskedasticity-robust standard errors (in particular, we use HC3 standard errors proposed by MacKinnon and White 1985) when estimating this specification and all other specifications in the paper unless noted otherwise. Across market indices (S&P 500 or Dow Jones Industrial index) and across both measures of market volatility (squared market returns over the whole event window or squared returns over five-minute increments), press conferences under Chair Powell are associated with a significant uptick in volatility compared to press conferences under his predecessors.[8]

[8]Appendix Figure A1 plots volatility across events and Chairs using the Dow Jones Industrial index to measure market returns, and Appendix Figure A2 plots volatility across events and Chairs using squared returns in five-minute increments as the measure of volatility, in the same format as Figure 2. Both figures show an uptick in market volatility during Chair Powell's press conferences compared to his predecessors', but no significant differences in

Table 1: Robustness: Heightened market volatility during Chair Powell's press conferences.

	Regression coefficients				
Period	Intercept	Std. Err.	Powell	Std. Err.	R^2
Volatility measure: Squared S&P 500 returns over event					
Press conference	0.190**	(0.049)	0.525**	(0.203)	0.06
FOMC statement release (30min window)	0.220**	(0.065)	0.048	(0.096)	0.00
FOMC statement release (15min window)	0.153**	(0.059)	0.101	(0.094)	0.01
Placebo period (1 week prior)	0.037**	(0.011)	0.017	(0.016)	0.01
Placebo period (2 weeks prior)	0.032**	(0.009)	0.019	(0.031)	0.00
Placebo period (4 weeks prior)	0.070**	(0.016)	0.020	(0.029)	0.01
Volatility measure: Squared Dow Jones Industrial returns over event					
Press conference	0.155**	(0.043)	0.358**	(0.139)	0.06
FOMC statement release (30min window)	0.203**	(0.074)	0.007	(0.091)	0.00
FOMC statement release (15min window)	0.159**	(0.072)	0.037	(0.092)	0.00
Placebo period (1 week prior)	0.033**	(0.011)	0.015	(0.015)	0.01
Placebo period (2 weeks prior)	0.027**	(0.009)	0.021	(0.024)	0.01
Placebo period (4 weeks prior)	0.052**	(0.012)	0.043	(0.030)	0.02
Volatility measure: Variance of S&P 500 returns over 5-min increments					
Press conference	0.014**	(0.003)	0.038**	(0.012)	0.09
FOMC statement release (30min window)	0.029**	(0.005)	0.015	(0.011)	0.02
FOMC statement release (15min window)	0.041**	(0.009)	0.020	(0.017)	0.01
Placebo period (1 week prior)	0.004**	(0.001)	0.002	(0.001)	0.02
Placebo period (2 weeks prior)	0.004**	(0.001)	0.001	(0.001)	0.01
Placebo period (4 weeks prior)	0.007**	(0.002)	0.001	(0.002)	0.00
Volatility measure: Variance of Dow Jones Industrial returns over 5-min increments					
Press conference	0.012**	(0.003)	0.027**	(0.009)	0.09
FOMC statement release (30min window)	0.026**	(0.005)	0.008	(0.009)	0.01
FOMC statement release (15min window)	0.037**	(0.008)	0.010	(0.014)	0.01
Placebo period (1 week prior)	0.003**	(0.001)	0.002	(0.001)	0.03
Placebo period (2 weeks prior)	0.003**	(0.001)	0.001	(0.001)	0.02
Placebo period (4 weeks prior)	0.005**	(0.001)	0.036	(0.036)	0.01

Note: The variable Powell is an indicator set to one for press conferences given by Chair Powell and zero otherwise. For placebo periods, the variable Powell is equal to one if Chair Powell delivered the press conference that follows one, two, or four weeks after the placebo period. Squared market returns expressed in units of percent squared. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significant at 5%, * at 10%.

One explanation for the heightened market volatility during Chair Powell's conferences could be the more volatile macro environment under his tenure, which includes the pandemic response and subsequent resurgence of inflation. However, we do not find evidence of significant differences in volatility during the placebo window across the three chairs, suggesting the heightened volatility during Chair Powell's press conferences is not an artifact of higher baseline market volatility. To ensure this result is not driven by the blackout period on communications before the FOMC meeting, we construct alternative placebo windows two and four weeks before the press conference and again find no evidence of heightened baseline market volatility during Chair Powell's tenure.[9]

We also do not find evidence of differences in market volatility in the window around the FOMC statement release across the three chairs, suggesting that heightened volatility during Chair Powell's press conferences is not the result of more surprising interest rate policy. Appendix Table A3 also compares market volatility around the release of the FOMC meeting minutes (which occur three weeks after each policy meeting date) and again finds no evidence of heightened volatility during Chair Powell's tenure, suggesting the press conference results are not due to market responsiveness to FOMC communications at large.[10]

Given the similarity in market volatility during the placebo window and following the FOMC statement release across the three chairs, we interpret the heightened market volatility specifically during Chair Powell's press conferences as evidence that either markets have become more reactive to the information released at the press conference or that the press conferences themselves have become a more important channel for transmitting market-relevant information during Chair Powell's term. While these two interpretations have some different implications (e.g., for whether the change has been purposeful, is due to higher levels of uncertainty vis-à-vis monetary policy, or is merely the result of changes in market attentiveness), they both suggest that press conferences have become a more important channel for Fed communications to affect market expectations and prices.

Figure 2 and Table 1 focus on market volatility averages across Chairs. We can alternatively compare the market impact of the press conference to the FOMC statement release on the same date, in order to gauge the amount of market volatility generated by the press conference relative to

market volatility across Chairs during the placebo window or in the window around the FOMC statement release, similar to Figure 2.

[9]Since these placebo windows are used to test for baseline market volatility in the weeks around the corresponding press conference date, we set the Powell indicator in eq. (1) equal to one if Chair Powell was the chair at the press conference corresponding to the placebo window. E.g., for Chair Powell's first press conference on March 21, 2018, we set the indicator $\text{Powell}_t = 1$ for the placebo windows constructed one, two, and four weeks prior to this conference.

[10]In Appendix Table A3, we also compare market volatility following the release of other macro news announcements under Chair Powell's tenure vs. under Chairs Bernanke and Yellen. For most releases, we do not find a significant difference across Chairs. However, we find heightened market volatility during Chair Powell's tenure for the release of the CPI and JOLTS Job Openings Report, consistent with the heightened importance of inflation and labor market tightness following Covid-19.

the content of the FOMC's policy decision. Appendix Figure A5 plots the magnitude and volatility of the market reaction to the press conference against the magnitude and volatility of the market reaction to the corresponding FOMC statement release. This view of the data yields a similar conclusion: conditional on a certain market reaction to the FOMC statement release, both the magnitude and volatility of the market reaction to the press conference appear to be larger under Chair Powell's tenure than under his predecessors, consistent with the press conference playing a relatively more important role in affecting market expectations during Chair Powell's term.

Sub-periods during Chair Powell's term. Which press conferences account for the heightened market volatility during Chair Powell's tenure? The time series in Appendix Figures A3 and A4 suggest that many of the conferences with the greatest magnitude of market reactions and greatest volatility take place near the end of our sample. These conferences largely take place after the onset of the Covid-19 crisis in March 2020, and many take place after the Fed began raising interest rates in March 2022.

To understand whether the heightened market volatility during Chair Powell's tenure is a consequence of the Fed's policy stance or the macroeconomic environment, we undertake two sets of analyses. First, Table 2 tests for whether heightened volatility during Chair Powell's term is due to (1) the post-Covid period and (2) the policy stance (i.e., tightening compared to accommodative or neutral). Columns 1 and 4 show that press conferences given since the start of the Covid-19 pandemic indeed account for the heightened volatility under Chair Powell's tenure: in fact, Chair Powell's pre-Covid press conferences are not significantly different from his predecessors'. In columns 2 and 5, we test for whether a tightening policy stance is associated with higher market volatility during press conferences.[11] We find that this is not the case during the tenures of Chair Bernanke and Yellen, but is the case during Chair Powell's tenure. Finally, in columns 3 and 6, we test the role of the post-Covid period and the policy stance on heightened volatility during Chair Powell's press conferences together. The results suggest that both the post-Covid period and the tightening stance remain predictors of heightened volatility during Chair Powell's press conferences—though the tightening stance is not a predictor of heightened volatility under previous Chairs.

Second, we test whether the heightened market volatility during Chair Powell's press conferences is a consequence of the inflation or unemployment at meeting dates during his term.[12] Ap-

[11] We categorize FOMC meeting dates as "tightening" if there was an increase in the target rate on that date, "accommodative" if there was a decrease in the target rate on the date or if the federal funds rate was at the zero lower bound, and "neutral" otherwise. Besides the tightening period starting in March 2022, this definition also tags the following press conferences as tightening: Dec 2015, Dec 2016, Mar 2017, Jun 2017, and Dec 2017 under Chair Yellen; and Mar 2018, Jun 2018, Sep 2018, and Dec 2018 under Chair Powell.

[12] For inflation, we use the year-over-year percent change in the seasonally-adjusted consumer price index for all urban consumers, all items in U.S. city average (`CPIAUCSL`), and for unemployment we use the Bureau of Labor

pendix Table A4 shows that while the level of inflation is associated with higher volatility during Chair Powell's tenure, we do not see the same association between the inflation level and volatility during press conferences for predecessors Chairs Bernanke and Yellen. The same is true when we consider the (absolute) distance of the inflation rate from the Fed's 2% target or an indicator for whether inflation is above 3%.[13] We also find that the level of unemployment does not explain the heightened market volatility during Chair Powell's press conferences.[14]

Thus, these analyses lead us to two conclusions. First, while our sample admittedly does not contain other instances of surging inflation or especially steep rate hikes commensurate with the 2021–2022 period, we do not find evidence that tightening or elevated inflation was associated with heightened volatility during the terms of Chairs Bernanke or Yellen. Second, heightened market volatility is mainly a feature of Chair Powell's post-Covid and tightening press conferences. We interpret this evidence as suggesting that the press conference has played a more important role in shaping market expectations either due to an intentional shift on the part of Chair Powell during the post-Covid period or due to a shift in the nature of how markets react to Fed communications taking place in the latter half of Chair Powell's tenure. We return to exploring the underlying drivers of these empirical patterns in Section 5.

Interaction with release of Summary of Economic Projections. How does the market reaction to the Chair's press conference interact with the depth of communication by the FOMC? One possibility is that the press conference serves as a substitute for other Fed communication. For example, when the FOMC is unable to share precise guidance with the market through its statement or other communications, market participants may rely more heavily on the press conference to understand the FOMC's plans.

A salient way in which the FOMC communicates future plans with the market is the Summary of Economic Projections (SEP), which includes FOMC participants' projections for GDP growth, the unemployment rate, inflation, and the appropriate Federal Funds rate over the coming years. During the tenures of Chairs Bernanke and Yellen, a SEP was released on the date of each press conference. However, when Chair Powell doubled the frequency of meetings from four annually to about eight per year starting in January 2019, the FOMC switched to releasing the SEP every other

Statistics unemployment rate / U-3 rate (`UNRATE`). We source both data series from the St. Louis Federal Reserve Economic Data (FRED) online application.

[13]The change in the relationship between inflation and volatility during Chair Powell's tenure *vs.* his predecessors' could be due to the change in the Fed's "Statement on Longer-Run Goals and Monetary Policy Strategy" announced on August 27, 2020. This change in the Fed's monetary policy strategy was the result of a comprehensive strategy review from 2019–2020, and introduced a new definition of maximum employment and a new strategy of flexible average inflation targeting. Since there were only three press conferences between March and August 2020, we are unable to separately identify the role of the post-Covid period from the post-Strategy Review period.

[14]Appendix Table A5 repeats Appendix Table A4 using the variance of returns in 5-minute increments as the measure of market volatility, and obtains qualitatively similar results.

Table 2: Press conference market volatility for sub-periods of Chair Powell's term.

Volatility measure:	*Squared S&P 500 returns over press conf.*			*Variance of S&P 500 returns in 5-min increments*		
	(1)	(2)	(3)	(4)	(5)	(6)
Powell	0.097	0.246	-0.155	0.011	0.009	-0.015
	(0.202)	(0.230)	(0.183)	(0.012)	(0.009)	(0.013)
Powell post-Covid	0.603*		0.572*	0.038**		0.035**
	(0.324)		(0.316)	(0.019)		(0.018)
Tightening		0.064	0.064		-0.004	-0.004
		(0.184)	(0.185)		(0.005)	(0.005)
Powell × Tightening		0.809*	0.790*		0.089**	0.088**
		(0.445)	(0.440)		(0.025)	(0.024)
Intercept	0.190**	0.178**	0.178**	0.014**	0.015**	0.015**
	(0.049)	(0.045)	(0.045)	(0.003)	(0.003)	(0.003)
N	73	73	73	73	73	73
R^2	0.10	0.15	0.19	0.14	0.35	0.39

Note: The variable Powell is an indicator set to one for press conferences under Chair Powell's tenure and zero otherwise. Squared market returns expressed in units of percent squared. Heteroskedasticity-robust (HC3) standard errors in parentheses.

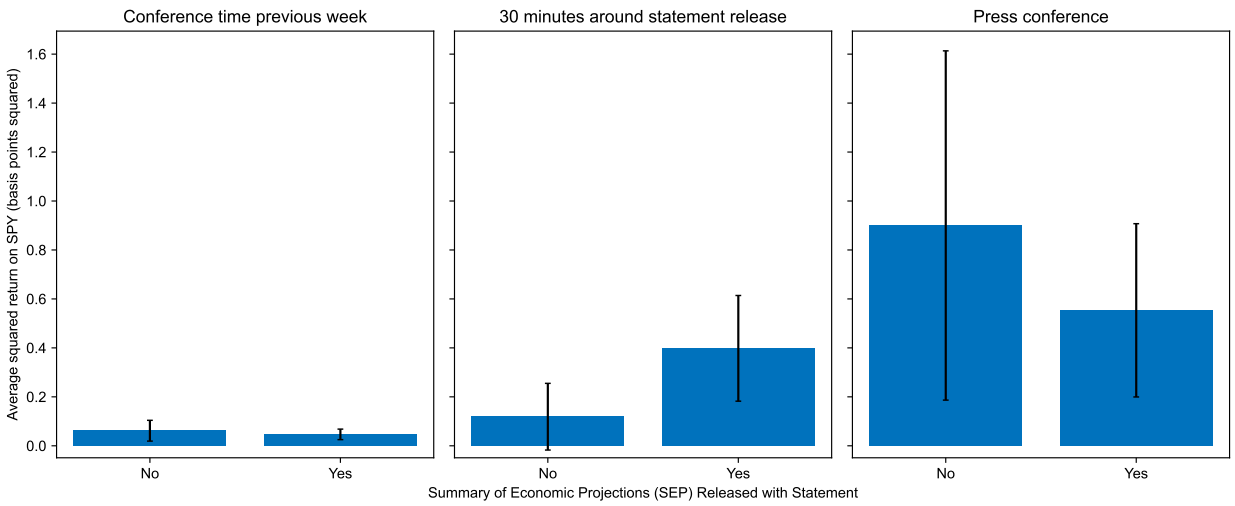
press conference. After markets fell over 2 percent during the press conference on January 26, 2022, economist Jón Steinsson proposed that the FOMC return to releasing a SEP every meeting, since "[the FOMC's] tools to communicate clearly with markets at 'off' meetings like this one are sub-par."[15]

In Figure 3, we compare market volatility following the FOMC statement release and during Chair Powell's press conference on dates where a SEP was or was not released. Directionally, the results support the hypothesis that the press conference performs as a substitute for the SEP: the average market reaction to the FOMC statement release is higher on dates when an SEP is released at the same time than on dates where no SEP is released, and conversely market volatility during the press conference is lower on dates when an SEP is released than not. This evidence suggests that releasing an SEP may indeed moderate the attention given to the Chair's press conference and perhaps allay market volatility. While a comparison of magnitudes supports this interpretation, we caution that the difference in market volatility across SEP and no-SEP days is not statistically significant, perhaps due to the small number of observations.[16]

[15] See `https://twitter.com/JonSteinsson/status/1486468435064156163`.

[16] A test of the difference in squared returns around the FOMC statement release on SEP days yields a t-statistic of 2.08 (p-value $= 0.044$), and a test of the difference in squared returns during the press conference on SEP days yields a t-statistic of -0.89 (p-value $= 0.380$). Limiting to only press conferences taking place after Jan 2019 (the first press conference on a non-SEP meeting date) yields similar results (t-statistics of 2.23 and -0.90 respectively).

Figure 3: Market volatility for placebo conference, FOMC statement release, and press conference under Chair Powell, separated by dates with Summary of Economic Projections (SEP) release.



Note: Average squared returns of the S&P 500 (proxied by the SPY ETF) during press conferences given by Chair Powell. We measure returns from the minute before the press conference starts to the minute it ends.

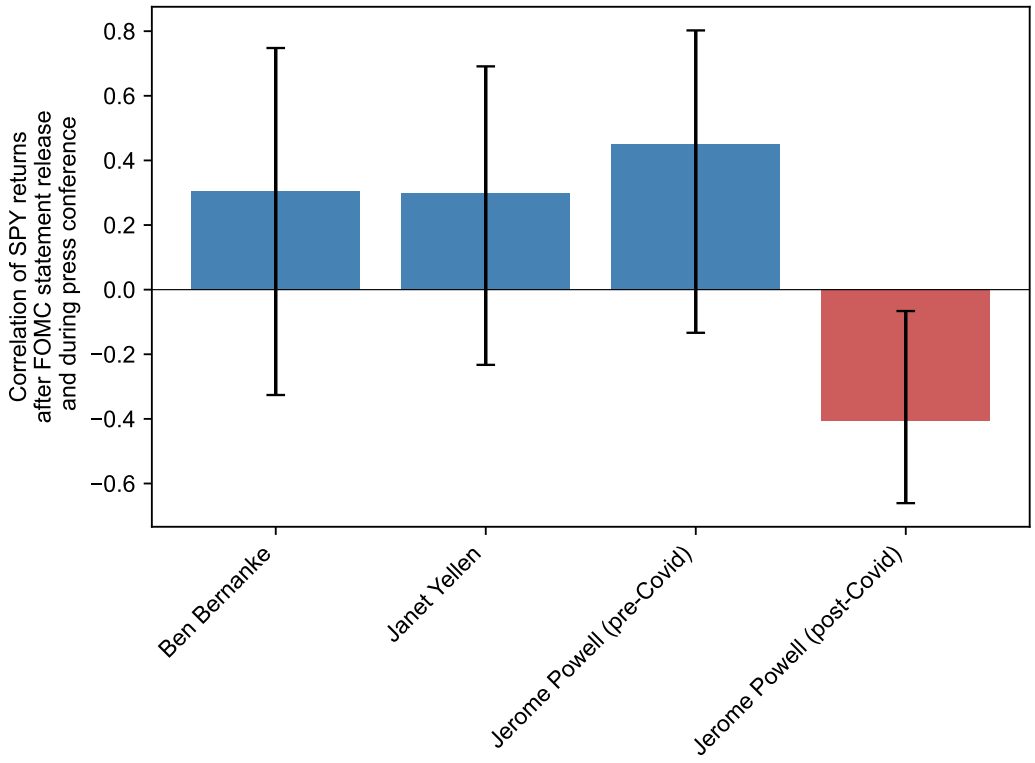
4.2 Reversals

Our second empirical finding is a pattern of reversals during Chair Powell's post-Covid press conferences. Figure 4 plots the correlation between the market return in the window around the FOMC statement release and the market return over the press conference, split by Fed Chair and by the pre- and post-Covid portions of Chair Powell's tenure. During post-Covid press conferences given by Chair Powell, the market has on average tended to move the *opposite* direction as it initially moved in response to the FOMC statement release. This is in contrast to former Chairs Bernanke and Yellen, whose press conferences tended to weakly reinforce the market's initial reaction to the FOMC statement release.

These reversals are not unique to the S&P 500: Table 3 shows that these reversals appear during Chair Powell's term across equity indices and in Treasury market yields. Whether considering the S&P 500 or Dow Jones Industrial equity market indices, or yields on two-, five-, or ten-year Treasuries, market movements over the press conference over the sample tend to at least weakly follow the same direction as movements following the release of the FOMC statement, but exhibit the opposite pattern during Chair Powell's term. (Note that the analysis of Treasury yields in Table 3 is limited to the tenures of Chairs Yellen and Powell, where we have intraday Treasury yield data from Bloomberg.)

In Appendix Figure A6, we further disaggregate Chair Powell's term into sub-periods before and after the start of the Fed's hiking cycle in March 2022. We find that market reversals initially

Figure 4: Correlation of market reaction to FOMC statement release with market reaction to press conference.



Note: Correlation of S&P 500 returns after statement release and during press conference for each chair, with Chair Powell's conferences split before/after March 2020. A positive correlation means that the S&P 500 tended to move in the same direction after the statement release and during the press conference given by the chair. Error bars indicate 95 percent confidence interval.

Table 3: Reversals during Chair Powell's tenure.

	Market Reaction to Press Conference				
	Equity markets		Treasury markets		
	S&P 500	Dow Jones Ind.	2Y	5Y	10Y
	(1)	(2)	(3)	(4)	(5)
Market Reaction to FOMC Statement	0.261	0.246	0.318**	0.397**	0.461**
	(0.197)	(0.170)	(0.091)	(0.095)	(0.135)
Powell × Market Reaction to Statement	-0.730**	-0.578*	-0.530**	-0.507**	-0.547**
	(0.323)	(0.323)	(0.209)	(0.193)	(0.214)
N	73	73	61	61	61
R^2	0.08	0.05	0.08	0.13	0.13

Note: For equity markets, reactions to FOMC statement and press conference are returns over the event window. For treasury markets, reactions to statement and press conference are changes in yields over the event window. Due to limitation on intraday data, Treasury market analyses (columns 3–5) are limited to the press conferences since March 2014 (start of Chair Yellen's tenure). Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

appear in the post-Covid, pre-tightening phase of Chair Powell's term—the correlation between market reactions to the FOMC statement and to the press conference falls from 0.45 to -0.07 after March 2020—but further deepen following the start of rate hikes in March 2022 (yielding a correlation of -0.48 during the sub-period of Chair Powell's term after March 2022). These visual observations are confirmed by a regression specification in Appendix Table A6. In other words, the timing of these reversals appears to coincide closely with the timing of heightened market volatility that we document above: both patterns emerge during the post-Covid period of Chair Powell's term and deepen during the period of rate hikes starting in March 2022.[17]

Finally, we explore whether the reversals in Treasury markets that start during Chair Powell's press conferences have a lasting effect on market expectations of yields. For this exercise, we focus on yields on five-year Treasuries, since previous work suggests that price discovery in the Treasury market primarily takes place in the market for five-year Treasury futures (Mizrach and Neely 2005; Brandt et al. 2007; Cremers et al. 2021). Figure 5 splits press conferences by dates when the five-year Treasury yield increased or decreased by over one basis point (bp) following the release of the FOMC statement. On dates where yields increased at least 1bp, five-year yields continue to further increase during Chair Yellen's press conferences, but tend to revert toward their level before the FOMC statement release during Chair Powell's conferences. As shown in

[17] In Appendix Figure A7, we explore whether the reversals in equity markets are predominantly driven by dates where the market had a positive reaction to the FOMC statement or negative reaction to the FOMC statement. We find that the pattern of reversals in equity markets appears roughly symmetric around zero. However, the Treasury market reversals are concentrated in meetings where yields rose after the FOMC statement release (see Figure 5).

Appendix Figure A8, this pattern extends to one, two, and three full days after the FOMC meeting, where five-year Treasury yields remain significantly different from their original level before the FOMC statement release under Chair Yellen but are not significantly different from their level before the FOMC statement release under Chair Powell. On the other hand, on dates where yields decreased at least 1bp, the path of five-year Treasury yields after the meeting and on subsequent days is broadly similar under Chairs Yellen and Powell.

5 Drivers of Heightened Volatility and Reversals

What explains the shift in the role of the press conference during Chair Powell's term? One explanation for the heightened volatility and market reversals is that the market has been over-reactive to FOMC statements. Overreaction is a common feature of financial markets, leading to eventual reversals, and previous work suggests that overreaction increases when investors anticipate a more extreme distribution of potential outcomes (Bordalo et al. 2024, Kwon and Tang 2020). This explanation would suggest that nothing has changed about Fed communications per se, but only the market's reactions to them.

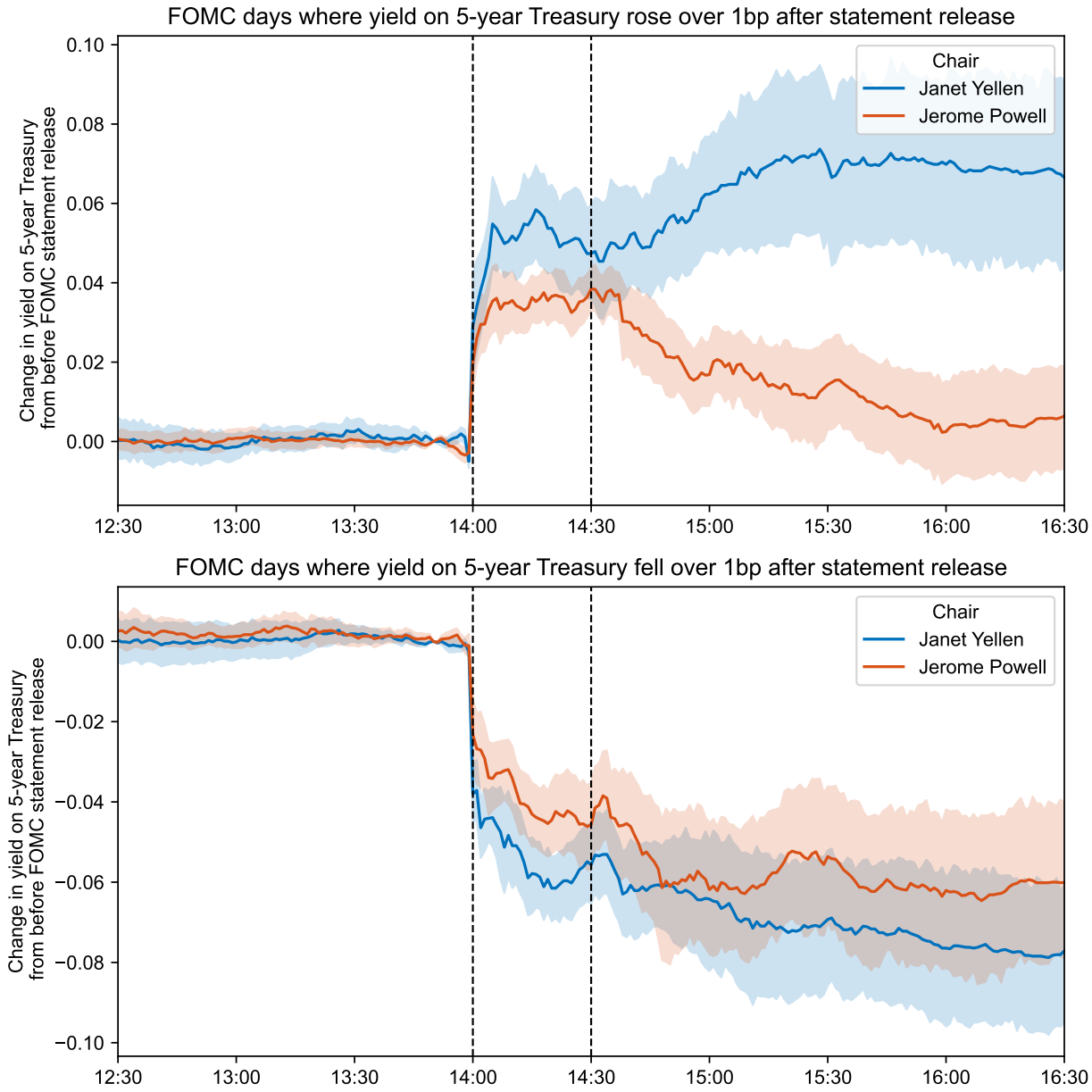
In this section, we provide evidence that changes in the market reaction to Fed press conferences are due at least in part to the content of these press conferences. To do so, we analyze the text of the Q&A portions of press conferences. Our text analysis suggests that the market reversals are linked to the language used by Chair Powell, rather than being artifacts of initial overreaction to the FOMC statement. We begin by taking two of Chair Powell's press conferences near the end of our sample as case studies and then extend our approach to the full set of press conferences in our sample.

5.1 Case Studies: September 21, 2022 and November 2, 2022

To motivate our text analysis, we start by taking two press conferences on September 21, 2022 and November 2, 2022, as case studies. As shown in Figure 6, these two dates were accompanied by large swings in Treasury market yields over the course of the FOMC statement release and press conference, but in opposite directions. We manually inspect the transcripts of both conferences and present quotes from the Q&A portion of each conference alongside minute-by-minute Treasury movements in Appendix Table A7 and Table A8.

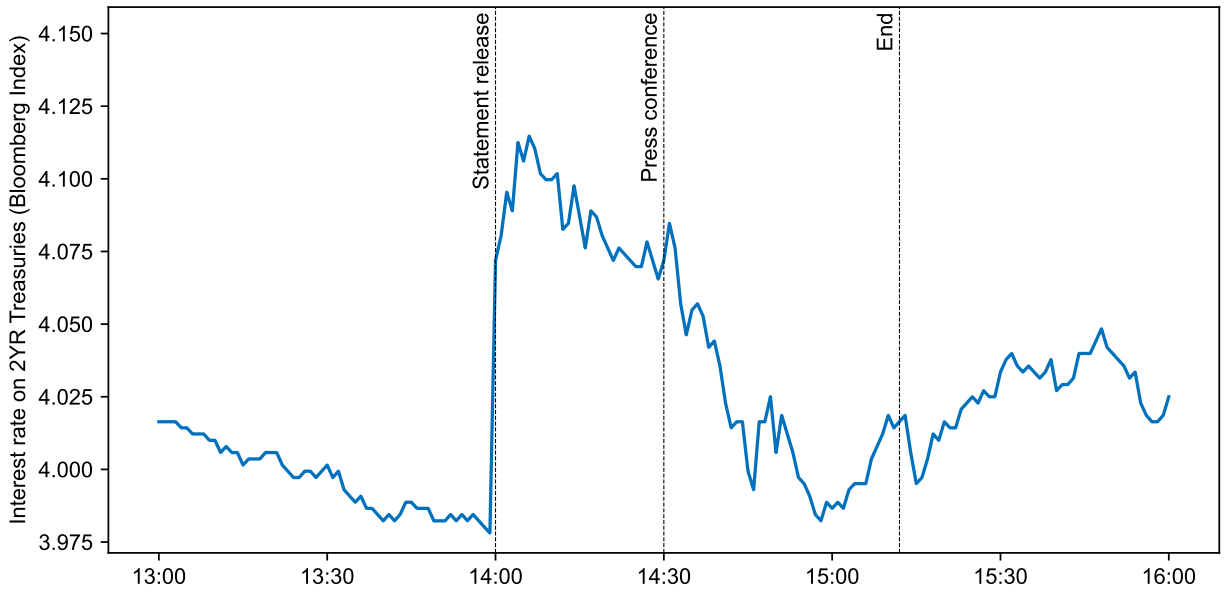
Consider first the policy statement and press conference on September 21, 2022. At 14:00 that day, the FOMC released a statement "moving [its] policy stance purposefully to a level that will be sufficiently restrictive to return inflation to 2 percent." The release of the FOMC statement prompted a sharp increase in Treasury yields; as shown in Figure 6, the interest rate on two-

Figure 5: Path of five-year Treasury yields on FOMC press conference days, split by conferences where yields increased/decreased over 1 basis point following FOMC statement release.

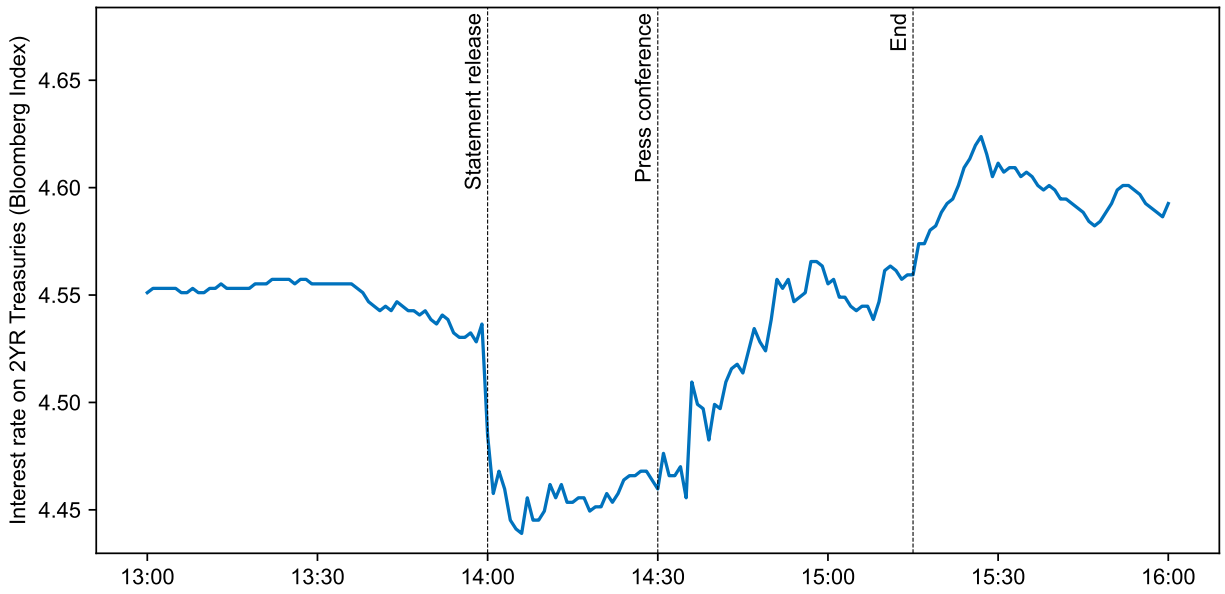


Note: The figure shows the average change in the yield of two-year Treasuries relative to 1:50 PM on the day of the FOMC press conference. Dashed lines indicate the FOMC statement release time (2:00 PM) and the press conference start time (2:30 PM). The upper panel contains six conferences under Chair Yellen (Mar 2014, Jun 2014, Sep 2014, Dec 2016, Jun 2017, Sep 2017) and seventeen under Chair Powell (Mar 2018, Jun 2018, Sep 2019, Oct 2019, Apr 2020, Dec 2020, Jun 2021, Nov 2021, Dec 2021, Mar 2022, Jun 2022, Sep 2022, Dec 2022, May 2023, Jun 2023, Sep 2023, Jan 2024). The lower panel contains nine conferences under Chair Yellen (Dec 2014, Mar 2015, Jun 2015, Sep 2015, Mar 2016, Jun 2016, Sep 2016, Mar 2017, Dec 2017) and thirteen under Chair Powell (Dec 2018, Jan 2019, Mar 2019, May 2019, Jun 2019, Dec 2019, Jun 2020, Jul 2020, Mar 2021, May 2022, Nov 2022, Mar 2023, Dec 2023). The shaded area is a bootstrapped standard error (68 percent confidence interval).

Figure 6: Examples of Treasury yield reversals during Chair Powell's conferences.



(a) September 21, 2022.



(b) November 2, 2022.

Note: Both panels plot intraday data on the yield of two-year Treasuries from Bloomberg (`USGG2YR`), using last price for the index in each minute.

year Treasuries rose nearly 10 basis points, from shy of 4 percent to about 4.08 percent, almost precisely at the time of the FOMC statement release. Yet, during Chair Powell's subsequent press conference, markets buoyed, with the interest rate on two-year Treasuries falling nearly to its level before the FOMC statement release by the end of the press conference. We show in Appendix Table A7 that the fall in Treasury yields over the press conference coincided with a number of statements by Chair Powell suggesting positive developments in commodity prices and wages that could suggest a return to neutral policy and saying that it may be "appropriate to slow the pace of rate hikes."

In contrast, on November 2, 2022, the FOMC released its statement suggesting it would "take into account the cumulative tightening of monetary policy [and] the lags with which monetary policy affects economic activity and inflation," leading to a drop in treasury yields and a rise in equity market indices. Yet, markets fell nearly 2 percent during the forty-five minute conference that followed. Commentators wrote that Chair Powell's press conference "[threw] cold water on the notion that the Fed may be about to pivot," and interpreted Chair Powell's responses as departing from other committee members who "hinted" that the long and variable lags associated with monetary policy should give the Fed pause about raising rates further.[18] The rise in Treasury yields during Chair Powell's press conference followed him telling participants, "it is premature to be thinking about pausing," and repeatedly saying "We have a ways to go" (see Appendix Table A8).

Computational approach. To supplement this narrative approach of manual transcript analysis, we develop an approach to systematically analyze the valence of the language used during press conferences. To do so, we start by building a corpus of words used in FOMC statements and assigning a "positive" or "negative" value to each word using the market reaction to FOMC statements containing those words. Note that, since FOMC statements and market reactions to those statements are used to build the corpus, these data have no overlap with the Q&A portion of the Chair's press conference. We compute the valence of word w as

$$\text{Valence}(w) = Cov(1\{\text{FOMC statement } i \text{ contains } w\}, \text{Market Reaction to FOMC statement } i).$$

Accordingly, words with high valences are ones that are most often associated with strong positive market reactions to the FOMC statement, while words with negative valences are ones that are most often associated with strong negative market reactions. Table 4 lists words with strong negative and strong positive valences. Words like "assessing," "pressures," and "raise" are associated with negative market reactions, while words like "improved," "stable," "accommodative," and "slow"

[18] See "So much for a Fed rally?" (*CNN*) and "Federal Reserve Chief Tells Markets to Focus on Interest-Rate Endpoint," (*Wall Street Journal*).

Table 4: Covariance of words in FOMC statements with market reaction.

Strong negative covariance	Strong positive covariance
Increases, Implications, Issued, Raise, Addition, Higher, Hardship, Upward, Ukraine, Gains, Attainment, Impede, Pandemic, Emerge, Assessing, Assessments, Overall, Job, Reducing, Wide, Causing, Human, Tremendous, Supply, Adjust, Invasion, Pressures, Russia, Size, Demand, Achieve, Strongly, Roughly, Prepared, Longer, Events	Improved, Time, Recovery, Pace, Maintain, Improvement, Sector, Housing, Dual, Continues, Developments, Pose, Existing, Maintaining, Lower, Help, Currently, Determining, Closely, Decides, Approach, Context, Gradually, Stable, Accommodative, Least, Accommodating, Reaffirmed, Support, Current, Slow, Consistent, Toward, Levels

are associated with positive market reactions.[19]

We then investigate Chair Powell's use of those words during the Q&A portions of his press conferences on September 21, 2022 and November 2, 2022. Figure 7 shows that Chair Powell's press Q&A on November 2, 2022 when markets fell during his press conference, shifted to a more negative set of words on average than his previous Q&A on September 21, 2022 which had buoyed markets. These patterns are consistent with the market reactions to Chair Powell's press conferences coinciding with his choice of language during the press Q&A.

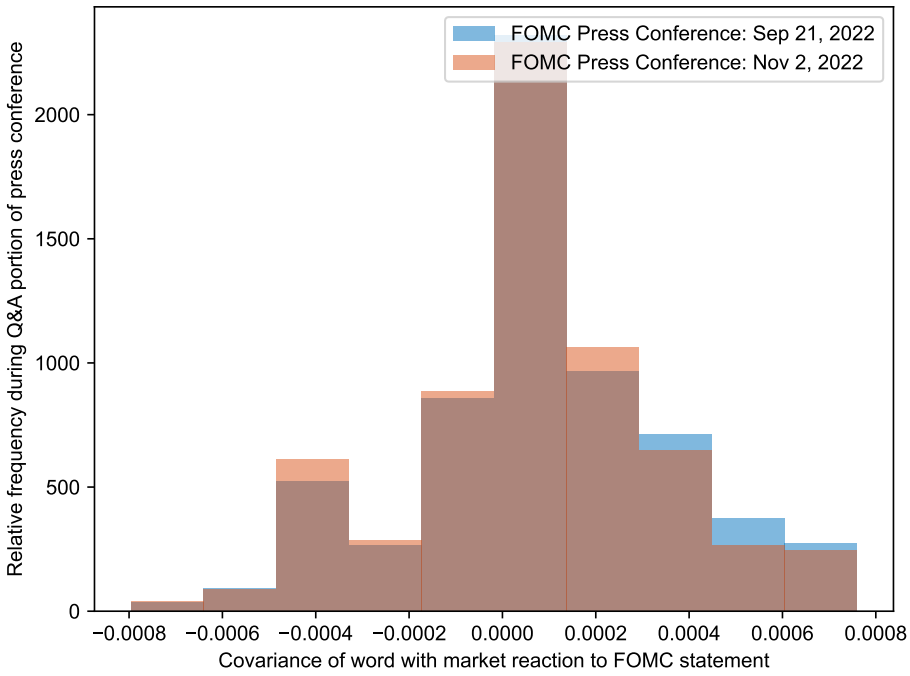
Out-of-sample validation: Brookings Speech on November 30, 2022. While our focus until now has been on press conferences given at the close of FOMC meetings, Cieslak et al. (2019) and Vissing-Jorgensen (2019) emphasize that there are occasions on which the Federal Reserve Chair and other FOMC officials are able to influence market expectations outside of these press conferences. Chair Powell's speech at the Brookings Institution on November 30, 2022 is one such example. Chair Powell gave this speech after we had conducted most of the analyses for this paper, allowing this speech to to be an "out-of-sample" datapoint to validate our text analysis procedure.

Intraday changes in Treasury yields and S&P 500 prices on November 30, 2022 are plotted in Figure 8. Chair Powell's Brookings speech on that day led to a sharp decline in Treasury yields and a 2 percent rally in market prices. Part of the decline in yields appeared to happen instantly at the time of Powell's speech, but a substantial portion unfolded over the course of the Q&A. By the end of the event, two-year Treasury yields fell by 10 basis points and yields on 10-year Treasuries about 7 basis points.

We use the same text analysis technique to understand what changes in Chair Powell's language

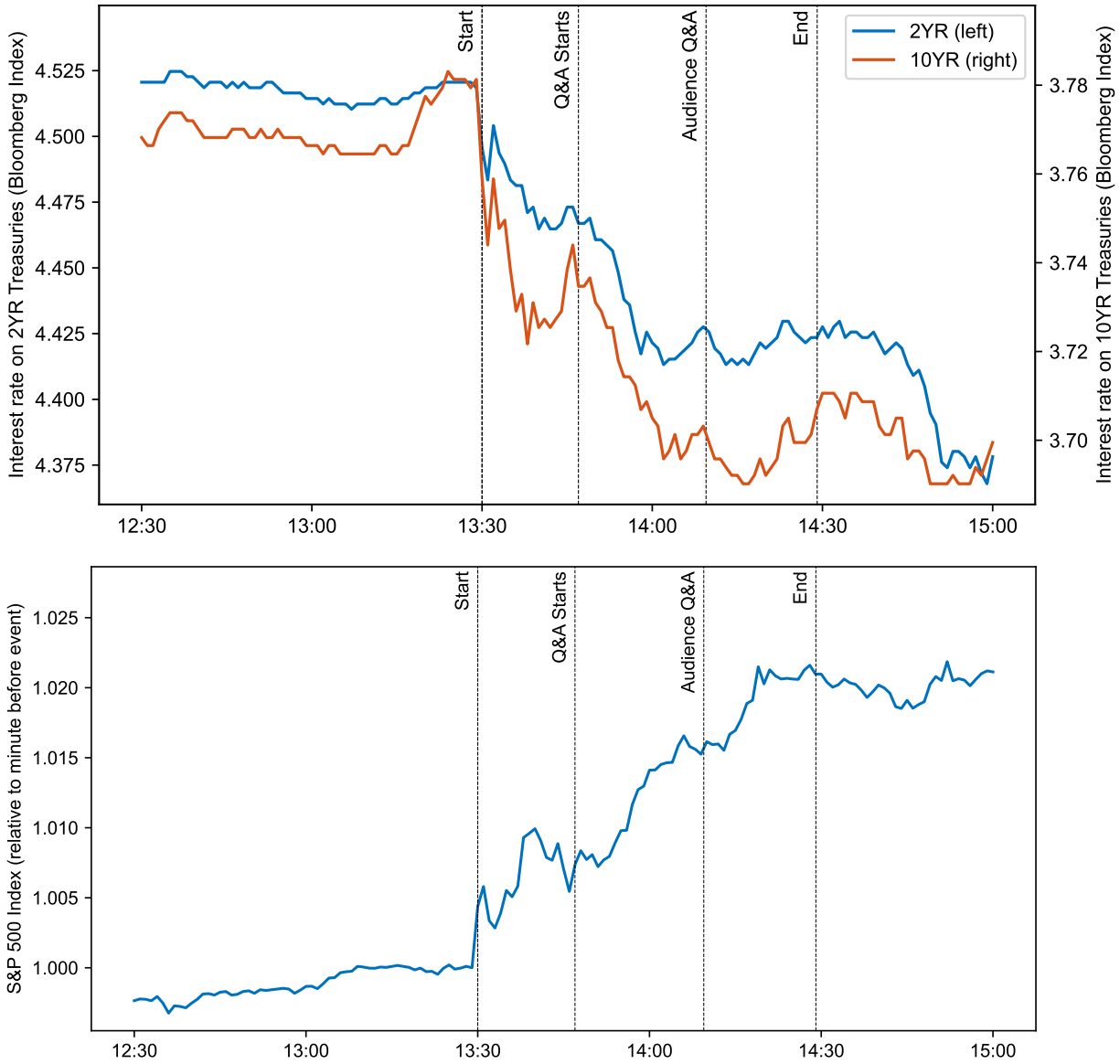
[19]We wrote the first draft of this paper in December 2022 and used statements from the dates of FOMC press conferences from April 2011 to November 2022 to develop this corpus. Reassuringly, we obtain similar results if we maintain this training sample or if we train the corpus using statements from all press conference dates to March 20, 2024, suggesting that the valence of words is not substantially affected by the sample timeframe.

Figure 7: Histogram of valences for words used during Chair Powell's Q&A.



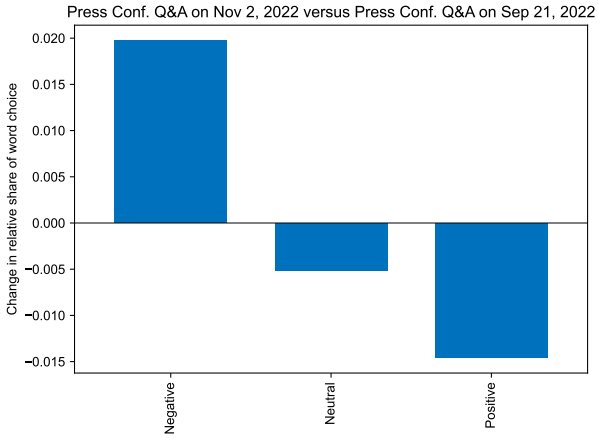
Note: The x-axis plots the valence of each word (i.e., covariance of whether a word appears in an FOMC statement with the S&P 500 reaction to that FOMC statement release). Words in the left-most buckets are most strongly associated with negative market reactions, while words in right-most buckets are most strongly associated with positive market reactions. The bars plot the relative frequency of words with each valence during the Q&A portion of Chair Powell's press conferences in Sep 2022 and Nov 2022.

Figure 8: Market reaction to Brookings speech and Q&A on November 30, 2022.

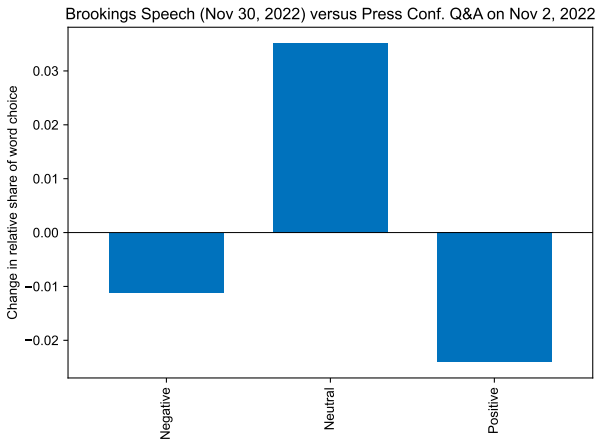


Note: The top panel plots intraday data on the yield of two- and ten-year Treasuries from Bloomberg (USGG2YR and USGG10YR), and the bottom panel plots intraday data on the S&P 500 index. We used the Brookings event transcript to identify the event timestamps.

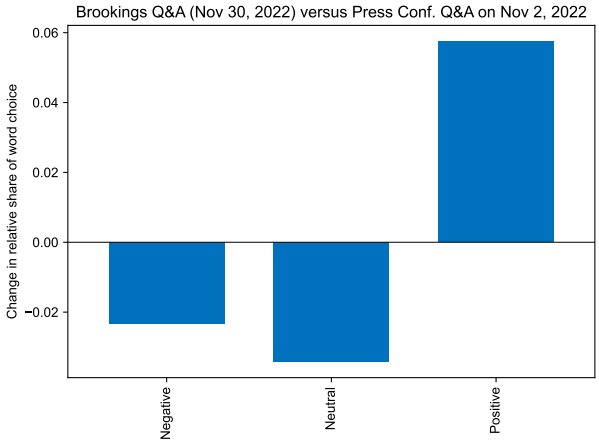
Figure 9: Change in valence of words used across events.



(a) Nov 2, 2022 Q&A *vs.* Sep 21, 2022 Q&A.



(b) Brookings Speech *vs.* Nov 2, 2022 Q&A.



(c) Brookings Q&A *vs.* Nov 2, 2022 Q&A.

Note: Words from FOMC statements are split into three equally sized groups of lowest, middle, and highest covariance with S&P 500 reactions to FOMC statement releases containing those words. The bars plot differences in relative shares of words from each group during each event.

triggered the market reaction. Figure 9 shows the results. As discussed above, Chair Powell's language shifted to words much more frequently associated with negative market reactions during the November 2, 2022 press conference Q&A. In comparison to that Q&A, Chair Powell's speech at Brookings was somewhat less negative, but on the whole made use of more neutral language. However, during the Brookings Q&A, Chair Powell's speech shifted to much more accommodative language. This suggests that the continued decline in yields over the course of his Brookings Q&A was linked to the language Chair Powell employed at the event.

5.2 Results from All Conferences

We now extend this text analysis approach to all press conferences in our sample. We show two main results. First, the valence of language used in the Q&A portion of the press conference by Chairs Bernanke and Yellen tended to mirror the market's initial reaction to the FOMC statement, but this pattern has flattened or even reversed under Chair Powell. Second, the differences between the valence of language in Chair Powell's Q&A and in the FOMC statement release is predictive of both the direction of the market response to the press conference and heightened market volatility during the press conference.

Valence of press Q&A vs. FOMC statement. We first compute a single statistic to capture the valence of language used during the Q&A portion of each press conference. As in Figure 9, we rank all words from FOMC statements by valence and split them into three groups of equal size. We term words in the top tercile of valence as "positive" words and words in the bottom tercile as "negative words." Our measure of the overall valence of language used during the Q&A portion of the press conference is the share of positive words in the text minus the share of negative words in the text:[20]

$$\text{Valence(text)} = \frac{\text{\# of positive words} - \text{\# of negative words}}{\text{total \# of words matched to corpus}}.$$

Table 5 shows how the valence of language in the Q&A portion of the press conference relates to the valence of language in the FOMC statement and the market's initial reaction to the FOMC statement. In columns 1 and 2, we show that the valence of the press conference Q&A is typically positively associated with the market's initial reaction to the FOMC statement—e.g., the Q&A tends to include more positive language when the market reacted favorably to the FOMC statement—but that this positive association has significantly declined under Chair Powell's tenure. A similar pattern appears when we compare the valence of the press conference Q&A to the valence

[20]Our results are not sensitive to this choice of how to summarize the valence of the text. For example, Appendix Table A9 shows similar results to Table 5 when we instead measure the valence of the text as (1) the share of positive words only, or (2) the mean valence of all words in the text.

Table 5: Language during press conference Q&A: Relationship with FOMC statement and market reaction.

	Valence of Press Conference Q&A					
	(1)	(2)	(3)	(4)	(5)	(6)
Returns around statement release	0.345*	1.251**				
	(0.208)	(0.513)				
Powell × Returns around statement		-1.471**				
		(0.529)				
Valence of FOMC Statement			0.584**	1.194**		
			(0.107)	(0.176)		
Powell × Valence FOMC Statement				-0.850**		
				(0.228)		
Valence of Press Conf. Opening					0.615**	1.039**
					(0.116)	(0.228)
Powell × Valence Press Conf. Opening						-0.706**
						(0.249)
Powell		-0.402		0.721**		0.089
		(0.261)		(0.225)		(0.155)
N	73	73	73	73	73	73
R^2	0.03	0.22	0.34	0.45	0.38	0.47

Note: The valence of each text is the share of positive words minus the share of negative words. Text measures normalized to have mean zero and unit standard deviation. Returns around statement release are SPY returns in the 30 minute window around the FOMC statement release. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

of the FOMC statement in columns 3–4.[21] Finally, columns 5–6 show that under Chair Powell, the valence of the press conference Q&A even departs from the valence of the Chair's opening remarks made at the start of the press conference, which briefly summarize the FOMC statement. In other words, the language used by Chairs Bernanke and Yellen during the press conference Q&A tended to echo the FOMC statement, the market's initial reaction to the FOMC statement, and the opening remarks made at the start of the press conference that summarize the FOMC statement. This has no longer been the case for press conferences under Chair Powell's tenure: as shown visually in Appendix Figure A9, the relationship between the market reaction to the FOMC statement and the valence of language used by Chair Powell during the press conference Q&A is flat or slightly negative.

In Appendix Table A9, we show that these results are robust to using other approaches to summarize the valence of language used at the press conference. In Appendix Table A11, we show

[21] Appendix Table A10 shows that the "reversal" in the language used by Chair Powell in the press conference Q&A compared to the FOMC statement can also be seen using the measure of text hawkishness from Parle (2022).

that there are no systematic changes in how the language of the FOMC statement relates to the market reaction to the FOMC statement under Chair Powell's tenure compared to his predecessors', nor any systematic changes in the link between the valence of the Chair's opening remarks at the start of the press conference and the initial FOMC statement. Together, these results suggest that the content of Chair Powell's press conferences—and in particular the Q&A portion of those conferences—departs significantly from the patterns of his predecessors, who tended to echo the valence of the FOMC statement throughout the subsequent Q&A.

Link between Q&A valence and market reaction to press conference. Can these shifts in language help explain the market reversals and heightened volatility during Chair Powell's press conferences? Table 6 explores how the departure of the language used in the Q&A from the FOMC statement predicts the direction of the market response to the press conference and the degree of market volatility during the press conference. In Panel A, we find that a shift toward more positive language during the press conference Q&A is associated with a positive market reaction to the press conference, both during Chair Powell's tenure and within-Chairs across the entire sample. In Panel A, column 3, we test whether the market's responsiveness to a shift in language used in the Q&A is uniform across Chairs or is heightened during Chair Powell's tenure; we find evidence of the latter, with the link between Q&A language and the market's response to the press conference driven primarily by Chair Powell's term.

Panels B and C of Table 6 explore the analogous relationship between the departure of the language used in the Q&A from the FOMC statement and the degree of market volatility during the press conference. We use the absolute value of the difference between the valence of the Q&A and the FOMC statement to capture the degree to which the Q&A departs from the FOMC statement. Using both measures of market volatility (squared returns over the press conference and the variance of returns in five-minute increments), we find that the absolute difference between the valence of the press conference Q&A and the FOMC statement is associated with heightened market volatility during the press conference, particularly during Chair Powell's term.

Together, Panels A–C of Table 6 suggest that the language used by Chair Powell during press conferences is indeed linked with both the direction of market reactions to the press conference and the heightened volatility during Chair Powell's conferences. Part of the shift in the role of the press conference appears to be due to Chair Powell's Q&A no longer echoing the valence of the FOMC statement, and part of the shift seems to be due to markets also becoming more responsive to Chair Powell's departures from the text of the FOMC statement.

Other text measures. To complement our valence measure of the press conference transcript texts, we assemble several other text measures from the literature and explore whether changes

Table 6: Q&A language and market reaction to press conference.

Panel A. Market Direction	*Returns over press conference*		
	(1)	(2)	(3)
Difference between Valence Q&A *vs.* Statement	0.500**	0.294**	0.041
	(0.228)	(0.149)	(0.101)
Powell × (Diff. Valence Q&A *vs.* Statement)			0.459*
			(0.253)
Sample	Powell	All	All
Chair FEs	-	Yes	Yes
N	45	73	73
R^2	0.10	0.06	0.09
Panel B. Market Volatility (Measure I)	*Sq. returns over press conference*		
	(1)	(2)	(3)
Abs. Diff. between Valence Q&A *vs.* Statement	0.402**	0.287**	-0.028
	(0.169)	(0.133)	(0.065)
Powell × (Abs. Diff. Valence Q&A *vs.* Statement)			0.430**
			(0.183)
Sample	Powell	All	All
Chair FEs	-	Yes	Yes
N	45	73	73
R^2	0.10	0.12	0.15
Panel C. Market Volatility (Measure II)	*Variance returns over 5-min increments*		
	(1)	(2)	(3)
Abs. Diff. between Valence Q&A *vs.* Statement	0.041**	0.030**	0.001
	(0.010)	(0.008)	(0.002)
Powell × (Abs. Diff. Valence Q&A *vs.* Statement)			0.040**
			(0.010)
Sample	Powell	All	All
Chair FEs	-	Yes	Yes
N	45	73	73
R^2	0.32	0.30	0.37

Note: The valence of each text is the share of positive words minus the share of negative words. Text measures normalized to have mean zero and unit standard deviation. Returns over press conference are SPY returns from the beginning to end of the press conference. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

in the language used by Chair Powell along these other dimensions can explain market reversals and heightened volatility. In particular, we adopt three measures from previous work: the Flesch-Kincaid measure of language complexity in the Q&A (used by De Pooter 2021), the number of Loughran and McDonald (2024) uncertainty words in the press conference Q&A, and the Parle (2022) Hawk-Dove index of the press conference Q&A. The time series for each of these measures is plotted in Appendix Figure A10. As documented by De Pooter (2021), there is a sharp drop in the complexity of language used in the Q&A by Chair Powell compared to his predecessors, as measured by the Flesch-Kincaid score. For the other two measures, however, we find little difference across the three Chairs.

We also construct additional measures of the departure of language used by Chair Powell in the Q&A compared to the FOMC statement and to minutes of the FOMC meeting (which are released three weeks after the policy meeting). We do so by calculating the cosine similarity between the transcript of the Q&A portion of the press conference with the FOMC statement and meeting minutes respectively. These measures capture differences in the words used by Chair Powell relative to the FOMC statement and minutes, but not the direction or valence of those differences. Figure 10 shows a sharp drop in the similarity of language used by Chair Powell during the press conference Q&A with both the language of the FOMC statement and the meeting minutes.

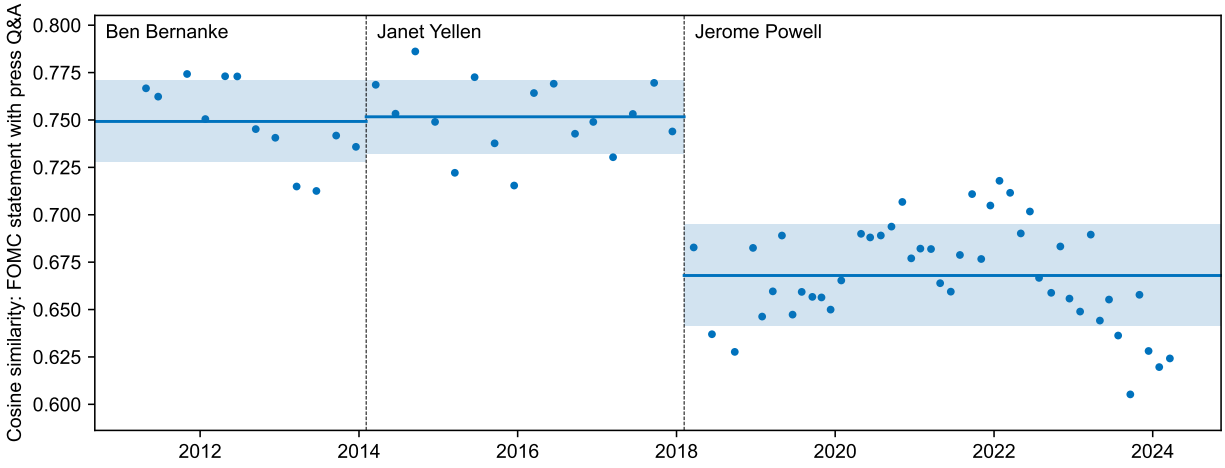
In Appendix Table A12, we repeat the exercise from Panel A of Table 6 for each of these other text measures. For most of the alternate text measures, we find no evidence of a link between the press conference Q&A and the market's reaction to the press conference. We do find some evidence that markets react more positively to the press conference when Chair Powell uses less complex language (as measured by the Flesch-Kincaid Score) and when the language of Chair Powell's Q&A departs more from the FOMC meeting minutes.[22] Similarly, Appendix Table A13 repeats the exercise from Panel B of Table 6 for the other text measures. We find simplicity of language is correlated with heightened market volatility during the press conference, consistent with De Pooter (2021), but otherwise find little systematic links between other textual features of the press conference and market volatility.

6 Implications

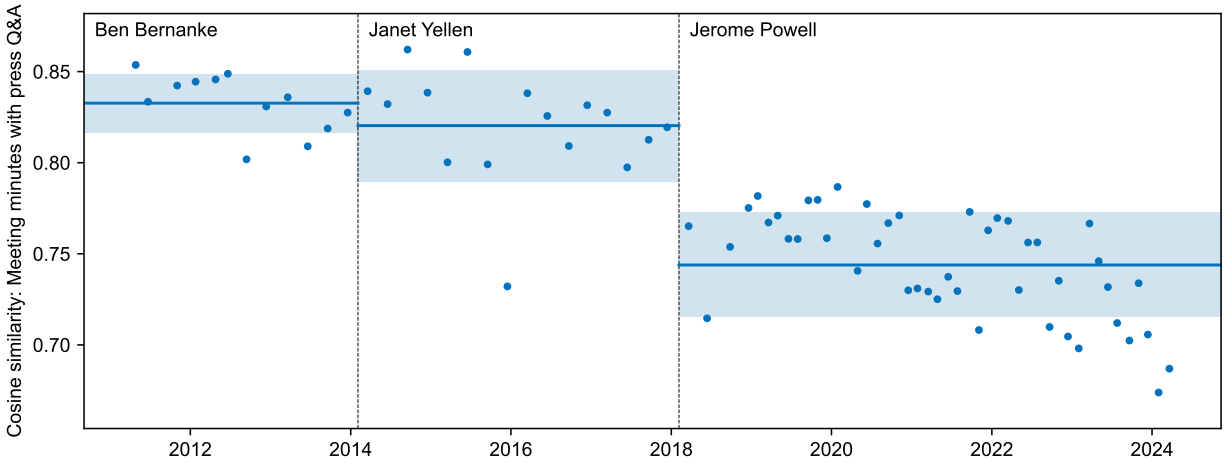
So far, we have documented two new patterns about Chair Powell's press conferences during the post-Covid period: they tend to be associated with heightened market volatility and often lead to

[22]This latter result is somewhat surprising since the FOMC minutes are not observed by market participants until three weeks after the press conference. It could be that Chair Powell's departures from the discussions of the FOMC are correlated with language/tone that is observable to viewers of the press conference in real time.

Figure 10: Text similarity of press conference Q&A with FOMC statement and meeting minutes.



(a) Cosine similarity: Press conference Q&A and FOMC statement.



(b) Cosine similarity: Press conference Q&A and FOMC meeting minutes.

reversals in market expectations following the FOMC statement release. We have also shown that these shifts appear to be linked to the content of these press conferences, rather than a shift in the responsiveness of financial markets alone. A natural question is whether this shift in the role of the press conference is a beneficial one.

One view on the role of Fed communications is expressed by Alan Blinder (1998): "By making itself more predictable to markets, the central bank makes market reactions to monetary policy more predictable to itself. And that makes it possible to do a better job of managing the economy." In our final empirical analysis, we adopt this notion of the goal of Fed communications—that these communications should increase the predictability of future monetary policy to markets—and provide a partial assessment of how the shift in the press conference role has fared along this dimension. At the end of this section, we stress that this metric is a necessarily incomplete description of the goal of Fed communications and discuss a few alternative ways of understanding the changing role of the press conference.

Implications for forward-looking uncertainty. We use end-of-day implied volatility from 30-day at-the-money options on futures of short- and long-term Treasuries as a measure of uncertainty about the path of future interest rates. Our use of this measure of interest rate uncertainty draws on Sinha (2015) and Cremers et al. (2021), among others. Sinha (2015) shows that investor beliefs, as captured by prices on two- and ten-year Treasury options, respond to forward guidance issued by the FOMC, and Cremers et al. (2021) show that implied volatility of at-the-money options on futures of five-year Treasury notes (which they call "yield implied volatility" or YIV) is a good proxy for interest rate uncertainty and that it predicts both the growth and volatility of a number of macroeconomic variables beyond other measures like the term spread, credit spread, and VIX. Appendix Figure A11 plots the time series of implied volatility on five-year Treasuries over our sample period. Implied volatilities display considerable variation over the terms of each Chair, and also exhibit higher-frequency cycles that roughly appear to match the cadence of FOMC meetings as documented by Bauer et al. (2022).

Figure 11 plots changes in implied volatility on short-term (five-year) and long-term (twenty-year) Treasuries from four market days before FOMC press conferences to seven days after FOMC press conferences.[23] The implied volatilities are plotted relative to their value one day before the FOMC press conference. The first observation apparent in Figure 11 is that implied volatility on both short- and long-term Treasuries tends to drop on the day of the FOMC press conference. Intuitively, uncertainty about the Fed's actions on the target range is resolved on the day of the FOMC statement release and press conference, leading to a decline in volatility. However, this

[23]We rely primarily on the five-year and long-term futures markets since, as noted by Cremers et al. (2021), the market for five-year Treasury futures contracts is largely responsible for price discovery in the Treasury futures market.

decline in volatility is slightly less pronounced under Chair Powell's tenure, especially for long-term Treasuries. A similar result is seen for changes in the VIX around press conference dates in Figure 11c.

We estimate the following differences-in-differences specification,

$$(\text{ImpliedVol}_{t+h} - \text{ImpliedVol}_{t-1}) = \beta_h + \gamma_h \times \text{Powell}_t + \varepsilon_{t,h}$$

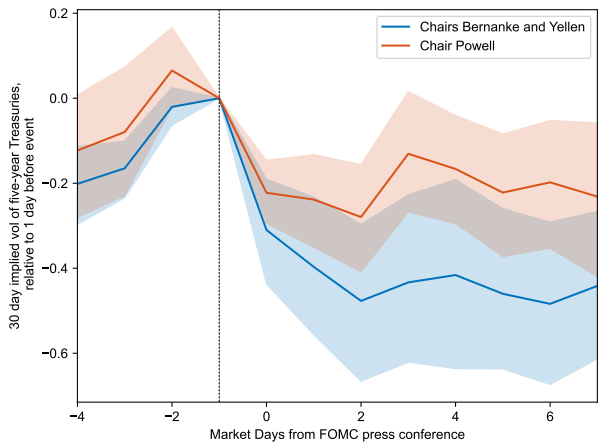
for $h \in \{-4,-3,...,6,7\}$, where ImpliedVol_{t+h} is the implied volatility at market close h days after the FOMC press conference date (t), β_h are fixed effects by lag h, Powell_t is an indicator for whether Chair Powell gave the press conference at date t, and γ_h are coefficients on the interactions for lag h with the indicator Powell_t. We estimate this specification for all scheduled conferences across Chairs Bernanke, Yellen, and Powell.

The estimated β_h coefficients are plotted in Appendix Figure A12 and tabulated in Appendix Table A14. Chair Powell's tenure is associated with a slight (but not significant) increase in implied volatility on two-year Treasuries following the FOMC meeting date, and with statistically significant increases in implied volatility on five-, ten-, and twenty-year Treasuries following the FOMC meeting date. These results are robust to controlling for the the Fed's policy stance and the macroeconomic environment (using the inflation rate and unemployment rate), excluding dates with important forward guidance announcements identified by Swanson (2021), and to separating out interaction terms for Chairs Bernanke and Yellen (see Appendix Table A15).

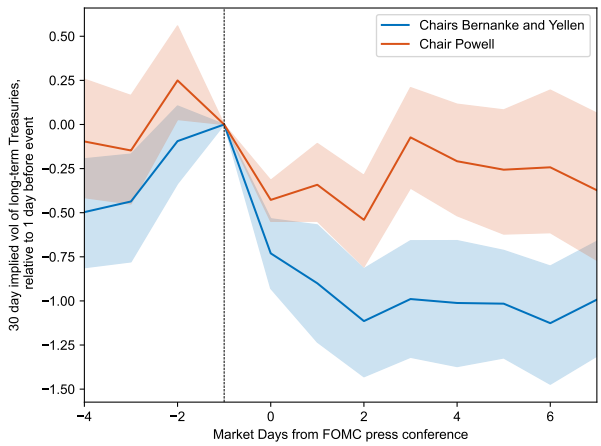
Of course, a limitation of this analysis is that, since we only have access to end-of-day data on implied volatility, we cannot separately assess the impact of the press conference compared to the FOMC statement on this trend. However, these results suggest that shifts in the Fed communications strategy under Chair Powell have broadly been less successful at alleviating market uncertainty about the path of future interest rates.

Other goals. Reducing market uncertainty may not be the only goal of the Federal Reserve or of Chair Powell in particular. Let us briefly describe two alternative goals that could explain the patterns that we document in our analysis above. A first possibility is that Chair Powell has strategically used the press conference to highlight departures in his own thinking from the FOMC, thereby softly committing the FOMC to a future path of decisions that he thinks is most likely to succeed. Previous studies by Meade (2005) and Gerlach-Kristen and Meade (2010) document strategies that previous Fed Chairs have used to manage dissent within the FOMC committee. During a time of contentious decision-making—and when many FOMC members make their own speeches apart from FOMC communications—the press conference may offer the Chair an opportunity to emphasize his own views and get out ahead of other committee members.

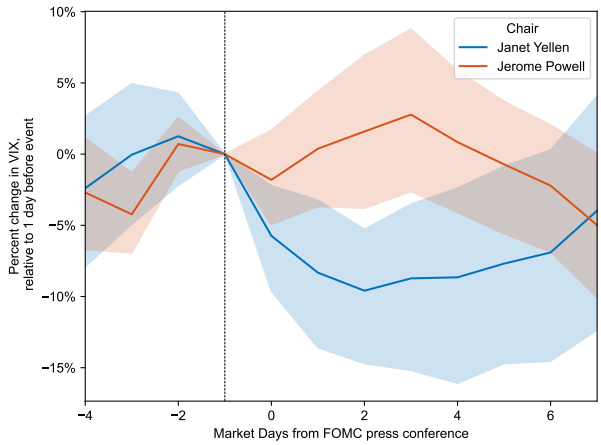
Figure 11: Effect of FOMC press conference days on VIX and 30 day implied volatility of short- and long-term Treasuries.



(a) Five-year Treasuries.



(b) Twenty-year Treasuries.



(c) VIX (CBOE).

Note: Thirty-day implied volatility of at-the-money options for five-year and long-term Treasuries are from Bloomberg's LIVE calculation engine. Shaded bands indicate bootstrapped 95 percent confidence intervals.

A second possibility is that, when economic conditions are changing rapidly, perhaps the goal of Fed communications should not be to reduce uncertainty, but instead to make space for more nimble actions on the part of the FOMC. As Stein (2014) posits, a Fed that has "developed a reputation for worrying less about the immediate bond-market effects of its actions [....may] be able to adjust more nimbly when it needed to." In other words, when the FOMC is learning about the state of the economy at a rapid clip, it may be useful for Fed communications to depart from a gradualist communication strategy, at the cost of greater market volatility. This explanation fits into the framework in Bauer and Swanson (2023b) who argue that both the Fed and the market react to rapidly changing news of the economy.

7 Conclusion

We document a change in market reactions to press conferences under Chair Powell's tenure compared to those under his predecessors. Compared to Chairs Bernanke and Yellen, Chair Powell has been more likely to elicit large market reactions, often in the opposite direction of initial reactions to the FOMC statement. Text analysis suggests that these reactions are due in part to the content of Chair Powell's communications—particularly shifts toward more positive or negative language that depart from the language of the FOMC statement. Outside of the FOMC press conferences, there is evidence that Chair Powell's communications at other events have a similar effect on the market.

We interpret these results as suggesting a more important role for the press conference among Fed communications, especially during the post-Covid period. Evidence from implied volatility on short- and long-term Treasuries suggests that this shift in strategy has been less successful at allaying uncertainty about the path of future interest rates, though it may serve other goals, such as managing dissent within the FOMC or making space for the FOMC to pursue changes in policy more nimbly.

The Federal Reserve's communication strategy has evolved over time—the introduction of the press conference by Chair Bernanke and the doubling of annual press conferences held by Chair Powell being just two examples—and the patterns we document signal yet another shift in how the Federal Reserve communicates with the market. This change is attended by some costs: the FOMC statement no longer appears to be the "final word" on the path of monetary policy to markets, and there has been weaker resolution of uncertainty about the path of future interest rates. On the other hand, as the U.S. economy faces its highest inflation rates and the steepest set of interest rate hikes in decades, perhaps extraordinary times call for such a shift.

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Appendix A Additional Figures and Tables

Table A1: Press conferences sample.

Date	Chair	Target Rate	SEP Release?	Statement Release	Press Conference Start	Press Conference End
Apr 27, 2011	Ben Bernanke	0 to 1/4 percent	Yes	12:30*	14:15	15:11
Jun 22, 2011	Ben Bernanke	0 to 1/4 percent	Yes	12:30†	14:15	15:05
Nov 02, 2011	Ben Bernanke	0 to 1/4 percent	Yes	12:30†	14:15	15:03
Jan 25, 2012	Ben Bernanke	0 to 1/4 percent	Yes	12:20†	14:15	15:21
Apr 25, 2012	Ben Bernanke	0 to 1/4 percent	Yes	12:35†	14:15	15:06
Jun 20, 2012	Ben Bernanke	0 to 1/4 percent	Yes	12:35†	14:15	15:00
Sep 13, 2012	Ben Bernanke	0 to 1/4 percent	Yes	12:35†	14:15	15:06
Dec 12, 2012	Ben Bernanke	0 to 1/4 percent	Yes	12:30†	14:15	15:31
Mar 20, 2013	Ben Bernanke	0 to 1/4 percent	Yes	14:00	14:15	15:11
Jun 19, 2013	Ben Bernanke	0 to 1/4 percent	Yes	14:00	14:15	15:13
Sep 18, 2013	Ben Bernanke	0 to 1/4 percent	Yes	14:00	14:15	15:12
Dec 18, 2013	Ben Bernanke	0 to 1/4 percent	Yes	14:00	14:15	15:21
Mar 04, 2014	Janet Yellen	0 to 1/4 percent	*Excluded: Unscheduled conference call*			
Mar 19, 2014	Janet Yellen	0 to 1/4 percent	Yes	14:00	14:30	15:31
Jun 18, 2014	Janet Yellen	0 to 1/4 percent	Yes	14:00	14:30	15:24
Sep 17, 2014	Janet Yellen	0 to 1/4 percent	Yes	14:00	14:30	15:27
Dec 17, 2014	Janet Yellen	0 to 1/4 percent	Yes	14:00	14:30	15:30
Mar 18, 2015	Janet Yellen	0 to 1/4 percent	Yes	14:00	14:30	15:25
Jun 17, 2015	Janet Yellen	0 to 1/4 percent	Yes	14:00	14:30	15:29
Sep 17, 2015	Janet Yellen	0 to 1/4 percent	Yes	14:00	14:30	15:28
Dec 16, 2015	Janet Yellen	1/4 to 1/2 percent	Yes	14:00	14:30	15:36
Mar 16, 2016	Janet Yellen	1/4 to 1/2 percent	Yes	14:00	14:30	15:30
Jun 15, 2016	Janet Yellen	1/4 to 1/2 percent	Yes	14:00	14:30	15:24
Sep 21, 2016	Janet Yellen	1/4 to 1/2 percent	Yes	14:00	14:30	15:30
Dec 14, 2016	Janet Yellen	1/2 to 3/4 percent	Yes	14:00	14:30	15:20
Mar 15, 2017	Janet Yellen	3/4 to 1 percent	Yes	14:00	14:30	15:19
Jun 14, 2017	Janet Yellen	1 to 1-1/4 percent	Yes	14:00	14:30	15:28
Sep 20, 2017	Janet Yellen	1 to 1-1/4 percent	Yes	14:00	14:30	15:35
Dec 13, 2017	Janet Yellen	1-1/4 to 1-1/2 percent	Yes	14:00	14:30	15:37
Mar 21, 2018	Jerome Powell	1-1/2 to 1-3/4 percent	Yes	14:00	14:30	15:13
Jun 13, 2018	Jerome Powell	1-3/4 to 2 percent	Yes	14:00	14:30	15:22
Sep 26, 2018	Jerome Powell	2 to 2-1/4 percent	Yes	14:00	14:30	15:27

Dec 19, 2018	Jerome Powell	2-1/4 to 2-1/2 percent	Yes	14:00	14:30	15:14
Jan 30, 2019	Jerome Powell	2-1/4 to 2-1/2 percent	No	14:00	14:30	15:17
Mar 20, 2019	Jerome Powell	2-1/4 to 2-1/2 percent	Yes	14:00	14:30	15:15
May 01, 2019	Jerome Powell	2-1/4 to 2-1/2 percent	No	14:00	14:30	15:11
Jun 19, 2019	Jerome Powell	2-1/4 to 2-1/2 percent	Yes	14:00	14:30	15:14
Jul 31, 2019	Jerome Powell	2 to 2-1/4 percent	No	14:00	14:30	15:15
Sep 18, 2019	Jerome Powell	1-3/4 to 2 percent	Yes	14:00	14:30	15:21
Oct 30, 2019	Jerome Powell	1-1/2 to 1-3/4 percent	No	14:00	14:30	15:17
Dec 11, 2019	Jerome Powell	1-1/2 to 1-3/4 percent	Yes	14:00	14:30	15:21
Jan 29, 2020	Jerome Powell	1-1/2 to 1-3/4 percent	No	14:00	14:30	15:24
Mar 03, 2020	Jerome Powell	1 to 1-1/4 percent	*Excluded: Emergency meeting*			
Mar 15, 2020	Jerome Powell	0 to 1/4 percent	*Excluded: Emergency meeting*			
Apr 29, 2020	Jerome Powell	0 to 1/4 percent	No	14:00	14:30	15:18
Jun 10, 2020	Jerome Powell	0 to 1/4 percent	Yes	14:00	14:30	15:28
Jul 29, 2020	Jerome Powell	0 to 1/4 percent	No	14:00	14:30	15:29
Sep 16, 2020	Jerome Powell	0 to 1/4 percent	Yes	14:00	14:30	15:33
Nov 05, 2020	Jerome Powell	0 to 1/4 percent	No	14:00	14:30	15:18
Dec 16, 2020	Jerome Powell	0 to 1/4 percent	Yes	14:00	14:30	15:27
Jan 27, 2021	Jerome Powell	0 to 1/4 percent	No	14:00	14:30	15:24
Mar 17, 2021	Jerome Powell	0 to 1/4 percent	Yes	14:00	14:30	15:29
Apr 28, 2021	Jerome Powell	0 to 1/4 percent	No	14:00	14:30	15:25
Jun 16, 2021	Jerome Powell	0 to 1/4 percent	Yes	14:00	14:30	15:30
Jul 28, 2021	Jerome Powell	0 to 1/4 percent	No	14:00	14:30	15:24
Sep 22, 2021	Jerome Powell	0 to 1/4 percent	Yes	14:00	14:30	15:24
Nov 03, 2021	Jerome Powell	0 to 1/4 percent	No	14:00	14:30	15:25
Dec 15, 2021	Jerome Powell	0 to 1/4 percent	Yes	14:00	14:30	15:30
Jan 26, 2022	Jerome Powell	0 to 1/4 percent	No	14:00	14:30	15:25
Mar 16, 2022	Jerome Powell	1/4 to 1/2 percent	Yes	14:00	14:30	15:24
May 04, 2022	Jerome Powell	3/4 to 1 percent	No	14:00	14:30	15:17
Jun 15, 2022	Jerome Powell	1-1/2 to 1-3/4 percent	Yes	14:00	14:30	15:26
Jul 27, 2022	Jerome Powell	2-1/4 to 2-1/2 percent	No	14:00	14:30	15:24
Sep 21, 2022	Jerome Powell	3 to 3-1/4 percent	Yes	14:00	14:30	15:12
Nov 02, 2022	Jerome Powell	3-3/4 to 4 percent	No	14:00	14:30	15:15
Dec 14, 2022	Jerome Powell	4-1/4 to 4-1/2 percent	Yes	14:00	14:30	15:15
Feb 01, 2023	Jerome Powell	4-1/2 to 4-3/4 percent	No	14:00	14:30	15:14
Mar 22, 2023	Jerome Powell	4-3/4 to 5 percent	Yes	14:00	14:30	15:13
May 03, 2023	Jerome Powell	5 to 5-1/4 percent	No	14:00	14:30	15:19
Jun 14, 2023	Jerome Powell	5 to 5-1/4 percent	Yes	14:00	14:30	15:19

Jul 26, 2023	Jerome Powell	5-1/4 to 5-1/2 percent	No	14:00	14:30	15:19
Sep 20, 2023	Jerome Powell	5-1/4 to 5-1/2 percent	Yes	14:00	14:30	15:23
Nov 01, 2023	Jerome Powell	5-1/4 to 5-1/2 percent	No	14:00	14:30	15:21
Dec 13, 2023	Jerome Powell	5-1/4 to 5-1/2 percent	Yes	14:00	14:30	15:14
Jan 31, 2024	Jerome Powell	5-1/4 to 5-1/2 percent	No	14:00	14:30	15:19
Mar 20, 2024	Jerome Powell	5-1/4 to 5-1/2 percent	Yes	14:00	14:30	15:17

Note: *The FOMC statement was released at the time indicated, and the SEP was released at 14:15.

†The FOMC statement was released at the time indicated, and the SEP was released at 14:00.

Table A2: Summary statistics of variables over press conferences sample.

Variable	Source	Mean	St. dev.	Min	Max
SPY return: statement release (%)	NYSE TAQ	0.085	0.511	-1.421	1.192
SPY return: press conference (%)	NYSE TAQ	0.091	0.723	-2.583	1.782
SPY return: placebo period (%)	NYSE TAQ	-0.026	0.217	-0.604	0.461
Variance SPY 5-min returns: statement (10^{-4})	NYSE TAQ	0.051	0.121	0.001	0.978
Variance SPY 5-min returns: press (10^{-4})	NYSE TAQ	0.061	0.212	0.001	1.780
Variance SPY 5-min returns: placebo (10^{-4})	NYSE TAQ	0.005	0.005	0.000	0.031
DIA return: statement release (%)	NYSE TAQ	0.081	0.465	-1.261	1.357
DIA return: press conference (%)	NYSE TAQ	0.062	0.621	-1.980	1.574
DIA return: placebo period (%)	NYSE TAQ	-0.031	0.205	-0.558	0.383
Variance DIA 5-min returns: statement (10^{-4})	NYSE TAQ	0.044	0.114	0.001	0.944
Variance DIA 5-min returns: press (10^{-4})	NYSE TAQ	0.052	0.201	0.002	1.718
Variance DIA 5-min returns: placebo (10^{-4})	NYSE TAQ	0.004	0.005	0.000	0.023
2Y Treasury: yield level (bp)	Bloomberg `USGG2YR`	189.66	160.11	11.720	505.38
2Y Treasury: change around statement (bp)	Bloomberg `USGG2YR`	-0.289	4.809	-13.430	10.900
2Y Treasury: change during press conf. (bp)	Bloomberg `USGG2YR`	-1.194	4.679	-20.350	9.550
5Y Treasury: yield level (bp)	Bloomberg `USGG5YR`	211.44	123.45	26.26	473.83
5Y Treasury: change around statement (bp)	Bloomberg `USGG5YR`	-0.196	4.618	-12.050	9.430
5Y Treasury: change during press conf. (bp)	Bloomberg `USGG5YR`	-1.242	4.177	-15.720	8.240
10Y Treasury: yield level (bp)	Bloomberg `USGG10YR`	239.60	102.72	59.05	480.56
10Y Treasury: change around statement (bp)	Bloomberg `USGG10YR`	-0.163	2.975	-8.360	6.410
10Y Treasury: change during press conf. (bp)	Bloomberg `USGG10YR`	-0.883	2.977	-10.150	5.560
Implied Vol 2Y: Level	Bloomberg LIVE	1.059	0.665	0.280	3.120
Implied Vol 5Y: Level	Bloomberg LIVE	3.072	1.195	1.230	6.820
Implied Vol 10Y: Level	Bloomberg LIVE	5.001	1.500	2.640	9.220
Implied Vol 20Y: Level	Bloomberg LIVE	9.686	2.493	5.650	17.290
VIX: Level	Bloomberg	18.698	6.260	9.780	37.210
Implied Vol 2Y: Change from day before	Bloomberg LIVE	-0.074	0.121	-0.430	0.140
Implied Vol 5Y: Change from day before	Bloomberg LIVE	-0.258	0.304	-1.330	0.500
Implied Vol 10Y: Change from day before	Bloomberg LIVE	-0.363	0.360	-1.500	0.330
Implied Vol 20Y: Change from day before	Bloomberg LIVE	-0.563	0.488	-2.130	0.480
VIX: Log change from day before	Bloomberg	-0.036	0.093	-0.193	0.480

Table A3: Market volatility following macroeconomic releases.

Event	Release Time	Number of releases Apr 2011–Dec 2022	Squared average SPY returns All	Powell	Post-Covid	Difference p-value Powell	Post-Covid
Before Market Hours:							
Productivity and Unit Labor Costs	08:30	93	0.014	0.008	0.007	0.178	0.292
Philadelphia Fed Business Outlook	08:30	85	0.022	0.024	0.038	0.803	0.174
Unemployment Rate & Nonfarm Payrolls	08:30	139	0.170	0.140	0.187	0.427	0.772
Consumer Price Index (CPI)	08:30	138	0.278	0.652	1.066	0.002**	0.000**
Industrial Production & Capacity Utilization	09:15	138	0.006	0.006	0.008	0.803	0.560
During Market Hours:							
Chicago Purchasing Managers Index (PMI)	09:45	138	0.024	0.037	0.032	0.101	0.512
The Conference Board U.S. Consumer Confidence	10:00	140	0.027	0.031	0.045	0.467	0.028**
JOLTS Job Openings Report	10:00	142	0.038	0.071	0.113	0.016**	0.000**
The Conference Board Leading Index	10:00	140	0.050	0.045	0.065	0.804	0.579
FOMC Minutes	14:00	94	0.040	0.040	0.053	0.977	0.173
Federal Reserve Consumer Credit Report	15:00	141	0.016	0.019	0.024	0.735	0.439

Note: Squared average SPY returns are measured over ten minute window starting one minute before release. Data on market returns outside of market hours should be interpreted with caution. The final two columns report p-values from a two-sided t-test of whether squared SPY returns are equal for (1) conferences given by Chair Powell versus other chairs, and (2) conferences given post-Covid (since March 2020) versus other chairs. Note that the sample of macro announcements in this table is limited to April 2011–December 2022.

Table A4: Market volatility during press conferences and macroeconomic indicators.

	Sq. S&P 500 returns over press conference					
	Inflation			Unemployment		
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation	-0.068					
	(0.046)					
Powell × Inflation	0.368**					
	(0.098)					
Infl. Distance from 2% Target		0.029				
		(0.072)				
Powell × Infl. Distance from 2% Target		0.325**				
		(0.126)				
Infl. Over 3%			-0.125**			
			(0.061)			
Powell × Infl. Over 3%			0.955**			
			(0.362)			
Unemployment Rate				0.002		
				(0.025)		
Powell × Unemployment Rate				-0.106**		
				(0.048)		
Unemp. Distance from u^*					-0.005	
					(0.029)	
Powell × Unemp. Distance from u^*					-0.113*	
					(0.063)	
Unemp. Over 6%						0.048
						(0.098)
Powell × Unemp. Over 6%						-0.665**
						(0.280)
Powell	-0.736**	-0.237	0.065	1.033**	0.683**	0.673**
	(0.263)	(0.177)	(0.141)	(0.406)	(0.276)	(0.253)
N	73	73	73	73	73	73
R^2	0.37	0.38	0.15	0.09	0.08	0.09

Note: Inflation is percent change over the past year in the BLS's seasonally-adjusted consumer price index for all urban consumers, all items in U.S. city average (`CPIAUCSL`), Unemp. is the unemployment rate from the BLS (`UNRATE`), and u^* is the NAIRU / noncyclical rate of unemployment from the CBO (`NROU`). Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A5: Market volatility (measured using volatility of returns in 5-min increments) during press conferences and macroeconomic indicators.

	Variance of S&P 500 returns over 5-min increments					
	Inflation			Unemployment		
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation	-0.007**					
	(0.004)					
Powell × Inflation	0.026**					
	(0.006)					
Infl. Distance from 2% Target		0.007				
		(0.007)				
Powell × Infl. Distance from 2% Target		0.015*				
		(0.009)				
Infl. Over 3%			-0.009**			
			(0.004)			
Powell × Infl. Over 3%			0.065**			
			(0.020)			
Unemployment Rate				-0.001		
				(0.002)		
Powell × Unemployment Rate				-0.006*		
				(0.003)		
Unemp. Distance from u^*					-0.002	
					(0.002)	
Powell × Unemp. Distance from u^*					-0.005	
					(0.003)	
Unemp. Over 6%						-0.003
						(0.006)
Powell × Unemp. Over 6%						-0.041**
						(0.016)
Powell	-0.045**	-0.005	0.007	0.066**	0.044**	0.046**
	(0.016)	(0.011)	(0.009)	(0.026)	(0.015)	(0.015)
N	73	73	73	73	73	73
R^2	0.45	0.46	0.22	0.14	0.11	0.14

Note: Inflation is percent change over the past year in the BLS's consumer price index for all urban consumers, all items in U.S. city average, Unemp. is the unemployment rate from the BLS, and u^* is the NAIRU / noncyclical rate of unemployment from the CBO. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A6: Reversals during Chair Powell's tenure.

	Returns over press conference		
	(1)	(2)	(3)
Bernanke × Returns around statement	0.367	0.367	0.367
	(0.410)	(0.413)	(0.416)
Yellen × Returns around statement	0.267	0.267	0.267
	(0.184)	(0.186)	(0.187)
Powell × Returns around statement	-0.469*		
	(0.260)		
Powell (pre-Covid) × Returns around statement		0.526	0.529
		(0.549)	(0.545)
Powell (post-Covid) × Returns around statement		-0.694**	
		(0.253)	
Powell (post-Covid, pre-tightening) × Returns around statement			-0.336
			(0.557)
Powell (post-Covid, tightening) × Returns around statement			-0.752**
			(0.282)
N	73	73	73
R^2	0.09	0.16	0.16

Note: Column (1) reports coefficients β_i from the specification

$$\text{ReturnsOverPressConference}_{i,t} = \alpha_i + \sum_i \beta_i \text{ReturnsAroundStatement}_{i,t} + \varepsilon_{i,t},$$

for chair i on press conference date t. The coefficients on the Chair dummies, α_i, are not reported for readability. Columns (2) and (3) further break apart Chair Powell's tenure into pre- and post-Covid phases using the date March 1, 2020, and break Chair Powell's tenure into pre-tightening and tightening phases using the date March 1, 2022 (prior to the first interest rate hike on March 16, 2022). Returns around statement are SPY returns over a thirty minute window around the FOMC statement release, and returns over press conference are SPY returns from start to end of the subsequent press conference. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A7: Snippets of Chair Powell's answers during September 21, 2022 press conference Q&A.

Meeting date	Time	Change in two-year Treasury yield (bp)	Quote
Sep 21, 2022	14:41	-2.14	So far there's only modest evidence that the labor market is cooling off. Job openings are down a bit, as you know; quits are off their all-time highs; **there's some signs that some wage measures may be flattening out but not moving up**; payroll gains have moderated but not much. And in light of the high inflation we're seeing, we think we'll need to—and in light of what I just said, we think that we'll need to bring our funds rate to a restrictive level and to keep it there for some time.
Sep 21, 2022	14:42	-2.13	And that's why I noted in my opening remarks that, at some point, as the stance of policy tightens further, it will become **appropriate to slow the pace of rate hikes** while we assess how our cumulative policy adjustments are affecting the economy and inflation. So that's how we think about that.
Sep 21, 2022	14:45	-1.70	In addition, in this cycle, **longer-run inflation expectations have generally been fairly well anchored**, and, as I've said, there's no basis for complacency there. But to the extent that continues to be the case, **that should make it easier to restore price stability**.
Sep 21, 2022	14:46	-2.34	So these are the kinds of events that are not really seen in prior business cycles, and, in principle, if those things start to get better—and **we do see some evidence of the beginnings of that.** It's not much more than that, but it's good to see that. For example, commodity prices look like they may have peaked for now; supply chain disruptions are beginning to resolve. Those developments, if sustained, could help ease the pressures on inflation.
Sep 21, 2022	14:48	+2.34	**You want to be at a place where real rates are positive across the entire yield curve.** And I think that would be the case if you look at the numbers that we're writing down and think about—you measure those against some sort of forward-looking assessment of inflation, inflation expectations. I think you would see at that time—you'd see positive real rates across the yield curve, and that is also an important consideration.

Note: The change in the two-year Treasury yield reported in the third column is the change from two minutes before to the minute given in the "Time" column. The quote column is a snippet from Chair Powell in the two minutes time window.

Table A8: Snippets of Chair Powell's answers during November 2, 2022 press conference Q&A.

Meeting date	Time	Change in two-year Treasury yield (bp)	Quote
Nov 2, 2022	14:37	+4.35	We are taking forceful steps to moderate demand so that it comes into better alignment with supply. Our overarching focus is using our tools to bring inflation back down to our 2 percent goal and to keep longer-term inflation expectations well anchored. Reducing inflation is likely to require a sustained period of below-trend growth and some softening of labor market conditions.... **The historical record cautions strongly against prematurely loosening policy. We will stay the course until the job is done.**
Nov 2, 2022	14:39	-1.66	We do need to see inflation coming down decisively, and good evidence of that would be a series of down monthly readings. Of course, that's what we'd all love to see, but that's—**I've never thought of that as the appropriate test for slowing the pace of increases** or for identifying the appropriately restrictive level that we're aiming for.
Nov 2, 2022	14:47	+2.07	We're now 18 months into this episode of high inflation, and we don't have a clearly identified, scientific way of understanding at what point inflation becomes entrenched. And so the thing we need to do from a risk-management standpoint is to **use our tools forcefully** but thoughtfully and get inflation under control—get it down to 2 percent—get it behind us. **That's what we really need to do and what we're strongly committed to doing.**
Nov 2, 2022	14:51	+3.33	Let me say this: **It is very premature to be thinking about pausing.** So people, when they hear lags, they think about a pause. It's very premature, in my view, to think about or be talking about pausing our rate hike. **We have a ways to go.** Our policy—we need ongoing rate hikes to get to that level of sufficiently restrictive.
Nov 2, 2022	15:10	+2.28	So I would also say, **it's premature to discuss pausing.** And it's not something that we're thinking about. That's really not a conversation to be had now. **We have a ways to go.** And the last thing I'll say is that I would want people to understand our commitment to getting this done and to not making the mistake of not doing enough or the mistake of withdrawing our strong policy and doing that too soon. So those—I control those messages, and that's my job.

Note: The change in the two-year Treasury yield reported in the third column is the change from two minutes before to the minute given in the "Time" column. The quote column is a snippet from Chair Powell in the two minutes time window.

Table A9: Robustness: Link between press conference Q&A and FOMC statement, using alternate measures of text valence.

	Valence of Press Conference Q&A							
Measure of text valence:	Share of Positive Words				Mean Valence of All Words			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Returns around statement release	0.550**	1.277**			0.482**	1.076**		
	(0.195)	(0.486)			(0.207)	(0.532)		
Powell × Returns around statement		-1.172**				-1.072*		
		(0.511)				(0.555)		
Valence of FOMC Statement			0.529**	1.080**			0.704**	1.337**
			(0.109)	(0.198)			(0.082)	(0.150)
Powell × Valence FOMC Statement				-0.736**				-0.677**
				(0.297)				(0.203)
Powell		-0.300		0.747**		-0.586**		0.900**
		(0.261)		(0.287)		(0.274)		(0.210)
N	73	73	73	73	73	73	73	73
R^2	0.07	0.19	0.28	0.38	0.06	0.24	0.49	0.60

Note: All text measures are normalized to have mean zero and unit standard deviation. In columns 3, 4, 7, and 8, the valence of the FOMC statement is constructed using the same approach (either share of positive words or mean valence of all words) as the dependent variable. Returns around statement release are SPY returns in the 30 minute window around the FOMC statement release. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A10: Parle (2022) Hawk-Dove Index of press conference Q&A vs. FOMC statement.

	Press Conference Q&A Hawk-Dove Index	
	(1)	(2)
FOMC Statement Hawk-Dove Index	0.018	0.538*
	(0.117)	(0.291)
Powell × FOMC Statement Hawk-Dove Index		-0.674**
		(0.317)
Powell		0.001
		(0.232)
N	73	73
R^2	0.00	0.08

Note: The Hawk-Dove Index of each text is measured using the approach described in Parle (2022). All text measures are normalized to have mean zero and unit standard deviation. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A11: Link between FOMC statement text, press conference opening remarks, and market reaction to statement.

	Valence of FOMC Statement Text		*Valence of Press Conference Opening Remarks*			
	(1)	(2)	(3)	(4)	(5)	(6)
Returns around statement release	0.914**	0.937**	0.675**	0.853**		
	(0.214)	(0.262)	(0.215)	(0.354)		
Powell × Returns around statement		-0.499		-0.529		
		(0.309)		(0.428)		
Valence of FOMC Statement					0.725**	0.925**
					(0.063)	(0.084)
Powell × Valence FOMC Statement						-0.068
						(0.192)
Powell		-1.389**		-0.795**		0.452**
		(0.164)		(0.223)		(0.209)
N	73	73	73	73	73	73
R^2	0.21	0.70	0.11	0.30	0.53	0.54

Note: The valence of each text is the share of positive words minus the share of negative words. All text measures are normalized to have mean zero and unit standard deviation. Returns around statement release are SPY returns in the 30 minute window around the FOMC statement release. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A12: Market reaction to press conference and other measures of language.

	Dependent variable: Returns over press conference					
	Measure		Powell × Measure			
Measure of Q&A	Estimate	Std. Error	Estimate	Std. Error	N	R^2
Difference Valence Q&A *vs.* Statement	0.500**	(0.228)			45	0.10
Difference Valence Q&A *vs.* Statement	0.294**	(0.149)			73	0.06
Difference Valence Q&A *vs.* Statement	0.041	(0.101)	0.459*	(0.253)	73	0.09
Flesch-Kincaid Score (complexity)	-0.583**	(0.280)			45	0.07
Flesch-Kincaid Score (complexity)	-0.291	(0.178)			73	0.03
Flesch-Kincaid Score (complexity)	0.030	(0.111)	-0.613**	(0.305)	73	0.07
Uncertainty words in Q&A	0.006	(0.140)			45	0.00
Uncertainty words in Q&A	-0.015	(0.088)			73	0.00
Uncertainty words in Q&A	-0.043	(0.075)	0.049	(0.160)	73	0.01
Hawk-Dove Index Q&A	-0.053	(0.122)			45	0.00
Hawk-Dove Index Q&A	0.001	(0.080)			73	0.00
Hawk-Dove Index Q&A	0.075	(0.081)	-0.128	(0.148)	73	0.01
Diff. Hawk-Dove Index Q&A *vs.* Statement	-0.079	(0.106)			45	0.01
Diff. Hawk-Dove Index Q&A *vs.* Statement	-0.060	(0.091)			73	0.01
Diff. Hawk-Dove Index Q&A *vs.* Statement	0.033	(0.113)	-0.112	(0.156)	73	0.01
Cosine Similarity of Statement and Q&A	-0.082	(0.285)			45	0.00
Cosine Similarity of Statement and Q&A	-0.105	(0.222)			73	0.01
Cosine Similarity of Statement and Q&A	-0.173	(0.241)	0.090	(0.376)	73	0.01
Cosine Similarity of Minutes and Q&A	-0.303	(0.190)			45	0.04
Cosine Similarity of Minutes and Q&A	-0.276**	(0.138)			73	0.05
Cosine Similarity of Minutes and Q&A	-0.219	(0.163)	-0.084	(0.252)	73	0.05

Note: All measures are normalized to have mean zero and unit standard deviation. Returns over press conference are SPY returns from the beginning to end of the press conference. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A13: Market volatility during press conference and other measures of language.

	Dependent variable: Sq. returns over press conference					
	Measure		Powell × Measure			
Measure of Q&A	Estimate	Std. Error	Estimate	Std. Error	N	R^2
Abs. Diff. Valence Q&A *vs.* Statement	0.402**	(0.169)			45	0.10
Abs. Diff. Valence Q&A *vs.* Statement	0.287**	(0.133)			73	0.12
Abs. Diff. Valence Q&A *vs.* Statement	-0.028	(0.065)	0.430**	(0.183)	73	0.15
Flesch-Kincaid Score (complexity)	-0.700*	(0.421)			45	0.05
Flesch-Kincaid Score (complexity)	-0.426*	(0.238)			73	0.09
Flesch-Kincaid Score (complexity)	-0.125	(0.080)	-0.576	(0.434)	73	0.10
Uncertainty words in Q&A	-0.165	(0.185)			45	0.01
Uncertainty words in Q&A	-0.078	(0.113)			73	0.06
Uncertainty words in Q&A	0.042	(0.026)	-0.207	(0.190)	73	0.07
Hawk-Dove Index Q&A	0.140	(0.170)			45	0.01
Hawk-Dove Index Q&A	0.068	(0.099)			73	0.06
Hawk-Dove Index Q&A	-0.029	(0.043)	0.169	(0.177)	73	0.07
Abs. Diff. Hawk-Dove Index Q&A *vs.* Statement	0.085	(0.231)			45	0.00
Abs. Diff. Hawk-Dove Index Q&A *vs.* Statement	0.066	(0.187)			73	0.06
Abs. Diff. Hawk-Dove Index Q&A *vs.* Statement	-0.012	(0.048)	0.096	(0.239)	73	0.06
Cosine Similarity of Statement and Q&A	1.047**	(0.443)			45	0.21
Cosine Similarity of Statement and Q&A	0.700**	(0.350)			73	0.17
Cosine Similarity of Statement and Q&A	-0.312**	(0.135)	1.358**	(0.468)	73	0.25
Cosine Similarity of Minutes and Q&A	0.303	(0.289)			45	0.02
Cosine Similarity of Minutes and Q&A	0.109	(0.218)			73	0.06
Cosine Similarity of Minutes and Q&A	-0.302**	(0.100)	0.604*	(0.309)	73	0.08

Note: All measures are normalized to have mean zero and unit standard deviation. Returns over press conference are SPY returns from the beginning to end of the press conference. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A14: VIX and forward-looking volatility on Treasuries around press conference dates.

	Implied vol. on Treasuries				VIX
	2 YR	5 YR	10 YR	20 YR	
	(1)	(2)	(3)	(4)	(5)
Powell × 4 days prior	0.002	0.078	0.189	0.400*	0.006
	(0.043)	(0.088)	(0.124)	(0.241)	(0.029)
Powell × 3 days prior	0.025	0.085	0.131	0.289	-0.015
	(0.034)	(0.082)	(0.116)	(0.226)	(0.026)
Powell × 2 days prior	0.055*	0.086	0.153*	0.344*	0.006
	(0.032)	(0.058)	(0.084)	(0.181)	(0.015)
Powell × day before (*omitted*)	-	-	-	-	-
Powell × day of conference	0.013	0.088	0.140	0.303**	0.047**
	(0.030)	(0.076)	(0.089)	(0.117)	(0.020)
Powell × 1 day after	0.043	0.158	0.305**	0.558**	0.069**
	(0.040)	(0.101)	(0.120)	(0.204)	(0.028)
Powell × 2 days after	0.036	0.197*	0.342**	0.574**	0.074**
	(0.047)	(0.118)	(0.139)	(0.220)	(0.029)
Powell × 3 days after	0.087*	0.303**	0.473**	0.916**	0.079**
	(0.047)	(0.127)	(0.160)	(0.235)	(0.034)
Powell × 4 days after	0.051	0.250*	0.409**	0.803**	0.084**
	(0.050)	(0.132)	(0.169)	(0.247)	(0.035)
Powell × 5 days after	0.028	0.238*	0.389**	0.759**	0.058*
	(0.053)	(0.123)	(0.159)	(0.250)	(0.035)
Powell × 6 days after	0.039	0.286**	0.489**	0.883**	0.045
	(0.053)	(0.125)	(0.163)	(0.272)	(0.035)
Powell × 7 days after	0.028	0.210	0.340**	0.620**	0.001
	(0.058)	(0.131)	(0.163)	(0.277)	(0.037)
N	868	868	868	868	868
R^2	0.17	0.28	0.30	0.27	0.07

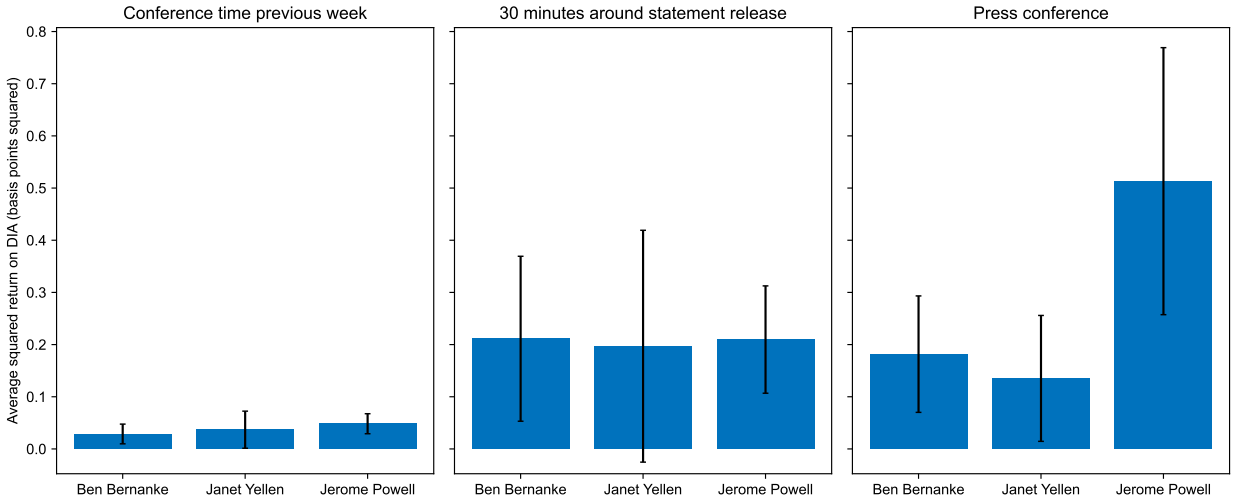
Note: Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Table A15: Forward-looking volatility on Treasuries around press conference dates.

	Addl. controls		*Excl. forward guid.*		*Separating chairs*	
	5 YR	20 YR	5 YR	20 YR	5 YR	20 YR
	(1)	(2)	(3)	(4)	(5)	(6)
Powell × 4 days prior	0.063	0.425	0.078	0.385	0.137	0.343
	(0.092)	(0.287)	(0.093)	(0.268)	(0.098)	(0.230)
Powell × 3 days prior	0.072	0.319	0.104	0.314	0.116	0.164
	(0.086)	(0.278)	(0.086)	(0.256)	(0.086)	(0.192)
Powell × 2 days prior	0.073	0.374	0.091	0.357*	0.089	0.200
	(0.077)	(0.249)	(0.060)	(0.199)	(0.059)	(0.143)
Powell × day before (*omitted*)	-	-	-	-	-	-
Powell × day of conference	0.073	0.329**	0.086	0.320**	0.107	0.206*
	(0.080)	(0.162)	(0.090)	(0.134)	(0.085)	(0.124)
Powell × 1 day after	0.143	0.585**	0.165	0.612**	0.219**	0.495**
	(0.097)	(0.229)	(0.116)	(0.228)	(0.107)	(0.252)
Powell × 2 days after	0.184*	0.603**	0.200	0.597**	0.279**	0.470*
	(0.110)	(0.240)	(0.135)	(0.245)	(0.110)	(0.245)
Powell × 3 days after	0.282**	0.937**	0.294**	0.952**	0.383**	0.819**
	(0.122)	(0.250)	(0.143)	(0.259)	(0.115)	(0.249)
Powell × 4 days after	0.235*	0.830**	0.248*	0.903**	0.362**	0.738**
	(0.125)	(0.259)	(0.150)	(0.262)	(0.110)	(0.251)
Powell × 5 days after	0.223*	0.786**	0.232*	0.792**	0.309**	0.642**
	(0.116)	(0.255)	(0.139)	(0.272)	(0.112)	(0.286)
Powell × 6 days after	0.271**	0.910**	0.273**	0.896**	0.347**	0.741**
	(0.116)	(0.273)	(0.137)	(0.289)	(0.123)	(0.298)
Powell × 7 days after	0.199	0.653**	0.202	0.637**	0.251**	0.357
	(0.121)	(0.273)	(0.142)	(0.301)	(0.126)	(0.291)
Bernanke × 4 days prior					0.136	-0.133
					(0.088)	(0.358)
Bernanke × 3 days prior					0.071	-0.291
					(0.071)	(0.350)
Bernanke × 2 days prior					0.008	-0.336
					(0.050)	(0.272)
Bernanke × day of conference					0.045	-0.226
					(0.140)	(0.212)
Bernanke × 1 day after					0.142	-0.147
					(0.175)	(0.340)
Bernanke × 2 days after					0.190	-0.242
					(0.209)	(0.361)
Bernanke × 3 days after					0.186	-0.228
					(0.231)	(0.366)
Bernanke × 4 days after					0.262	-0.153
					(0.247)	(0.406)
Bernanke × 5 days after					0.166	-0.273
					(0.217)	(0.325)
Bernanke × 6 days after					0.144	-0.333
					(0.209)	(0.353)
Bernanke × 7 days after					0.095	-0.614*
					(0.201)	(0.335)
Additional controls	Yes	Yes				
N	868	868	796	796	868	868
R^2	0.31	0.28	0.25	0.25	0.29	0.27

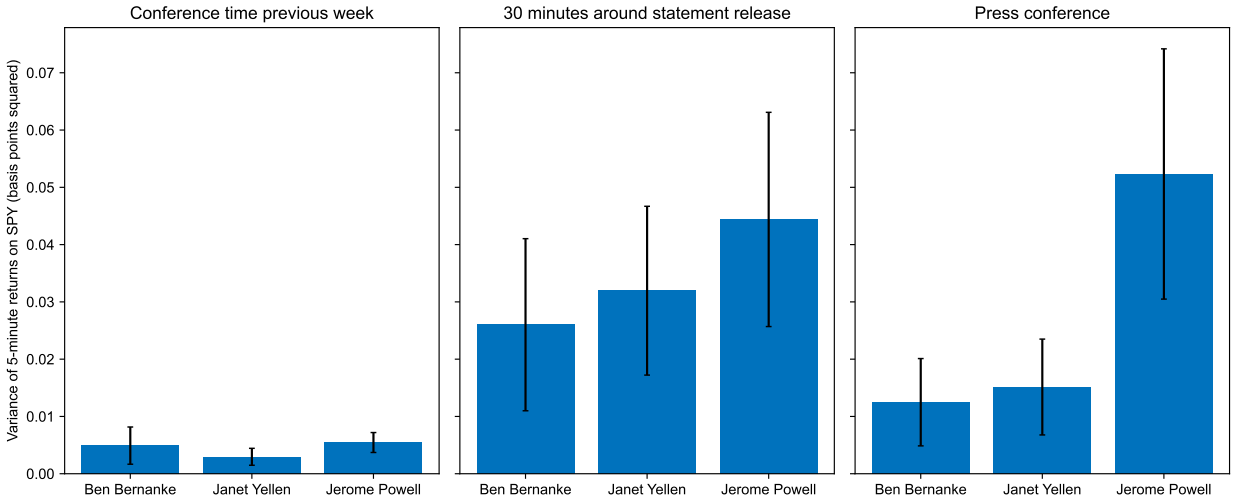
Note: Columns 1–2 include the following additional controls: the unemployment rate, the unemployment rate squared, the inflation rate, the inflation rate squared, and fixed effects for the policy stance (tightening, neutral, or accommodative). Columns 3–4 exclude meeting dates with major forward guidance announcements listed in Swanson (2021) Table 1. Heteroskedasticity-robust (HC3) standard errors in parentheses. ** indicates significance at 5%, * at 10%.

Figure A1: Market volatility for placebo conference, FOMC statement release, and press conference under three chairs, using returns on the Dow Jones Industrial index.



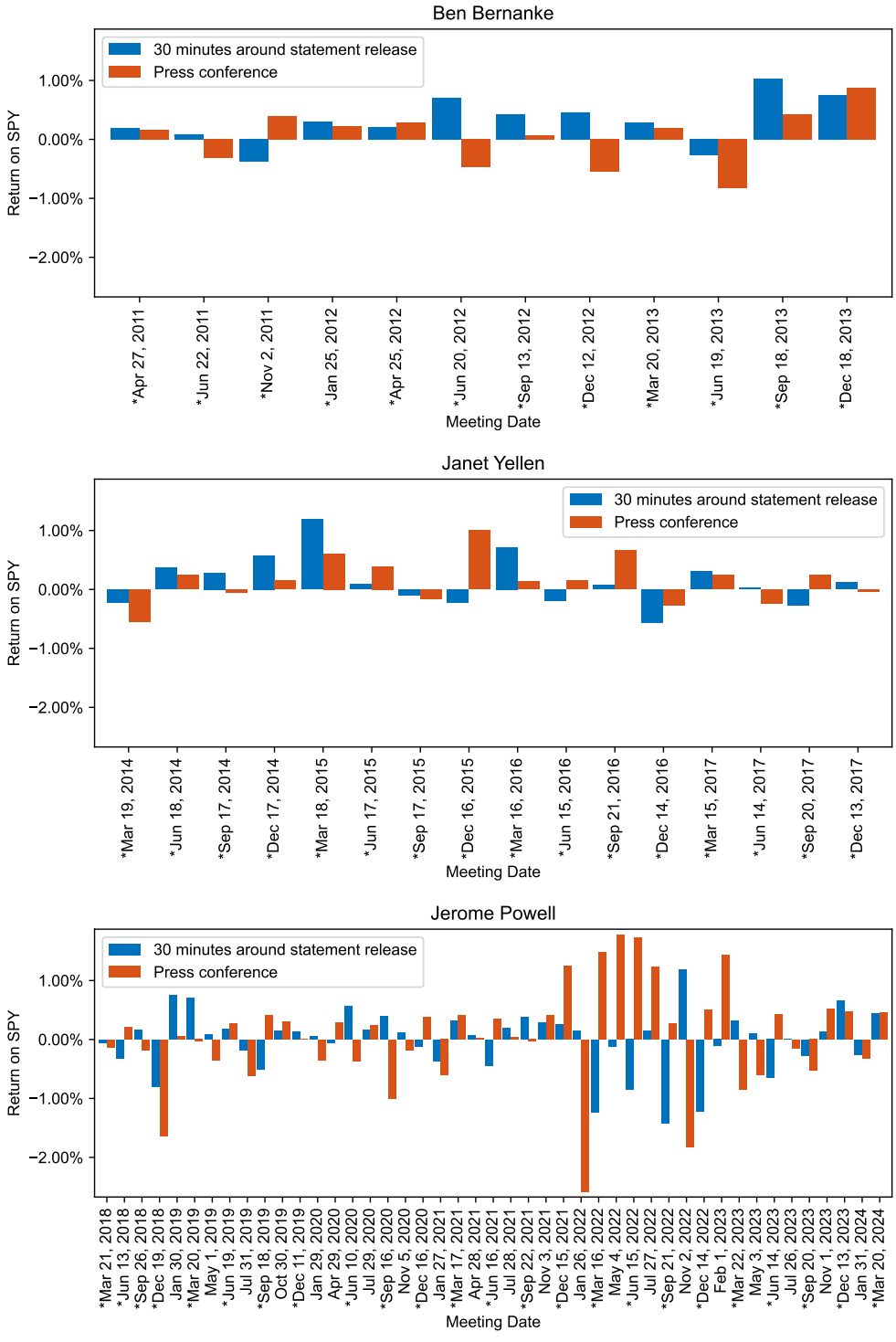
Note: The figure shows average squared returns of the Dow Jones Industrial index (proxied by the DIA ETF) during press conferences given by Chair Powell, Chair Yellen, and Chair Bernanke. We measure returns from the minute before the press conference starts to the minute it ends. We exclude emergency and unscheduled conferences: the March 4, 2014 unscheduled conference call under Chair Yellen and the emergency Covid-19 related press conferences given by Chair Powell on March 3, 2020 and March 15, 2020.

Figure A2: Market volatility for placebo conference, FOMC statement release, and press conference under three chairs, measured using returns in five-minute increments.



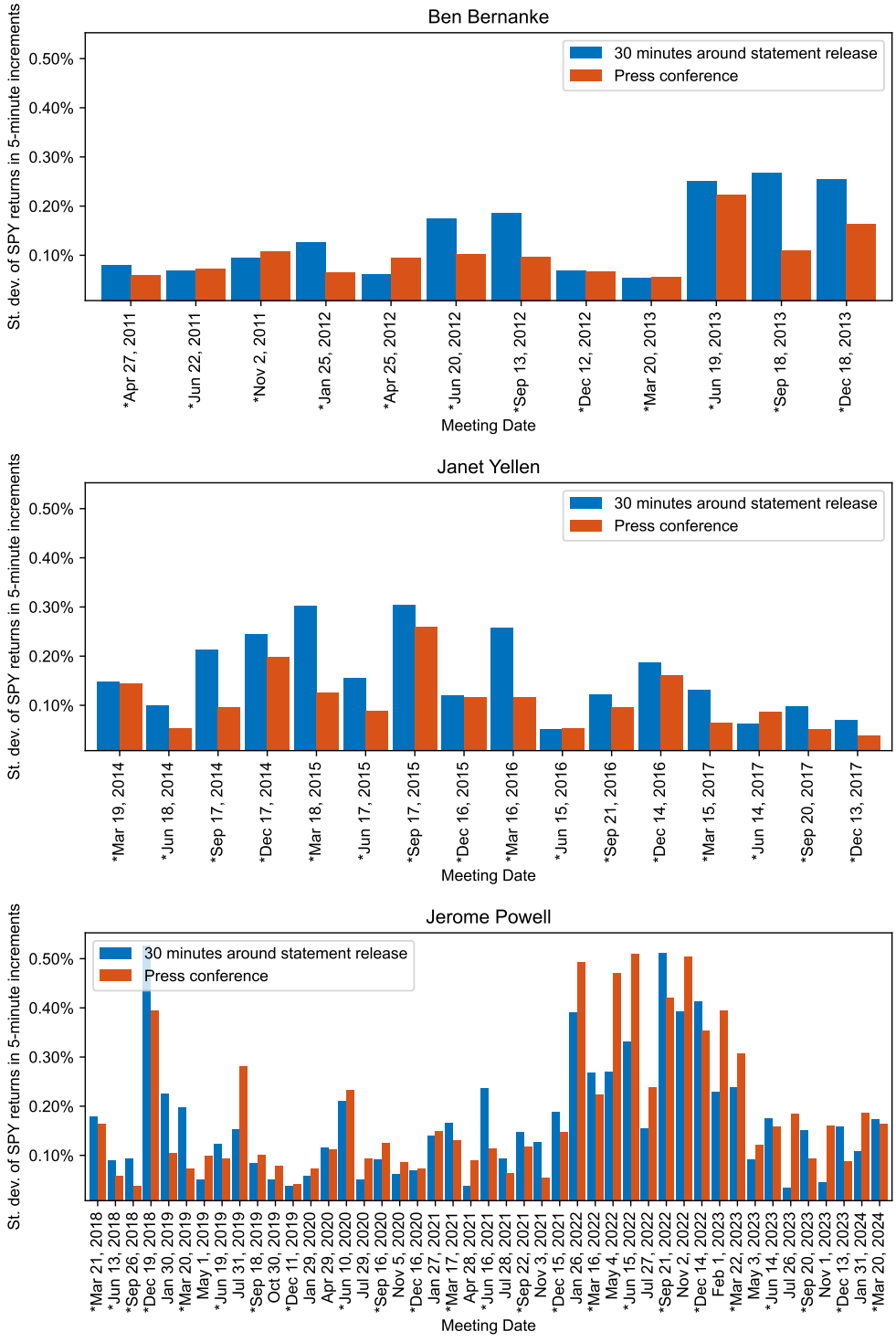
Note: The figure shows average squared returns of the S&P 500 index (proxied by the SPY ETF) over 5-minute increments during press conferences given by Chair Powell, Chair Yellen, and Chair Bernanke. We measure returns from the minute before the press conference starts to the minute it ends. We exclude emergency and unscheduled conferences: the March 4, 2014 unscheduled conference call under Chair Yellen and the emergency Covid-19 related press conferences given by Chair Powell on March 3, 2020 and March 15, 2020.

Figure A3: S&P 500 returns for FOMC statement release and press conference for each conference.



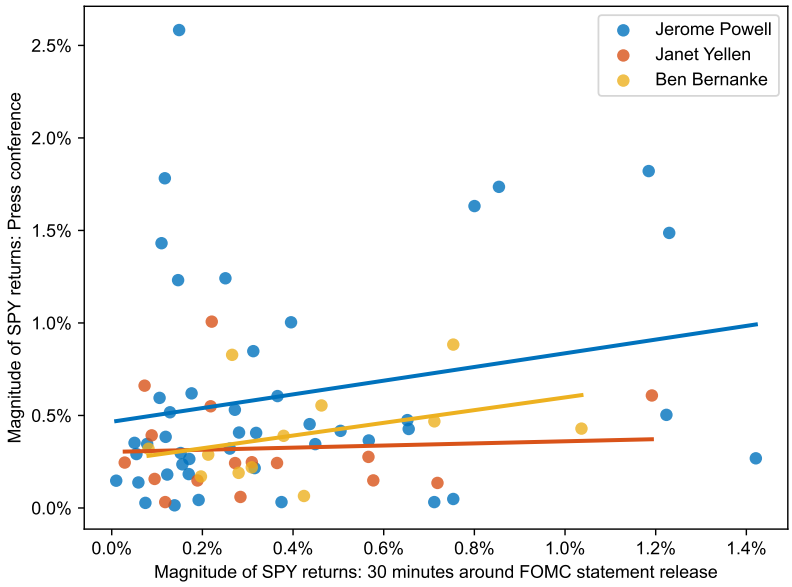
Note: Asterisks denote meetings at which an FOMC projections dot plot was released.

Figure A4: Standard deviation of S&P 500 returns measured in five-minute increments for each conference.

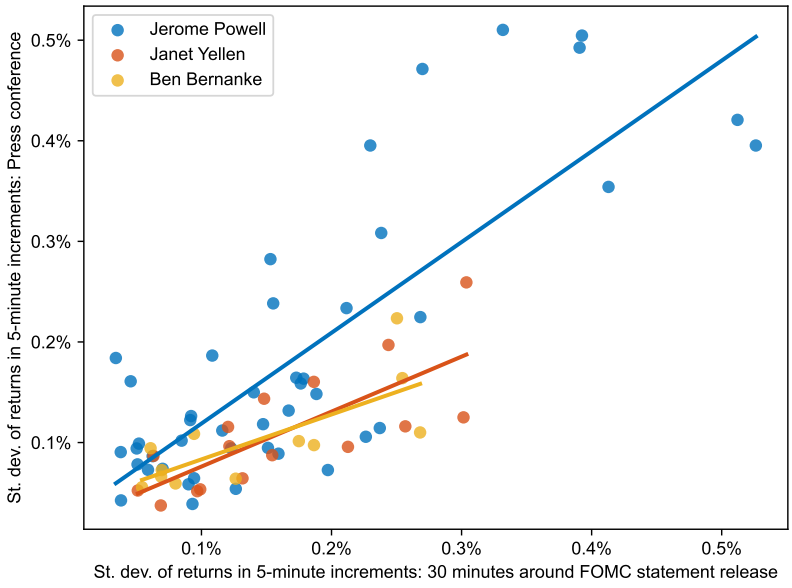


Note: Asterisks denote meetings at which an FOMC projections dot plot was released.

Figure A5: Correlation of magnitude and volatility of market reaction to FOMC statement release and to press conference.



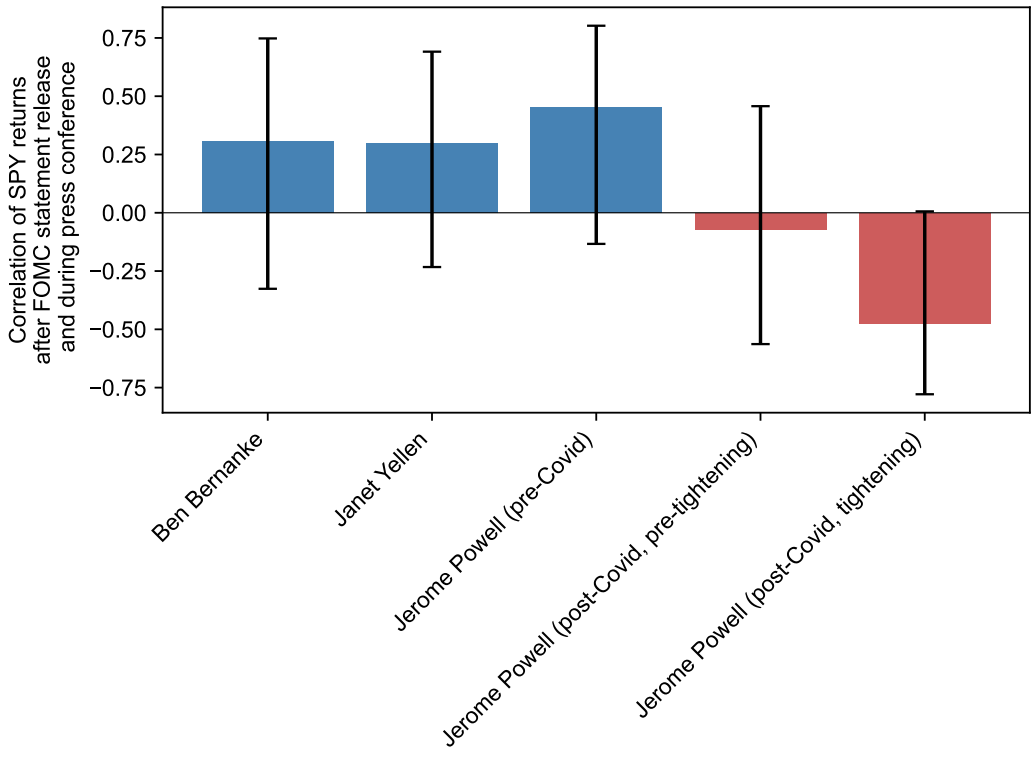
(a) Absolute magnitude of market reaction.



(b) Volatility of market reaction.

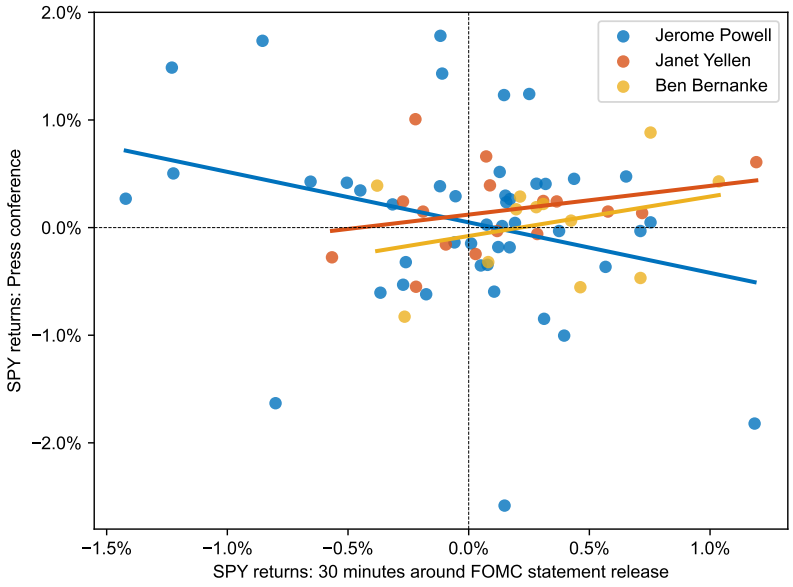
Note: The top panel plots the magnitude (absolute value) of the market return to the FOMC statement release against the magnitude of the market return during the press conference. The bottom panel plots the dispersion of returns measured in five-minute increments in the 15 minutes after the FOMC statement release against the dispersion of returns during the press conference. These figures use S&P 500 returns; results from returns on the Dow Jones Industrial index are similar.

Figure A6: Correlation of market reaction to FOMC statement release with market reaction to press conference.



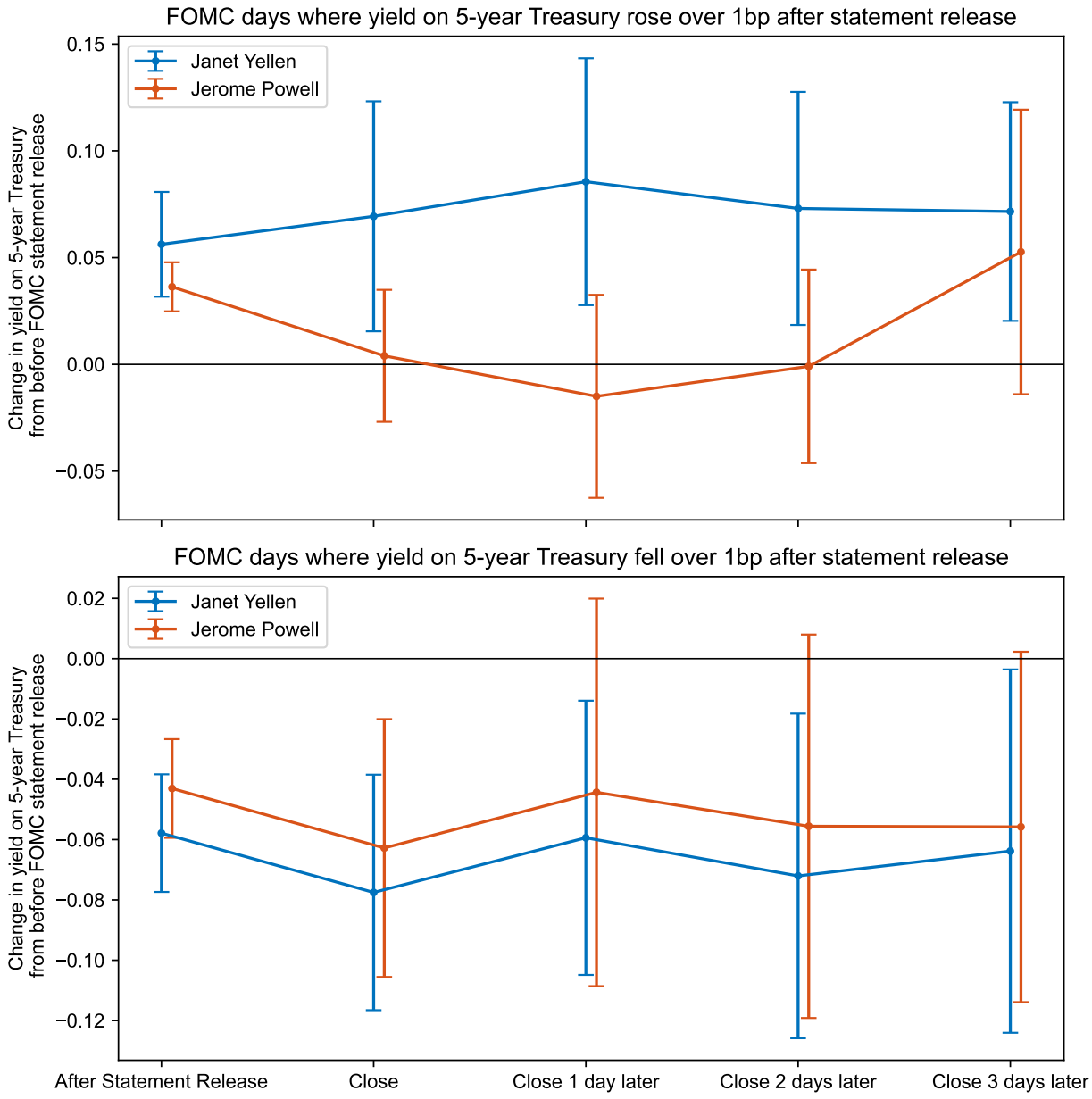
Note: Correlation of S&P 500 returns after statement release and during press conference for each chair, with Chair Powell's conferences split before/after March 1, 2020 and March 1, 2022. A positive correlation means that the S&P 500 tended to move in the same direction after the statement release and during the press conference given by the chair. Error bars indicate 95 percent confidence interval.

Figure A7: Scatterplot of market returns during press conference vs. returns around statement release.



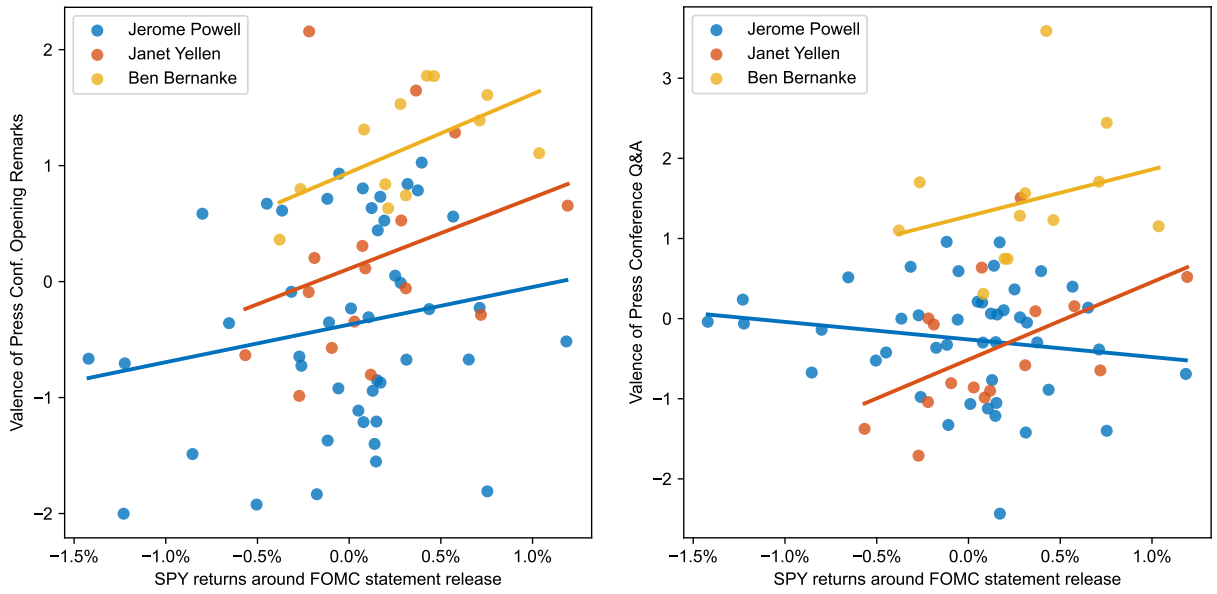
Note: The figure plots the S&P 500 return from beginning to end of the press conference against the S&P 500 return in a 30 minute window around the FOMC statement release, with best-fit lines by Federal Reserve Chair. Results from returns on the Dow Jones Industrial index are similar.

Figure A8: Average change in five-year Treasury yields following FOMC press conference days, split by conferences where yields increased/decreased over 1 basis point following FOMC statement release.



Note: The figure shows the average change in the yield of five-year Treasuries relative to 1:50 PM on the day of the FOMC press conference. The change in the yield after the FOMC statement release measures the change from 1:50 PM to 2:15 PM. See Figure 5 for a list of conferences in each panel. Error bars indicate bootstrapped confidence intervals.

Figure A9: Market reaction to FOMC statement and valence of language in press conference.

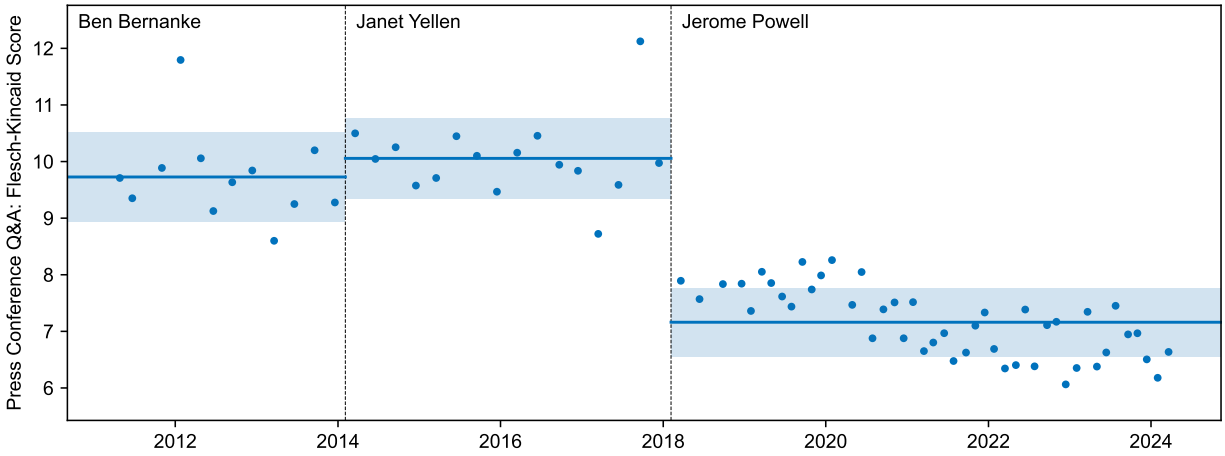


(a) Press conference opening remarks.

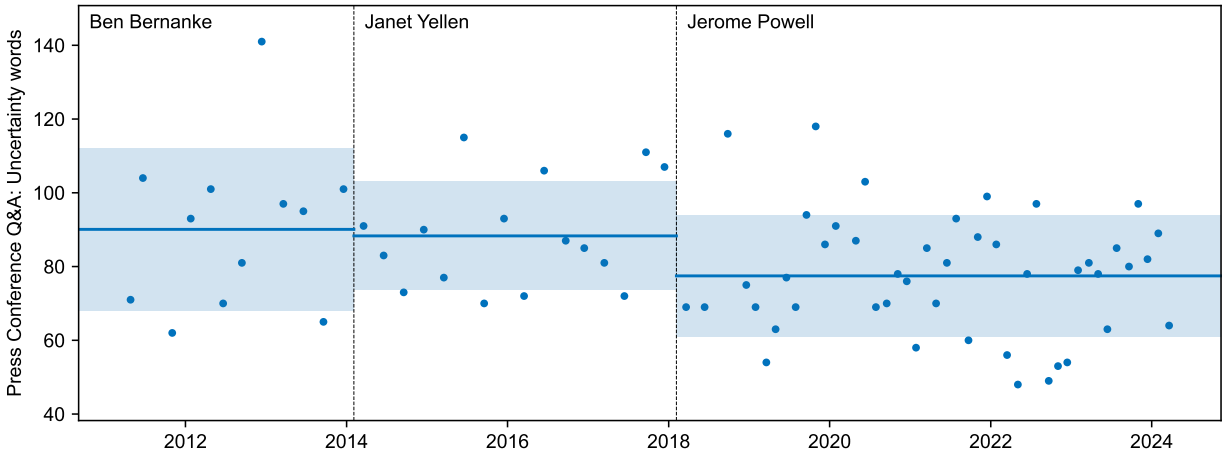
(b) Press conference Q&A.

Note: The valence of each text is the share of positive words minus the share of negative words. Valence normalized to mean zero and unit standard deviation. Returns around statement release are SPY returns in the 30 minute window around the FOMC statement release.

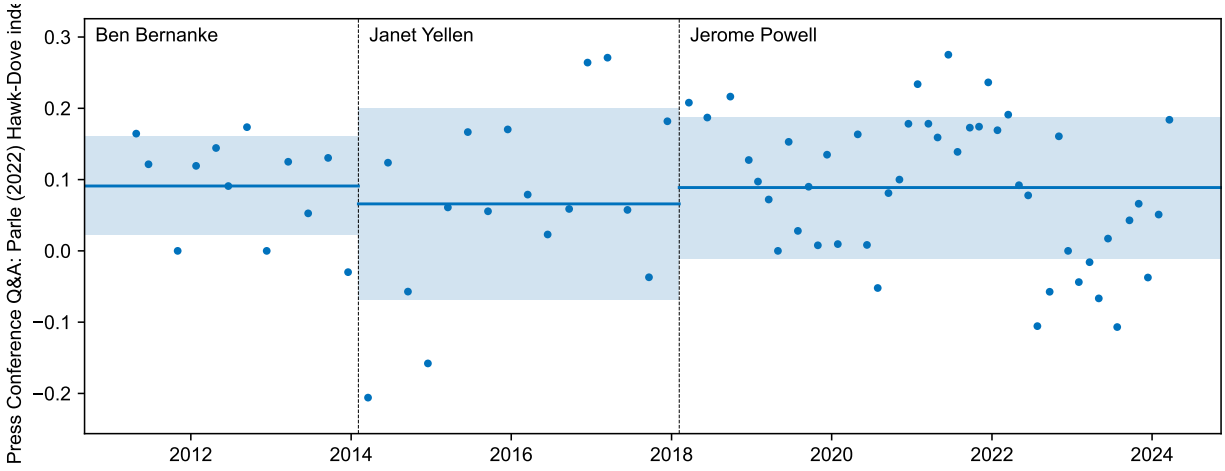
Figure A10: Textual features of Q&A portion of press conferences.



(a) Text complexity (Flesch-Kincaid index).

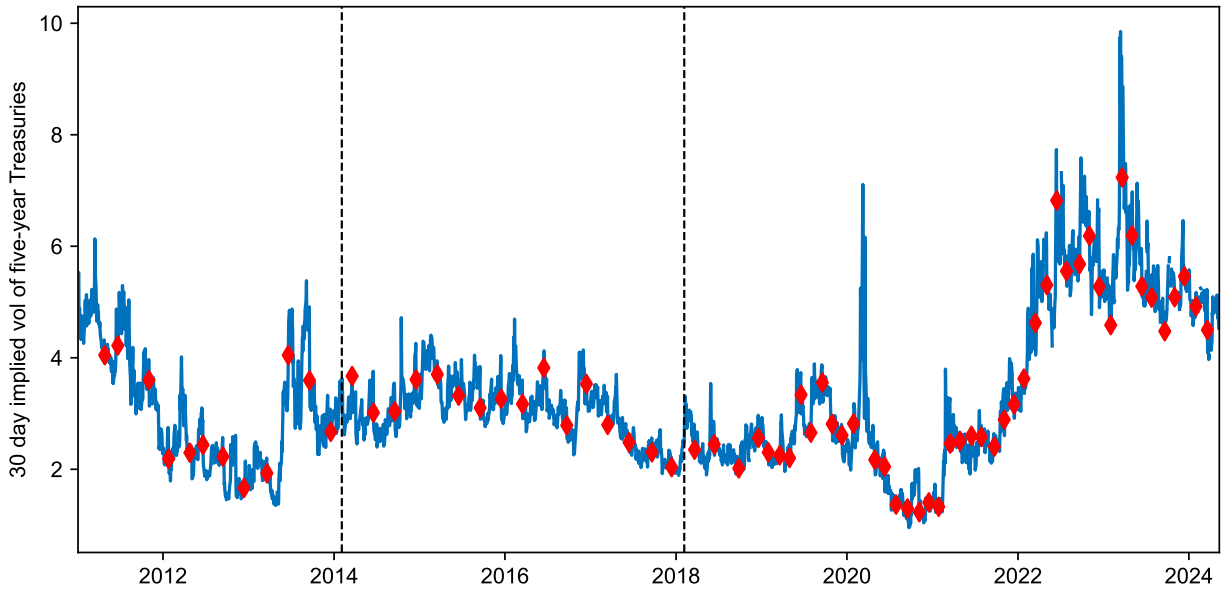


(b) Uncertainty words (Loughran and McDonald 2024).



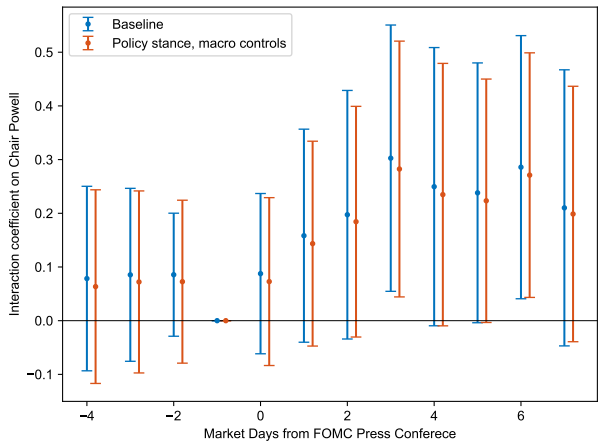
(c) Hawk-Dove index (Parle 2022).

Figure A11: Time series of 30-day implied volatility on five-year Treasuries.

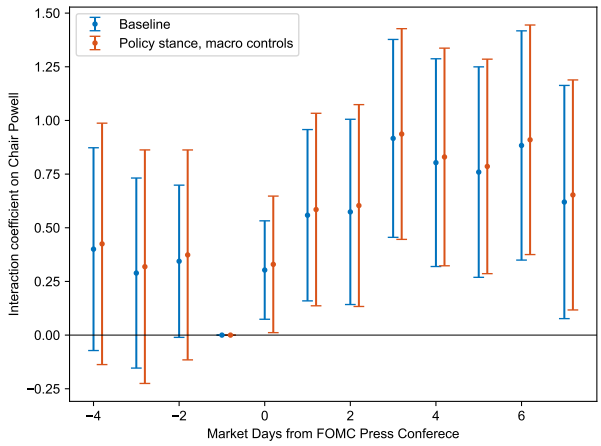


Note: The dotted lines refer to the start of Chair Yellen and Chair Powell's terms. The red diamonds indicate dates of FOMC press conferences (excluding unscheduled and emergency meetings).

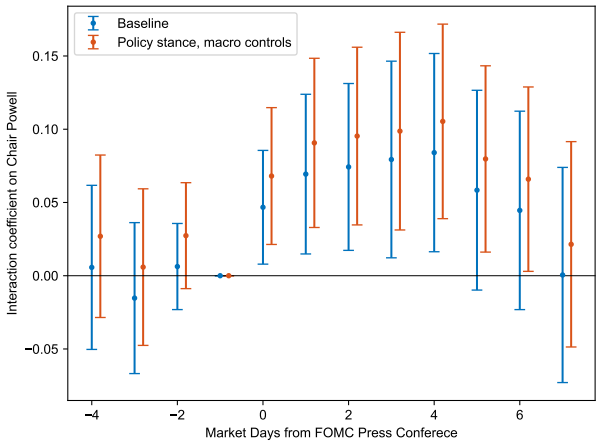
Figure A12: Difference-in-diferences estimates of the impact of Chair Powell's conferences on implied volatility.



(a) Five-year Treasuries.



(b) Long-term (≈20 year) Treasuries.



(c) VIX (CBOE).

Note: Thirty-day implied volatility of at-the-money options for five-year and long-term Treasuries are from Bloomberg's LIVE calculation engine. Standard errors clustered by meeting date, and error bars indicate 95 percent confidence intervals. The second series of coefficients in each plot includes controls for the unemployment rate, the unemployment rate squared, the inflation rate, the inflation rate squared, and fixed effects for the policy stance (tightening, neutral, or accommodative).