The Economics of the Fed Put

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We document that since the mid-1990s low stock market returns predict accommodating policy by the Federal Reserve. We show that this fact emerges because, over this period, (i) negative stock returns are strongly correlated with downgrades to the Fed's growth expectations, and (ii) growth downgrades are highly significant in a Taylor rule framework. We use textual analysis of FOMC minutes and transcripts to argue for a causal effect of the stock market on the Fed's growth expectations and thereby on policy. We document that FOMC members pay attention directly to the stock market and view it as a causal factor for the economy. The primary mechanism, as perceived by the Fed, is the effect of the stock market on consumption (and to some extent investment); less attention is focused on the stock market simply predicting (as opposed to driving) the economy. The Fed's expectations updating is roughly in line with that of private sector forecasters and with the stock market's predictive power for realized growth and unemployment.

First version: December 2016
This version: March 2019
Key words: Fed put, monetary policy, stock market, textual analysis, Taylor rules
JEL codes: E44, E52, E58

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I. Introduction

The effect of the stock market on monetary policy is a topic of long-standing importance with policymakers having to decide both whether to accommodate stock market slumps and whether to lean against the wind in times of stock market booms. This question has received renewed interest in the years following the financial crisis. Some observers have criticized the Fed for being excessively driven by asset prices, the stock market in particular, rather than by economic data. For example, former Fed governor Kevin Warsh has stated: *"[...] They look to me asset price dependent, more than they look [economic] data dependent. When the stock market falls like it did in the beginning of this year, they say: 'Oh, we'd better not do anything.'"*[1] In this paper, we empirically revisit the question of whether the Fed is responding to the stock market and, if yes, why.

Establishing a causal impact of the stock market on policy is difficult because the stock market and policy may be reacting to each other and both may be driven by underlying macroeconomic news. Rigobon and Sack (2003) use identification through heteroscedasticity and find that a 5 percent decrease in the stock market causes a 14 basis point reduction in the federal funds target at the next Federal Open Market Committee (FOMC) meeting. An alternative approach is to estimate Taylor rules that include past stock returns in addition to the Fed's forecasts of macroeconomic variables. The inclusion of macroeconomic expectations in the Taylor rule helps overcome omitted variables problems while lagging stock returns to some extent addresses concerns about reverse causality (from policy to stock returns). Based on such estimates, Bernanke and Gertler (1999) find a modest but statistically significant effect of stock returns on the federal funds target. They argue theoretically that monetary policy should not respond to the stock market beyond its effect on inflation and output and conclude that actual policy by the US Federal Reserve is largely consistent with this advice.

A large subsequent literature builds on the above approaches to estimate the impact of the stock market on Fed policy.[2] While the findings differ depending on the specification and period under study, existing empirical evidence also leaves open issues regarding causality and mechanism. In terms of causality, even if the stock market was not significant in a Taylor rule estimation it could still be a strong determinant of policy if it is a driver of the macro-variables included in the Taylor rule. As for mechanism, existing evidence does not directly speak to the economic channels that determine any impact of the stock market on the Fed's expectations and decision-making.

[1] See CNBC's "Squawk Box" interview, July 14, 2016 (available here).

[2] See, e.g., Hayford and Malliaris (2004), Fuhrer and Tootell (2008), Bjørnland and Leitemo (2009), Ravn (2012), Hoffmann (2013).

In this paper, we seek to cast light on these issues by asking four questions. First, what is the relationship between the Fed's updating of macroeconomic expectations and the stock market? Second, does the Fed pay attention directly to the stock market, a necessary condition for the stock market causing policy (via macro-expectations or above and beyond those)? Third, if the Fed does, in fact, react to the stock market, what is the economic mechanism that underlies the Fed's thinking? Fourth, if the Fed reacts to the stock market, is the reaction appropriate or too strong?

Revisiting the statistical relationship between the stock market and the Fed funds target, we show that since the mid-1990s the Fed has engaged in a sequence of policy easings following large stock market declines. We refer to this pattern as a "Fed put," by which we mean strong accommodation following poor stock returns.[3]

Our first set of results ties this fact to the Fed's macroeconomic expectations. We document a close comovement between stock returns and the updates to the Fed's expectations about real activity (output growth and unemployment). This comovement emerges in the mid-1990s and holds through the 2007/09 financial crisis and beyond. The relationship is asymmetric, i.e., it is present mainly for returns over the negative range: A 10 percent lower stock returns in the period between FOMC meetings is associated with a one percentage point downgrade in the Fed's expectations about real GDP growth for the following year. Estimating various specifications of the Taylor rule, we then show that negative stock returns are a significant predictor of the fed fund target primarily via their correlation with Fed's downgrades of growth expectations.

To assess whether the Fed pays attention to the stock market, we conduct textual analysis of FOMC minutes and transcripts. This allows us to distinguish between a coincidental relation where the Fed views the stock market as uninformative and the market just happens to be correlated with variables that drive policy, and a causal relation in which the Fed views stock returns as informative about the state of the economy and thus reacts to them.

Analyzing Fed documents, we argue in favor of a causal relation by showing that the Fed started paying systematic attention to the stock market in the mid-1990s. In our baseline approach, we search for phrases related to the stock market (e.g., "stock market," "equity prices," "S&P 500") in FOMC minutes. We find 983 mentions of the stock market in the 184 FOMC minutes covering the 1994–2016 period. We manually classify their tone into positive or negative based on whether FOMC meeting attendees discuss the market going

[3]The Financial Times, in one of the early articles on the subject, defines the Fed put as saying "when financial markets unravel, count on the Federal Reserve and its chairman Alan Greenspan (eventually) to come to the rescue," Financial Times, December 8, 2000. We address the issue of whether markets expected the Fed put ex-ante in the last section of the paper and discuss potential moral hazard.

up or down. The tone of the stock market mentions relates to actual stock returns with the expected signs, with low (high) stock returns leading to more negative (positive) stock market mentions. This result is present both before and during the zero-lower bound period. While many of the stock market mentions are descriptive simply summarizing recent developments, the textual analysis allows us to construct a measure of how frequently FOMC participants mention the market in a non-descriptive sense (i.e., indicating some causal effect on their thinking). We find that these mentions are strongly predictive of future policy and in an asymmetric way: mentions of stock market declines predict monetary easing, whereas there is no relationship between mentions of stock market gains and tightening.

To evaluate the robustness of these result to using FOMC transcripts, we develop an algorithm to find and classify stock market mentions. The algorithm is based on a set of stock market phrases interacted with a list of direction words describing the market going down (negative words) or up (positive words). We train the algorithm on the FOMC minutes and then use it to show that our results are robust to studying FOMC transcripts. In addition to studying stock market mentions we also document mentions of other financial conditions beyond stocks. We show that, while interest rates, the dollar and credit conditions have always played a part in Fed's deliberations, the increased attention to the stock market is a distinct feature that emerges from the mid-1990s.

We then use textual analysis to understand the mechanism for why the Fed pays attention to the stock market. We classify the 983 paragraphs that mention the stock market in the minutes according to what is said about the market. We additionally exploit the structure of the minutes to distinguish the comments provided by the Fed staff versus FOMC participants. The purely descriptive cases (551 paragraphs) appear mainly in the staff's summary of financial conditions. More interesting, of the other 432 paragraphs, 265 (61%) discuss the impact of the stock market on consumption. The majority of those are brought up by FOMC participants and specifically refer to the consumption-wealth effect, i.e., the notion that higher stock market wealth leads to higher consumption. The impact of the stock market on investment, mostly via the firms' cost of capital, is another repeated theme in FOMC discussions, appearing 34 times. In another 44 cases, the stock market is discussed as part of a broader set of variables describing financial conditions, with financial conditions seen as influencing investment and, less frequently mentioned, consumption. Of the 432 paragraphs with stock market mentions that are not purely descriptive, over 90% are cases in which the Fed views the stock market as a driver of the economy, as opposed to just a signal about economic shocks. Overall, this evidence suggests that the Fed views the stock market as an important driver of consumption and investment.

We provide several benchmarks to quantify the strength of the Fed's reaction to the stock market. Our main approach is to compare the impact of the stock market on Fed economic forecasts to that on the corresponding private sector forecasts, as well as to the predictive power of the stock market for realized economic variables (output, unemployment, and inflation). We find little evidence that Fed expectations overreact to the stock market relative to these benchmarks. Importantly, both the Fed's and private sector's expectations of real activity update asymmetrically with the stock market, being predictable with negative stock market outcomes. Realized growth and unemployment changes also respond more to negative than to positive returns, though not quite as asymmetrically as expectations. Additionally, we study whether households are more concerned about the stock market at the same time the Fed is. We exploit responses in the Michigan Survey of Consumers where participants report any relevant positive or negative changes to business conditions they perceive. The stock market is the third most commonly mentioned news category (after news about employment situation and news about specific industries). Measuring the relative frequency of stock market news (relative to any other news) reported by consumers over time, we find a correlation of 0.68 between the Fed's and households' attention to negative stock market news.

In terms of methodology, recent research increasingly exploits information in textual data to gain insight into the workings of monetary policy. Using tools from computational linguistics, Hansen et al. (2017) study how central bank transparency influences monetary policymakers' deliberations, while Hansen and McMahon (2016) analyze the effects of Fed communication on both asset markets and macroeconomic outcomes. Schmeling and Wagner (2017) show that changes in the tone of ECB's communication have a significant effect on asset prices. While this work focuses on central bank deliberation and communication, we explore Fed documents to understand whether and how the stock market affects central bank decision making. In terms of textual analysis of FOMC documents, most closely related to our work are Cecchetti (2003) and Peek, Rosengren, and Tootell (2016). Cecchetti (2003) uses counts of words related to the stock market and asset prices to argue that the FOMC pays attention to the stock market. He does not distinguish between positive and negative stock market mentions – which we show have an asymmetric effect on policy – and does not study the mechanism underlying why the Fed pays attention to the stock market. Peek, Rosengren, and Tootell (2016) use text to assess whether the Fed acts as if financial stability was its tertiary mandate. They focus on a set of 32 noun phrases which they classify as positive or negative from a financial stability perspective.[4] The goal of our textual analysis is to

[4]For example, Peek et al. (2016) classify "stock market," "stock prices," "equity values" as positive financial stability words. We show that many of these appear within a negative context, and those have strong predictive power for the fed fund target.

assess the importance of different economic channels that drive the Fed's reaction to the stock market.

The rest of the paper proceeds as follows. Section III describes the statistical relationship between the Fed funds target and stock returns, and compares the stock market to macroeconomic indicators as predictor of Fed policy. Section IV contains the textual analysis evidence that the stock market causes Fed policy while Section V provides textual analysis evidence on the mechanisms through which the stock market drives the Fed's thinking. Section VI focuses on whether the Fed reacts too strongly to the stock market and Section VII discusses public perceptions of the Fed put. Section VIII concludes.

II. Data and variable definitions

II.A. Defining target changes and intermeeting excess stock returns

Since 1981, the Fed has held 8 scheduled meetings per year roughly 6 to 8 weeks apart. Since 1994, changes to the federal fund rate target have been publicly announced. Prior to 1994, we rely on Thornton (2005) to determine when market participants learned about the FOMC decision. Thornton dates target changes based on when they were likely implemented in open markets operations by the Desk at the Federal Reserve Bank of New York (generally 1 or 2 days after the FOMC's decision). The time series of the FFR target going back to September 27, 1982 is available via FRED Economic Data.

Following Cieslak, Morse, and Vissing-Jorgensen (2018, CMVJ), we define the FOMC cycle day as the number of days elapsed from a scheduled FOMC meeting. Thus, day 0 in FOMC cycle time is the day of a scheduled meeting (the last day for 2-day meetings), day -1 ($+1$) is the day before (after) a meeting, and so on. For the period after 1994, we compute cumulative target changes from day 0 of cycle $m-1$ to day 0 of cycle $m+X$ where m indexes the scheduled FOMC meetings. For the 1982:09–1993 period, we calculate target changes from day 2 of cycle $m-1$ to day 2 of cycle $m+X$, consistent with Thornton's dating approach.

Daily stock returns and T-bill returns are from Ken French's website. We denote intermeeting excess stock returns as rx_m. From 1994 onward, we calculate the intermeeting return for the FOMC cycle m as the excess return of stocks over Treasury bills from day 1 of cycle $m-1$ to day -2 of cycle m, i.e., excluding returns earned one day before and on the day of scheduled FOMC meetings. We exclude the day -1 and 0 returns since these may be particularly driven by monetary policy news, potentially leading to reverse causality. For the 1982:09–1993 period, we calculate intermeeting returns using returns from day 3 of cycle $m-1$ to day -2 of cycle m to reflect the fact that investors did not know the decision until a

day or two after the meeting. For all years, we additionally exclude excess returns earned on days of intermeeting moves because the Fed's decisions likely influence the stock market on those days.[5] We identify days of intermeeting moves as those when the FFR target changed outside of scheduled meetings.

To separately study the relation between monetary policy and bad versus good stock market news in the intermeeting period, we define a variable $rx_m^- = \min(0, rx_m)$ to capture movement in excess stock returns over the negative range and $rx_m^+ = \max(0, rx_m)$ to capture variation in excess stock return over the positive range. We refer to rx_m^- as the stock market put variable.

II.B. Selection of subsamples

In our subsequent analysis, we document differences in the effect of the stock market on Fed policy in the pre- and post-1994 period, where the post-1994 sample starts on January 1, 1994. While it is difficult to point to one particular break-date event, several facts related to the Fed's internal modeling and its public communication make 1994 a plausible demarcation line for our analysis. In terms of internal modeling, historical accounts indicate major modifications to the Fed's models from the early to mid 1990s. In particular, following the 1991 recession, by around 1993 it became clear that Fed models in use at that time were unable to explain the slow recovery and its relationship with the "financial headwinds" (Reifschneider et al., 1997).[6] Around that time the Fed staff began to work on a new model of the US economy and Fed policy, the so-called FRB/US model, which became fully operational in mid-1996 (Brayton and Tinsley, 1996). The key innovation of the FRB/US model was to incorporate explicit specifications of expectation formation and intertemporal decision making of households and firms. In terms of communication, with the first meeting in 1994, the FOMC began making public announcements of their decisions. This moment coincides with a switch from quite frequent to rare intermeeting target moves before and after 1994, implying a change in the Fed's reaction to events in the intermeeting period. Together, these developments suggest that the mid-1990s was a period of significant changes

[5] One exception to this treatment is the intermeeting move on September 17, 2001—the first day of stock market trading after the 9/11 attacks. On this day, the S&P500 index lost 11.6%, despite an accommodating policy move announced about an hour before the US stock markets reopened, suggesting that the attacks (rather than monetary policy) was the dominant piece of news. We keep this observation in the computation of the intermeeting return between the meetings on August 21, 2001 and October 2, 2001. However, we verify that dropping this data point does not significantly influence our results.

[6] Reifschneider et al. (1997) cite a 1993 analysis by Stockton which examines structural equations of the old Fed model. This analysis revealed particularly large errors in the model's consumption equation, and suggested a decline in spending as a major factor for growth slowdown in the early 1990s.

to the way Fed policy was conducted. An advantage of our textual analysis is that it will provide a direct assessment of when policy makers began focusing more on the stock market.

III. Stock returns as predictor of Fed growth expectation updates and monetary policy

This section analyzes the relation between intermeeting stock market excess returns, Fed updates to macroeconomics expectations, and subsequent federal fund rate (FFR) changes. The evidence supports a strong statistical relation between the stock market, Fed's expectations about the real economy, and its monetary policy decisions. In later sections, we use textual analysis to argue that the documented relations are likely to be causal.

III.A. Low stock returns predict policy accommodation

The left graph in Figure 1 displays changes in the federal funds target as a function of past excess stock returns. Using data for 1994–2008, we plot the average cumulative change in the target from meeting $m-1$ to meeting $m+X$ (for different values of X) against average intermeeting excess stock returns, with both averages calculated by quintile of the intermeeting excess stock return.[7] Intermeeting excess stock returns in the lowest quintile (averaging around -7 percent) are associated with an average reduction in the target of as much as 119 basis points over the 8 subsequent FOMC cycles from $m-1$ to $m+7$. No such pattern of Fed accommodation following low stock returns is seen pre-1994 (right graph in Figure 1).

[Insert Figure 1 here.]

In Table I, we provide the corresponding regression evidence for the pre- and post-1994 sample. Columns (1)–(4) show regressions of target changes on a dummy variable equal to one for an intermeeting excess return in the lowest quintile. Over horizons ranging from one FOMC cycle ($X=0$) to a year ($X=7$, i.e., 8 cycles), target changes in the post-1994 sample are significantly lower following an intermeeting excess return in the lowest quintile. To exploit the continuous variation in excess returns, in columns (5)–(8), we report analogous regressions using rx_m^- and rx_m^+ as the explanatory variables. The R^2 values for explaining target changes are higher relative to the quintile dummy regressions, indicating that the Fed's accommodation is stronger following more negative intermeeting excess returns. The

[7] The quintiles of intermeeting returns are constructed over the full 1994–2016 sample. We obtain similar results when calculating quintiles in real time.

results also point to an asymmetry in that positive intermeeting returns are in most cases not significant predictors of target changes. The bottom panel of Table 1 shows that the above relationship is absent in the pre-1994 sample.

[Insert Table I here.]

The analysis of the federal funds target over the 1994-2008 period is not informative for whether the stock market has predictive power for monetary policy in the post-2008 period, during most of which the target was at the zero-lower bound. A useful feature of the textual analysis we present in the following sections is that Fed minutes are available up to the end of our sample. This allows us to study whether the Fed paid attention to the stock market both in the 1994-2008 and the 2009-2016 period.

Additionally, to speak to the zero-lower-bound period, we exploit the approach from CMVJ which studies the effect of Fed policy on stock returns. CMVJ argue based on a series of facts that monetary policy news disproportionately arrives in "even weeks" in FOMC cycle time. They show that over the 1994–2016 period, stock returns mean-reverted in even-weeks that followed particularly bad realizations of stock returns, which they associate with news about unexpectedly strong policy accommodation coming out. Figure 2 Panel A illustrates this "Fed put in stock returns," plotting average excess stock returns on day t against prior 5-day excess stock returns. The figure documents high average day-t returns on even-week days that follow prior returns in the lowest quintile. Figure 2 Panel B splits the 1994-2016 period into 1994–2008 and 2009–2016. In both sub-periods, stock returns are high on even-week days that follow poor stock returns. The 2009-2016 evidence suggests that the Fed put is present – and that the market is still updating about how strong it is – during the zero-lower bound period.[8]

[Insert Figure 2 here.]

III.B. Updates to Fed growth expectations comove strongly and asymmetrically with stock market returns

To start understanding the economics underlying the relation between the stock market and policy, we first document how much updates to the Fed's macroeconomic expectations comove with the stock market. A few days before each scheduled FOMC meeting, the staff

[8] Also extending CMVJ's evidence, Figure 2 Panel C shows that the effect is absent in the pre-1994 period, lining up with our finding that the stock market was not a significant predictor of target changes before the mid-1990s.

at the Federal Reserve Board prepares macroeconomic forecasts collected in the so-called Greenbook (now called the Tealbook). The forecast data become publicly available with a five-year lag and so our forecast data end in December 2012. The Greenbooks report forecasts for various calendar quarters. We consider how macroeconomic expectations for a given calendar quarter are updated from one FOMC meeting to the next. Specifically, we compute updates relative to expectations in the prior Greenbook for same calendar quarter, i.e., for a variable Z the update is defined as

$$\text{Update}_m^{GB}(Z_{qi}) = E_m^{GB}(Z_{qi}) - E_{m-1}^{GB}(Z_{qi}), \tag{1}$$

where qi is a particular calendar quarter ($q0$ is the current quarter, $q1$ is the next quarter, etc., relative to meeting m);[9] $E_m^{GB}(\cdot)$ denotes a Greenbook forecast at meeting m.

We estimate regressions of the type:

$$\text{Update}_m^{GB}(Z_{qi}) = \gamma_0 + \gamma_1 rx_m + \gamma_2 rx_{m-1} + \varepsilon_m. \tag{2}$$

We allow for one lag of the stock return variable to account for gradual expectations updating (additional lags are generally not significant).[10] Regressions are estimated at the FOMC meeting frequency, resulting in 152 observations for the 1994–2012 period, and 90 observations for the 1982:09–1993 period.

Figure 3 displays the time series of updates to real GDP growth expectations for one quarter ahead ($E_m^{GB}(g\text{RGDP}_{q1})$) along with the fitted values from regression (2). The regression is estimated separately on the pre- and post-1994 sample (the sample split is indicated with the vertical line in the graph). The differences between the two subsamples are striking. In the pre-1994 sample, the Fed's updates of growth expectations display essentially no relationship with the stock market returns; neither of the return variables in (2) is statistically significant and the regression R^2 is about 4%. In contrast, in the post-1994 period, the stock market explains 33% of variation in growth updates and both return lags are strongly economically and statistically significant. Summing the coefficient on rx_m and rx_{m-1}, a 10% lower stock market return is approximately associated with a 0.25 ($= 0.10 \times (4.75 + 5.08)/4$) percentage point growth expectations downgrade for the next quarter. Figure 3 suggests that the tight

[9] For example, if meeting m is in February 2000, horizon $q1$ means that the forecast $E_m^{GB}(Z_{q1})$ is for the second quarter of 2000. Forecast update, $\text{Update}_m^{GB}(Z_{q1})$, is the revision of forecasts between February 2000 (m) and December 1999 ($m-1$) meeting of what Z will be in the second quarter of 2000. Thus, when computing updates, we make sure that both the m and $m-1$ forecast refer to the same calendar quarter.

[10] The Greenbooks are internally released to the FOMC participants a few days before the scheduled FOMC meetings. The median time elapsed between the Greenbook's internal release date and the date of the FOMC announcement is four business days (six calendar days). Our conclusions remain unchanged if we exclude returns earned after the Greenbook release date from the calculation of rx_m.

relationship between stock returns and growth updates emerges in the second half of the 1990s and holds through the end of the Greenbook sample in 2012.

[Insert Figure 3 here.]

Table II extends the above evidence to include longer forecast horizons and Greenbook updates of inflation and unemployment expectations in addition to the real GDP growth. To study whether macroeconomic expectations comove with the stock market in a symmetric or asymmetric fashion, we augment specification (2) to allow for different coefficients on positive and negative stock return realizations. We additionally include the lagged update in the regression as a control. We summarize results across forecast horizons by summing the updates made in the current Greenbook for quarters zero through three quarters forward (i.e., spanning updates for one year ahead). Since Greenbook unemployment expectations are for the level of the unemployment rate (as opposed to a growth rate as for real GDP and inflation), we study how expectations for unemployment in the third quarter forward update with stock market news.

[Insert Table II here.]

The top panel of Table II documents that Fed growth and unemployment expectations update asymmetrically with the stock market, loading significantly on the current and lagged intermeeting returns over the range of negative returns, with a smaller and less significant reaction to positive returns. The sum of the coefficients on the current and lagged returns is reported at the bottom of the panel. For real GDP growth in column (1), a 10 percent lower intermeeting return is associated with a reduction of the total expected growth rate over the next four quarters of slightly below 1 percentage point. Estimating regressions separately for updates at each forecast horizon, we find a significant relation for each of the four quarters q0 to q3 (not reported in any table) with the strongest effect for q1.[11] As such, the fit in Figure 3 is predominantly driven by the negative intermeeting returns. Before 1994, there is only a weak relationship between the stock market and updates to Fed growth expectations (column (2) of Table II). In particular, there is little downgrading of growth expectations following poor stock returns.

Table II columns (3) and (4) shows the same analysis for changes in Fed expectations about the unemployment rate. Based on the sum of the coefficients on the rx^- variables, a 10 percent lower intermeeting excess stock return implies an increase of 0.47 percentage point

[11] The effect for q1 is 0.31 percentage point when based on coefficients on rx^- and rx^- lagged.

in the expected unemployment rate over the one-year period from last quarter to three quarters out. In the positive region, the excess stock return has little explanatory power for Fed unemployment updates. None of the stock market variables are significant in the pre-1994 period. The bottom panel of Table II refers to updating of Fed inflation expectations. We find little evidence for asymmetry and the impact of the stock market on these forecasts appears sensitive to the measure of inflation used.

To put the explanatory power of the stock market for the Fed's growth expectation update into perspective, Appendix A.1 compares it to the explanatory power of macroeconomic indicators. The intermeeting stock return and its first lag are statistically stronger explanatory variables for the Fed growth expectations update than any of the 38 macro indicators available in Bloomberg and than the CFNAI, a principal component of 85 macro series.

Overall, for the post-1994 period, the estimates in Table II document an economically strong and statistically significant relation between negative stock market returns and Fed expectations for real output growth and the unemployment rate, with a less clear pattern for inflation. These results complement recent evidence that shocks to financial conditions and realized (as opposed to expected) economic growth are linked, with a stronger relation in the left tail of the distribution. Adrian et al. (2019) find that a deterioration in financial conditions is associated with both an increase in conditional volatility and a decline in the conditional mean of the GDP growth. Berger et al. (2018) show that innovations in realized stock market volatility are followed by contractions. Our results link those findings in the recent literature to the expectations and the reaction function of the Fed. By themselves, the regressions we report above are not evidence of a causal effect of the stock market on Fed expectations (for example, the stock market and growth updates may both be driven by a third variable). Below, we use textual analysis to argue for a causal effect of the stock market on Fed growth expectations and policy.

III.C. Fed policy reacts to growth expectations downgrades

The results so far establish that (i) the stock market has a strong predictive power for future FFR target rate changes, and (ii) updates to the Fed's expectations of real economic activity are tightly correlated with recent negative stock market outcomes. To study the link between these facts and the Fed's policy making, we estimate Taylor rules augmented with stock market returns and growth expectations updates using data for the 1994–2008 period.

We start with a general specification of the Taylor rule:

$$\Delta \text{FFR}_m = \gamma_0 + \sum_{k=1}^{K} \gamma_k \text{FFR}_{m-k} + \phi_1 E_m^{GB}(g\text{PGDP}_{qh_1}) + \phi_2 E_m^{GB}(g\text{RGDP}_{qh_2}) \\ + \phi_3 E_m^{GB}(g\text{UNE}_{qh_3}) + \beta' Y_m + \varepsilon_m. \tag{3}$$

We allow for higher-order interest rate smoothing (lagged FFR terms) and include Greenbook forecasts of inflation (GDP deflator, gPGDP), real GDP growth (gRGPD), and unemployment (UNE). These terms are standard in the literature (see e.g., Coibion and Gorodnichenko (2012)).[12] In addition to the standard Taylor rule variables, the vector Y_m contains updates to growth expectations and/or intermeeting stock returns. Focusing on the baseline specification that excludes Y_m ($\beta = 0$), we determine the number of FFR lags and the horizon of the Greenbook forecasts using Akaike and Bayesian information criteria (AIC and BIC).[13] This approach leads to the inclusion of three FFR lags[14] and forecasts for the current quarter real GDP growth ($g\text{RGDP}_{q0}$) and inflation one quarter ahead ($g\text{PGDP}_{q1}$). The unemployment rate turns out to not be statistically significant so we drop it from the baseline specification for parsimony (also preferred based on the information criteria). For extended specifications with Y_m variables, we use information criteria to determine the horizon of the GDP growth forecast update, and the number of lags of intermeeting stock returns. This leads to a selection of the expectations update for growth one quarter ahead, and two lags of intermeeting returns.

[Insert Table III here.]

Table III presents estimates of different version of regression (3). Column (1) shows that 36% of the variation in FFR target changes can be explained by FFR target lags. Including intermeeting stock returns and their lag (allowing for separate coefficients on positive and negative returns) in column (2) raises the explanatory power of the regression to 54%, with the explanatory power driven by the negative return realizations. In terms of overall significance of negative versus positive returns, the coefficients sum up to 5.35 for rx_m^- and rx_{m-1}^- (t-stat = 4.71 for the null that the sum of the two coefficients is zero) versus -1.80

[12] We estimate (3) using changes in the FFR rather than its level as the dependent variable. While this choice does not affect the significance of any explanatory variable (except for the first lag of the FFR), the specification in changes is more convenient for interpreting the explanatory power of the regression. The regression in levels yields an R^2 very close to 1.

[13] We select the specification that minimizes the average value of the two information criteria, considering combinations of forecast horizons between $h = 0$ and $h = 4$ quarters ahead for the three macro variables and FFR up to four lags ($K = 4$), for a total of 500 combinations.

[14] While Coibion and Gorodnichenko (2012) consider smoothing of order two ($K = 2$), we find that the third lag of FFR is strongly significant. Similarly, a specification where ΔFFR_m is regressed on lags of ΔFFR_m shows that the second lag is significant.

for rx_m^+ and rx_{m-1}^+ (t-stat $= -1.05$). Column (3) shows that the Fed's forecast update for real GDP growth contains about as much information for predicting target changes as the stock market with an R^2 of 55%, and likewise, its entire explanatory power comes from growth downgrades, $\text{Update}_m^{GB}(g\text{RGDP}_{1q})^- = \min(0, \text{Update}_m^{GB}(g\text{RGDP}_{1q}))$. A joint specification with the stock market variables and growth updates in column (4) does not lead to large improvements in the R^2. While both negative stock returns and negative growth updates remain significant, their respective coefficients are now reduced by more than a third compared to columns (2) and (3), respectively, suggesting that the two variables contain similar information.

Columns (5)–(8) estimate the baseline Taylor rule according to the specification selection procedure described above, as well as the rule augmented with intermeeting stock returns and growth updates. There are several observations worth highlighting. First, expectations of macro variables (column (5)) explain as much of the variation in target changes in the post-1994 period as the stock market or growth updates alone. Second, both stock returns (column (6)) and growth updates (column (7)) over the negative domain remain strongly economically and statistically significant. Comparing column (2) to (6), the sum of the coefficients on rx_m^- and rx_{m-1}^- drops from 5.35 to 3.06 (t-stat $= 2.92$); analogously, comparing columns (3) and (7) the coefficient on the negative growth update declines from 0.26 to 0.17 (t-stat $= 3.64$). Finally, in the full specification in column (8), the inclusion of levels of macro variables jointly with negative growth updates drives out the significance of the stock market.[15]

In terms of economic magnitudes, the cumulative effect of a 10% drop in stock returns on the FFR target over the next year (including the current meeting and seven subsequent meetings) is -96 bps with no controls in column (2), -52 bps in column (4), -31 bps in column (6), down to -17 bps in column (8) with the full set of macro forecasts.

Taken together, these results suggest an asymmetry in the policy reaction function in the post-1994 sample. The Fed appears to have followed an accommodative policy in response to downgrades in growth expectations but has not tightened symmetrically in response to upgrades. The stock market put is a strong predictor of target changes because downgrades to growth expectations comove closely with the negative stock market returns realized over the

[15]These results update and extend the evidence in Fuhrer and Tootell (2008) by including more recent data as well as by documenting the asymmetric relationship between the target, Fed growth expectations updates, and the stock market. Hoffmann (2013) and Ravn (2012) also find an asymmetric response of the Taylor rule to the stock market, similar to column (6) of Table III. We show that the relationship is driven by an asymmetric reaction of policy to growth updates, with growth updates strongly correlated with the stock market.

past few intermeeting periods.[16] These patterns are absent in the pre-1994 period because neither the link between stock returns and growth updates nor the link between growth updates and policy is present. Indeed, estimating the regressions in columns (3) and (7) over the pre-1994 sample, the growth update is not a significant determinant of policy and there is no pattern of asymmetry.

IV. Establishing causality by textual analysis: Does the Fed pay attention to the negative stock market outcomes?

There are two possible interpretations of the above evidence regarding the high explanatory power of the stock market for Fed funds target changes. One possibility is that relation is *coincidental* in the sense that the Fed views the stock market as uninformative but the econometrician finds that the stock market has explanatory power for target changes because the market is correlated with variables that drive the Fed's decision making. Alternatively, the relation may be *causal* by which we mean that the Fed perceives stock returns as informative and therefore reacts to them. This could be due to stock returns being viewed as a driver of the economy, or due to them being viewed as a useful predictor of economic variables the Fed cares about (notably growth).

We first seek to distinguish the coincidental from the causal relation. To establish that the Fed does pay attention to the stock market directly, we perform textual analysis of FOMC meeting minutes and transcripts. We find strong evidence of the Fed focusing on the stock market and show that Fed's attention to negative stock market outcomes is predictive of policy moves. In the next section, we then turn to using textual analysis to understand the mechanism behind these results in order to distinguish between alternative causal relations.

IV.A. Textual data: Minutes and transcripts of FOMC meetings

We collect texts of minutes and transcripts of FOMC meetings. The longest sample we consider is from 1976 through 2016. FOMC meetings are highly structured events which always include:

1. Staff Review of the Economic Situation;
2. Staff Review of the Financial Situation;
3. Staff Economic Outlook;

[16] In addition to the explanatory power of the stock market for Fed's growth expectations updates, in Appendix A.2, we also show that the explanatory power of negative stock returns for changes in the Federal funds target is stronger than that of almost all of the 38 macro variables covered by Bloomberg.

4. Participants' Views on Current Conditions and the Economic Outlook;
5. Committee Policy Action.

FOMC minutes are carefully crafted with the goal to "record all decisions taken by the Committee with respect to these policy issues and explain the reasoning behind these decisions," as stated on the Federal Reserve Board's website. We refer to sections 1–3 as representing the views of the staff, and sections 4 and 5 as representing the views of the participants (the chair, vice-chair, governors and regional Fed presidents). The sections of the minutes corresponding to the above five parts of the FOMC meeting are typically 7–10 pages long. Since 2005, minutes have been published three weeks after the FOMC meeting. Before 2005, they were published three days after the next FOMC meeting. Minutes are available up to the end of our sample period in 2016.[17]

FOMC transcripts contain verbatim comments made by individual staff members and meeting participants. They are released with a 5-year lag. Our sample covers transcripts available up to 2011. Each meeting transcript is around 200–300 pages long. Due to the length of the transcripts, we manually code the stock market mentions focusing on the FOMC minutes. We then develop an algorithm to find and classify such mentions in an automated way and use this algorithm on the transcripts to show that our results are robust to studying those documents as well. We follow this approach both in signing the direction of the stock market mentions and in studying the context of a given stock market mention.

Figure 4 displays simple counts of stock-market related phrases in the minutes (Panel A) and in the transcripts (Panel B) starting in 1976.[18]

[Insert Figure 4 here.]

The main observation from the graph is that the stock market is rarely mentioned during the FOMC deliberations before mid-1990s, with the exception of a spike in October 1987

[17]From 1993 through today, the minutes have followed a standardized format with sections corresponding to the five parts of the FOMC meetings. Sections headings appear explicitly in the minutes from April 2009 onward. However, given that the structure of the documents has remained essentially unchanged since the early 1990s, for the period between 1994 and March 2009, we manually assign text to sections. Before 1993, the type of material now included in the FOMC minutes was covered in two separate documents: Record of Policy Actions (ROPA) and the Minutes of Actions (MOA). We also collect these texts and treat them jointly as one unit of observation related to a given FOMC meeting.

[18]The counts are based on the following phrases: stock market*, stock price*, stock ind*, S&P 500 index, equities, equity and home price*, equity and house price*, equity ind*, equity market*, equity price*, equity value*, equity wealth, home and equity price*, house and equity price*, housing and equity price*, where * allows for different word endings. Throughout our analysis, we make sure that there is no double counting of phrases. So if phrase A encompasses phrase B (e.g., "housing and equity price*" encompasses "equity price*"), we count it as phrase A and not B.

following the 1987 market crash. From the mid-1990s, the number of mentions increases, varies persistently over time and remains elevated through the end of the sample. Given the change in attention paid to the stock market in mid-1990s, our subsequent textual analysis focuses mainly on the post-1994 period. This is also the period for which our analysis of the funds target and of stock market returns in even-weeks in FOMC cycle time suggests that policy is affected by the stock market.

IV.B. Results based on manual coding of stock market mentions in FOMC minutes

We extract all paragraphs in the 1994–2016 FOMC minutes that mention the stock market. The counts for each phrase are shown below:

Phrase	Count
stock market*	153
stock price*	137
stock ind*	5
S&P 500 index	51
equities	22
equity and home price*	3
equity and house price*	6
equity and housing price*	2
equity ind*	58
equity market*	125
equity price*	385
equity value*	23
equity wealth	6
home and equity price*	4
house and equity price*	2
housing and equity price*	1
Total	**983**

Over the 1994–2016 period, there are 983 references to stock market conditions in FOMC minutes. This number represents 14% of times that minutes mention inflation, and 31% of times they mention (un)employment. Figure 5 Panel A reports the counts of stock-market phrases by section of the minutes. About half are in the section of the minutes covering the staff's summary of the financial situation, with the other, more interesting, half split between the staff and the FOMC decision makers ("participants" in Fed terminology).

[Insert Figure 5 here.]

We read the 983 paragraphs with stock market mentions and classify them based on the direction of the market's evolution: positive (discussion of the stock market going up),

negative (discussion of the stock market going down), neutral (stock market flat), and hypothetical (discussion of would happen if the stock market were to move in a particular way). If the direction is unclear or cannot be determined, we mark the phrase as "n/a" and these stock market mentions are not counted in the 983 mentions described above.

Figure 5 Panel B displays the positive, negative, neutral and hypothetical counts by staff and participants, respectively. Consistent with the stock market on average having increased over the 1994–2016 period, there are more positive than negative stock market mentions in both the sections summarizing participant comments and the sections summarizing staff presentations. Figure 6 displays the time series of negative (Panel A) and positive (Panel B) stock market mentions. Peaks in the number of negative mentions often correspond to periods of market stress, which are marked on the graph. The time series properties of positive stock market mentions in Panel B are less apparent.

[Insert Figure 6 here.]

IV.B.1. Predicting Fed's attention to the stock market with past stock returns

To systematically relate stock market mentions to stock returns, Figure 7 Panel A and B plots negative and positive stock market mentions in a given FOMC minute document against intermeeting excess stock returns. In Panel C and D, we display the average number of mentions against average intermeeting excess stock returns, with averages calculated by intermeeting excess stock return quintiles. From Panel A and C, it is clear that lower intermeeting excess stock returns lead to more negative stock market mentions, especially in the lowest quintile of returns. Similarly, Panel B and D show that higher stock returns lead to more positive stock market mentions.

[Insert Figure 7 and Table IV here.]

To assess whether these relations are statistically significant, in Table IV we regress stock market mentions on intermeeting excess stock returns. From column (1), the intermeeting excess stock return and its lags have strong explanatory power for negative stock market mentions with an R^2 of 0.50. The explanatory power strengthens further when we consider the negative return realizations in columns (2)–(4). In column (2), the sum of the coefficients on rx_m^- and its lags is -63.6. This implies that a 10% lower excess stock return leads to 6.4 more negative stock market mentions, a substantial impact relative to the mean (1.8) and standard deviation (2.6) of the number of negative stock market mentions. Columns (3) and (4) indicate that the relation between low stock returns and a high number of negative stock

market mentions is present both before and during the zero lower bound period. For positive stock market mentions, columns (6)–(8) also suggest a strong relation in both statistical and economic terms, with more positive stock returns leading to more positive stock market mentions, as one would expect.

IV.B.2. Predicting target changes with Fed stock market mentions

Table V Panel A presents results on whether counts of stock market mentions in the FOMC minutes predict target changes over the 1994–2008 period. Negative stock market mentions in the minutes of the current and past FOMC meeting have statistically significant explanatory power for target changes.[19] The estimates in column (1) imply that a one standard deviation increase in the number of negative stock market mentions (2.6 more mentions) leads to a cumulative reduction in the Fed funds target of 32 bps (7 bps at the current meeting, 12 additional bps at the next meeting etc.).

[Insert Table V here.]

Importantly for arguing causality, negative stock market mentions predict target changes if we focus only on mentions by FOMC participants (column (3)) rather than staff (column (2)). As we discuss in more detail in Section V, some of the stock market mentions by the staff are purely descriptive summarizing recent financial developments. In contrast, mentions by the participants are more likely to indicate a causal effect of the stock market on decision makers' thinking. If all explanatory power of stock market mentions came from the descriptive staff mentions, one would be concerned that the stock market was not causally affecting FOMC decision makers. This is not the case given the strong result in column 3. Accordingly, when we split the stock market mentions into those that are purely descriptive versus others (column (4) and (5)), we find significant results also for those mentions that do not simply summarize recent developments (column (5)). In terms of economic magnitudes, a one standard deviation increase in the negative non-descriptive mentions of the stock market is associated with a cumulative reduction in the target of 24 bps.

To assess whether the above results are robust to using FOMC transcripts, we develop an algorithm to identify negative and positive stock market mentions in the transcripts (see Appendix B for details). Table V Panel B predicts target changes using counts from the

[19] For parsimony, we include lags of target changes as opposed to levels as in Taylor rules in Table III. The results are not affected by this choice. The regressions also include a control for the overall length of the documents (measured as the number of sentences in a document) to make sure that the explanatory power of the stock market mentions does not simply stem from Fed deliberations being more extensive in certain periods. Dropping those controls does not materially affect our conclusions.

algorithmic approach. Columns (1)–(3) repeat the analysis on the the minutes showing similar results as for the manual coding. Columns (4)–(5) present analogous results for the transcripts. The analysis based on the transcripts confirms that while there is no relationship between positive stock market mentions and target changes, negative stock market counts predict target reductions. Importantly, the mentions by the FOMC participants have strong predictive power for the target, with the economic magnitudes in line with those in Panel A.

In summary, the Fed pays attention directly to the stock market rather than merely to variables correlated with the stock market. Our textual analysis finds lots of discussion of the stock market at the FOMC meetings by both the staff and by the FOMC participants. Positive and negative stock market mentions move with intermeeting excess stock returns in the expected direction and the Fed put is present in the textual analysis results in that counts of negative stock market mentions predict target reductions. Taken together, these facts are consistent with the view that the stock market is a causal factor influencing Fed policy making.

IV.C. Discussion of broader financial conditions

Our above analysis may understate the FOMC's concern with the stock market. The FOMC minutes often talk about "financial conditions" without explicitly mentioning the stock market. To assess the frequency of references to financial conditions that do not explicitly mention the stock market (and thus may not be accounted for above), we create a list of phrases that relate to financial conditions along with lists of positive and negative direction words used to describe them. We then algorithmically code the number of negative and positive financial conditions phrases that do not explicitly mention the stock market. Below, we summarize the main findings and relegate the details to Appendix C.

We find 350 negative and 232 positive financial conditions mentions in the FOMC minutes. To the extent that the stock market is one of the indicators of financial conditions, this suggests even more attention paid to the stock market (and other financial markets) than our prior analysis would suggest. Not surprisingly, we find that mentions of negative financial conditions spike during the financial crisis in 2008 and 2009. Counts of financial conditions mentions are predictable by the intermeeting stock returns in the same way as are the counts of stock market mentions (reported in Table IV above). Additionally, we find that financial conditions predict Fed fund target changes, and have predictive power over and above the stock market mentions. However, this result is driven by year 2008. Dropping 2008 from the analysis, the stock market mentions subsume the explanatory power of financial conditions for target changes.

[Insert Figure 8 here.]

To distinguish stock market mentions from specific other financial conditions, Figure 8 Panel A graphs textual analysis counts for mentions of interest rates, credit and spreads, and exchange rates, along with our series for stock market mentions.[20] As recently described by the President of the New York Fed, William Dudley, *"(...) financial conditions can be broadly summarized by five key measures: short- and long-term Treasury rates, credit spreads, the foreign exchange value of the dollar, and equity prices."* (Dudley, 2017).[21]

To assess the relative importance of those different measures of financial conditions in Fed's deliberations, we analyze the number of times they are mentioned in FOMC minutes. The textual analysis counts in Figure 8 show that the focus on the stock market emerges strongly in the mid-1990s whereas mentions of interest rates, credit and spreads, and exchange rates are prevalent going back to the start of our textual analysis in the late 1970s.

V. Establishing mechanism by textual analysis: Why does the stock market cause Fed policy?

To shed light on the Fed's economic reasoning about the stock market as a determinant of policy, we analyze the content of the 983 paragraphs in the FOMC minutes that contain stock market mentions. Our goal is to distinguish different causal mechanisms that could lead the Fed to pay attention to the stock market. At a broad level, we seek to uncover whether the Fed thinks of the stock market as a *driver* of the economy or as a *predictor* of the economic outlook. If the first possibility dominates, we would like to understand the economic channels though which the Fed believes the stock market impacts the economy. We again take both a manual and an algorithmic approach to answer these questions.

Importantly, in terms of the interpretation of the textual analysis results, if the Fed discusses the market as a driver of the economy, e.g., via a consumption-wealth effect or an effect of the market on investment, these channels can be operative whether the Fed views the stock market return as an independent shock (via preference or belief shocks) or as being driven by underlying fundamental factors (e.g., oil price or productivity shocks).

[20] Word lists for each of the concepts graphed are available in Appendix Table IA-VIII.

[21] Using a structural VAR approach, Caldara and Herbst (2019) show that Fed policy is responding to changes in the credit spreads. We complement these results by documenting the frequency with which various financial condition are discussed by the Fed, notably the increased focus on the stock market starting in the mid-1990s.

V.A. Results based on manual coding of discussion in paragraphs with stock market mentions

Our main results are based on reading the 983 paragraphs in the FOMC minutes with stock market mentions. We classify the discussion of the stock market into the eight categories, listed below. For each category, we include an example extracted from one of the paragraphs with a stock market mention.

Descriptive: "Broad U.S. equity price indexes were highly correlated with foreign equity indexes over the intermeeting period and posted net declines." (Staff Review of the Financial Situation, 9/17/2015)

Different ways in which the stock market *drives* the economy:

Consumption: "With regard to the outlook for key sectors of the economy, a number of members commented that consumer spending had held up reasonably well in recent months despite a variety of adverse developments including the negative wealth effects of stock market declines, widely publicized job cutbacks, heavy consumer debt loads, and previous overspending by many consumers." (Participants' Views on Current Conditions and the Economic Outlook, 5/15/2001)

Investment: "Many businesses also were inhibited in their investment activities by less accommodative financial conditions associated with weaker equity markets and tighter credit terms and conditions imposed by banking institutions. As a consequence, a substantial volume of planned investment was being postponed, if not cancelled." (Participants' Views on Current Cond. and the Economic Outlook, 3/20/2001)

Demand (no detail on which component of demand): "Financial market conditions continued to improve, providing support to aggregate demand and suggesting that market participants saw some reduction in downside risks to the outlook: Equity prices rose further, credit spreads declined somewhat, and the dollar depreciated over the intermeeting period." (Participants' Views on Current Conditions and the Economic Outlook, 4/27/2016)

Financial conditions (stock market as part of financial conditions driving the economy): "Participants noted that financial conditions had worsened significantly over the intermeeting period. The failure or near failure of a number of major financial institutions had deepened market concerns about counterparty credit risk and liquidity risk. As a result, financial intermediaries had cut back on lending to some counterparties, particularly for terms beyond overnight, and in general were conserving liquidity and capital. Moreover, risk aversion of investors increased, driving credit spreads sharply higher. Survey results and anecdotal information also suggested that credit conditions had tightened significantly further for businesses and households. Equity prices had varied widely and were substantially lower, on net." (Participants' Views on Current Conditions and the Economic Outlook, 10/29/2008)

Stock market as driver of the economy, no mechanism stated: "In the discussion of monetary policy for the intermeeting period, most members believed that a further significant easing in policy was warranted at this meeting to address the considerable worsening of the economic outlook since December as well as increased downside risks. As had been the case in some previous cyclical episodes, a relatively low real federal funds rate now appeared appropriate for a time to counter the factors that were restraining economic growth, including the slide in housing activity and prices, the tightening of credit availability, and the drop in equity prices." (Participants' Views on Current Conditions and the Economic Outlook, 1/30/2008)

Economic outlook (stock market as predictor of the economy): "Participants noted that financial markets were volatile over the intermeeting period, as investors responded to news on the European fiscal situation and the negotiations regarding the debt ceiling in the United States. However, the broad declines in stock prices and interest rates over the intermeeting period were seen as mostly reflecting the incoming data pointing to a weaker outlook for growth both in the United States and globally as well as a reduced willingness of investors to bear risk in light of the greater uncertainty about the outlook." (Participants' Views on Current Conditions and the Economic Outlook, 8/9/2011)

Financial stability: "However, during the discussion, several participants commented on a few developments, including potential overvaluation in the market for CRE, the elevated level of equity values relative to expected earnings, and the incentives for investors to reach for yield in an environment of continued low interest rates."(Participants' Views on Current Conditions and the Economic Outlook, 7/27/2016)

[Insert Table VI here.]

Table VI summarizes our findings on how the Fed thinks about the stock market based on the above classification. About half (551) of the 983 stock market mentions are descriptive. Most of these mentions are in the Staff Review of the Financial Situation. Of the other 432 stock market mentions, the stock market is most frequently discussed in the context of it affecting consumption, with 265 such cases (61% of the non-descriptive mentions). When more detail is provided, discussions of the stock market wealth effect—higher household wealth leading to increased consumption—is common. The word "wealth" appears 192 times. A second quite frequent theme is the impact of the stock market on investment, with 34 such cases. In many of these cases, the discussion refers to the effect of the stock market on firms' cost of capital or ability to raise equity financing on favorable terms. In 44 cases the discussion of the stock market is in the context of financial conditions more broadly. Other stock market mentions discuss the stock market's impact on demand without specifying which component

of demand (15 cases) or discusses the stock market as a driver of the economy without specifying the mechanism (37 cases). We find only a small number of cases (13) where stock market is viewed simply as a predictor of the economy.

The substantial focus on consumption in paragraphs mentioning the stock market is consistent with recent comments by President Dudley of the New York Fed and President Fisher of the Dallas Fed:

"We care about financial conditions not for themselves, but instead for how they can affect economic activity and ultimately our ability to achieve the statutory objectives of the Federal Reserve – maximum employment and price stability. [...] A rise in equity prices can boost household wealth, which is one factor that underpins consumer spending." (William Dudley, speech, March 30, 2017)

"Basically, we had a tremendous rally and I think a great digestive period is likely to take place now and it may continue because, again, we front-loaded at the Federal Reserve an enormous rally in order to accomplish a wealth effect." (Richard Fisher, CNBC interview, January 5, 2016)

The weight that the Fed puts on consumption is perhaps not surprising given that consumption growth is the main contributor to overall growth in output. As a robustness check, we also analyze whether consumption drives the asymmetric response of the policy rule to growth downgrades (and negative stock market returns) documented in Table III. We decompose the variation in the Greenbook gRGDP forecasts and forecast updates into the part stemming from the growth rate in real consumption expenditures (gRPCE) and other components, which we summarize as a residual from regressing gRGDP forecast (updates) on the gRPCE forecast (updates). Re-estimating regressions in Table III separately on these two components of gRGDP (not reported in any table), we find that FFR responds significantly to downgrades to gRPCE, whereas the residual component of the update is generally not significant.

V.B. Results based on algorithmic coding of economic content of paragraphs with stock market mentions

In addition to the manual coding of the mechanisms, we also study which economic phrases are most frequently discussed in conjunction with the stock market. We conduct the analysis at the level of the paragraph in FOMC minutes in which we have identified a stock market phrase with our manual searches ("stock-market paragraph" below). We first create a dictionary of various economic phrases that appear in the stock-market paragraphs. To ensure a comprehensive coverage of terms, we combine phrases identified with a noun phrase

extraction algorithm in Python (TextBlob) with those identified by human reading. Then, we count the number of times that each economic phrase is mentioned both within the stock-market paragraphs as well as within the full sections of the minutes that contained the stock-market paragraphs.

[Insert Table VII here.]

Table VII lists economic phrases that are most frequently discussed within the stock-market paragraphs, by section of the minutes, displaying only phrases that occur 20 times or more. The table provides the counts of each economic phrase in the stock-market paragraph (column (1)), in the minutes' section (column (2)), and their ratio (column (3)). It also reports the odds ratio (column (4)), i.e., the odds of finding a given economic phrase in the stock-market paragraph relative to the odds of finding it in the overall section.

As we tabulated above in Table VI, the two sections containing the largest share of non-descriptive stock market mentions are Staff Review of Economic Situation and Participants' Views.[22] Focusing on these two sections, Table VII makes clear that the economic variables that are most frequently discussed together with the stock market are related to consumption. For example, the participants mention "consumer spending" 179 times within the stock-market paragraph, which corresponds to 40% of their total references to consumer spending. This implies that it is 3.28 times more likely that consumer spending will be mentioned in a stock-market paragraph within this section of the minutes than that it will be mentioned in this section in general.

Similarly, nearly half of participants' mentions of "consumer confidence," "consumer expenditures" and "consumer sentiment" occur within the stock market paragraph. In Staff Review of Economic Situation, "disposable income," "consumer sentiment," and "personal consumption expenditure*" are most tightly linked to the stock market occurrences as measured by the ratios is column (3) and (4). Consistent with our manual coding of the mechanism, mentions of business investment are relatively less common, with participants referring to it only 13% of the time within the context of the stock market paragraph.

A firm belief in the importance of wealth effects on consumption from stock market declines would imply that the Fed should also focus on wealth effects from the housing market to consumption. Figure 8 Panel B shows textual analysis results for mentions of the housing market or mortgage markets in the FOMC minutes. The series for the housing market spikes

[22]Staff Economic Outlook section also contains a significant number of non-descriptive statements. However, given that in early years it is frequently comprised of just a single paragraph, the interpretation of co-occurrences of stock market and economic phrases is less tight than for the Staff Review of Economic Situation and Participants' Views, both of which contain multiple paragraphs focusing on distinct topics.

as the financial crisis hits, while the mortgage series peaks later, likely because a lot of the mortgage discussion is in the context of various rounds of quantitative easing. In Appendix Table IA-IX, we repeat the above analysis to study which economic concepts are discussed in the context of housing market mentions. The results show that, similar to the stock market mentions, housing is mostly discussed together with consumption, household spending, and consumer confidence.

VI. Benchmarks to assess the Fed's response to the stock market

Based the Taylor rule estimates in Section III.C, the Fed appears to react to the stock market predominantly via the effect of the stock market on the Fed's growth expectations and their updates.[23]

In this section, we use several additional benchmarks to empirically evaluate whether the Fed may be reacting too strongly to the stock market. First, we analyze whether the Fed's growth and inflation expectations update more with the stock market than the expectations of private sector forecasters or than what the predictability of the stock market for realized output growth and inflation would suggest. Second, we study consumer attention to the stock market in the Michigan Survey of Consumers to assess whether Fed and consumer attention to the stock market are highly correlated.

VI.A. Comparing the sensitivity of Fed economic forecasts to the stock market with that of the private sector forecasts and of the realized data

VI.A.1. Private sector forecasts

In Section III.B, we have documented the comovement between updates to the Fed growth forecast and intermeeting stock returns. We now compare the Fed's forecast updating to that of the private sector, relying on two surveys of private sector macroeconomic expectations:

[23]There is an active debate on whether the Fed should respond to the stock market beyond its effects on expectations for output gap and inflation. Gilchrist and Leahy (2002) extend the model evidence of Bernanke and Gertler (1999) to study the optimal response of monetary policy to asset prices in a setting with two types of shocks: technology shocks that are phased in gradually over time and net worth shocks. For the technology shocks, they confirm the result that the Fed should react to asset prices only to the extent that they affect expected inflation (thereby affecting the real rate). However, in the scenario with net worth shocks, that policy fails to stabilize the economy. Cecchetti et al. (2000) argue that central banks can improve macroeconomic performance by responding to asset prices because asset price bubbles create distortions in investment and consumption (leading to extreme increases and then decreases in both output and consumption). Related, Peek et al. (2016) argue that any residual predictive power of the stock market could be optimal if the Fed is concerned with the fiscal costs of financial instability. Alternatively, the Fed may view the equilibrium real rate (the natural federal funds rate) as being dependent on the stock market, as argued by Taylor (2008), Meyer and Sack (2008), and Curdia and Woodford (2010).

the Survey of Professional Forecasters (SPF) and the Blue Chip Economic Indicators (BCEI) survey. To the extent that omitted variables affect both the stock market and Fed expectations, they should affect private sector expectations similarly. Therefore, the comparison of the strength of the relations across the Fed and the private sector is informative about whether Fed expectations may over-react to the stock market.

[Insert Table VIII here.]

Table VIII Panel A presents results for how much private sector expectations from the SPF for the same three dependent variables update with the stock market news.[24] The explanatory power of the stock market for private sector expectations of both real output growth and the unemployment rate is apparent over the range of negative excess stock returns. Based on column (1), summing the coefficients of 4.56 and 4.26 on the current and lagged inter-survey excess stock returns, a 10 percent lower inter-survey excess stock return implies a reduction of the total expected growth rate over the next four quarters of 0.88 percentage point, similar to the 0.96 percentage point found for Fed Greenbook expectations for real GDP growth in Table II. The impact of the stock market on private sector unemployment rate expectations in column (2) is also similar to that seen for Fed expectations, with a 0.54 (0.47) percentage point increase in SPF (Fed) unemployment expectations following a 10 percent lower excess stock return. Furthermore, similar to the Fed expectations, the SPF data show no clear relation between the stock market and updates to inflation expectations.

Table VIII Panel B presents result for private sector expectations from the BCEI. This survey is available monthly back to 1980.[25] Column (1) and (2) show that BCEI expectations for both real GDP growth and the unemployment rate update significantly with stock returns over the range of negative stock returns (with some significance for positive stock returns too). BCEI expectations update a bit less strongly with negative stock returns than the

[24]The SPF conducts four surveys per year, resulting in 92 observations over the 1994-2016 period. The deadline for respondents supplying their expectations to the survey are only available from the third survey of 1990 so we do not present pre-1994 results. We calculate cumulative inter-survey excess stock returns over the period from the date of the prior survey deadline to the day before the deadline for the current survey. As in earlier analysis we omit returns on day -1 and 0 relative to scheduled FOMC meetings as well as days with intermeeting target changes as defined in Section II.A.

[25]Survey results are released the 10th of each month, with the survey conducted during the preceding 1-week period. We do not know the exact deadline for responses but assume that respondents set their expectations based on data up to the first business day of the month. In analogy to the SPF, we compare expectations from a given survey to expectations three months earlier and define the excess stock return since the last survey accordingly. We then report results based on all BCEI data, i.e. both those using months 1, 4, 7, 10, months 2, 5, 8, 11 and months 3, 6, 9, 12, with standard errors allowing for autocorrelation up to order 2.

expectations of the Fed or the SPF in economic terms but differences are modest. Unlike the Fed's expectations, column (4) and (5) show that BCEI expectations were sensitive to negative stock returns even in the 1982:9-1993 period though less strongly so than in the post-1994 period.

VI.A.2. Forecasting realized macro variables with the stock market

In Table IX, we document the strength of the relationship between excess stock returns and realized macro variables. Quarterly NIPA data on real GDP growth and the GDP deflator are available from 1947 to 2016 as are data on the unemployment rate from the BLS. We show results both for the 1994–2016 period, the pre-1994 period and the full 1947–2016 period. For analogy with the survey-based results, we regress the realized sum of growth rates, unemployment rate changes, or inflation rates over a four-quarter period (the current and the subsequent three quarters) on quarterly excess stock returns for the current quarter. We do not include lags here since the lags in Table II and VIII were motivated by gradual expectations updating and the current table is for realized values as opposed to expectations.

[Insert Table IX here.]

For real GDP growth, the coefficient on rx^- of 9.74 for the 1994–2016 period translates to a 0.97 percentage point lower growth rate for a 10 percent drop in the stock market, almost the same effect as for Fed growth expectations in Table II. For the unemployment rate changes, the coefficient of -6.23 post-1994 implies a 0.62 percentage point change in response to a 10 percent drop in the stock market, slightly larger than the 0.47 percentage point for the Fed. The relation between excess stock returns and realized GDP growth or unemployment rate changes is asymmetric being stronger over the range of negative excess return values. The main difference between the results for the realized variables and for Fed expectations is that the realized data show similar relations to the stock market pre- and post-1994. Realized inflation for the GDP deflator is only weakly related to the stock market, consistent with the mixed results for inflation expectations for the Fed (across inflation measures) and across private sector surveys where only BCEI inflation expectations are significantly related to stock returns.

Overall, relative to either private sector expectations or realized macroeconomic variables there is little evidence that Fed expectations for growth or unemployment overreact to stock market news.

VI.B. Do consumers pay attention to stock market news?

Our last benchmark for assessing whether the Fed reacts appropriately to the stock market is to measure whether there is a high correlation between when the Fed and households express concern a out stock market declines. Constructing a measure of household concern about the stock market from the Michigan Survey of Consumers (MSC), we find that the variation over time in the Fed's negative stock market mentions is highly correlated with that of consumers.

MSC elicits responses about important economic news that affected participants' recent economic decisions by asking: *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* Respondents indicate (un)favorable news in the following categories: government, employment, elections, consumer demand, prices, stock market, trade deficit, energy. Responses to this question can be viewed as a statement about the economic shocks that consumers perceived as relevant for their decisions. We measure the relative attention of consumers to negative stock market news by dividing the number of respondents mentioning unfavorable stock market news in survey conducted in month t by the number of respondents mentioning any news in that survey:

$$\text{MSC negative stocks news ratio}_t = \frac{\#\text{respondents citing unfavorable stock market news}_t}{\#\text{respondents citing any news}_t},$$

and analogously for positive stock market news.[26]

[Insert Figure 9 here.]

Figure 9 superimposes the frequency of negative stock market mentions in the FOMC minutes with the negative stocks news ratio in the MSC. The figure shows that the two series are highly positively correlated with a correlation of 0.68. The correlation between the positive stock market mentions in the minutes and the positive stocks news ratio in the MSC is 0.44 (not plotted). In terms of magnitudes, over the 1994–2016 period, a one standard deviation increase in the MSC negative stocks news ratio is associated with 1.75 more negative stock market mentions in FOMC minutes in the same month (with a robust t-statistic of 8.65). The relationship is weaker on the positive side, with one standard deviation increase in the MSC positive news ratio corresponding to 0.93 more positive stock market mentions in the FOMC minutes (with a robust t-statistic of 7.04).

[26]Over the 1994–2016 sample, 60% of responses cited at least one piece of economic news. The stock market constituted 8% of all news mentions and was the third most commonly referenced news category, preceded by news about the employment situation (20% of mentions) and declines/improvements in specific industries (16% of mentions). For comparison, news about inflation represented 6.2% of all news mentions.

VII. Public perceptions of the "Fed put"

The results so far do not directly answer the question whether the public expects the Fed to ease when the stock market falls, and equally importantly, whether the public expects easing in excess of what would be justified by the changing perceptions of the economic conditions. This section addresses these questions.

VII.A. Does the public expect the Fed to ease beyond what is justified by expectations of fundamentals?

To cast light on this question, we exploit the behavior of the private sector's expectations of the FFR obtained from the Blue Chip Financial Forecasts (BCFF). BCFF's panelists provide monthly forecasts of FFR for a few quarters ahead as well as forecasts of CPI inflation and real GDP growth. A consistent data coverage for the post-1994 sample is available for horizons up to four quarters ahead. Cieslak (2018) shows that the BCFF forecasts of the FFR have similar properties to the expectations embedded in the fed fund futures, and hence are a good proxy for investors' expectations of the policy rate. We study how forecasters update their projections for FFR between surveys conducted in months $t-2$ and t. The two-month period is used to approximate the distance between scheduled FOMC meetings.[27]

In Table X, we present regressions of FFR forecast updates for horizons of one and three quarters ahead on the positive and negative stock returns and additional controls. The specification without controls in column (1) shows that stock market declines are associated with forecasters revising down their expectations of future short rate. A 10% lower return is associated with a 67 basis points downward revision in FFR forecast for the next quarter with a t-statistic above 7. Given the similar magnitudes in coefficients at the one- and three-quarter horizon (columns (1) and (3), respectively), the forecasters expect most of the accommodation to occur within the next couple of FOMC meetings. These results, however, do not allow to assess if the public expects the Fed to ease more than what would be warranted by the perceived weakening of economic conditions. In columns (2) and (5), we thus introduce controls for contemporaneous updates of inflation and real GDP growth expectations in order to absorb any effect that the stock market has on FFR expectations via updates of expectations about the economy. The economic significance of the negative returns is now cut roughly in half compared to columns (1) and (3). Finally, our most

[27] We construct the corresponding inter-survey excess stock returns earned between surveys conducted in months $t-2$ and t, following the approach in Section VI.A.1. The BCFF survey is conducted during the last week of the month (month t) and the results are published on the 1st day of the next month. Since we do not know the deadline for submission of survey responses, we skip observations in the last four business days of month t when constructing inter-survey excess returns. The results are not sensitive to alternative assumptions about when the responses are submitted.

extensive specification (columns (3) and (6)) additionally controls for the past levels of expectations and lagged updates as it is plausible that both matter for how the public revises their FFR forecasts going forward. With the full set of controls, the importance of stock returns shrinks further to about a third of the initial estimate with no controls. Overall, the public beliefs appear to behave consistently with the view that the causal impact of the stock market on the policy rate, if any, runs dominantly through the effect that the stock market has on (the beliefs about) economic conditions.

VII.B. Moral hazard considerations

A potentially important issue regarding the Fed put is risk-taking (e.g., Blinder and Reis (2005), Diamond and Rajan (2012)). This could happen in an ex-post sense with agents adding leverage as the Fed lowers the interest rate and thereby reduces the cost of leverage (as in the model of Drechsler, Savov, and Schnabl (2018) where financial institutions hold liquidity buffers in response to leverage and the Fed controls the cost of liquidity). Alternatively, the Fed put may generate moral hazard, i.e., additional ex-ante risk taking by the private sector in the expectation that the Fed put will diminish the impact of any negative economic shocks on asset values (loans, securities).

Our evidence is relevant for thinking about whether it is likely that the Fed put leads to additional ex-ante risk taking. First, the lack of evidence of a Fed put (meaning strong accommodation following low stock returns) in the pre-1994 period suggest that as of 1994 it is unlikely that agents expected that a Fed put would protect them going forward. Second, watching the Fed actions and narrative about the stock market, agents should gradually update their views about the Fed put over the 1994-2016 sample. Thus, it is possible that markets believe in the Fed put by the end of our sample. If agents react to these evolving beliefs, additional ex-ante risk taking would be a growing issue over time. To see whether the market's perception of the Fed put has changed over time, we revisit the evidence from CMVJ (2018) illustrated in Figure 2. The even-week mean-reversion in stock returns suggests that accommodating monetary policy following stock market declines came as a (partial or complete) surprise to markets over the 1994-2016 period. CMVJ document that the even-week mean-reversion in stock returns is driven by a reduction in the equity risk premium (as opposed to a reduction in the risk-free rate) via a promise of accommodation should the economy deteriorate further ("stand ready to act as needed" in Fed terminology). A reduction in the equity risk premium is consistent with markets learning about the Fed put. In that sense, additional ex-ante risk taking is more likely standing in 2016 than it was in 1994. However, since Figure 2 Panel B shows that the even-week mean-reversion is present even in the 2009-2016 sample, it is possible that markets do not yet fully appreciate the

strength of the Fed put. Indeed, recent events suggest that the Fed is still able to surprise the market. Following stock market declines at the end of 2018, MarketWatch commented: *"The Federal Reserve's decision (...) to signal a pause in the rate-hike cycle, adopting a wait-and-see approach just six weeks after delivering its fourth rate increase of 2018, took investors by surprise."*[28]

To the extent that policy makers wanted to influence risk premia and risk-taking to promote economic expansion, additional ex-ante risk-taking may be desirable. However, it is important to recognize that additional ex-ante risk-taking may necessitate an even more accommodating policy response to negative economic shocks going forward.

VIII. Conclusion

We study the economic underpinnings of the "Fed put"—the tendency of negative stock market returns to precede monetary policy accommodation by the Federal Reserve. From the mid-1990s, negative inter-meeting stock market returns are a strong predictor of updates to the Fed's expectations of real GDP growth and of subsequent target changes. Using a Taylor rule, we find that negative stock market returns predict target changes mostly due to their strong correlation with downgrades to Fed growth expectations. We argue in favor of a causal (rather than coincidental) interpretation of this result. Using textual analysis of FOMC minutes and transcripts, we document that the Fed pays significant attention to stock market developments. Intermeeting stock market returns predict the tone of the Fed's discussions about the stock market during subsequent FOMC meetings with the expected sign and negative stock market mentions during FOMC meetings predict significant cuts to the Fed funds target rate; no analogous relationship exists for positive stock market mentions. We use textual analysis to establish whether the Fed thinks about the stock market as merely a predictor of future economic outcomes or as a driver of the economy. We find overwhelming evidence in favor of the latter. Discussions of stock market conditions by FOMC attendees are most frequently cast in the context of consumption, with the consumption-wealth effect highlighted as one of the main channels through which the stock market affects the economy. Some attention is also paid to the stock market working through investment and, relatedly, through the cost of capital. To understand whether the Fed's reaction to the stock market is appropriate or excessive, we benchmark Fed expectations updating to the stock market to the updating of private sector macro forecasts and to the predictive power of the stock market for realized macro variables. Relative to both of these benchmarks, we find little evidence for the Fed overreacting to the stock market.

[28] https://www.marketwatch.com/story/how-the-powell-put-could-unleash-one-last-stock-market-meltup-2019-02-08

Table I. Predicting target changes with stock returns

The table presents regressions of FFR target changes on a dummy variable for intermeeting excess return being in quintile 1 (lowest), and positive and negative intermeeting stock excess returns. Excess return quintiles are defined over the full 1994–2016 period in the 1994–2008 regressions and over the 1982:9–1993 period in the regressions for that period. T-statistics are robust to heteroscedasticity and autocorrelation (HAC) up to order X. In this and subsequent tables, *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Dependent variable: (FFR target on day 0 of cycle $m+X$)−(FFR target on day 0 of cycle $m-1$)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sample: 1994-2008							
	$X=0$	$X=1$	$X=4$	$X=7$	$X=0$	$X=1$	$X=4$	$X=7$
Dummy (rx_m in qtile 1)	-0.15	-0.42***	-0.93***	-1.20***				
	(-1.65)	(-2.87)	(-3.79)	(-3.06)				
rx_m^-					3.15***	7.13***	10.3***	12.7***
					(4.11)	(6.32)	(3.54)	(3.05)
rx_m^+					-1.91*	-2.30	1.58	2.08
					(-1.75)	(-1.35)	(0.40)	(0.33)
Constant	0.011	0.049	0.069	0.011	0.075**	0.13*	0.026	-0.058
	(0.41)	(0.87)	(0.36)	(0.03)	(2.00)	(1.77)	(0.10)	(-0.12)
N	120	120	120	120	120	120	120	120
R^2	0.039	0.10	0.11	0.093	0.13	0.22	0.13	0.096
	Sample: 1982:9-1993							
	$X=0$	$X=1$	$X=4$	$X=7$	$X=0$	$X=1$	$X=4$	$X=7$
Dummy (rx_m in qtile 1)	0.11	0.14	0.24	0.14				
	(0.90)	(0.88)	(0.80)	(0.37)				
rx_m^-					0.25	0.0047	0.25	-3.35
					(0.17)	(0.00)	(0.09)	(-0.75)
rx_m^+					-0.23	0.58	-1.77	1.55
					(-0.17)	(0.22)	(-0.40)	(0.26)
Constant	-0.093**	-0.17*	-0.34	-0.46	-0.064	-0.15	-0.25	-0.51
	(-2.16)	(-1.71)	(-1.27)	(-1.06)	(-1.01)	(-1.21)	(-0.84)	(-1.05)
N	90	90	90	90	90	90	90	90
R^2	0.013	0.0075	0.0062	0.0011	0.00043	0.00063	0.0016	0.0034

Table II. Stock market and the Fed's growth, unemployment and inflation expectations (Greenbook forecasts)

The table reports regressions of updates to Greenbook expectations of macroeconomic variables on intermeeting stock market returns. Updates are relative to expectations in prior Greenbook for same calendar quarter. Core CPI expectations data start in 1986. All specifications include one lag of the dependent variable and a constant. Rows labelled as "∑coef" report sums of the coefficients, with stars indicating the statistical significance for the null hypothesis that the sum of the coefficients is zero. The growth rates of inflation and real GDP (dependent variables) are in percent per annum (e.g., 1 means 1% higher expected growth rate over the next year). Intermeeting excess returns are in decimals (e.g., 0.01 means 1% return). Robust t-statistics are in parentheses.

	Real GDP growth forecast update		Unemployment rate forecast update	
	(1)	(2)	(3)	(4)
	1994–2012	1982:9-1993	1994–2012	1982:9-1993
	q0+q1+q2+q3	q0+q1+q2+q3	q0+q1+q2+q3	q0+q1+q2+q3
rx_m^-	5.10***	2.31	-2.83***	-0.81
	(2.91)	(1.43)	(-5.28)	(-0.91)
rx_{m-1}^-	4.46***	-0.85	-1.87***	-0.48
	(3.54)	(-0.46)	(-2.73)	(-0.57)
rx_m^+	2.13	2.44	-0.34	-0.14
	(1.38)	(1.58)	(-0.62)	(-0.12)
rx_{m-1}^+	1.66	2.64	0.45	-0.60
	(1.27)	(1.46)	(0.54)	(-0.48)
Lag dept.	-0.090	0.14	0.017	0.14
	(-0.98)	(1.19)	(0.21)	(1.09)
Constant	0.010	-0.10	-0.074**	-0.019
	(0.14)	(-1.31)	(-2.25)	(-0.38)
∑coef rx^-	9.57***	1.45	-4.70***	-1.30
∑coef rx^+	3.79*	5.09*	0.11	-0.74
N	152	90	152	90
R^2	0.38	0.12	0.37	0.045
$\bar{R}^2$	0.36	0.064	0.35	-0.012

	Inflation forecast update					
	(1)	(2)	(3)	(4)	(5)	(6)
	1994–2012, q0+q1+q2+q3			1982:9–1993, q0+q1+q2+q3		
	GDP defl.	CPI	Core CPI	GDP defl.	CPI	Core CPI
rx_m^-	0.58*	3.85***	1.10**	-0.63	0.24	0.90
	(1.91)	(3.17)	(2.10)	(-0.78)	(0.13)	(0.59)
rx_{m-1}^-	0.46	0.77	0.44	0.86*	-0.92	-1.17
	(0.63)	(0.52)	(0.73)	(1.75)	(-1.06)	(-1.38)
rx_m^+	-1.03*	-2.33**	-1.16**	-0.41	-3.28**	-0.91
	(-1.86)	(-2.09)	(-2.03)	(-0.40)	(-2.17)	(-0.91)
rx_{m-1}^+	-1.08*	-0.34	-0.49	-0.45	0.15	1.49
	(-1.92)	(-0.27)	(-0.83)	(-0.53)	(0.10)	(1.28)
Lag dept.	0.091	0.29**	0.30***	0.30***	0.22	0.33***
	(1.04)	(2.49)	(3.39)	(2.74)	(1.49)	(2.75)
Constant	0.088***	0.18**	0.065**	-0.0014	0.00070	-0.038
	(2.78)	(2.60)	(2.05)	(-0.03)	(0.01)	(-0.80)
∑coef rx^-	1.04	4.62**	1.53**	0.23	-0.68	-0.27
∑coef rx^+	-2.10**	-2.68	-1.65*	-0.86	-3.13	0.58
N	152	152	152	90	90	62
R^2	0.054	0.24	0.16	0.11	0.14	0.14
$\bar{R}^2$	0.022	0.21	0.13	0.057	0.090	0.068

Table III. Taylor rules

The table reports regressions predicting FFR target changes from meeting $m-1$ to m. $E_m^{GB}(\cdot)$ denotes Greenbook forecasts. The forecasts are for the real GDP growth (current quarter, $g\text{RGDP}_{q0}$) and inflation (GDP deflator, one quarter ahead, $g\text{PGDP}_{q1}$). $\text{Update}_m^{GB}(g\text{RGDP}_{q1})$ is the forecast update of the next quarter's real GDP growth rate between the previous and the current FOMC meeting, and $\text{Update}_m^{GB}(g\text{RGDP}_{q1})^+ = \max(\text{Update}_m^{GB}(g\text{RGDP}_{q1}), 0)$, $\text{Update}_m^{GB}(g\text{RGDP}_{q1})^- = \min(\text{Update}_m^{GB}(g\text{RGDP}_{q1}), 0)$. The lags of the FFR and horizons for Greenbook forecasts are chosen by minimizing the average of the Akaike and Bayesian information criteria (AIC and BIC). The sample period is 1994–2008. Robust t-statistics are in parentheses.

Dependent variable: $\Delta\text{FFR}_m = \text{FFR}_m - \text{FFR}_{m-1}$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FFR_{m-1}	0.40***	0.22***	0.24***	0.19***	-0.031	-0.024	-0.0089	-0.0068
	(4.27)	(3.21)	(2.81)	(2.75)	(-0.28)	(-0.25)	(-0.11)	(-0.09)
FFR_{m-2}	-0.092	0.096	0.074	0.12	0.21	0.24*	0.23	0.24*
	(-0.55)	(0.76)	(0.47)	(0.92)	(1.30)	(1.74)	(1.63)	(1.78)
FFR_{m-3}	-0.32***	-0.34***	-0.34***	-0.35***	-0.22**	-0.26***	-0.26***	-0.28***
	(-2.88)	(-3.98)	(-3.37)	(-3.79)	(-2.24)	(-3.17)	(-2.91)	(-3.19)
$E_m^{GB}(g\text{RGDP}_{q0})$					0.12***	0.090***	0.084***	0.075***
					(5.47)	(4.29)	(4.68)	(4.02)
$E_m^{GB}(g\text{PGDP}_{q1})$					0.16***	0.12***	0.14***	0.12***
					(4.67)	(3.35)	(4.88)	(3.87)
rx_m^-		2.38**		1.42		1.34		0.73
		(2.37)		(1.63)		(1.52)		(0.89)
rx_{m-1}^-		2.97***		1.66**		1.72***		0.92
		(5.58)		(2.37)		(3.16)		(1.39)
rx_m^+		-1.31		-1.39		-0.60		-0.65
		(-1.22)		(-1.48)		(-0.66)		(-0.77)
rx_{m-1}^+		-0.49		-0.16		-0.0068		0.27
		(-0.51)		(-0.17)		(-0.01)		(0.34)
$\text{Update}_m^{GB}(g\text{RGDP}_{q1})^-$			0.26***	0.16**			0.17***	0.13**
			(4.83)	(2.31)			(3.64)	(2.12)
$\text{Update}_m^{GB}(g\text{RGDP}_{q1})^+$			0.028	0.047			-0.010	-0.00045
			(0.52)	(0.88)			(-0.20)	(-0.01)
Constant	0.063	0.24***	0.17***	0.24***	-0.47***	-0.25**	-0.26***	-0.19*
	(1.11)	(3.83)	(3.61)	(4.22)	(-4.68)	(-2.05)	(-3.04)	(-1.81)
N (FOMC meetings)	120	120	120	120	120	120	120	120
R^2	0.36	0.54	0.55	0.59	0.59	0.64	0.65	0.67
$\bar{R}^2$	0.34	0.51	0.53	0.56	0.58	0.61	0.63	0.63

Table IV. Predicting negative and positive stock market phrases in the FOMC minutes by intermeeting stock market excess returns (manual coding)

The table presents regressions of counts of positive and negative stock market mentions in FOMC minutes on intermeeting stock market excess returns. The results are based on manual coding of stock market mentions. HAC t-statistics are in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Negative stock market phrases				Positive stock market phrases			
Sample:	1994-2016	1994-2016	1994-2008	2009-2016	1994-2016	1994-2016	1994-2008	2009-2016
rx_m	-30.0***				22.6***			
	(-6.15)				(5.88)			
rx_{m-1}	-12.2***				7.61***			
	(-5.59)				(2.92)			
rx_{m-2}	-5.89**				1.80			
	(-2.39)				(0.75)			
rx_m^-		-38.5***	-32.3**	-72.1***		8.01**	5.35**	26.7***
		(-2.92)	(-2.40)	(-4.55)		(2.26)	(2.07)	(3.32)
rx_{m-1}^-		-19.0***	-21.5***	-1.18		-1.24	-1.42	-0.045
		(-7.06)	(-7.15)	(-0.20)		(-0.58)	(-0.80)	(-0.01)
rx_{m-2}^-		-6.10	-12.5	2.16		2.65	3.16	0.71
		(-1.48)	(-1.63)	(0.46)		(0.83)	(0.76)	(0.22)
rx_m^+		-18.2***	-22.2***	-10.5**		43.2***	30.9***	46.1***
		(-2.62)	(-2.65)	(-2.20)		(8.13)	(6.80)	(4.92)
rx_{m-1}^+		1.08	-0.96	-4.96		26.5***	21.1***	23.6***
		(0.22)	(-0.17)	(-0.76)		(4.55)	(2.80)	(2.91)
rx_{m-2}^+		0.39	-2.89	-4.82		9.57***	7.95**	3.96
		(0.08)	(-0.46)	(-0.74)		(2.76)	(2.00)	(0.64)
Constant	1.98***	1.03**	0.85	1.68***	2.08***	0.66**	0.60**	1.73***
	(11.75)	(2.32)	(1.58)	(4.54)	(12.78)	(2.22)	(2.40)	(4.07)
$\sum$coef rx	-48.2***				32.0***			
$\sum$coef rx^-		-63.6***	-66.2***	-71.1***		9.42	7.09	27.3***
$\sum$coef rx^+		-16.7	-26.0*	-20.2*		79.2***	60.0***	73.7***
N	184	184	120	64	184	184	120	64
R^2	0.50	0.52	0.57	0.65	0.38	0.49	0.44	0.56
$\bar{R}^2$	0.49	0.51	0.55	0.61	0.37	0.47	0.41	0.52

Table V. Predicting target changes with positive and negative stock market mentions

The table presents regressions of FFR target changes between meetings $m-1$ and m, ΔFFR_m, on counts of positive and negative stock-market mentions in FOMC documents of meeting m and $m-1$. The sample period is 1994–2008. One observation is lost due the use of lagged stock-market counts in the minutes documents, which we manually code starting from 1994. The regressions control for the overall number of sentences in the documents associated with the m-th meeting, $\#\text{Doc.length}_m$ (lags of this variable are not significant). All counts used as explanatory variables are standardized to have unit standard deviation. Robust t-statistics are in parentheses.

Panel A. Minutes, manual coding

	(1) All	(2) Staff	(3) Partic.	(4) Desc.	(5) Nondesc.
ΔFFR_{m-1}	0.19***	0.26***	0.22***	0.30***	0.20***
	(2.88)	(4.11)	(3.16)	(4.39)	(2.98)
ΔFFR_{m-2}	0.26**	0.28**	0.23**	0.31***	0.23**
	(2.40)	(2.45)	(1.98)	(2.74)	(1.99)
$\#\text{Stocks}^-_m$	-0.073**	-0.072**	-0.050**	-0.083**	-0.061**
	(-2.38)	(-1.98)	(-2.27)	(-2.28)	(-2.44)
$\#\text{Stocks}^-_{m-1}$	-0.10***	-0.13***	-0.072***	-0.098***	-0.078***
	(-3.08)	(-2.78)	(-3.07)	(-2.63)	(-2.80)
$\#\text{Stocks}^+_m$	-0.047**	-0.060*	0.0029	-0.068**	0.00098
	(-2.09)	(-1.81)	(0.20)	(-2.36)	(0.06)
$\#\text{Stocks}^+_{m-1}$	0.0037	-0.0023	0.0074	0.030	-0.0080
	(0.13)	(-0.06)	(0.41)	(1.11)	(-0.36)
$\#\text{Doc.length}_m$	-0.11**	-0.095**	-0.12**	-0.083**	-0.11**
	(-2.56)	(-2.31)	(-2.49)	(-2.14)	(-2.43)
Constant	-0.11***	-0.14***	-0.076*	-0.12***	-0.077*
	(-2.96)	(-3.30)	(-1.77)	(-3.09)	(-1.92)
N	119	119	119	119	119
R^2	0.52	0.50	0.48	0.51	0.49

Panel B. Minutes and transcripts, algorithm-based coding

	(1)	(2) Minutes	(3)	(4)	(5) Transcripts	(6)
	All	Staff	Partic.	All	Staff	Partic.
ΔFFR_{m-1}	0.17**	0.28***	0.16*	0.16**	0.29***	0.20***
	(2.17)	(4.46)	(1.81)	(2.43)	(3.84)	(3.09)
ΔFFR_{m-2}	0.21*	0.24**	0.21*	0.23**	0.28**	0.20*
	(1.84)	(2.04)	(1.95)	(2.19)	(2.51)	(1.76)
$\#\text{Stocks}^-_m$	-0.069**	-0.063	-0.065**	-0.049**	-0.093***	-0.030**
	(-2.10)	(-1.50)	(-2.33)	(-2.20)	(-3.15)	(-2.22)
$\#\text{Stocks}^-_{m-1}$	-0.087**	-0.070	-0.081***	-0.092***	-0.016	-0.095***
	(-2.39)	(-1.45)	(-2.70)	(-3.96)	(-0.74)	(-4.09)
$\#\text{Stocks}^+_m$	-0.037	-0.045	0.0018	-0.012	0.013	-0.019
	(-1.52)	(-1.47)	(0.13)	(-0.73)	(0.78)	(-1.28)
$\#\text{Stocks}^+_{m-1}$	0.011	0.019	0.0038	-0.0043	0.013	-0.016
	(0.50)	(0.69)	(0.28)	(-0.26)	(0.55)	(-1.14)
$\#\text{Doc.length}_m$	-0.091**	-0.079*	-0.10**	-0.14***	-0.096**	-0.14***
	(-2.14)	(-1.84)	(-2.29)	(-3.12)	(-2.24)	(-2.95)
Constant	-0.084**	-0.090**	-0.068*	-0.058	-0.064*	-0.053
	(-2.26)	(-2.30)	(-1.69)	(-1.52)	(-1.92)	(-1.24)
N	119	119	119	119	119	119
R^2	0.51	0.46	0.50	0.55	0.50	0.54

Table VI. Economic content of stock market mentions in FOMC minutes

The table describes the economic content of the stock market related mentions in FOMC minutes. Stock market mentions that are not purely descriptive are assigned into categories for the mechanism through which the stock market affects the economy. We report the number of stock market mentions by category (mechanism mentioned) and by the section of the FOMC minutes. The sample period is 1994–2016.

	Staff Review of Economic Situation	Staff Review of Financial Situation	Staff Economic Outlook	Particip. Views	Committee Policy Action	Other	**Total**
Descriptive	4	491	10	11	1	34	**551**
Consumption	72	0	43	150	0	0	**265**
Investment	2	2	1	29	0	0	**34**
Financial conditions	0	0	0	40	4	0	**44**
Causal, no mechanism	3	3	11	12	6	2	**37**
Demand	0	1	5	9	0	0	**15**
Economic outlook	0	1	0	12	0	0	**13**
Financial stability	0	2	0	5	0	0	**7**
Other	0	3	0	4	1	9	**17**
Total	**81**	**503**	**70**	**272**	**12**	**45**	**983**

Table VII. Algorithmic coding of economic content of stock market mentions in FOMC minutes

The table shows counts of phrases related to economic conditions that occur within the same paragraph (# in par.) and within the same section (# in sec.) of the minutes, in which a stock market phrase is mentioned. Stock market phrases and paragraphs are obtained by manual searches within FOMC minutes over the 1994–2016 sample period. The odds ratio is defined as (# phrase i in paragraph mentioning stocks / # all phrases in paragraph mentioning stocks) / (# phrase i in section / # all phrases in section). We display only phrases that occur 20 times or more in the same paragraph as a stock market phrase.

Phrase	(1) # in par.	(2) # in sec.	(3) Ratio (1)/(2)	(4) Odds ratio
Staff Review of the Economic Situation				
disposable income	32	68	0.47	8.09
consumer sentiment	47	111	0.42	7.28
personal consumption expenditure*	32	109	0.29	5.05
pce	43	206	0.21	3.59
retail sales	31	149	0.21	3.58
consumer spending	46	243	0.19	3.25
motor vehicle*	66	609	0.11	1.86
Staff Review of the Financial Situation				
un(employment)	31	58	0.53	1.99
economic activity	33	75	0.44	1.64
economic outlook	22	60	0.37	1.36
inflation	129	531	0.24	0.90
economic growth	33	138	0.24	0.89
Staff Economic Outlook				
wealth effect*	20	21	0.95	3.66
final demand	24	26	0.92	3.54
exports	30	68	0.44	1.69
productivity	21	48	0.44	1.68
labor market*	21	50	0.42	1.61
potential output	23	63	0.37	1.40
business investment	26	74	0.35	1.35
economic activity	57	185	0.31	1.18
consumer spending	24	89	0.27	1.03
real gdp	31	139	0.22	0.86
gdp growth	32	167	0.19	0.74
un(employment)	28	160	0.18	0.67
inflation	63	530	0.12	0.46
Participants' Views on Current Conditions and the Economic Outlook				
wealth effect*	23	29	0.79	6.54
consumer expenditures	30	63	0.48	3.93
consumer confidence	62	139	0.45	3.68
retail sales	39	88	0.44	3.65
consumer sentiment	28	66	0.42	3.50
consumer spending	179	450	0.40	3.28
motor vehicle*	45	120	0.38	3.09
economic expansion	25	142	0.18	1.45
aggregate demand	20	120	0.17	1.37
economic outlook	32	207	0.15	1.27
productivity	52	383	0.14	1.12
business investment	32	248	0.13	1.06
business spending	21	163	0.13	1.06
economic activity	58	524	0.11	0.91
un(employment)	64	714	0.09	0.74
energy prices	24	276	0.09	0.72
exports	22	273	0.08	0.66
economic growth	26	367	0.07	0.58
labor market*	43	661	0.07	0.54
inflation	93	2451	0.04	0.31

Table VIII. Stock market and growth, unemployment and inflation expectations (private sector forecasts)

The table presents regressions of forecast updates in the SPF and BCEI surveys on the inter-survey stock market returns. Subscripts t measure time at the survey frequency. Panel A regresses updates of expectations in the SPF on inter-survey stock returns. SPF is conducted at the quarterly frequency. Thus, rx_t is the quarterly inter-survey return preceding survey in quarter t. Lag $t-1$ refers to the survey in the previous quarter. Robust t-statistics are in parentheses. Panel B repeats the analysis for the BCEI survey. BCEI survey is conducted at the monthly frequency. For comparison with Panel A, updates and inter-survey returns in Panel B are measured over a 3-month period. The regressions are estimated at the monthly frequency. HAC t-statistics to account for the overlapping data are reported in parentheses. Other conventions are consistent with Table II.

Panel A. SPF forecasts (1994-2016, q0+q1+q2+q3), quarterly frequency

	(1)	(2)	(3)
	Real GDP growth	Unemployment rate	Inflation (GDP deflator)
rx_t^-	4.56***	-3.48***	0.30
	(3.05)	(-3.44)	(0.89)
rx_{t-1}^-	4.26***	-1.95***	1.51
	(4.68)	(-2.91)	(1.52)
rx_t^+	1.48	0.54	-0.72
	(1.41)	(0.83)	(-1.46)
rx_{t-1}^+	0.01	0.44	-0.45
	(0.02)	(0.71)	(-0.79)
Lag dept	0.10	0.32**	0.16
	(0.88)	(2.63)	(1.54)
Constant	0.01	-0.14**	0.03
	(0.11)	(-2.31)	(0.79)
$\sum$coef rx^-	8.82***	-5.44***	1.81
$\sum$coef rx^+	1.49	0.98	-1.16
N (quarters)	92	92	92
R^2	0.53	0.53	0.15

Panel B. BCEI forecasts, monthly frequency

	1994–2016, q0+q1+q2+q3			1982:9–1993, q0+q1+q2+q3	
	(1)	(2)	(3)	(4)	(5)
	Real GDP growth	Unemployment rate	Inflation (GDP deflator)	Real GDP growth	Unemployment rate
rx_t^-	4.64***	-3.58***	1.65***	3.94***	-1.62***
	(4.02)	(-5.04)	(3.27)	(6.28)	(-4.85)
rx_{t-3}^-	1.25*	-0.83	-0.03	-0.32	0.22
	(1.72)	(-1.41)	(-0.09)	(-0.59)	(0.35)
rx_t^+	1.65***	-0.15	-0.50	2.19***	-0.16
	(3.07)	(-0.37)	(-1.45)	(3.64)	(-0.30)
rx_{t-3}^+	1.10***	-0.50	-0.24	0.25	0.14
	(2.93)	(-1.57)	(-1.08)	(0.36)	(0.28)
Lag dept	0.15	0.29***	0.32***	0.30***	0.54***
	(1.36)	(3.09)	(4.40)	(5.70)	(6.76)
Constant	-0.08*	-0.06*	0.04	-0.08*	-0.02
	(-1.68)	(-1.78)	(1.32)	(-1.73)	(-0.58)
$\sum$coef rx^-	5.89***	-4.41***	1.63***	3.62***	-1.40***
$\sum$coef rx^+	2.75***	-0.65	-0.74	2.44***	-0.02
N	276	276	276	141	144
R^2	0.56	0.56	0.25	0.43	0.32

Table IX. Predictive power of stock market for realized macro variables

The table presents predictive regressions of realized macro variables (four-quarter growth rates or changes) on lagged positive and negative stock market realizations. Real GDP data are from NIPA Table 1.1.1. The unemployment rate is the seasonally adjusted series for individuals 16 years and over from the Bureau of Labor Statistics. The GDP deflator is from NIPA Table 1.1.4. The regressions are estimated at the quarterly frequency. HAC t-statistics are in parentheses.

	Real GDP growth q0+q1+q2+q3			Unemployment rate change q0+q1+q2+q3		
	1994-2016	1947-1993	1947-2016	1994-2016	1948-1993	1948-2016
rx_t^-	9.74**	13.34***	12.52***	-6.23***	-6.59**	-6.94***
	(2.47)	(2.64)	(3.39)	(-2.81)	(-2.44)	(-3.53)
rx_t^+	5.82*	9.24**	7.973**	-2.73	-3.57	-3.18***
	(1.73)	(2.01)	(2.40)	(-1.32)	(-1.51)	(-2.02)
Lag of q0-value	1.05***	0.40**	0.54***	1.84***	0.77***	0.97***
of dept. var.	(3.54)	(1.99)	(2.81)	(4.52)	(3.39)	(4.32)
Constant	1.77***	3.19***	2.77***	-0.07	0.03	-0.03
	(4.21)	(6.95)	(7.93)	(-0.37)	(0.17)	(-0.18)
N (quarters)	89	186	275	89	182	271
R^2	0.31	0.12	0.15	0.50	0.15	0.21

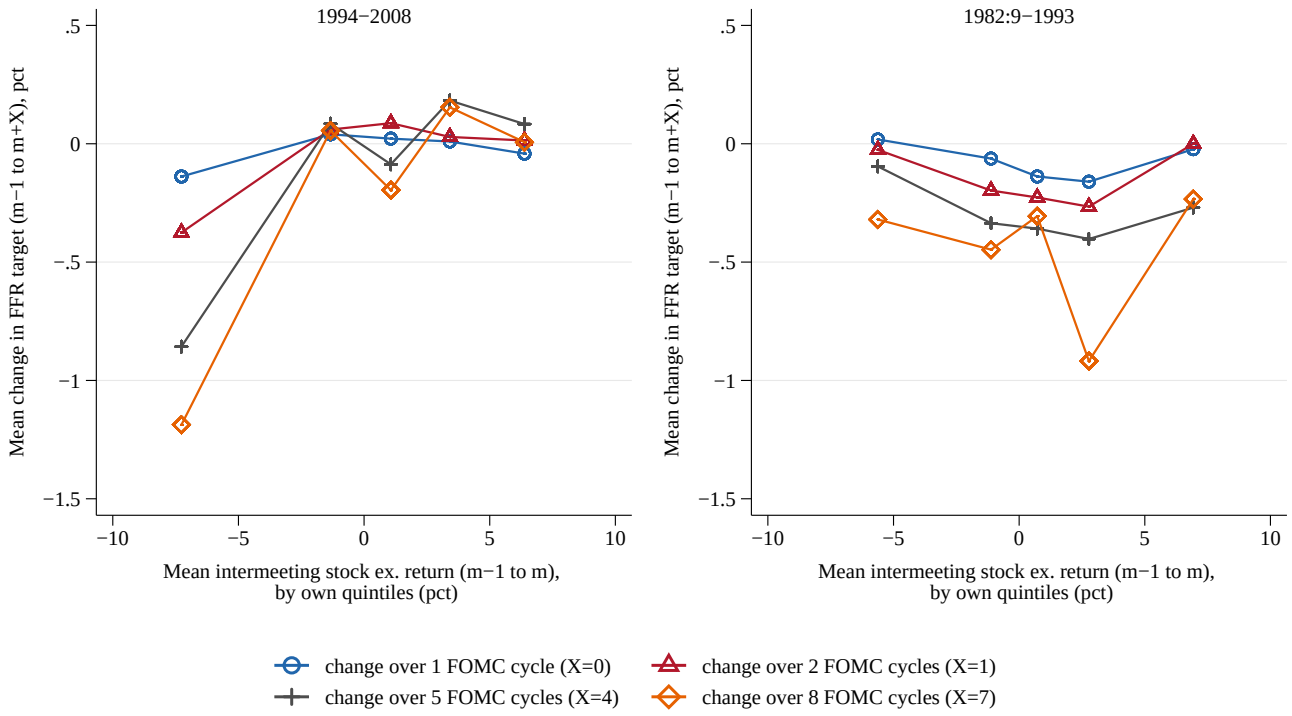
	Inflation (GDP deflator) q0+q1+q2+q3		
	1994-2016	1947-1993	1947-2016
rx_t^-	0.036*	-0.051	-0.015
	(1.74)	(-1.53)	(-0.56)
rx_t^+	-0.01	0.002	-0.002
	(-1.07)	(0.07)	(-0.12)
Lag of q0-value	1.62***	2.59***	2.75***
of dept. var.	(4.20)	(6.69)	(7.93)
Constant	0.013***	0.01***	0.01***
	(7.07)	(3.30)	(3.67)
N (quarters)	89	186	275
R^2	0.33	0.56	0.59

Table X. Private sector FFR expectations

The table presents regressions of updates in private sector forecasts of the FFR rate on the lagged stock market returns and controls. The controls include updates to forecasts of the inflation and real GDP growth as well as lagged forecasts. Forecasts are from the BCFF survey. Surveys are conducted at the monthly frequency. Updates to forecasts of FFR and macro variables are constructed over 2-month period (month $t-2$ to month t) to approximate the distance between the scheduled FOMC meetings. The forecast horizon of updates to macro variables is chosen using the information criteria, following the approach in Table III, resulting in selection of update for current quarter RGDP growth forecast and update of CPI inflation forecast two quarters ahead. Regressions are estimated at the monthly frequency. To account for the 2-month window over which updates are measured, forecasts are lagged by 2 months. Excess stock returns are also measured over a 2-month period. To account for the overlap in the errors, HAC t-statistics are reported in parentheses. The sample period is 1994–2008.

Dependent variable: $\text{Update}_t^{BC}(\text{FFR}_h) = E_t^{BC}(\text{FFR}_h) - E_{t-2}^{BC}(\text{FFR}_h)$						
	$h = q1$			$h = q3$		
	(1)	(2)	(3)	(4)	(5)	(6)
rx_t^-	3.64***	1.77***	1.37***	4.61***	1.85***	1.09*
	(7.35)	(2.97)	(2.67)	(5.57)	(2.97)	(1.78)
rx_{t-2}^-	3.09***	1.78***	0.79	3.12***	1.21*	0.047
	(3.83)	(2.84)	(1.26)	(3.12)	(1.79)	(0.07)
rx_t^+	-1.60*	-0.79	-0.52	-2.45**	-1.13	-1.12
	(-1.88)	(-1.11)	(-0.81)	(-2.07)	(-1.29)	(-1.35)
rx_{t-2}^+	-0.16	-0.64	0.25	0.29	-0.15	0.74
	(-0.21)	(-1.06)	(0.38)	(0.27)	(-0.19)	(1.00)
$\text{Update}_t^{BC}(g\text{RGDP}_{q0})$		0.19***	0.17***		0.25***	0.23***
		(4.51)	(4.65)		(5.00)	(5.01)
$\text{Update}_t^{BC}(g\text{CPI}_{q2})$		0.48**	0.63***		0.91***	1.10***
		(2.11)	(3.23)		(2.97)	(4.35)
$\text{Update}_{t-2}^{BC}(g\text{RGDP}_{q0})$			0.030			-0.062
			(0.79)			(-1.55)
$\text{Update}_{t-2}^{BC}(g\text{CPI}_{q2})$			-0.29			-0.56**
			(-1.65)			(-2.45)
$\text{Update}_{t-2}^{BC}(\text{FFR}_h)$			0.17**			0.22***
			(2.13)			(3.00)
$E_{t-2}^{BC}(g\text{RGDP}_{q0})$			0.031			0.062*
			(1.03)			(1.94)
$E_{t-2}^{BC}(g\text{CPI}_{q2})$			0.18*			0.23**
			(1.84)			(2.25)
$E_{t-2}^{BC}(\text{FFR}_{q0})$			-0.036**			-0.0079
			(-2.12)			(-0.40)
Constant	0.11**	0.070	-0.37	0.14**	0.072	-0.69**
	(1.98)	(1.57)	(-1.38)	(2.12)	(1.46)	(-2.55)
N	180	180	180	180	180	180
R^2	0.30	0.45	0.53	0.29	0.51	0.59
$\bar{R}^2$	0.29	0.43	0.49	0.28	0.50	0.56

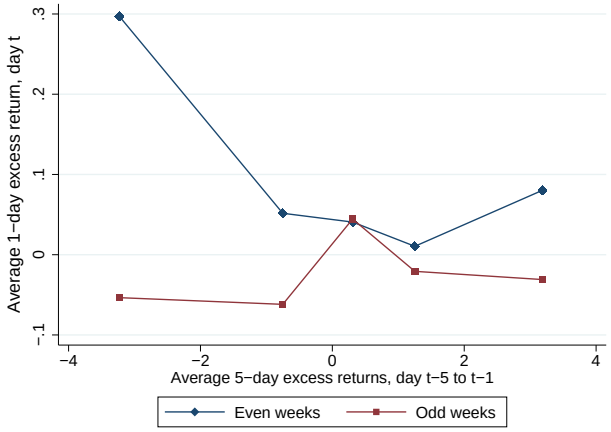
Figure 1. Changes in FFR target conditional on intermeeting stock excess returns



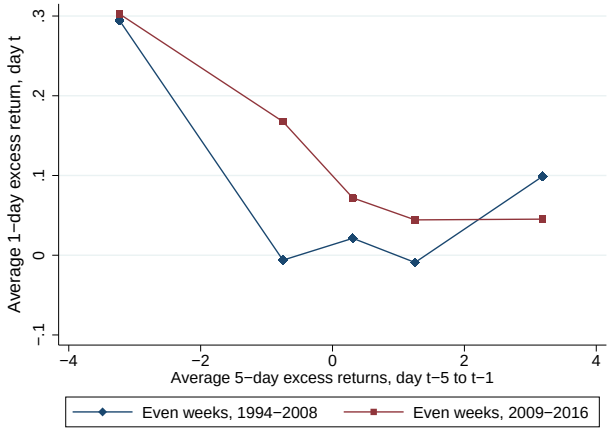
The figure plots the change in FFR target against quintiles of intermeeting stock excess returns. The average cumulative FFR target change from day 0 of cycle $m-1$ to day 0 of cycle $m+7$ (approximately a one-year period) is plotted as a function of the intermeeting excess return.

Figure 2. The Fed put in stock returns: pre/post-2008

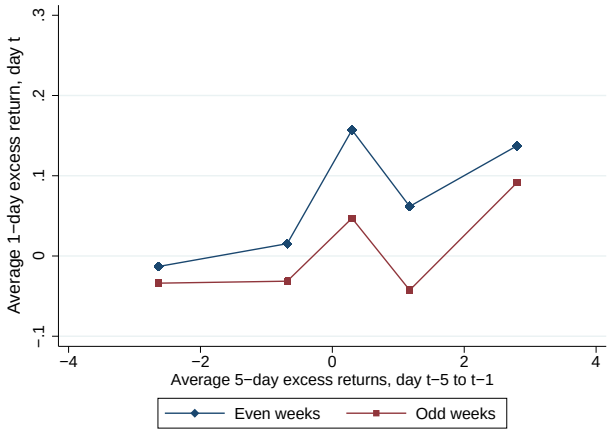
Panel A. 1994–2016



Panel B. 1994–2016, pre/post-2008

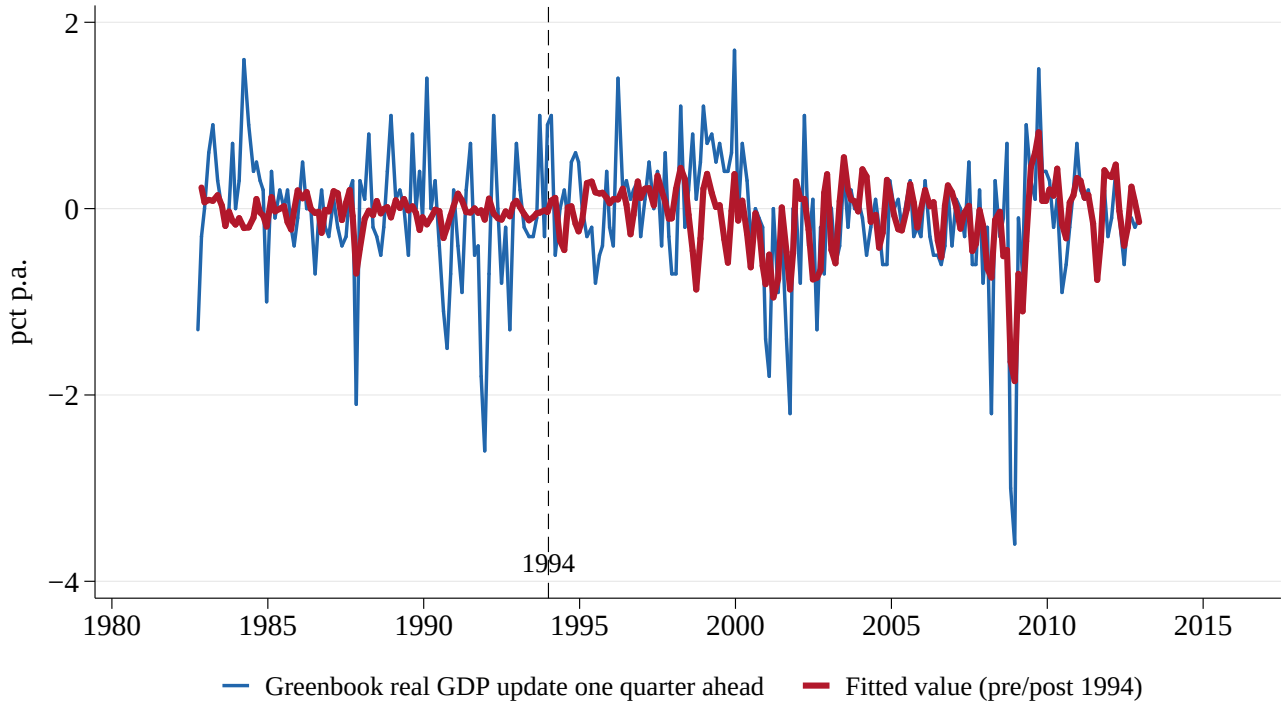


Panel C. 1982:09-1993



The figure graphs average excess stock returns conditional on the returns in the previous week, with separate results based on the week of the FOMC cycle. Following CMVJ (2018), even weeks are defined as weeks 0, 2, 4 and 6 in FOMC cycle time, where week 0 of the FOMC cycle starts on the day before a scheduled FOMC announcement day (weekends are excluded).

Figure 3. Greenbook growth expectations updates and intermeeting stock market returns



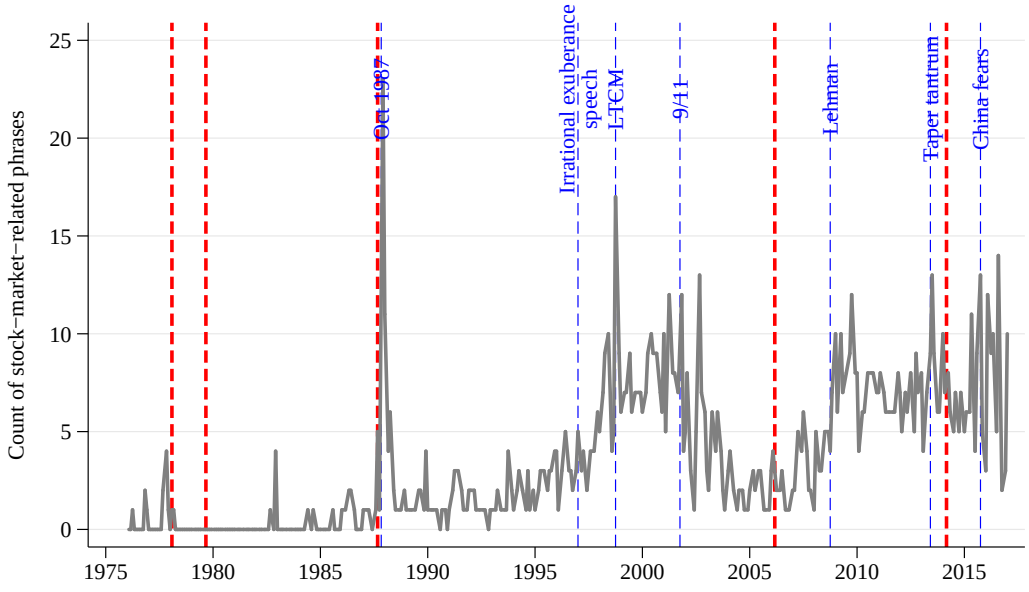
The figure plots fitted values from regressions of Greenbook real GDP growth expectations updates of one-quarter-ahead forecasts on the current and lagged intermeeting stock market returns. Updates are expressed in percent per annum. The regressions are estimated separately on the 1982:09–1993 and 1994–2012 samples (the vertical line in the graph indicates the sample split date). For the 1982:09–1993 and 1994–2012 samples, the estimates respectively are (robust t-statistics in parentheses):

$$\text{Sample 1982:09–1993:}\quad \text{Update}_m^{GB}(g\text{RGDP}_{q1}) = \underset{(-0.82)}{-0.066} + \underset{(1.27)}{2.62}\, rx_m + \underset{(0.73)}{1.01}\, rx_{m-1},\ R^2 = 0.04, N = 90,$$

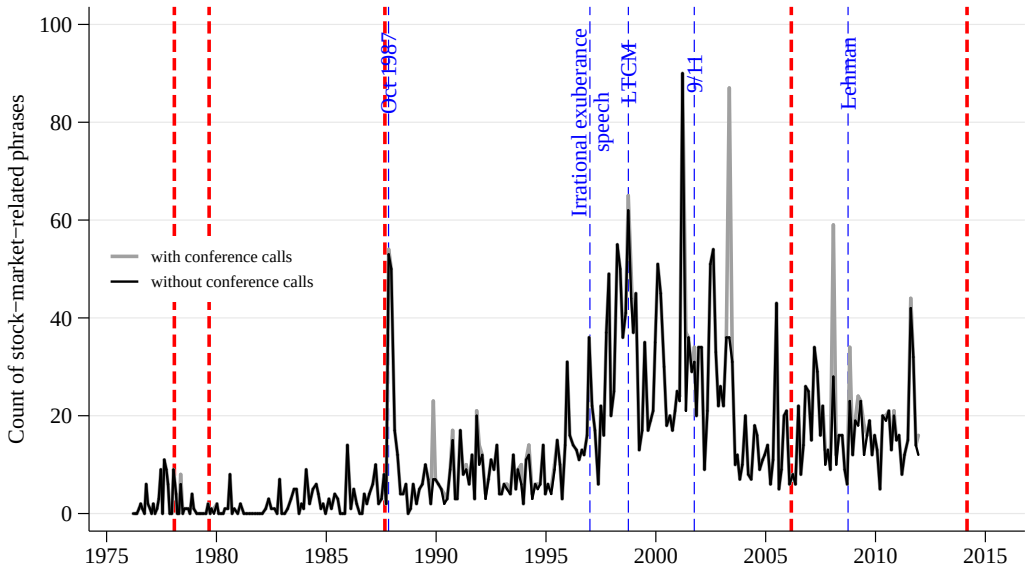
$$\text{Sample 1994–2012:}\quad \text{Update}_m^{GB}(g\text{RGDP}_{q1}) = \underset{(-2.35)}{-0.11} + \underset{(3.68)}{4.75}\, rx_m + \underset{(3.47)}{5.08}\, rx_{m-1},\ R^2 = 0.33, N = 152.$$

Figure 4. Counts of stock market mentions in FOMC documents

Panel A. FOMC minutes (1976–2016)



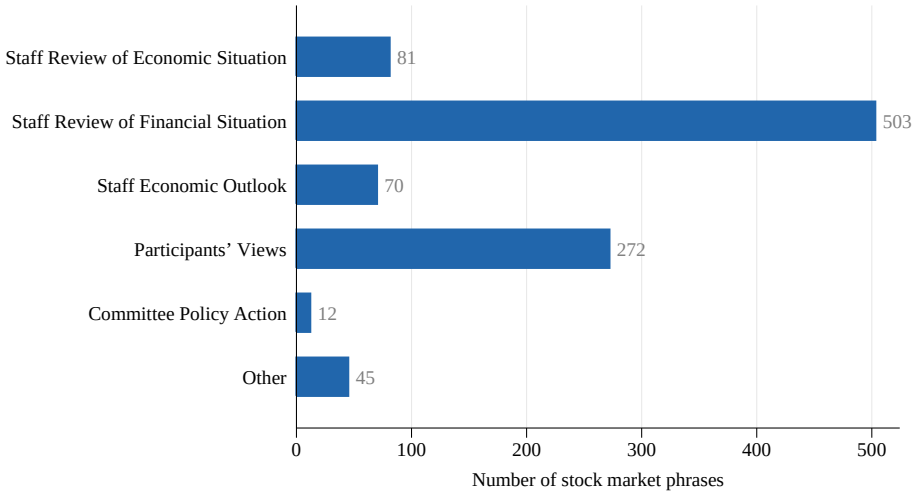
Panel B. FOMC transcripts (1976–2011)



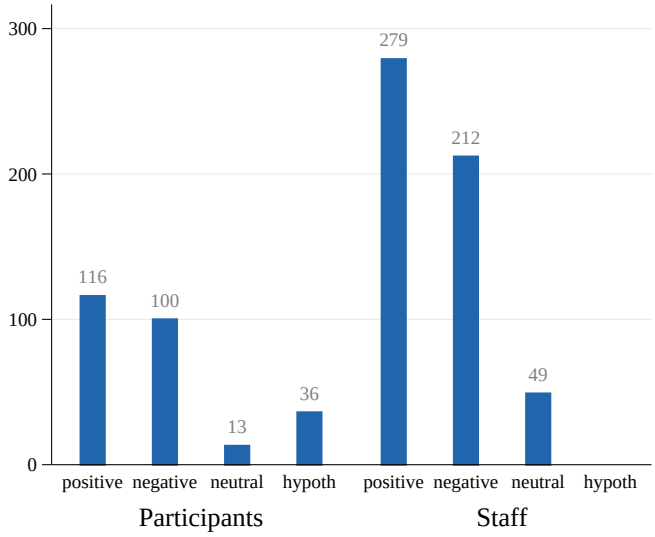
Panel A reports combined counts of stock market mentions in Records of Policy Actions and Minutes of Actions for the 1976–1992 sample and in FOMC minutes for the 1993–2016 sample. Panel B reports counts in the transcripts of FOMC meetings (solid black line) and those combined with counts in transcripts of FOMC conference calls (solid gray lines). Counts in transcripts of conference calls in the intermeeting period are added to the counts in the transcripts of the next FOMC meeting. Vertical thick dashed lines in both panels mark ends of tenures of subsequent Fed Chairs: Miller, Burns, Volcker, Greenspan, Bernanke.

Figure 5. Summary statistics for counts of stock market mentions in FOMC minutes (1994–2016)

Panel A. Counts by section of the minutes



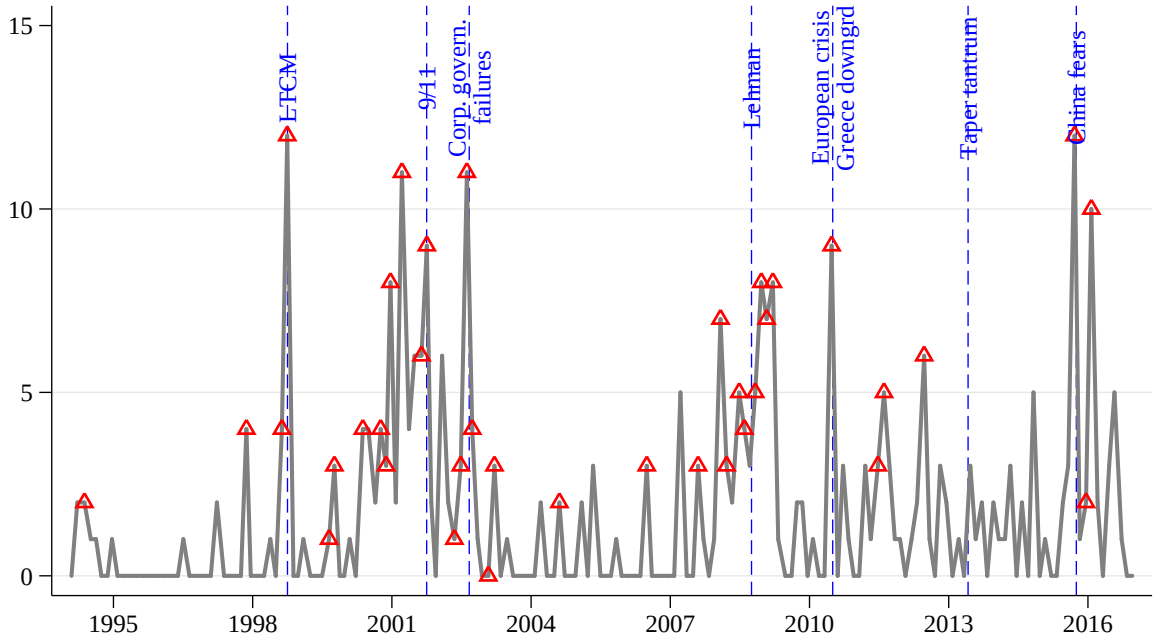
Panel B. Positive/negative counts by staff and participants



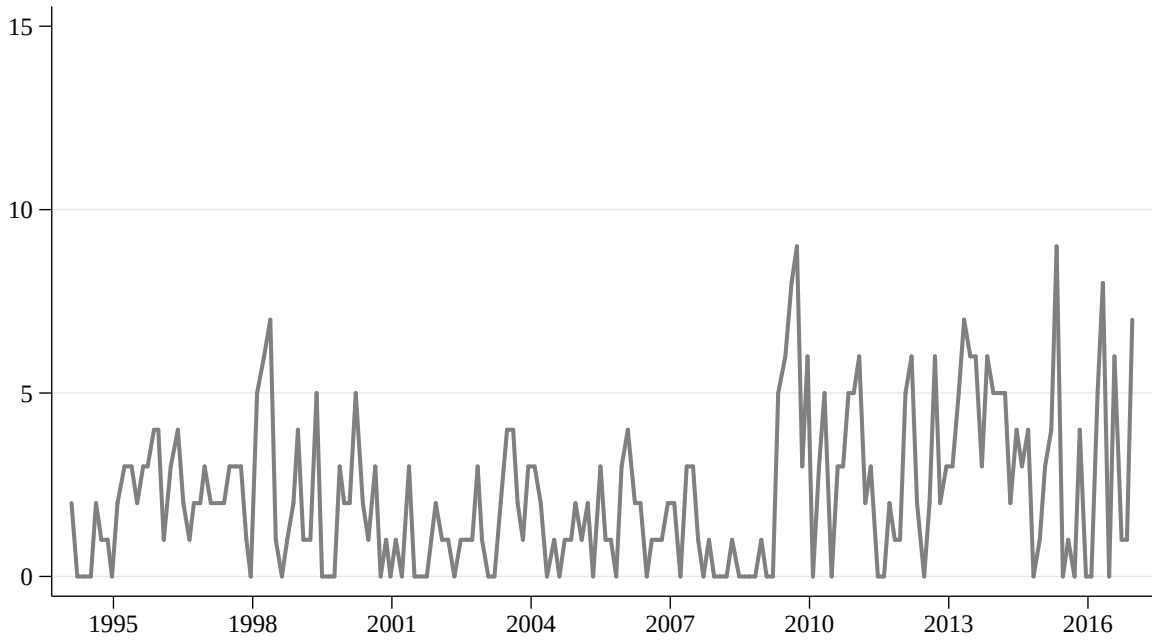
Panel A reports the number of stock market phrases, by section of the FOMC minutes. Panel B presents the total number of positive and negative stock market phrases, split by participants and staff, respectively. The results are based on manual coding of FOMC minutes' content.

Figure 6. Time series of positive and negative stock market phrases in FOMC minutes

Panel A. Negative phrases count

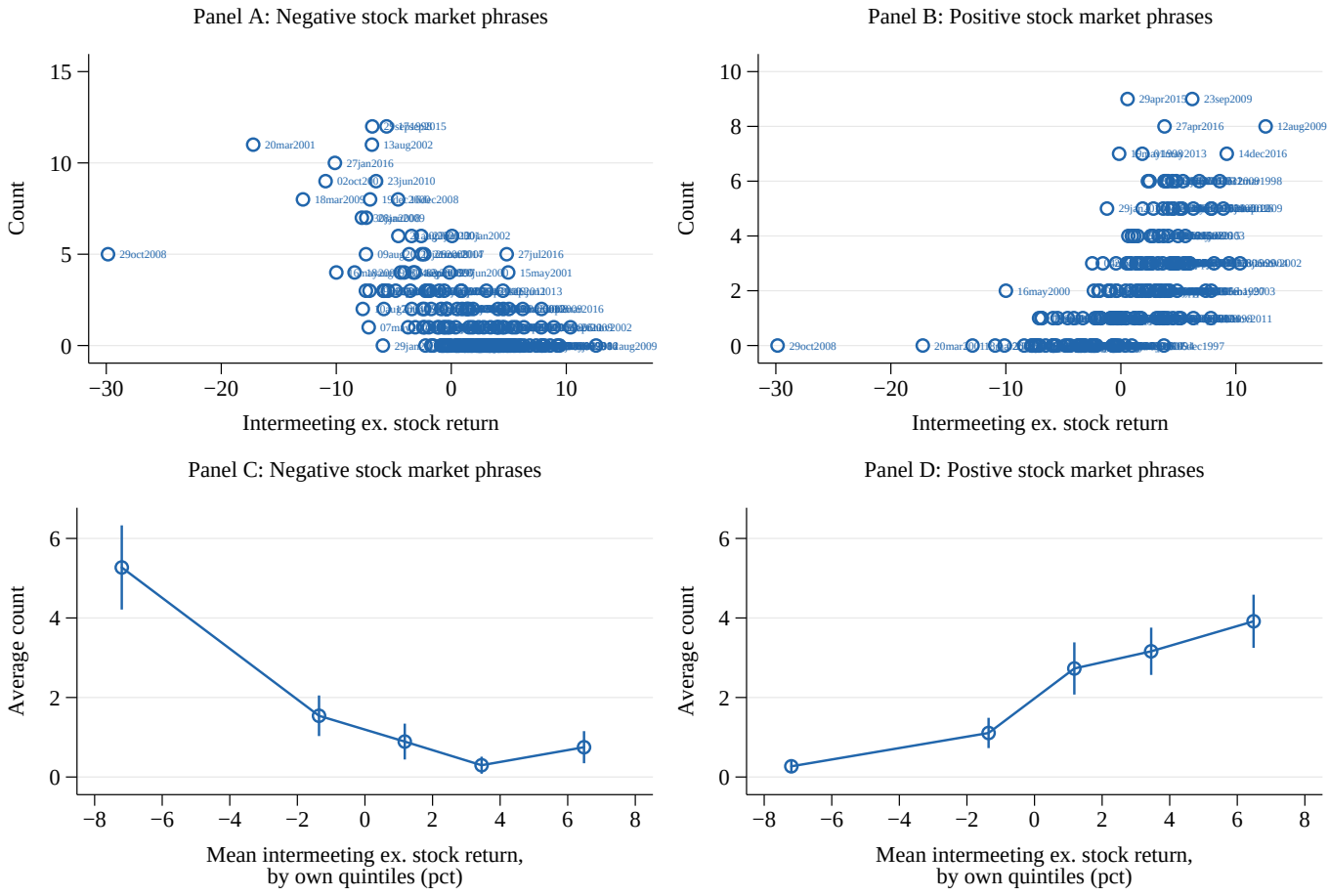


Panel B. Positive phrases count



The figure presents the time series of negative and positive stock market phrases in FOMC minutes based on manual coding. The sample period is 1994–2016. The triangles in Panel A indicate FOMC meetings that were preceded by intermeeting stock market returns in the lowest quintile.

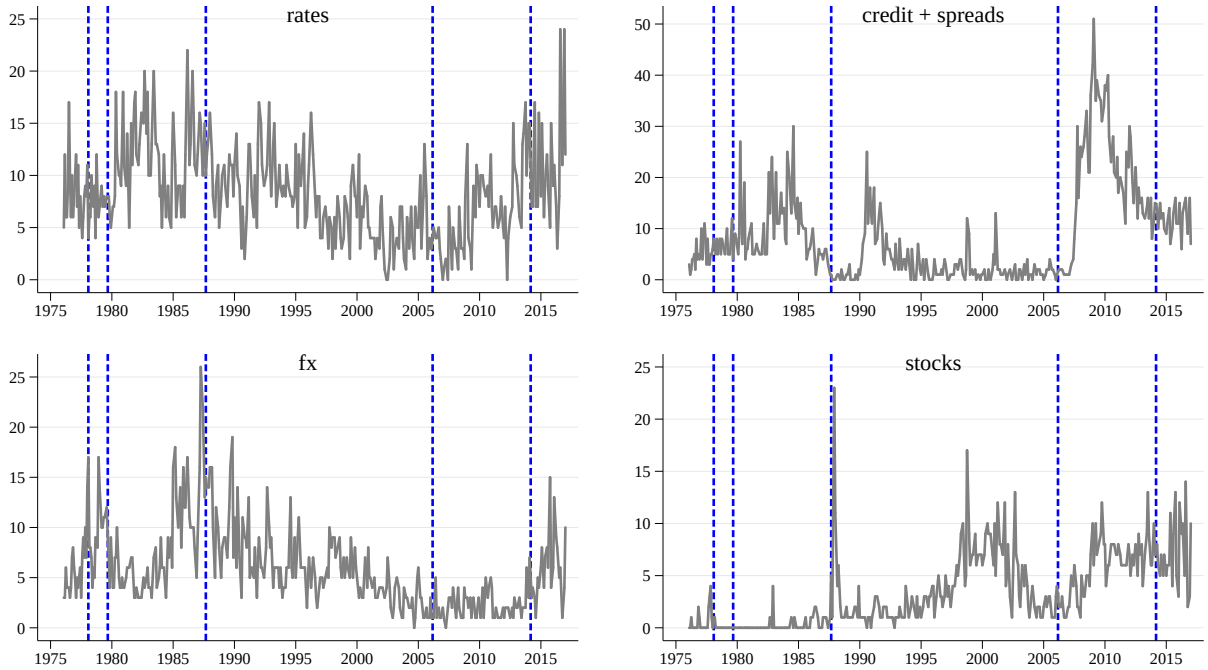
Figure 7. Impact of intermeeting stock returns on negative and positive stock market phrases in FOMC meetings



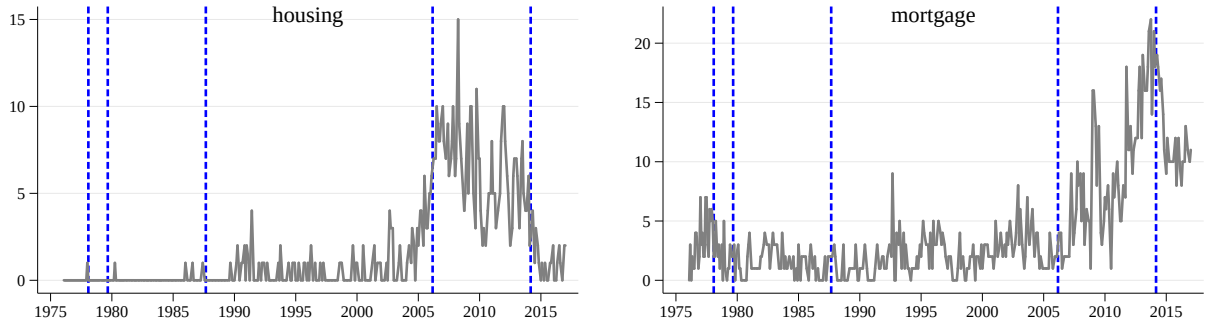
The figure presents the relationship between intermeeting stock market excess returns and number of positive and negative stock market mentions in FOMC minutes. The upper panels provide scatter plots of the number of positive or negative stock market mentions against excess stock returns realized in the intermeeting period. The bottom panels present the average count of positive and negative stock market phrases conditional on the quintiles of intermeeting stock market excess returns (x-axis labels report the average intermeeting return within a given quintile). The sample period is 1994–2016. The results are based on manual coding of the minutes content.

Figure 8. Mentions of specific financial conditions in FOMC minutes

Panel A. Various financial conditions

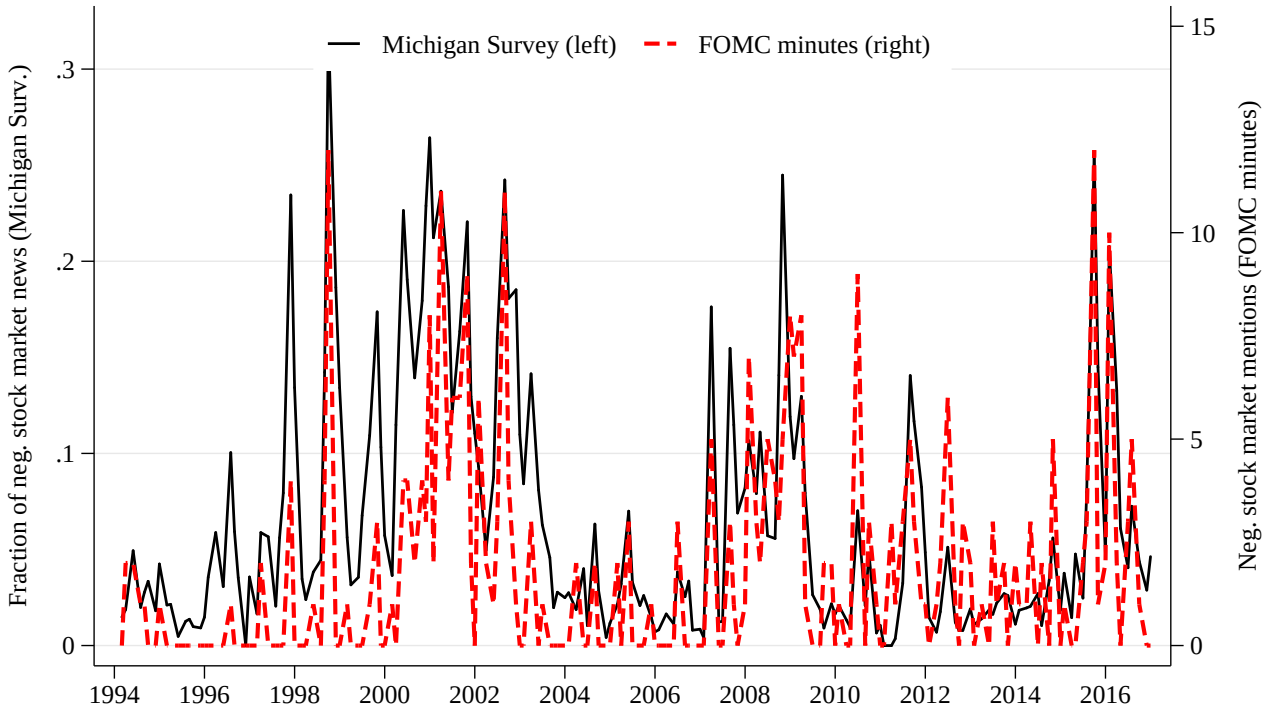


Panel B. Financial conditions relating to housing and mortgage markets



The figure displays counts of mentions of different variables determining financial conditions. The counts are obtained from FOMC minutes. Dashed vertical lines indicate the end of tenures of subsequent Fed Chairs.

Figure 9. Consumer attention to negative stock market news (Michigan Survey of Consumers)



The figure superimposes the MSC negative stocks news ratio (number of Michigan survey respondents citing negative stock market news relative to the number of respondents citing any news) with the frequency of negative stock market mentions in the FOMC minutes.

References

Adrian, T., N. Boyarchenko, and D. Giannone (2019). Vulnerable growth. *American Economic Review 4*(109).

Berger, D., I. Dew-Becker, and S. Giglio (2018). Uncertainty shocks as second-moment news shocks. Technical report. *Review of Economic Studies*, forthcoming.

Bernanke, B. S. and M. Gertler (1999). Monetary policy and asset volatility. *Federal Reserve Bank of Kansas City Economic Review 84*(4), 17–62.

Bjørnland, H. C. and K. Leitemo (2009). Identifying the interdependence between us monetary policy and the stock market. *Journal of Monetary Economics 56*(2), 275–282.

Blinder, A. and R. Reis (2005). Understanding the Greenspan standard. In *Federal Reserve Bank of Kansas Jackson Hole Symposium on the Global Dimensions of Unconventional Monetary Policy, Jackson Hole, August*, pp. 11–96.

Brayton, F. and P. Tinsley (1996, October). *A Guide to FRB/US: A Macroeconomic Model of the United States*. Washington, D.C. 20551: Macroeconomic and Quantitative Studies, Federal Reserve Board.

Caldara, D. and E. Herbst (2019). Monetary policy, real activity, and credit spreads: Evidence from bayesian proxy SVARs. *American Economic Journal: Macroeconomics 11*(1), 157–92.

Cecchetti, S. (2003). What the FOMC says and does when the stock market booms. In *in A. Richards and T. Robinson, eds., Asset Prices and Monetary Policy, Proceedings of the Research Conference of the Reserve Bank of Australia*, pp. 77–96.

Cecchetti, S., H. Genberg, J. Lipsky, and S. Wadhwani (2000). Asset prices and monetary policy. In *Report prepared for the conference Central banks and asset prices, organised by the International Centre for Monetary and Banking Studies, Geneva, May*.

Cieslak, A. (2018). Short rate expectations and unexpected returns in Treasury bonds. *Review of Financial Studies 31*, 3265–3306.

Cieslak, A., A. Morse, and A. Vissing-Jorgensen (2018). Stock returns over the FOMC cycle. Journal of Finance, *forthcoming*.

Coibion, O. and Y. Gorodnichenko (2012). Why are target interest rate changes so persistent? *American Economic Journal: Macroeconomics 4*, 126–162.

Curdia, V. and M. Woodford (2010). Credit spreads and monetary policy. *Journal of Money, Credit and Banking 42*(6).

Diamond, D. W. and R. G. Rajan (2012). Illiquid banks, financial stability, and interest rate policy. *Journal of Political Economy 120*(3), 552–591.

Drechsler, I., A. Savov, and P. Schnabl (2018). A model of monetary policy and risk premia. *The Journal of Finance 73*(1), 317–373.

Dudley, W. (2017). The importance of financial conditions in the conduct of monetary policy: remarks at the university of south florida sarasota-manatee, sarasota, florida. Technical report, Federal Reserve Bank of New York.

Fuhrer, J. and G. Tootell (2008). Eyes on the prize: How did the Fed respond to the stock market? *Journal of Monetary Economics 55*(4), 796–805.

Gilchrist, S. and J. V. Leahy (2002). Monetary policy and asset prices. *Journal of Monetary Economics 49*, 75–97.

Hansen, S. and M. McMahon (2016). Shocking language: Understanding the macroeconomic effects of central bank communication. *Journal of International Economics 99*, 114–133.

Hansen, S., M. McMahon, and A. Prat (2017). Transparency and deliberation within the FOMC: A computational linguistics approach. *The Quarterly Journal of Economics 133*(2), 801–870.

Hayford, M. D. and A. Malliaris (2004). Monetary policy and the us stock market. *Economic Inquiry 42*(3), 387–401.

Hoffmann, A. (2013). Did the Fed and ECB react asymmetrically with respect to asset market developments? *Journal of Policy Modeling 35*(2), 197–211.

Meyer, L. H. and B. P. Sack (2008). Updated monetary policy rules: Why don't they explain recent monetary policy. *Macroeconomic Advisers, Monetary Policy Insights*.

Peek, J., E. S. Rosengren, and G. M. Tootell (2016). Should US monetary policy have a tertiary mandate? Working paper, Federal Reserve Bank of Boston.

Ravn, S. H. (2012). Has the Fed reacted asymmetrically to stock prices? *The B.E. Journal of Macroeconomics 12*(1), 1–36.

Reifschneider, D. L., D. J. Stockton, and D. W. Wilcox (1997). Econometric models and the monetary policy process. *Carnegie-Rochester Conference Series on Public Policy 47*, 1–37.

Rigobon, R. and B. Sack (2003). Measuring the reaction of monetary policy to the stock market. *The Quarterly Journal of Economics 118*(2), 639–669.

Schmeling, M. and C. Wagner (2017). Does central bank tone move asset prices? Working paper, Goethe University and Copenhagen Business School.

Taylor, J. B. (2008). Monetary policy and the state of the economy. Testimony before the Committee on Financial Services, U.S. House of Representatives, February 26, 2008.

Thornton, D. L. (2005). A new federal funds rate target series: September 27, 1982-december 31, 1993. *Federal Reserve Bank of St. Louis Working Paper Series* (2005-032).

Appendix for
The Economics of the Fed Put

Not for publication

A. Stock market and macroeconomic news announcements as predictors of growth updates and policy

We compare the explanatory power of the intermeeting stock returns and macroeconomic news announcements for the Fed growth expectations updates and the FFR target rate.

We obtain data on macro announcements from Bloomberg. We start from the universe of variables included in Bloomberg's calendar of US economic releases. The Bloomberg data go back to October 1996. We consider macroeconomic variables for which at least 10 years of announcement data are available over the 1996:10–2008:12 sample.[29] Additionally, to assess the explanatory power of macroeconomic variables combined (as opposed to individually), we consider the Chicago Fed National Activity Index (CFNAI), available monthly. This index is the first principal component of 85 macroeconomic series. It has been made available in real time since 2001 but data are available back to 1967 for each release. We use data from the June 2018 release.

A.1. Predicting Fed growth expectation updates

For each explanatory variable x (the intermeeting stock market return or a macro variable), we estimate the following regression:

$$\text{Update}_m^{GB}(g\text{RGDP}_{q1}) = \beta_0 + \delta_1 x_m + \delta_2 x_{m-1} + \gamma_1 \mathbf{1}_{x_m} + \gamma_2 \mathbf{1}_{x_{m-1}} + \varepsilon_m. \tag{IA.1}$$

The regression is estimated with one observation per scheduled FOMC meeting. x_m denotes the latest realized value of the explanatory variable that is available as of date of internal Greenbook publication. $\mathbf{1}_{x_m}$ is a dummy variable equal to one if x_m is missing and similarly for $\mathbf{1}_{x_{m-1}}$. Missing values occur mainly because some series start later than October 1996. We also code a variable as missing if there has been no announcement for this variable since the last Greenbook date. We use the actual values of the macro variables as regressors rather than the surprises relative to consensus. This is because we want our x_m variables to capture news that has arrived since the $(m-1)$-th Greenbook forecasts. Consensus forecasts for macro releases are generally dated just before the release and thus reflect information about the likely value of the release that arrives between the $(m-1)$-th meeting Greenbook forecast and (just before) the release. Surprises relative to consensus forecasts would therefore focus only on a subset of the news contained in x_m. The inclusion of x_{m-1} as a regressor allows for a delayed Fed response to the news contained in the particular macro announcement.

[29] There are 38 such variables, 32 of which have monthly announcements. Of the rest, one variable has weekly announcements (Initial Jobless Claims), one has 24 announcements per year (University of Michigan Confidence), two variables have 4 announcements per year (Current Account Balance, Employment Cost Index), and two variables have 8 announcements per year (Nonfarm Productivity, Unit Labor Costs).

We report the R^2 values from each of the regressions and the p-values from an F-test of $H_0 : \delta_1 = \delta_2 = 0$.

[Insert Table IA-I here.]

The results are reported in Table IA-I for samples ending in 2008 and 2012, both starting in October 1996. Variables are listed in order of declining R^2 for the 1996:10–2008 sample (column (3)). The intermeeting stock returns rank at the top of the list in both samples, with an R^2 of about 0.38 and the p-value for the test of $H_0 : \delta_1 = \delta_2 = 0$ less than 0.1%.[30] CFNAI ranks second in the 1996:10–2008 sample with an R^2 of 0.35. Extending the sample through 2012 leads to significant declines in the explanatory power of macro variables. For example, CFNAI's R^2 drops from 35% to 14%, while the explanatory power of the stock market remains largely unchanged.

In sum, since mid-1990s, there has been a stable relation between Fed growth expectations updates and the stock market, which continues throughout the financial crisis and the zero-lower bound period. This relation is statistically strong compared to that between Fed growth expectations updates and macroeconomic variables.

A.2. Predicting FFR target changes

For each explanatory variable x, we estimate the following two regressions:

$$\Delta\text{FFR}_m = \beta_0 + \beta_1 \Delta\text{FFR}_{m-1} + \beta_2 \Delta\text{FFR}_{m-2} + \delta_1 x_m + \delta_2 x_{m-1} + \gamma_1 \mathbf{1}_{x_m} + \gamma_1 \mathbf{1}_{x_{m-1}} + \varepsilon_m \tag{IA.2}$$

$$\Delta\text{FFR}_m = \beta_0 + \beta_1 \Delta\text{FFR}_{m-1} + \beta_2 \Delta\text{FFR}_{m-2} + \gamma_1 \mathbf{1}_{x_m} + \gamma_1 \mathbf{1}_{x_{m-1}} + \varepsilon_m \tag{IA.3}$$

Similar to the growth updates regressions (IA.1), the target regressions above are estimated with one observation per scheduled FOMC meeting. $\Delta\text{FFR}_m = \text{FFR}_m - \text{FFR}_{m-1}$ is the change in the Fed funds target between meetings $m-1$ and m. x_m denotes the latest realized value of the explanatory variable that is available as of date of the m-th meeting. $\mathbf{1}_{x_m}$ is a dummy variable equal to one if x_m is missing and similarly for $\mathbf{1}_{x_{m-1}}$. We use lags of FFR changes (as opposed to lagged levels as we do in the Taylor rule estimates in Table III) for parsimony, but the results are not sensitive to this choice. We calculate the R^2 values from each of the regressions and use the difference as a measure of the incremental R^2 generated by the particular variable. By using incremental R^2, rather than simply the R^2 from equation (IA.2), we disregard any explanatory power due to the lags of the target changes and the dummy variables for missing data. To assess whether a given x_m-variable has statistically significant explanatory power for Fed policy, we report the p-values from an F-test of $H_0 : \delta_1 = \delta_2 = 0$.

[30] With the sample starting in 1996 as opposed to 1994, the R^2 for the stock market are slightly higher than those reported in Figure 3.

Table IA-I. Greenbook growth expectations updates, macro announcements and the stock market

The table reports estimates of regressions (IA.1). The dependent variable is the Greenbook real GDP growth update for one-quarter-ahead forecast. The regressions are estimated over two samples: 1996:10–2008 and 1996:10-2012. We do not use any data in the intermeeting period that are after the internal Greenbook release date. The explanatory variables are listed in the order of declining R^2 for the 1996:10–2008 sample (column (3)). The p-values are for the F-test of the null hypothesis H_0: $\delta_1 = \delta_2 = 0$ in equation (IA.1).

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		1996:10-2008			1996:10-2012		
Event	Bloomberg ticker	Rank	R^2	p-value	Rank	R^2	p-value
Stock market		1	0.385	0.000	1	0.381	0.000
CFNAI		2	0.346	0.000	4	0.135	0.000
Change in Nonfarm Payrolls	NFP TCH Index	3	0.203	0.000	20	0.059	0.022
ISM Non-Manufacturing	NAPMNMI Index	4	0.200	0.000	5	0.133	0.000
Chicago Purchasing Manager	CHPMINDX Index	5	0.199	0.000	2	0.151	0.000
Initial Jobless Claims	INJCJC Index	6	0.191	0.000	19	0.062	0.017
Consumer Confidence Index	CONCCONF Index	7	0.188	0.000	10	0.099	0.001
ISM Manufacturing	NAPMPMI Index	8	0.184	0.000	3	0.143	0.000
Wards Domestic Vehicle Sales	SAARDTOT Index	9	0.176	0.000	13	0.083	0.003
U. of Mich. Sentiment	CONSSENT Index	10	0.176	0.000	12	0.085	0.003
GDP Annualized QoQ	GDP CQOQ Index	11	0.161	0.000	9	0.111	0.001
Philadelphia Fed Business Outlook	OUTFGAF Index	12	0.161	0.000	6	0.127	0.000
Factory Orders	TMNOCHNG Index	13	0.135	0.001	8	0.112	0.001
Industrial Production MoM	IP CHNG Index	14	0.132	0.001	27	0.045	0.056
Import Price Index MoM	IMP1CHNG Index	15	0.121	0.002	7	0.117	0.000
Housing Starts	NHSPSTOT Index	16	0.100	0.006	33	0.015	0.373
Capacity Utilization	CPTICHNG Index	17	0.096	0.009	28	0.044	0.059
Unemployment Rate	USURTOT Index	18	0.082	0.018	34	0.015	0.390
Trade Balance	USTBTOT Index	19	0.079	0.022	15	0.080	0.006
Current Account Balance	USCABAL Index	20	0.077	0.021	14	0.083	0.004
Personal Spending	PCE CRCH Index	21	0.074	0.027	21	0.056	0.026
Unit Labor Costs	COSTNFR% Index	22	0.071	0.023	16	0.079	0.004
Leading Index	LEI CHNG Index	23	0.067	0.040	17	0.077	0.007
Change in Manufact. Payrolls	USMMMNCH Index	24	0.066	0.034	25	0.049	0.038
CPI Index NSA	CPURNSA Index	25	0.066	0.040	26	0.048	0.044
Nonfarm Productivity	PRODNFR% Index	26	0.065	0.041	11	0.093	0.002
CPI MoM	CPI CHNG Index	27	0.063	0.048	23	0.052	0.034
Durable Goods Orders	DGNOCHNG Index	28	0.055	0.069	24	0.052	0.034
New Home Sales	NHSLTOT Index	29	0.054	0.072	36	0.010	0.542
Monthly Budget Statement	FDDSSD Index	30	0.054	0.075	31	0.017	0.341
CPI Ex Food and Energy MoM	CPUPXCHG Index	31	0.053	0.079	30	0.020	0.277
Avg Hourly Earning MOM Prod	USHETOT% Index	32	0.051	0.081	18	0.064	0.015
Avg Weekly Hours Production	USWHTOT Index	33	0.050	0.075	40	0.002	0.888
PPI MoM	PPI CHNG Index	34	0.050	0.090	22	0.054	0.030
Consumer Credit	CICRTOT Index	35	0.039	0.153	39	0.002	0.862
Personal Income	PITLCHNG Index	36	0.027	0.277	38	0.005	0.723
PPI Ex Food and Energy MoM	PXFECHNG Index	37	0.023	0.337	29	0.021	0.271
Wholesale Inventories MoM	MWINCHNG Index	38	0.006	0.772	35	0.010	0.535
Business Inventories	MTIBCHNG Index	39	0.004	0.819	32	0.016	0.352
Employment Cost Index	ECI SA% Index	40	0.003	0.860	37	0.007	0.638

The results are reported in Table IA-II. Variables are listed in order of declining incremental R^2. For the stock market put variable, the incremental R^2 is 0.180 and the p-value for the test of $H_0 : \delta_1 = \delta_2 = 0$ is less than 0.1%. Only the Philadelphia Fed Business Outlook Survey comes close in its incremental R^2 with a value of 0.159.

[Insert Table IA-II here.]

To assess the explanatory power of macroeconomic variables combined (as opposed to individually), we consider the Chicago Fed National Activity Index (CFNAI), available monthly. This index is the first principal component of 85 macroeconomic series. It has been made available in real time since 2001 but data are available back to 1967 for each release. We use data from the June 2018 release and re-estimate the incremental R^2 for the (non-real time) CFNAI over the 1996:10 to 2008:12 period used in Table IA-II. The results are included in the last row of Table IA-II and show an incremental R^2 of 0.129, lower than that of the stock market put and the Philadelphia Fed Business Outlook Survey.

The strong predictive power of the stock market put suggests that the Federal funds target is particularly sensitive to bad news. To treat macro variables and the stock market similarly in terms of a functional form, and to put macro variables on equal footing with the stock market put in terms of censoring, we have re-estimated Table IA-II using the minimum of the 20th percentile and the actual value of each variable as the regressor.[31] This approach also results in the stock market put, the Philadelphia Fed Business Outlook and the CFNAI having the highest incremental R^2, at 0.174, 0.182, and 0.177 respectively, with none of the other macro variables reaching incremental R^2 above 0.12.

Overall, the explanatory power of the stock market put for target changes is large relative to that of macroeconomic indicators, with only the Philadephia Fed Business Outlook (or the non-real time CFNAI index) reaching similar levels of incremental R^2 values.

[31] We apply this specification also to the stock market for which the 20th percentile over the 1996:10–2008:12 sample is -4.4 percent. For initial jobless claims and the unemployment rate, we use the negative of each variable as bad news corresponds to high values.

Table IA-II. Ability of the stock market and macroeconomic indicators to predict FFR target changes

The table reports estimates of regressions (IA.2) and (IA.3). The incremental R^2 is the difference between the R^2 from regression (IA.2) and (IA.3). The p-values are for the F-test of the null hypothesis H_0: $\delta_1 = \delta_2 = 0$. The sample period is 1996:10–2008:12.

Indicator	Bloomberg ticker	Incremental R^2	p-value
Neg. stock returns, rx^-		0.180	<0.0001
CFNAI		0.129	<0.0001
Philadelphia Fed Business Outlook Survey	OUTFGAF Index	0.159	<0.0001
ISM Manufacturing	NAPMPMI Index	0.110	0.0001
ISM Non-Manufacturing	NAPMNMI Index	0.096	0.0005
Housing Starts	NHSPSTOT Index	0.091	0.001
Industrial Production	IP CHNG Index	0.087	0.001
Consumer Confidence	CONCCONF Index	0.075	0.003
Change in Manufact. Payrolls	USMMMNCH Index	0.061	0.010
Import Price Index (MoM)	IMP1CHNG Index	0.060	0.010
New Home Sales	NHSLTOT Index	0.054	0.016
Change in Nonfarm Payrolls	NFP TCH Index	0.053	0.018
Chicago Purchasing Manager	CHPMINDX Index	0.052	0.019
U. of Michigan Confidence	CONSSENT Index	0.050	0.023
Capacity Utilization	CPTICHNG Index	0.049	0.024
Consumer Price Index NSA	CPURNSA Index	0.049	0.025
Leading Indicators	LEI CHNG Index	0.047	0.030
Avg Hourly Earning MoM Prod	USHETOT% Index	0.045	0.034
Producer Price Index (MoM)	PPI CHNG Index	0.041	0.047
Avg Weekly Hours Production	USWHTOT Index	0.032	0.088
Unemployment Rate	USURTOT Index	0.031	0.099
Domestic Vehicle Sales	SAARDTOT Index	0.027	0.115
GDP QoQ (Annualized)	GDP CQOQ Index	0.027	0.130
Initial Jobless Claims	INJCJC Index	0.027	0.137
Consumer Price Index (MoM)	CPI CHNG Index	0.022	0.195
Personal Income	PITLCHNG Index	0.020	0.229
Business Inventories	MTIBCHNG Index	0.015	0.331
CPI Ex Food & Energy (MoM)	CPUPXCHG Index	0.014	0.345
Personal Spending	PCE CRCH Index	0.012	0.398
Current Account Balance	USCABAL Index	0.012	0.417
Factory Orders	TMNOCHNG Index	0.008	0.560
Nonfarm Productivity	PRODNFR% Index	0.007	0.600
Employment Cost Index	ECI SA% Index	0.006	0.660
Trade Balance	USTBTOT Index	0.005	0.675
Consumer Credit	CICRTOT Index	0.005	0.697
Unit Labor Costs	COSTNFR% Index	0.005	0.694
Monthly Budget Statement	FDDSSD Index	0.005	0.719
Durable Goods Orders	DGNOCHNG Index	0.004	0.752
Wholesale Inventories	MWINCHNG Index	0.002	0.850
PPI Ex Food and Energy MoM	PXFECHNG Index	0.002	0.857

B. Algorithm-based textual analysis

B.1. Descriptions of the algorithm

We develop an algorithm to search for positive and negative phrases associated with economic and financial conditions in FOMC minutes and transcripts. We build dictionaries associated with the following categories: The stock market; financial conditions; economic growth; inflation and wages. For each category, the dictionary contains a list of noun phrases along with two groups of direction word (group 1 and 2). Word groups 1 and 2 are assigned to each of the noun phrases to form a positive or negative match. The dictionaries are available in Table IA-III through Table IA-V.

All FOMC documents are downloaded from the FRB website. The documents are available in a pdf format (for transcripts) and in a pdf and web formats for the minutes and statements. We convert all documents into a txt format and use utf-8 encoding.

Below we describe the main steps in the algorithm.

Defining a sentence. In order to avoid incorrect matches that neglect the sentence structure, we apply several rules for defining a "sub-sentence." Typically one sentence contains several sub-sentences. The matching of noun phrases with direction words happens within a sub-sentence. The rules for defining a sub-sentence are as follows:

- Treat ",", ".", "!", "?", ";", "and", "as", "or", "to", "of", "after", "because", "but", "from", "if", "or", "so", "when", "where", "while", "although", "however", "though", "whereas", "so that", "despite" as the start of a new sub-sentence.
  - The need to include "as" in the above list is sentences like: "Subsequently, interest rates fell as stock prices tumbled."
  - The need to include "to" in the above list is sentences like: "adjustments in financial markets to low rates."
  - The need to include "of" in the above list is sentences like: "These negative factors might be offset to some extent by the wealth effects of the rise in stock market prices."
- Remove period marks (".") that do not indicate an end of a sentence. For example, we remove periods in abbreviations (U.S. replaced by US, a.m. by am, etc.), periods indicating decimals (e.g., "The unemployment rate rose to 9.3, but inflation went up." will be treated as as two sub-sentences separated by a comma: "The unemployment rate rose to 93, but inflation went up."), and periods indicating abbreviations of names (e.g., in transcripts "Robert P. Forrestal" will be coded as "Robert P Forrestal").

Word combinations. For every noun phrase, we allow combinations with *"rate* of, growth of, level* of, index* of, indices of"* at the beginning of the noun phrase. Then, we use those new combinations to match group words. The direction of the combined phrase is the same as of the original phrase. For example, for "employment", we have combined phrases such

as: rate of employment, level of employment and so on, which we match with group words. The direction of "rate of employment" is the same as "employment."

Ordering of words. We do not count matches in which an economic/financial phrase is followed by "reduced", "reduce", "reducing ", "boosted", "boost", "boosting", "fostered", "foster", "fostering", "encouraged", and "encourage". For example, in the sentence "Credit conditions continued to tighten for both households and businesses, and ongoing declines in equity prices further reduced household wealth", we do not count "equity prices reduced" but we do count "declines in equity prices" and "reduced household wealth."

Negative phrases without direction words. Phrases such as financial crisis, financial turmoil are counted as negative. These are listed separately in Table IA-V.

Removing descriptive words. We remove common descriptive adverbs and adjectives (e.g. "somewhat", "unusual*" , "remarkabl*", "much", "rapid*" as in "bond market rapidly improved"), and verbs ("experience*", "show", "register*" as in "Core PCE price inflation registered an increase of 1.6 percent").

Removing stop words. After making the above adjustments, we remove stop words ("a", "the", "are", "had", etc.) using the list of English language stop words (Phyton `stop_words` package) unless they appear as part of a direction phrase (e.g., we allow for matches of nouns with "mov* down", although "down" is a stop word).

Treatment of "not". We do not treat the word "not" as a stop word, and thus we keep it in the text. This avoids misclassification of cases like: "Several participants indicated that recent trends in euro-area equity indexes and sovereign debt yields had not been encouraging." We code "not" plus a group 1 word as a group 2 word (i.e., "not encouraging" is the opposite of the "encouraging"), and "not" plus a group 2 word as a group 1 word.

Stemming. We take into account different grammatical forms of words. These are marked with a "*" in our dictionary lists. For example, "decreas*" would include decrease, decreased, decreasing.

Distance parameter. A central parameter in the algorithm determines the distance between a noun phrase and a positive/negative group word. The lower this distance is, the more accurately a financial/economic phrase is classified as positive or negative but the more likely it is that no match is found. We currently use a distance of zero words, i.e. the match is found if a direction word directly precedes or follows a financial/economic phrase.

Sectioning of documents. We assign each matched phrase into a "staff" or "participants" category:

- For the minutes, the assignment is made by section of the document. We divide minutes into sections listed in Section IV of the paper. Sections 1–3 are classified as presenting the views of the staff, and sections 4–5 as presenting the views of participants. Section headings appear explicitly in the minutes from April 2009 onward. However, given that the structure of the documents has remained essentially unchanged since the early 1990s, for the period between the start of 1994 and March 2009, we manually

assign text to sections. We drop other parts of the minutes, e.g. discussions of special topics occurring only in particular meetings.

- For the transcripts, we have direct information about the speaker. A comment by a speaker starts with his/her capitalized name (e.g., CHAIRMAN GREENSPAN, MR. BROADDUS). For each meeting, we assign all governors and regional Fed presidents (who were in office at the time of the meeting) to the participants' category, and everybody else to the staff category. The names and start/end dates for the tenures of regional Fed presidents as well as members of the Board of the Governors are collected from the websites of the Federal Reserve Board and regional Federal Reserve Banks.[32]

B.2. Results based on algorithmic coding of stock market mentions in FOMC minutes and transcripts

To assess whether the results in Section IV are robust to using FOMC transcripts we apply the algorithm to identify negative and positive stock market mentions in the transcripts. The algorithm looks for a set of 47 stock market related phrases. It then searches for a direction word (negative/positive) near the stock market phrase based on a list of 52 negative and 41 positive words. Negative words correspond to the market going down and positive words to it going up. The word lists are shown in Appendix Table IA-III. We train the algorithm on the minutes in order to identify and correctly classify as many of the 983 stock market mentions as possible. The algorithm captures 589 stock market mentions in the minutes without inducing a substantial number of misclassified phrases. A central parameter in the algorithm determines within how many words around the stock market phrase a direction word should occur (search is bounded within a sentence). The lower this distance is, the more accurately a given stock market mention is classified but the more likely it is that no positive or negative word is found. We use a distance of zero words, i.e., a match is found if a direction word directly precedes or follows a stock market phrase. This rule is applied after dropping stop words as well as certain descriptive phrases, and defining sentences as laid out in the Appendix. Such a setup allows us to err on the side of obtaining an accurate classification of stock market mentions rather than to capture a maximum number of phrases. We do not seek to code neutral or hypothetical phrases in the algorithmic approach. For comparison with manual searches in paper's Figure 5 Panel B, in Appendix Figure IA-1, we provide algorithm-based searches.

Turning to the FOMC transcripts, we find a total 2,680 stock market mentions over the 1994–2011 period (whether or not they are accompanied by direction words), using the stock market search words listed in Section IV.B. Of these, our algorithm picks up 1,197 mentions that appear together with direction words, i.e., 45% of the overall count, of which 618 are negative matches and 579 are positive matches.

For robustness, we replicate our earlier results obtained using manual searches by applying the algorithm to both minutes and transcripts. Appendix Figure IA-2 shows the relation

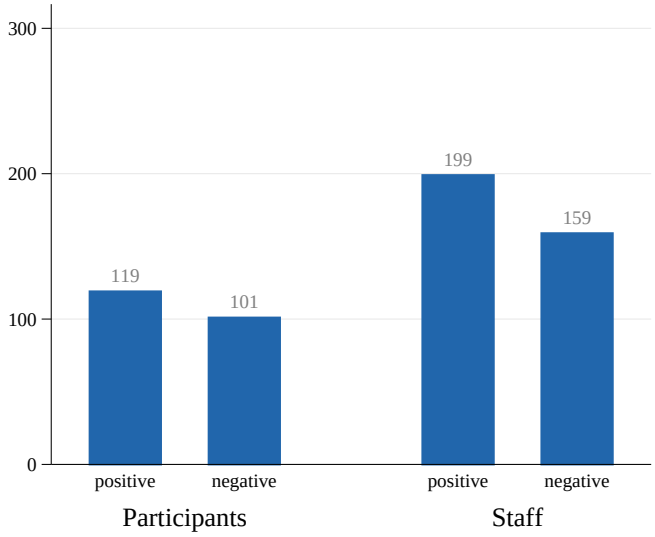
[32] E.g., information about the membership at the Board of Governors can be accessed at https://www.federalreserve.gov/aboutthefed/bios/board/boardmembership.htm#members.

between intermeeting returns and negative and positive stock market mentions in the minutes and transcripts, respectively. The results indicate that our algorithmic approach is able to capture the same key features of this relationship that we have established using the manual search approach. Appendix Table IA-IV shows that the predictability of negative and positive stock market mentions by intermeeting excess stock returns is robust to using the algorithmic approach.

Table IA-III. Noun phrases and direction words related to the stock market

Nouns	Match w/ direction words		Direction words	
	Positive	Negative	Group 1	Group 2
asset index*	2	1	*adjust* downward*	*acceler**
asset indic*	2	1	*adverse*	*adjust* upward*
asset market*	2	1	*burst**	*advanc**
asset price index*	2	1	*contract**	*bolster**
asset price indic*	2	1	*cool**	*boost**
asset price*	2	1	*deceler**	*edge* up*
asset valu*	2	1	*declin**	*elevat**
equities	2	1	*decreas**	*encourag**
equity and home price*	2	1	*deteriorat**	*expand**
equity and home valu*	2	1	*down*	*fast**
equity and house price*	2	1	*downturn*	*favor**
equity and housing price*	2	1	*downward*	*gain**
equity index*	2	1	*downward adjust**	*go* up*
equity indic*	2	1	*downward movement*	*high**
equity market index*	2	1	*downward revision*	*improv**
equity market indic*	2	1	*drop**	*increas**
equity market price*	2	1	*eas**	*mov* high**
equity market valu*	2	1	*edge* down*	*mov* up*
equity market*	2	1	*fall**	*mov* upward*
equity price index*	2	1	*fell*	*pick* up*
equity price indic*	2	1	*go* down*	*rais**
equity price measure*	2	1	*limit**	*rallied*
equity price*	2	1	*low**	*rally**
equity valu*	2	1	*moderate**	*rebound**
financial wealth	2	1	*moderati**	*recoup**
home and equity price*	2	1	*mov* down*	*revis* up**
house and equity price*	2	1	*mov* downward*	*rise**
household wealth	2	1	*mov* lower*	*rising*
household* net worth	2	1	*plummet**	*rose*
housing and equity price*	2	1	*pressure**	*run up*
price* of risk* asset*	2	1	*pull* back*	*runup*
ratio of wealth to income	2	1	*pullback*	*stop decline*
risk* asset price*	2	1	*reduc**	*strength**
s p 500 index	2	1	*revis* down**	*strong**
stock index*	2	1	*slow**	*tick* up*
stock indic*	2	1	*slow* down*	*up*
stock market index*	2	1	*soft**	*upward*
stock market price*	2	1	*stagnate**	*upward adjust**
stock market wealth	2	1	*stall**	*upward movement*
stock market*	2	1	*strain**	*upward revision*
stock price indic*	2	1	*stress**	*went up*
stock price*	2	1	*subdu**	
stock prices index*	2	1	*take* toll on*	
stock val*	2	1	*tension**	
us stock market price*	2	1	*tick* down*	
wealth effect*	2	1	*tight**	
wealth to income ratio	2	1	*took toll on*	
			*tumbl**	
			*weak**	
			weigh on*	
			went down	
			*worse**	

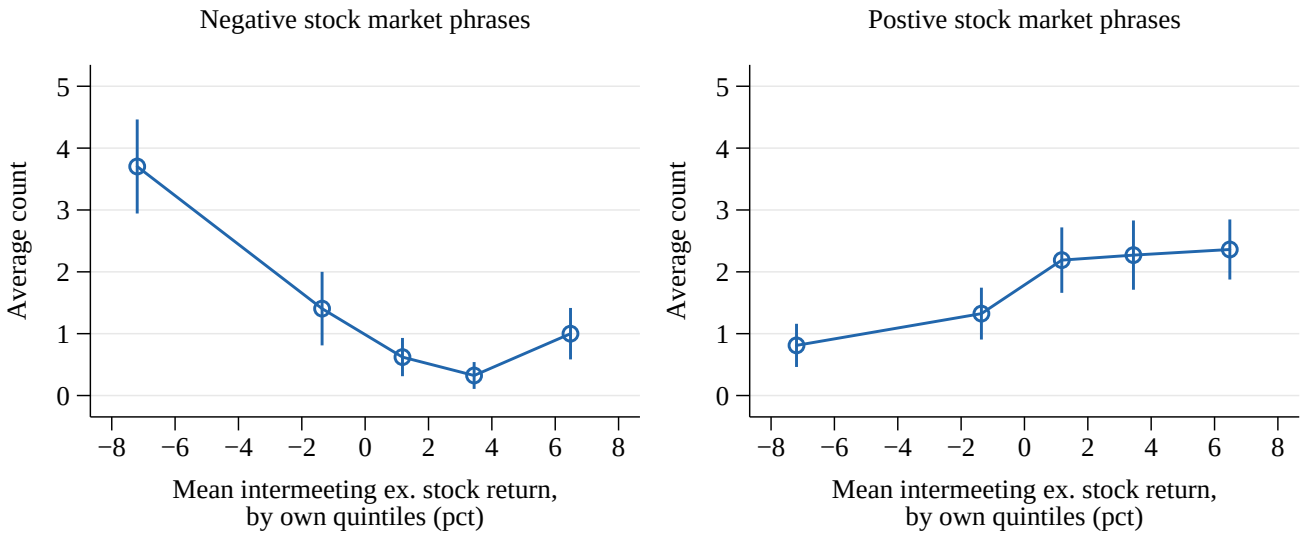
Figure IA-1. Positive/negative counts in FOMC minutes (1994–2016): Algorithm-based approach



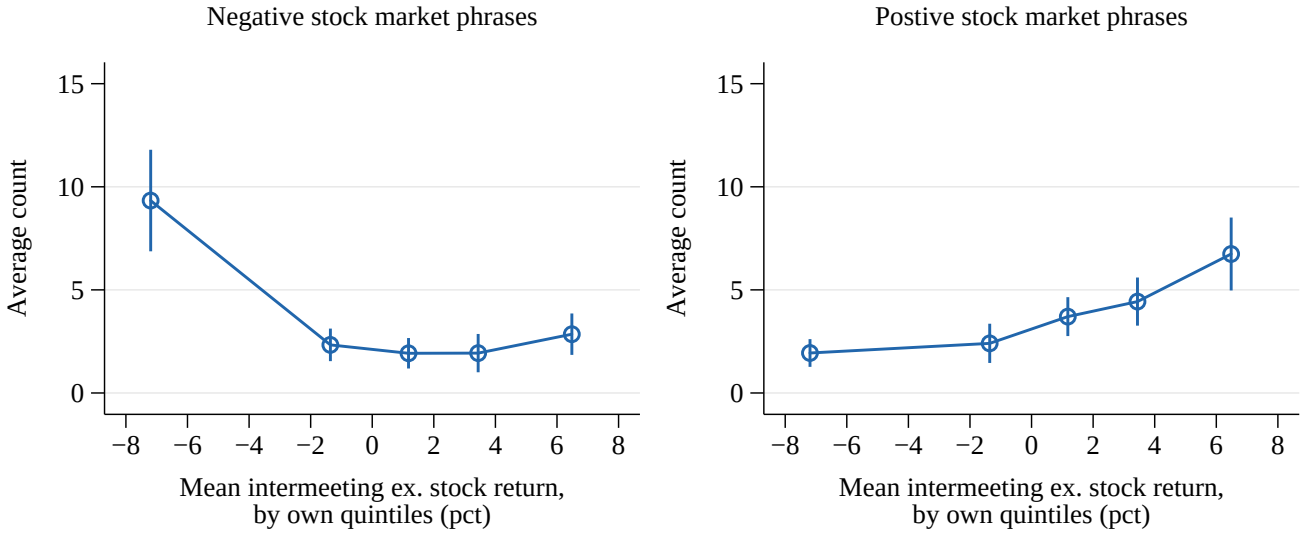
The figure presents the total number of positive and negative stock market phrases, split by participants and staff, respectively. The results are based on algorithm-based coding of FOMC minutes' content. Corresponding results of manual searches are reported in Figure 5 Panel B in the paper.

Figure IA-2. Impact of stock market returns in FOMC minutes and transcripts: Algorithm-based searches

Panel A. Minutes



Panel B. Transcripts



The figure presents the average count of positive and negative stock market phrases in FOMC documents conditional on the quintiles of intermeeting stock market excess returns. The x-axis reports the mean of intermeeting stock return within a quintile. The counts of stock market phrases are based on our automated search algorithm. The upper panels display the results based on the FOMC minutes (sample: 1994–2016), and the bottom panels display results based on the FOMC transcripts (sample: 1994–2011).

Table IA-IV. Predicting negative and positive stock market phrases in the FOMC minutes by intermeeting stock market excess returns (algorithm-based coding)

This table reproduces results from Table IV, but uses the algorithm-based coding of the positive and negative stock market phrases. See caption of Table IV for details.

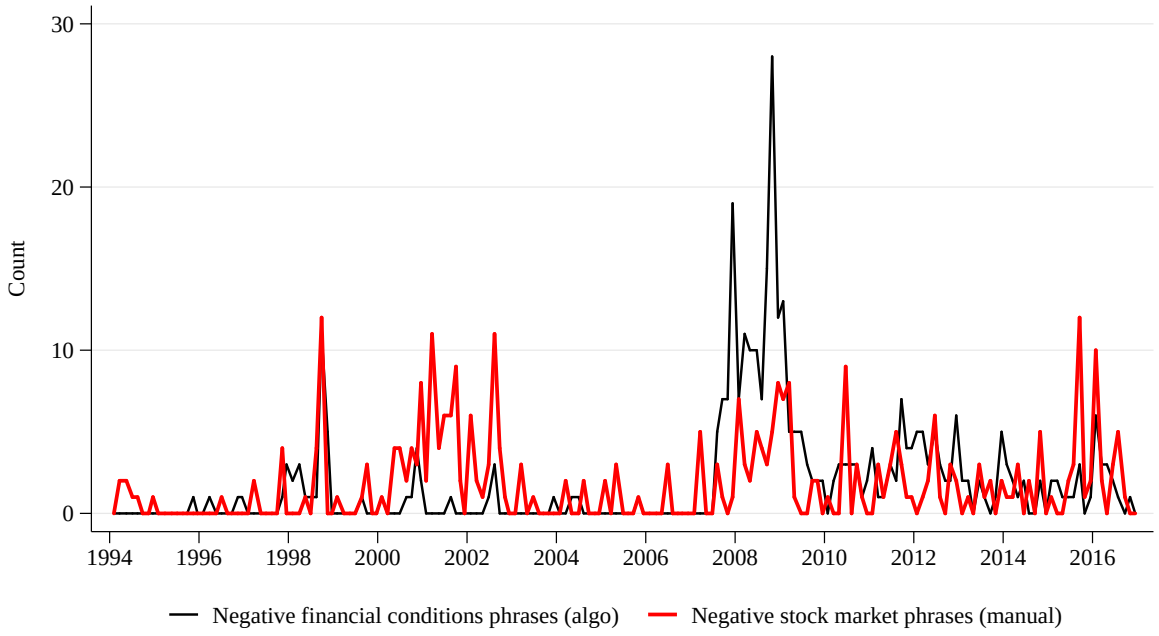
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Negative stock market phrases				Positive stock market phrases			
Sample:	1994-2016	1994-2016	1994-2008	2009-2016	1994-2016	1994-2016	1994-2008	2009-2016
rx_m	-18.9***				10.6***			
	(-5.79)				(4.19)			
rx_{m-1}	-11.8***				6.04***			
	(-4.45)				(2.83)			
rx_{m-2}	-5.97**				1.72			
	(-2.04)				(0.82)			
rx_m^-		-27.5***	-26.1***	-35.1***		3.05	0.69	12.2***
		(-3.61)	(-2.99)	(-3.11)		(1.24)	(0.28)	(3.47)
rx_{m-1}^-		-21.1***	-23.5***	-6.92		-1.87	-4.07	7.66
		(-6.52)	(-11.05)	(-0.83)		(-0.84)	(-1.48)	(1.49)
rx_{m-2}^-		-6.80	-17.6**	0.69		1.88	2.78	-1.04
		(-1.17)	(-1.99)	(0.22)		(0.59)	(0.53)	(-0.25)
rx_m^+		-6.96	-15.0**	2.43		21.0***	15.4***	26.3***
		(-1.36)	(-2.15)	(0.64)		(4.93)	(3.39)	(3.92)
rx_{m-1}^+		5.34	3.93	0.67		20.8***	22.3***	13.7*
		(1.21)	(1.04)	(0.07)		(4.09)	(3.03)	(1.77)
rx_{m-2}^+		2.43	6.01	-4.62		7.57*	11.2	0.29
		(0.60)	(1.06)	(-0.83)		(1.71)	(1.58)	(0.04)
Constant	1.58***	0.45	0.20	1.00**	1.70***	0.77***	0.57*	1.43***
	(10.07)	(1.34)	(0.55)	(2.20)	(11.41)	(3.15)	(1.91)	(5.20)
$\sum$coef rx	-36.6***				18.3***			
$\sum$coef rx^-		-55.4***	-67.2***	-41.3***		3.06	-0.61	18.8***
$\sum$coef rx^+		0.80	-5.02	-1.52		49.3***	48.9***	40.3***
N	184	184	120	64	184	184	120	64
R^2	0.44	0.51	0.64	0.35	0.19	0.27	0.20	0.38
$\bar{R}^2$	0.43	0.49	0.62	0.28	0.17	0.24	0.16	0.31

C. Discussion of broader financial conditions

To assess the frequency of references to financial conditions that do not explicitly mention the stock market (and thus may not be accounted for above), we create a list of words that relate to financial conditions along with lists of positive and negative direction words used to describe them. We then algorithmically code the number of negative and positive financial conditions phrases that do not explicitly mention the stock market. The word lists are shown in the Appendix Table IA-V.

Appendix Figure IA-3 graphs the count of negative financial conditions phrases over time together with the series for manually coded negative stock market mentions included for comparison. Appendix Table IA-VI shows that counts of financial conditions mentions are predictable by the intermeeting stock returns in the same way as are the counts of stock market mentions (reported in Table IV in the paper). Additionally, in Appendix Table IA-VII, we find that financial conditions predict Fed fund target changes (column (1)–(2)). Including both financial conditions mentions and stock market mentions, financial conditional have predictive power over and above the stock market (column (3) and (5)). However, this result is driven by year 2008. Dropping 2008 from the analysis, the stock market mentions subsume the explanatory power of financial conditions for target changes (columns 4 and 6).

Figure IA-3. Negative financial conditions versus stock market phrases in FOMC minutes



The figure superimposes the counts of negative financial conditions phrases against negative stock market phrases in FOMC minutes over the 1994–2016 sample. Financial conditions phrases are obtained using algorithm-based coding, and stock market phrases are obtained by manual coding.

Table IA-V. Noun phrases and direction words related to financial conditions

Nouns	Match w/ direction words		Direction words	
	Positive	Negative	Group 1	Group 2
appetite* risk taking	2	1	*adjust* downward*	*acceler**
appetite* risk*	2	1	*adverse*	*adjust* upward*
appetite* risk* asset*	2	1	*contract**	*advanc**
appetite* risk* investment*	2	1	*cool**	*bolster**
appetite* taking risk*	2	1	*deceler**	*boost**
condition* credit market*	2	1	*declin**	*eas**
condition* financial market*	2	1	*decreas**	*elevat**
credit condition*	2	1	*deteriorat**	*encourag**
credit growth	2	1	*down*	*expand**
credit market	2	1	*downturn*	*fast**
credit market conditions	2	1	*downward*	*favor**
credit market demand	2	1	*downward adjust**	*gain**
development financial market*	2	1	*downward revision*	*go* up*
financial condition*	2	1	*drop**	*high**
financial development*	2	1	*fall**	*improv**
financial instabilit*	1	2	*fell*	*increas**
financial market condition*	2	1	*go* down*	*loos**
financial market confidence	2	1	*limit**	*mov* higher*
financial market development	2	1	*low**	*mov* up*
financial market index*	2	1	*moderate**	*mov* upward*
financial market indic*	2	1	*moderati**	*normaliz**
financial market pressure*	1	2	*mov* down*	*pick* up*
financial market price*	2	1	*mov* downward*	*rais**
financial market sentiment	2	1	*mov* lower*	*rallied*
financial market*	2	1	*pressure**	*rally**
financial situation	2	1	*pullback*	*rebound**
financial stability	2	1	*reduc**	*recoup**
investor* appetite*	2	1	*restrictive*	*revis* up**
investor* appetite* risk*	2	1	*revis* down**	*rise**
investor* confidence	2	1	*slow**	*rising*
investor* risk appetite*	2	1	*soft**	*rose*
investor* sentiment	2	1	*stagnate**	*run up*
investor* sentiment toward risk*	2	1	*stall**	*runup*
investor* sentiment toward risk* asset*	2	1	*strain**	*stop decline*
liquidity	2	1	*stress**	*strength**
pressure* financial market	1	2	*subdu**	*strong**
risk appetite*	2	1	*take a toll on*	*tick* up*
			*tension**	*up*
			tick down*	*upward*
			*tight**	*upward adjust**
			took toll on	*upward revision*
			turbulent	*went up*
			*weak**	
			weigh on*	
			went down	
			*worsen**	
Negative phrases:	financial strain*; financial crisis; financial turmoil; financial turbulence; financial dislocat*; financial stress*; financial distress*			

Table IA-VI. Predicting positive/negative financial conditions phrases with intermeeting returns

This table provides evidence analogous to Table IV, but using financial condition phrases as the dependent variable. Financial condition phrases are classified into positive and negative by applying the algorithm-based approach to the FOMC minutes. Other specification details are as in Table IV for details.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Negative fin. cond. phrases				Positive fin. cond. phrases			
Sample:	1994-2016	1994-2016	1994-2008	2009-2016	1994-2016	1994-2016	1994-2008	2009-2016
rx_m	-23.3*				4.52			
	(-1.80)				(1.06)			
rx_{m-1}	-13.8***				3.92			
	(-3.03)				(1.26)			
rx_{m-2}	-12.4**				-7.51*			
	(-2.04)				(-1.90)			
rx_m^-		-46.8**	-49.3**	-23.5**		-9.67**	-6.92	-5.89
		(-2.39)	(-2.07)	(-2.28)		(-2.40)	(-1.31)	(-0.95)
rx_{m-1}^-		-20.4***	-20.8**	-12.5*		-6.40*	-2.81	-9.88
		(-3.35)	(-2.52)	(-1.75)		(-1.87)	(-0.83)	(-1.11)
rx_{m-2}^-		-18.1**	-6.87	-29.6***		-12.6**	-2.55	-19.1***
		(-2.49)	(-0.55)	(-7.18)		(-2.53)	(-0.49)	(-3.64)
rx_m^+		9.96	-1.76	10.0		24.3***	4.50	35.0***
		(1.10)	(-0.12)	(1.50)		(3.71)	(1.03)	(4.00)
rx_{m-1}^+		4.73	-6.11	4.11		24.6***	6.01	35.6***
		(0.58)	(-0.45)	(0.55)		(3.46)	(0.88)	(4.42)
rx_{m-2}^+		7.77	-6.85	14.7**		9.93**	-2.84	8.28
		(0.89)	(-0.45)	(2.24)		(2.27)	(-0.66)	(0.92)
Constant	2.13***	-0.053	0.36	0.77	1.26***	-0.51	0.26	-0.22
	(4.34)	(-0.06)	(0.27)	(1.61)	(5.65)	(-1.28)	(0.66)	(-0.50)
$\sum$coef rx	-49.6**				0.93			
$\sum$coef rx^-		-85.3***	-77.0**	-65.6***		-28.6***	-12.3	-34.8***
$\sum$coef rx^+		22.5	-14.7	28.8**		58.8***	7.67	78.9***
N	184	184	120	64	184	184	120	64
R^2	0.22	0.31	0.33	0.55	0.063	0.23	0.075	0.44
$\bar{R}^2$	0.21	0.28	0.29	0.50	0.047	0.20	0.026	0.38

Table IA-VII. Predicting target changes with financial conditions and stock market phrases

This table extends the regression specification from Table V, predicting FFR target changes with financial conditions phrases in addition to stock market phrases. The sample period is 1994–2008. The counts are obtained by algorithm-based coding of FOMC minutes.

	(1)	(2)	(3)	(4)	(5)	(6)
			Algo for #Stocks		Manual for #Stocks	
	1994-2008	1994-2007	1994-2008	1994-2007	1994-2008	1994-2007
ΔFFR$_{m-1}$	0.25***	0.24**	0.16*	0.15*	0.17*	0.15
	(2.63)	(2.20)	(1.87)	(1.68)	(1.84)	(1.53)
ΔFFR$_{m-2}$	0.34***	0.44***	0.24*	0.31**	0.29**	0.37***
	(2.67)	(3.68)	(1.81)	(2.04)	(2.47)	(2.94)
#Fin.cond.$^{-}_{m}$	-0.011*	-0.005	-0.007	-0.005	-0.009	-0.007
	(-1.67)	(-0.54)	(-1.07)	(-0.61)	(-1.29)	(-0.80)
#Fin.cond.$^{-}_{m-1}$	-0.038***	-0.035***	-0.029**	-0.018	-0.029**	-0.011
	(-3.87)	(-2.92)	(-2.43)	(-1.27)	(-2.52)	(-0.84)
#Fin.cond.$^{+}_{m}$	0.052*	0.019	0.027	-0.0037	0.030	-0.006
	(1.74)	(0.96)	(0.93)	(-0.24)	(1.06)	(-0.36)
#Fin.cond.$^{+}_{m-1}$	0.050**	0.044**	0.026	0.012	0.032	0.019
	(2.57)	(2.40)	(1.16)	(0.64)	(1.49)	(1.01)
#Stocks$^{-}_{m}$			-0.014	-0.002	-0.013	-0.010
			(-1.21)	(-0.20)	(-1.53)	(-0.97)
#Stocks$^{-}_{m-1}$			-0.040*	-0.057***	-0.031**	-0.040***
			(-1.79)	(-4.05)	(-2.24)	(-3.62)
#Stocks$^{+}_{m}$			-0.016	-0.012	-0.015	-0.015
			(-1.00)	(-0.86)	(-1.26)	(-1.41)
#Stocks$^{+}_{m-1}$			0.002	-0.003	-0.007	-0.007
			(0.18)	(-0.30)	(-0.51)	(-0.50)
Constant	-0.008	-0.003	0.093*	0.11**	0.11**	0.12**
	(-0.27)	(-0.11)	(1.87)	(2.35)	(2.12)	(2.41)
N (meetings)	119	111	119	111	119	111
R^2	0.51	0.43	0.56	0.54	0.56	0.53

Table IA-VIII. Other financial conditions

For phrase counts, if phrase A encompasses phrase B (e.g., "credit spreads" encompasses "credit"), we count it as phrase A and not B.

rates	**credit+spreads**	**fx**	**housing**	**mortgage**
interest rate*	credit	the dollar	hous* price*	mortgage*
short term rate*	credit spreads		housing market*	
long term rate*	credit risk spreads		home price*	
shorter term rate*	spreads		home equity	
longer term rate*				
treasury rate*				
treasury yield*				
treasury bond rate*				
treasury bond yield*				
rate* treasury bond*				
yield* treasury bond*				

Table IA-IX. Algorithmic coding of economic content of housing-related mentions in FOMC minutes

The table shows counts of phrases related to economic conditions that occur within the same paragraph (# in par.) and within the same section (# in sec.) in which a stock market phrase is mentioned. Stock market phrases and paragraphs are obtained by manual searches within FOMC minutes over the 1994–2016 sample period. The odds ratio is defined as (# phrase i in paragraph mentioning stocks / # all phrases in paragraph mentioning stocks) / (# phrase i in section / # all phrases in section). We display only phrases that occur 20 times or more in the same paragraph as a stock market phrase.

Phrase	(1) # in par.	(2) # in sec.	(3) Ratio (1)/(2)	(4) Odds ratio
Staff Review of the Economic Situation				
consumer spending	102	243	0.42	3.83
consumer sentiment	31	111	0.28	2.55
retail sales	33	149	0.22	2.02
business investment	27	132	0.20	1.87
labor market*	36	203	0.18	1.62
economic activity	51	346	0.15	1.35
industrial production	42	292	0.14	1.31
energy prices	39	366	0.11	0.97
un(employment)	66	657	0.10	0.92
motor vehicle*	59	609	0.10	0.88
inflation	74	857	0.09	0.79
inventories	30	439	0.07	0.62
Staff Review of the Financial Situation				
inflation	46	531	0.09	1.21
Staff Economic Outlook				
consumer spending	43	89	0.48	1.74
exports	27	68	0.40	1.43
potential output	23	63	0.37	1.31
business investment	27	74	0.36	1.31
real gdp	49	139	0.35	1.27
economic activity	65	185	0.35	1.26
pce	23	69	0.33	1.20
inflation	90	530	0.17	0.61
un(employment)	27	160	0.17	0.61
gdp growth	25	167	0.15	0.54
Participants' Views on Current Conditions and the Economic Outlook				
residential construction	36	55	0.65	5.09
consumption	37	63	0.59	4.56
household* spending	44	95	0.46	3.60
consumer sentiment	22	66	0.33	2.59
consumer spending	146	450	0.32	2.52
retail sales	27	88	0.31	2.38
consumer confidence	35	139	0.25	1.96
motor vehicle*	25	120	0.21	1.62
economic outlook	40	207	0.19	1.50
inventories	41	227	0.18	1.40
business investment	41	248	0.17	1.28
energy prices	45	276	0.16	1.27
economic expansion	22	142	0.15	1.20
economic activity	79	524	0.15	1.17
economic growth	55	367	0.15	1.16
un(employment)	107	714	0.15	1.16
labor market*	64	661	0.10	0.75
inflation	154	2451	0.06	0.49