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ABSTRACT

Since the mid-1990s, low stock returns predict accommodating policy by the Federal Reserve. This fact emerges because, over this period, negative stock returns comove with downgrades to the Fed's growth expectations. Textual analysis of the FOMC documents reveals that policymakers pay attention to the stock market, and their negative stock-market mentions predict federal funds rate cuts. The primary mechanism why policymakers find the stock market informative is via its effect on consumption, with a smaller role for the market viewed as predicting the economy.

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An online appendix is available at: http://www.nber.org/data-appendix/w26894

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 react to each other and are both affected 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 rate (FFR) 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. Based on such estimates, Bernanke and Gertler (1999) find a modest but statistically significant effect of stock returns on the FFR target. They argue theoretically that monetary policy should not respond to the stock market beyond its effect on inflation expectations and conclude that actual policy by the US Federal Reserve is largely consistent with this advice.

A subsequent literature builds on the above approaches. While the findings differ depending on the specification and period under study,[2] the existing empirical evidence also leaves open issues regarding causality and mechanism. In terms of causality, even if the stock market

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

[2] See, e.g., Hayford and Malliaris (2004), Fuhrer and Tootell (2008), Bjørnland and Leitemo (2009), Ravn (2012), Hoffmann (2013). Furlanetto (2011) shows that the estimates of Rigobon and Sack (2003) are strongly affected by the October 1987 crash.

was insignificant above and beyond growth and inflation forecasts in a Taylor rule, it could still be a determinant of policy if it affects macroeconomic expectations included in the rule. As for the mechanism, existing evidence does not speak directly to the economic channels through which the stock market affects Fed's expectations and policy.

In this paper, we use textual analysis of FOMC documents to shed light on these questions. Our first objective is to determine whether the Fed finds the stock market *informative* in its policy-making. Frequent Fed discussions of the stock market would suggest that it is an important input to policy-making. By contrast, few stock market mentions in FOMC documents would imply that the Fed does not find the market to be informative and that the predictive power of the market for subsequent FFR target changes is coincidental, reflecting an omitted variables bias. Our second objective is to understand the economic *mechanism* for the Fed finding the stock market informative. Specifically, we seek to distinguish between the *driver view* of the stock market, whereby the Fed views stock market fluctuations as one of the factors affecting the economy, and the *predictor view* of the stock market, whereby the Fed attends to the stock market because it is a good predictor of future economic developments (growth, unemployment etc.).

We begin our analysis by reviewing statistical facts about the link between the stock market and policy. We show that since the mid-1990s the Fed has engaged in a sequence of policy easings following large stock market declines in the intermeeting period. We refer to this pattern as a "Fed put," by which we mean policy accommodation following poor stock returns. We then tie this fact to the Fed's macroeconomic expectations, documenting a close comovement between intermeeting stock returns and updates to the Fed's expectations about the real activity (output growth and unemployment), and a much weaker link to inflation expectations. The comovement emerges in the late 1990s and holds through the 2007/09 financial crisis and beyond. The relationship is asymmetric—stronger for returns over the negative range. Estimating various specifications of the forward-looking Taylor rule, we show that negative stock returns are a significant predictor of the FFR target changes

primarily via their correlation with the Fed's downgrades of growth expectations and the Fed's assessment of the level of current growth.

To interpret those empirical facts, we turn to the analysis of the minutes and transcripts of the FOMC meetings. To document that the Fed views the stock market as informative, in our baseline approach, we search for phrases related to the stock market (e.g., "stock market," "equity prices," "S&P 500") in the FOMC minutes. We find 975 mentions of the stock market in the 184 FOMC minutes covering the 1994–2016 period. In relative terms, this number represents 14% of inflation mentions and 33% of (un)employment mentions. We classify their tone into positive or negative based on whether FOMC meeting attendees discuss the market going up or down. The tone relates to actual stock returns with the expected signs, with low (high) stock returns leading to more negative (positive) stock market mentions, both before and during the zero-lower bound period. The structure of the Fed documents allows us to measure how frequently actual decision makers at the FOMC (participants, in the minutes' language) mention the stock market. We find that these mentions are strongly predictive of future policy and do so 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. We verify the robustness of these findings using the FOMC transcripts.

In the next step, we use textual analysis to understand the mechanism for why the Fed pays attention to the stock market and, specifically, to assess the relative weight it puts on the driver versus predictor view of the stock market. Our classification of the minutes' content indicates that 38% of stock market mentions align with the driver view, and 8% with the predictor view; further 11% discuss the stock market determinants, and 38% are purely descriptive summarizing recent stock market moves. For the driver view, the dominant mechanism is via the wealth effect of the stock market on consumption, corresponding to 22% of all stock market mentions. We find a much smaller role for the stock market affecting investment, mainly via the cost of capital channel. However, since consumption demand directly affects firms' expected sales, and expected sales is a central determinant of investment, the consumption-wealth effect implies an indirect effect of the market on

investment. Given the importance of the wealth effect in the Fed's deliberations, we show that the Fed's concern about the negative effect of the stock market declines on consumption concurs with participants in the Michigan Survey of Consumers reporting negative stock market news as an important determinant of their consumption choices.

It is possible that the FOMC minutes understate the importance of the predictor view of the stock market due to the way they are crafted. We therefore extend the analysis of the mechanism to the FOMC transcripts, focusing on the stock market mentions by the contemporaneous and future Fed chairs: Alan Greenspan, Ben Bernanke, and Janet Yellen. In the chairs' statements, the driver view is nearly three times as frequent as the predictor view, with 43% versus 15% of mentions across the three chairs. More frequently than suggested by the minutes, the chairs engage in discussions of the determinants of stock market valuations, either trying to learn about economic shocks underlying stock market reactions, or deliberating the potential effects of a stock market correction on the economy.

In terms of the interpretation of the textual analysis results, when the Fed discusses the stock market as a driver of the economy (e.g., via the consumption-wealth effect), this channel can be operative whether the Fed perceives stock market fluctuations as independent shocks (shocks to risk aversion or investor sentiment) or as reflecting underlying expectations of economic fundamentals. We find evidence that the risk premium plays a role in the Fed's decision-making as indicated by Fed officials referencing the market mood, sentiment, and risk aversion. Furthermore, we use a decomposition of stock market news in the intermeeting period into different structural shocks to show that not only negative growth-news shocks but also negative risk-premium shocks (i.e., shock raising the risk premium) matter for policy. Since risk-premium shocks likely have a substantial exogenous component, this finding is consistent with our interpretation of the textual evidence as implying a causal effect of the market on policy.

We provide several benchmarks to quantify the strength of the Fed's reaction to the stock market. To this end, we compare the relationship between the stock market and the Fed's updating of economic forecasts to that of the corresponding private sector forecasts, as

well as to the predictive power of the stock market for realized economic variables (output, unemployment, and inflation). Over the post-1994 period, we find little evidence that the Fed is updating its growth or unemployment expectations too aggressively relative to either of these benchmarks.

An important consideration related to the Fed's response to the stock market is the question of moral hazard that it may entail. Analysis of articles published in the Wall Street Journal and the Financial Times indicates that while public awareness of the put goes back to at least 2000, the strength of the Fed put remains a debated issue with each incoming Fed chair.[3] Based on the model of intermediaries by Adrian and Shin (2014), we then review the link between the risk premium in risky assets and the amount of leverage in the economy. The results suggest that active leverage management in response to reductions in the risk premium (due to the Fed put or other drivers) pertains mostly to the broker-dealer sector in the pre-crisis period. To understand the policymakers' own perceptions of the Fed put and the impact of moral-hazard considerations on their decision-making, we gather evidence based on textual analysis of financial stability concerns in the Fed documents, reasons for dissents within the FOMC, and direct discussion of the Fed put in the FOMC transcripts. While the FOMC is clearly aware of the potential moral hazard effects of loose policy, especially post-crisis, such concerns do not appear to have a major impact on actual policy choices.

Our work is related to the recent literature exploiting information in textual data to gain insight into the workings of monetary policy. Hansen et al. (2017) study how central bank transparency influences monetary policymakers' deliberations, while Hansen and McMahon (2016) analyze the effects of the Fed communication on asset markets and macroeconomic outcomes. Schmeling and Wagner (2017) show that changes in the tone of the ECB communication have a significant effect on asset prices. While this work focuses on central bank deliberations and communication, we explore the Fed documents to understand the

[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," (FT, December 8, 2000).

mechanism though which the stock market affects central bank decision-making. Cecchetti (2003) counts words related to the stock market and asset prices to argue that the FOMC pays attention to the stock market, but does not classify their positive/negative tone—which we show has an asymmetric relation to policy—and does not evaluate why the Fed pays attention to the stock market, which is our main focus. Peek, Rosengren, and Tootell (2016) use text to assess whether the Fed acts as if financial stability was its tertiary mandate. Based on a set of 32 noun phrases, they classify mentions as positive or negative from a financial stability perspective.[4] We instead undertake an extensive classification of all stock market mentions in the FOMC minutes and by chairs in the transcripts to assess the relative weight that the Fed puts on the predictor versus driver view of the stock market, and we further distill the specific economic channels underlying the driver view.

The rest of the paper proceeds as follows. Section II explains what data we use. Section III describes the statistical relationship between the FFR target and stock returns. Section IV performs textual analysis to establish that the Fed finds the stock market informative, while Section V provides textual analysis of the mechanisms through which the stock market affects the Fed's thinking. Section VI provides several benchmarks to assess the relation between the stock market and the Fed's expectations, and Section VII discusses the moral hazard implications of the Fed put. Section VIII concludes.

II. Data and variable definitions

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

The time series of the FFR target going back to September 27, 1982 is available from the FRED Economic Data. Since 1981, the Fed has held 8 scheduled meetings per year roughly 6 to 8 weeks apart, and has publicly announced changes to the FFR target since 1994. Prior to 1994, the target series rely on Thornton (2005), who dates target changes based on when the public likely learned about them via the open market operations. This is generally one

[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 FFR target.

or two days after the FOMC's decision. The first FOMC meeting for which we observe the FFR target is October 5, 1982. 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 two-day meetings), day -1 ($+1$) is the day before (after) a meeting, and so on.

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 T-bills from day 1 of cycle $m-1$ to day -2 of cycle m, i.e., excluding returns earned on day -1 and 0 since these days may be particularly driven by monetary policy news, leading to reverse causality. For the pre-1994 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.

II.B. Selection of subsamples

In our subsequent analysis, we document differences in the effect of the stock market on the Fed policy in the pre- and post-1994 period. The pre-1994 (post-1994) sample starts with

[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.

the November 1982 (February 1994) meeting and ends with the December 1993 (December 2016) meeting. While it is difficult to point to one 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, major modifications to the Fed's models took place following the 1991 recession. By around 1993, it became clear that the 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] The new model, so-called FRB/US, became fully operational in mid-1996 (Brayton and Tinsley, 1996), with its key innovation to incorporate 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 to the way the Fed policy was conducted.

Table 1 presents summary statistics of the intermeeting stock excess returns in the pre- and post-1994 sample. The standard deviation of intermeeting returns is about 10% lower in the pre-1994 period, but an F-test for the difference in standard deviations does not reject the null hypothesis that the volatilities in the two subsamples are equal against the alternative that they are different or against the alternative that volatility in the pre-1994 sample was lower than that in the post-1994 sample (p-value for the one-sided test is 0.18). If we define quintiles of intermeeting returns based on all years, 18% of intermeeting returns fall in the lowest quintile in the pre-1994 period, compared to 21% in the post-1994 period. This suggests sufficient return distribution within each subsample to reveal whether the Fed accommodates low stock returns in a given subsample.

[Table 1 about here.]

[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.

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

This section reviews the statistical facts connecting intermeeting stock market excess returns, updates to the Fed's macroeconomics expectations, and subsequent FFR target changes. The evidence supports a strong comovement between the stock market, the Fed's expectations about the real economy, and its monetary policy decisions that emerges in the second half of the 1990s. Subsequently, we use textual analysis to argue that the statistical facts reflect the Fed viewing the stock market as informative for policymaking.

III.A. Low stock returns predict policy accommodation

Using data for 1994–2008, in Figure 1 Panel A, we plot the average cumulative change in the FFR 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. The quintiles of intermeeting returns are constructed over the 1994–2008 sample.[7] Returns in the lowest quintile (averaging around -8 percent) are associated with an average reduction in the target of as much as 119 basis points over 8 subsequent FOMC cycles from $m-1$ to $m+7$ (significant at the 1% level). No such pattern of the Fed accommodation following low stock returns is seen before 1994 (Figure 1 Panel B).

In Table 2, we report predictive regressions using rx_m^- and rx_m^+ as the explanatory variables for the FFR target changes. The significantly positive coefficients on rx^- in the post-1994 sample indicate that more negative intermeeting returns forecast a stronger Fed accommodation. A 10% stock market decline predicts a reduction in the FFR target of 32 bps at the next meeting and 127 bps after one year. The results also point to an asymmetry, with positive intermeeting returns in most cases being insignificant. The right panel shows that the relationship is absent in the pre-1994 sample.[8]

[7] We obtain similar results when calculating quintiles in real time (see Appendix Figure 1).

[8] Our 1994–2008 estimates are not directly comparable to Rigobon and Sack (2003) since we allow for a longer response period for the FFR target. Additionally, their estimates are for the 1985–1999 sample.

[Figure 1 about here.]

[Table 2 about here.]

The analysis of the FFR 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 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 Cieslak, Morse, and Vissing-Jorgensen (2019, CMVJ) who study the effect of the 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 in even weeks. 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: returns are high on even-week days that follow prior returns in the lowest quintile. Figure 2 Panels B and C split the 1994–2016 period into years 1994–2008 and 2009–2016. In both sub-periods, stock returns are high (around 30 bps, statistically significant) on even-week days that follow poor stock returns. The 2009–2016 evidence suggests that "Fed put" in returns is present during the zero-lower bound period. Extending CMVJ's evidence, Figure

When applying their estimator to the 1994–2008 sample, we find that a 5% increase/decline in the S&P500 index increases/reduces the FFR target after the next FOMC meeting by only 2 bps (using their preferred specification). One reason for this weak relation based on the Rigobon-Sack approach is that, over the post-1994 period, a significant part of the FFR reduction after stock market declines came gradually and as a partial surprise to the market. Cieslak, Morse, and Vissing-Jorgensen (2019) show that unexpectedly accommodating policy lead to high even-week stock returns, and Cieslak (2018) argues that in this period the Fed has surprised the market by easing more in downturns than what the public expected. Since the Rigobon-Sack methodology relies on daily data and investors having a full real-time understanding of the Fed's reaction function, it will not capture Fed accommodation that is not appreciated by the market in real time.

2 Panel D shows that the effect is absent in the pre-1994 period, coinciding with our finding that the stock market was not a significant predictor of target changes before the mid-1990s.

[Figure 2 about here.]

III.B. Updates to the Fed's growth expectations comove asymmetrically with stock returns

As a first step toward understanding the relation between the stock market and policy, we document how updates to the Fed's macroeconomic expectations comove with the stock market. A few days before each scheduled FOMC meeting, the staff at the Federal Reserve Board prepares macroeconomic forecasts for several quarters ahead, collected in the so-called Greenbook (now called the Tealbook). Greenbooks become publicly available with a five-year lag. Our forecast dataset, available from the Philadelphia Fed's website, ends in December 2012.

To see how macroeconomic expectations evolve from one FOMC meeting to the next, we compute updates relative to expectations in the previous Greenbook for same calendar quarter, i.e., for a variable Z the update is defined as $\text{Updt}_m(Z_{qi}) = E_m(Z_{qi}) - E_{m-1}(Z_{qi})$, where qi is a calendar quarter ($q0$ is the current quarter, $q1$ is the next quarter, etc.);[9] $E_m(\cdot)$ denotes a Greenbook forecast at meeting m. We regress the updates on past intermeeting returns, and generally find that two return lags (rx_m, rx_{m-1}) are significant. The lagged returns account for gradual expectations updating.[10]

Figure 3 displays the time series of updates to real GDP growth expectations for one quarter ahead along with the fitted regression values. The regressions are estimated separately on the pre- and post-1994 sample. The differences between the two subsamples are readily visible.

[9]For example, if meeting m is in February 2000, horizon $q1$ means that the forecast $E_m(Z_{q1})$ is for the second quarter of 2000. Forecast update, $\text{Updt}_m(Z_{q1})$, 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.

[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 internal Greenbook release date from the calculation of rx_m.

Before 1994, the updates display essentially no relationship with stock returns; neither of the return lags is statistically significant and the R^2 is 4%. In contrast, post-1994, 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. The tight 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.

[Figure 3 about here.]

Table 3 extends the evidence to include longer forecast horizons and Greenbook updates of inflation and unemployment expectations in addition to the real GDP growth. To study a potential asymmetry, we allow for different coefficients on positive and negative stock return realizations. All regressions include two lags of rx^+ and rx^- (m and $m-1$), the lagged dependent variable and a constant. We summarize the results by reporting the sum of coefficients on the intermeeting returns.

The top panel of Table 3 documents that, in the post-1994 sample, Fed growth and unemployment expectations update asymmetrically with the stock market, loading significantly on intermeeting returns over the negative range, with a smaller and less significant relation to positive returns. A 10% 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 for real GDP growth (column (1)),[11] and with an increase of 0.47 percentage point in the expected unemployment rate over the one-year period from last quarter to three quarters out (column (3)). Before 1994, there is only a weak relationship, and in particular, there is little downgrading of expectations following poor stock returns (columns (2) and (4)). The bottom panel of Table 3 refers to the updating of the Fed's inflation expectations. We find

[11] Estimating regressions separately for each forecast horizon, we find a significant relation for each of the four quarters q0 to q3 with the strongest effect for q1. As such, the fit in Figure 3 is predominantly driven by the negative intermeeting returns.

little evidence for asymmetry and the results appear sensitive to the measure of inflation used.[12]

To put these results into perspective, we verify that the intermeeting stock returns have a stronger explanatory power for the Fed's growth expectations updates than any of the 38 macroeconomic indicators available in Bloomberg economic calendar and than the Chicago Fed National Activity Index (CFNAI), a principal component of 85 macro series (see Appendix A for details of this analysis). This fact could suggest that the stock market provides continuously updated information to policymakers.[13]

To summarize, the strong relation between negative stock returns and the Fed's expectations of real variables emerges from the mid-1990s, with a less clear pattern for inflation. These results complement recent evidence that shocks to financial conditions and realized economic growth are linked in the left tail of the distribution (Adrian et al., 2019; Berger et al., 2018). By themselves, however, the regressions above are not evidence of a causal effect of the stock market on Fed expectations (the stock market and growth updates may both be driven by other variables). The textual analysis in Section V establishes that the Fed does in fact view the stock market as informative in forming growth expectations and deciding on policy.

[Table 3 about here.]

III.C. Fed policy reacts to growth expectations downgrades

To link the predictive power of the stock market for the Fed's expectations and the FFR to policy-making, we estimate Taylor rules augmented with stock returns and growth expecta-

[12]The positive coefficient on rx_m^- is consistent with inflation being generally pro-cyclical for most of the post-1994 sample (e.g., Campbell et al., 2019), and its significance is especially driven by the deflation fears during the financial crisis. The negative coefficient (albeit weakly significant) on rx_m^+ aligns with Fed officials being surprised by the lack of inflation in times of economic boom in the late 1990s and thus systematically revising their expectations down in good times (see Gorodnichenko and Shapiro (2007) for an extensive discussion of inflation expectations in this episode).

[13]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 FFR target is stronger than that of almost all of the 38 macro variables covered by Bloomberg.

tions updates using data for the 1994–2008 period. We start with a general specification of the Taylor rule:

$$\Delta \text{FFR}_m = \gamma_0 + \sum_{k=1}^{K} \gamma_k \text{FFR}_{m-k} + \phi_1 E_m(\pi_{qh_1}) + \phi_2 E_m(g_{qh_2}) + \phi_3 E_m(u_{qh_3}) + \beta' Y_m + \varepsilon_m, \qquad (1)$$

where $\Delta \text{FFR}_m = \text{FFR}_m - \text{FFR}_{m-1}$. Following Coibion and Gorodnichenko (2012), we allow for interest rate smoothing (lagged FFR terms) and include Greenbook forecasts of inflation (GDP deflator, π), real GDP growth (g), and unemployment (u).[14] In addition, vector Y_m includes updates to growth expectations and/or intermeeting stock returns. Focusing on the baseline specification ($\beta = 0$), we determine the number of FFR lags and the horizon of the Greenbook forecasts using information criteria (see note to Table 4). This approach selects three FFR lags[15] and forecasts for the current quarter real GDP growth ($E(g_{q0})$, nowcast) and inflation one quarter ahead ($E(\pi_{q1})$). The unemployment rate turns out not statistically significant, so we exclude 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 ($\text{Updt}(g_{q1})$), and two lags of intermeeting returns.

Table 4 estimates different versions of equation (1). Column (1) provides a statistical benchmark to document the stock market significance on a stand-alone basis. Intermeeting stock returns and lags of the FFR explain 54% of FFR target changes in column (1) (FFR lags alone explain 36%). The stock market significance is driven by the negative return realizations. 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 for rx_m^+ and rx_{m-1}^+ (t-stat =

[14] We estimate equation (1) using change 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 meaningful for interpreting the explanatory power of the regression. The regression in levels yields an R^2 very close to 1.

[15] This finding is consistent with Coibion and Gorodnichenko (2012). Specifically, Coibion and Gorodnichenko (2012) find that smoothing of the third order (three lags) provides the best fit to the data over the 1987–2006 sample (their Table 3, Panel B) when the Taylor rule is estimated at the FOMC meeting frequency.

-1.05). Column (2) uses the Greenbook variables to explain the FFR changes. Splitting growth expectations updates into positive and negative shows that only negative updates are significant, $\text{Updt}_m(g_{q1})^- = \min(0, \text{Updt}_m(g_{q1}))$. Column (3) estimates a combined specification with Greenbook variables and intermeeting stock returns. The sum of coefficients on negative stock returns now drops from 5.35 in column (1) to 1.66 in column (3) (a 69% reduction) and becomes insignificant. The coefficients on negative growth update looses part of its statistical significance consistent with its correlation with intermeeting returns documented in Table 3.[16]

Columns (4)–(6) provide robustness to these results, following the branch of the literature that omits FFR lags in the Taylor rule (e.g., Orphanides (2019) and Hartmann and Smets (2018)). Without controlling for the lagged FFR, the negative intermeeting returns are significant up to five lags (we do not report lags that are insignificant). Including the Greenbook variables reduces the sum of coefficients on the intermeeting returns by 75%. As such, across specifications, most of the explanatory power of the stock market for target changes can be rationalized by its correlation with the Greenbook forecasts. To better understand these relations, columns (7)–(8) study the explanatory power of negative intermeeting returns for the real GDP nowcast, negative growth update, and inflation forecast. Lags of rx_m^- strongly predict the growth nowcast ($R^2 = 0.52$) and the growth update ($R^2 = 0.44$). For inflation, however, none of the return lags are significant ($R^2 = 0.04$).

These results suggest an asymmetry in the policy reaction function in the post-1994 sample: accommodation in response to downgrades in growth expectations without symmetric tightenings in response to upgrades. The latter fact is consistent with stable and low inflation over this period (see e.g., Gorodnichenko and Shapiro, 2007).

[Table 4 about here.]

[16] 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 (5) of Table 4. We show that the relationship is driven by an asymmetric reaction of policy to growth updates, and of growth updates to stock returns.

III.D. Which types of news reflected in intermeeting returns predict policy moves?

The regression-based analysis presented so far does not clarify what kind of news reflected in intermeeting returns is predictive of the Fed's response. The stock market fluctuations in the intermeeting period can reflect risk-premium shocks (shocks to risk aversion or investor sentiment), shocks to investors' expectations about economic fundamentals and/or about the path of monetary policy. To quantify the importance of such shocks, we follow the approach of Cieslak and Pang (2019) to decompose stock returns into contributions of structural shocks interpreted as dividend growth news, monetary news, and risk-premium news.[17] This approach allows to decompose stock returns at the *daily* frequency, which we aggregate to the intermeeting frequency. As the decomposition applies to log returns, we denote the overall intermeeting log return with ret_m, and the parts of return earned due to growth, monetary and risk-premium news with ret_m^g, ret_m^{mp}, and ret_m^{rp}, respectively.

In Table 5, we revisit the predictability of the FFR target changes with components of intermeeting returns. To keep the specification parsimonious, we construct two-period returns by summing up positive/negative returns due to each type of news over the last two intermeeting periods (e.g., $ret_{m,m-1}^{g+} = ret_m^{g+} + ret_{m-1}^{g+}$ is the positive return earned due to growth news over the intermeeting period prior to meeting m and $m-1$). Column (1) reports results for the overall log return, and column (2) for the components. The FFR target changes are significantly predictable by $ret_{m,m-1}^{g-}$ and $ret_{m,m-1}^{rp-}$ (i.e., negative returns due to bad growth and risk premium news) and $ret_{m,m-1}^{mp+}$ (i.e., positive returns due to news about accommodating policy). The signs of coefficients have an intuitive interpretation. The negative coefficient on $ret_{m,m-1}^{mp+}$ indicates that this variable helps account for reverse causality: the effect of monetary news on the intermeeting period on the stock market. Indeed, CMVJ (2019) show that monetary policy news comes out regularly between scheduled FOMC meetings. Consistent with the previously documented asymmetric relation

[17] The Cieslak and Pang (2019) identification exploits the comovement between stocks returns and bond yield changes and the impact of shocks on yields across maturities. They identify two independent risk-premium shocks; both of these shocks increase the stock market risk premium but act on bond risk premia in opposite directions. Since both risk-premium shocks move stocks in the same direction, we report their combined effect.

to stock returns, the Fed lowers the target following negative growth news and/or news that raises the risk premium, as indicated by the positive coefficients on $ret^{g-}_{m,m-1}$ and $ret^{rp-}_{m,m-1}$.[18] To the extent that risk-premium news is more exogenous than dividend-growth news, the decomposition also helps address the omitted variables concerns (both stock market and the Fed being driven by growth expectations).

We now turn to the textual analysis which is our main approach to establishing that policymakers pay attention to the stock market in their decision-making and to documenting the underlying economic mechanism for why the Fed may find the stock market informative.

[Table 5 about here.]

IV. Does the Fed pay attention to the stock market?

There are two possible interpretations of the high explanatory power of the stock market for the Fed's growth expectations and the FFR target changes. The relation could be *coincidental* in the sense that the Fed views the stock market as uninformative but the econometrician finds it has explanatory power for target changes because the stock market is correlated with variables that drive the Fed's decision-making. Alternatively, the Fed may perceive stock returns as *informative* and therefore react 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. If the stock market is informative for policy we would say that it causes policy. If the stock market drives the economy, we would say that it causes growth; instead, a predictive relation between the market and growth would not indicate a causal effect.

We first seek to distinguish the coincidental view from the informative view. To establish that the Fed does pay attention to the stock market directly, we perform a textual analysis

[18] Estimating the regressions using each of the two lags of intermeeting returns (as opposed to two-period returns), we find significant coefficient on the first lag (m) of the risk premium and monetary news and on the second lag ($m-1$) of the growth news, consistent with somewhat sluggish reaction to macroeconomic news.

of the minutes and transcripts of FOMC meetings. In the next section, we then turn to using textual analysis to understand the mechanism for why the Fed may view the stock market as informative.

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

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

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, other governors, and regional Reserve Bank presidents). The FOMC minutes are carefully crafted 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. 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 in 2016.[19] The FOMC transcripts contain verbatim comments by individual staff members and meeting participants, with each transcript 200–300 pages long. They are released publicly with a five-year lag, our sample ending in 2013.

[19]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 and the Minutes of Actions. We also collect these texts and treat them jointly as one unit of observation related to a given FOMC meeting.

Our baseline results rely on human reading and coding of the minutes content, and we use both algorithm-based coding and human reading of the transcripts for robustness.

Figure 4 displays simple counts of stock market related phrases in the minutes (Panel A) and in the transcripts (Panel B) starting in 1976.[20] The stock market is rarely mentioned before the mid-1990s, with the exception of a spike in October 1987 following the 1987 market crash. From the mid-1990s, the number of mentions increases 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 sample. This is also the period during which our results thus far suggest that policy could be affected by the stock market.

[Figure 4 about here.]

IV.B. Stock market mentions in FOMC minutes

We extract all paragraphs in FOMC minutes between 1994 and 2016 that are related to the stock market. There are 975 such mentions. Table 6 Panel A reports the number of times each search phrase appears, and Panel B reports the counts of stock market phrases by section of the minutes. The category "Other" refers to parts outside the regular minutes' sections (e.g., summary of special sessions or conference calls). About half of the mentions are in section 2—the Staff Review of the Financial Situation, with the other half split between the staff and the participants.

[Table 6 about here.]

We read and classify the tone of stock market mentions based on the direction of the market's evolution: positive (discussion of the stock market going up), negative (discussion of the

[20] The list of search phrases is reported in Table 6 Panel A. 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.

stock market going down), neutral (stock market flat), and hypothetical (discussion of what would happen if the stock market were to move in a particular way). Counts by tone are displayed in Table 6 Panel C. Mentions where tone is unclear or cannot be determined are marked as "unclear." Consistent with the stock market on average having increased over the sample, there are more positive than negative stock market mentions. Figure 5 displays the respective frequencies over time. Mentions in the Staff Review of the Financial Situation are frequently purely descriptive (more on our classification of the content below). Therefore, in Figure 5, we present both overall counts and excluding counts from that section. Peaks in the number of negative mentions in Panel A often correspond to periods of market stress, as marked on the graph. The positive mentions in Panel B are relatively more uniformly distributed over time.

[Figure 5 about here.]

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

To relate stock market mentions to stock returns, Figure 6 plots the average number of mentions against average intermeeting excess stock returns (with and without the Staff Review of the Financial Situation section), with averages calculated by quintiles of rx_m defined over the 1994-2016 sample. Lower intermeeting returns in the left panel predict more negative stock market mentions, especially in the lowest quintile of return realizations. Similarly, in the right panel, higher stock returns lead to more positive stock market mentions. There are relatively more negative mentions when the stock market performed very poorly than there are positive mentions when it did well, which is particularly visible when we exclude the Staff Review of the Financial Situation.

Past intermeeting returns have a strong forecasting power for the frequency of stock market mentions in the minutes with an R^2 around 0.50 (Appendix Table 1 provides the details). The relation has the expected signs on both negative and positive side. For example, more negative (positive) past intermeeting returns predict more (fewer) negative stock market

mentions. A 10% more negative return is associated with 6.4 more negative stock-market mentions, a substantial effect relative to the mean (1.8 mentions) and standard deviation (2.6 mentions). The fact is present both before and during the zero lower bound period.

[Figure 6 about here.]

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

Does the degree of the Fed's attention to the stock market predict actual policy actions? Table 7 shows that negative stock market mentions in the minutes of the current and past FOMC meeting have statistically significant explanatory power for the FFR target changes.[21] The estimates in column (1) imply that a one-standard-deviation increase in the number of negative mentions (2.6 more mentions) is associated with a cumulative reduction in the FFR target of 32 bps. In contrast, there is no systematic relation between positive mentions and subsequent target changes.[22]

If all explanatory power came from the discussions by the staff, this would speak against the policymarkers viewing the stock market as informative. In column (2)–(4), we therefore estimate the regressions separately for the Staff Review of the Financial Situation (minutes' section 2), other sections by the staff (sections 1 and 3), and participants (sections 4 and 5). Importantly, negative stock market mentions predict target changes if we focus only the FOMC participants. While many mentions by the staff simply summarize recent developments in financial markets, Section V shows that participants most often describe a causal effect of the stock market on the economy.

[21] To make sure that the explanatory power of the stock market mentions does not simply reflect Fed deliberations being more extensive in certain periods, the regressions control for the overall length of the documents.

[22] The coefficient on positive mentions in column (1) is also marginally significant at the 10% level. As subsequent columns show, this result stems mainly from stock market mentions in the Staff Review of the Financial Situation. The negative coefficient is consistent with reverse causality, i.e., the Fed policy (easing) positively affecting the stock market. The Staff Review of the Financial Situation describes stock market developments and their drivers. On some occasions, the staff refers to the market going up on news about policy easing.

To assess whether the minutes-based results accurately reflect the nature of Fed deliberations, we extend the analysis to the FOMC transcripts. We develop an algorithm to identify negative and positive stock market mentions in the transcripts (see Appendix B for details). The results, reported in column (5) of Table 7, confirm that while there is no relationship between participants' positive stock market mentions and target changes, their negative stock market predict target reductions.

To conclude, the Fed pays attention directly to the stock market rather than just to variables correlated with the stock market. Positive and negative stock market mentions move with intermeeting excess stock returns in the expected directions and the frequency of negative stock market mentions predicts FFR target reductions. These facts suggest that the Fed views the stock market as informative for policy-making.

[Table 7 about here.]

IV.C. Stock market and broader financial conditions

The analysis so far may understate the FOMC's concern with the stock market. The FOMC minutes often talk about "financial conditions" without explicitly referring to the stock market, and thus such cases are not accounted in our analysis above. As 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).[23]

To assess the frequency of such references, we use an algorithm to code the number of negative and positive mentions of financial conditions that do not explicitly reference the stock market in the minutes (identifying 350 negative and 232 positive cases). Mentions of negative financial conditions spike during the financial crisis in 2008 and 2009, and their frequency is predictable by intermeeting stock returns. While negative financial conditions

[23]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.

mentions predict FFR target changes over and above the stock market mentions, this result is driven by the financial crisis. Once 2008 is excluded, the stock market mentions subsume the explanatory power of financial conditions for the target. Appendix C reports detailed results.

To put the Fed's attention to the stock market into perspective, Figure 7 graphs the frequency of mentions of interest rates, credit and spreads, and exchange rates, along with our series for stock market mentions. The focus on the stock market emerges in the second half of the 1990s, whereas mentions of interest rates, credit and spreads, and exchange rates are prevalent going back to the late 1970s.

[Figure 7 about here.]

V. Why is the stock market viewed as informative by Fed policymakers?

To shed light on why the Fed views the stock market as informative, we analyze the content of the stock market mentions. We start with the FOMC minutes, and then extend the analysis to the transcripts studying the stock market mentions by the contemporaneous and future Fed chairs (Greenspan, Bernanke, and Yellen). Our goal is to distinguish different mechanisms that could lead the Fed to pay attention to the stock market, i.e., whether the Fed thinks of the stock market as a *driver* of the economy or as a *predictor* of future economic conditions. If the first possibility dominates, we would like to understand the economic channels through which the Fed believes the stock market impacts the economy.

V.A. The content of stock market mentions in the FOMC minutes

We read and classify the 975 stock market mentions in the minutes into four main categories: 1) consistent with the driver view (describing the stock market as having a causal effect on the economy), 2) consistent with the predictor view (describing how the stock market reflects the economic outlook or investors' expectations), 3) describing other determinants of stock valuation (factors affecting the stock market, other than the economic outlook, and including

the effect of policy on the market) and discussing valuation levels, and 4) descriptive (simply summarizing recent stock market movements). In the driver-view category, we further distinguish mentions of the effect of the stock market on consumption, investment, demand (when there is no detail about which component of demand), and other mentions indicating that the market affects the economy but for which no precise mechanism is stated. We take an expansive approach to the predictor view to give this channel the best chance. Thus, we include not only cases where the stock market is explicitly stated as an indicator of the outlook or predictor of economic conditions, but also cases discussing how the stock market reflects investors' expectations of economic conditions. We treat those separately from discussions of other stock market determinants, especially from how the stock market responds to current (as opposed to expected) economic data.[24] There are a few mentions of the stock market in the context of financial stability, which we report separately. Mentions that we cannot classify are collected in the "Other" category. Appendix D contains sample excerpts from the minutes illustrating these categories.

Table 8 reports the classification results: 38% of mentions align with the driver view, and 8% with the predictor view, another 11% discuss stock market determinants, and 38% are purely descriptive. When the FOMC participants discuss the stock market, the driver view prevails, accounting for more than 70% of participants' mentions. Overall, the majority of mentions in the driver-view category comes from the participants' sections of the minutes. Instead, among the 8% of cases consistent with the predictor view and the 11% of cases discussing valuation determinants most belong to the staff.

The largest category in the driver view are mentions that explicitly refer to the stock market affecting the economy through its impact on consumption (including residential investment). Within the consumption category, we document a large role for the wealth effect, with 213 of 257 consumption-related stock market mentions (of the 213, all but a couple appear together with the words "wealth" or "net worth").[25] Going back to Modigliani (1971), the

[24]When current data and outlook are discussed together, we code them as referring to the outlook.

[25]The Fed's understanding of the wealth effect can be summarized by the following quote from Reifschneider et al. (1997): "(...) financial conditions should have a major influence on private spending through wealth effects because the desired level of consumer spending depends, in part, on the current value

wealth effect is usually estimated as the marginal propensity to consume (MPC) out of stock market wealth (keeping labor income constant) of around 3–5%.[26] To illustrate why the wealth effect draws the Fed's attention, it is useful to consider an example: In 2007q3, the US households held $17.8 trillion in corporate equity (Financial Accounts of the US) and the US GDP was $14.5 trillion. A 10% stock market drop would reduce household wealth by $1.78 trillion. Assuming a 4% wealth effect on consumption, this means a $71 billion decline in aggregate consumption, and a reduction in the growth rate of GDP of 0.49 percentage point—a significant effect. To this, one should add the indirect effect of consumption on firm investment (via reduced demand). In reality, in 2007–2008 the stock market declined by about 40%, so the wealth effect resulting from this decline could have been material.

For business investment, the main economic rationale mentioned in the minutes is an effect of the stock market on the cost of capital, accounting for 9 of 32 mentions. (However, as the minutes frequently mention sales as a determinant of investment, one should keep in mind the above-mentioned indirect effect of consumption on investment.) In addition to cases with an explicit driver mechanism, we find some (44 for consumption- and 12 for investment-related mentions), which align with the driver view but no specific channel is stated.

Figure 8 plots the frequency of mentions in different categories over time. For the driver-view category, we plot cases related to consumption separately from the other channels. The consumption channel dominates in the dot-com years, increases again during the financial crisis 2007/09 and in 2013.[27] The continued focus on consumption 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 net household assets. An important component of the latter is corporate equity, whether held directly or owned indirectly in the form of mutual fund shares and pension fund reserves."

[26] Two recent papers exploit microdata to obtain well-identified estimates of the magnitude of the consumption-wealth effect. Chodorow-Reich et al. (2019) exploit geographic heterogeneity in stock market wealth across the US and estimate a consumption-wealth effect of 3.2%. Di Maggio et al. (2020) exploit heterogeneity in portfolio choice across Swedish households and estimate a marginal propensity to consume out of stock market capital gains of about 5% for the top half of households in terms of financial wealth, higher for poorer households.

[27] The spike in 2013 reflects discussions of high market returns in that year and how they support consumption. The market returned 35% in 2013, its best year since 1995.

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 on 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 on January 5, 2016)

[Table 8 about here.]

[Figure 8 about here.]

V.A.1. Stock-market co-occurrences with economic phrases

As a robustness check to our coding of the mechanism, we 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 the minutes that references the stock market ("stock-market paragraph" below).[28]

Table 9 lists economic phrases occurring 20 times or more within the stock-market paragraphs in a given section of the minutes. Columns (1) and (2) show the counts of phrases in the stock-market paragraph and in the minutes' section, respectively, and column (3) reports their ratio. To measure the tightness of the relationship, column (4) displays the odds ratio, 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.

Focusing on the two sections with the most non-descriptive mentions (Staff Review of the Economic Situation and Participants' Views), the economic variables that are most

[28]We first create a dictionary of various economic phrases that appear in the stock-market paragraphs. We then 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 contain 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.

frequently discussed together with the stock market are related to consumption.[29] For example, the participants mention "consumer spending" 176 times within the stock-market paragraph, which corresponds to 43% of their total references to consumer spending. This implies that consumer spending is 3.4 times more likely to be mentioned in the stock-market paragraph within this section than in this section in general. Also consistent with our coding of the mechanism in Table 8, discussions of business investment are relatively less common, with participants referring to it only 14% of the time within the stock-market paragraph.

The belief in the importance of wealth effects on consumption from the stock market would imply that the Fed should also focus on wealth effects from the housing market. Repeating the co-occurrences analysis, we find that housing is also mostly discussed together with consumption, household spending, and consumer confidence, in line with the results for the stock market. However, compared to the stock market, the frequency of the housing market mentions becomes material only as the financial crisis hits. Details are reported in Appendix Table 2 and Appendix Figure 3.

[Table 9 about here.]

V.A.2. Do consumers pay attention to stock market news?

Given the Fed's focus on the stock market wealth effect, we document that households indeed treat stock market news as relevant for their choices. The Michigan Survey of Consumers (MSC) elicits responses about key economic news that have affected consumers' 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. To measure the relative attention of consumers to stock market news, we construct a MSC negative (positive) stocks news ratio

[29]The Staff Economic Outlook section also contains a significant number of non-descriptive statements. However, given that in early years it is frequently comprised of 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.

by dividing the number of MSC respondents reporting unfavorable (favorable) stock market news in a given month by the number of respondents mentioning any news in that month.[30]

We find a strong correlation between the Fed's and consumers' attention to the negative stock-market outcomes, as shown in Figure 9. Over the 1994–2016 period, a one-standard-deviation increase in the MSC negative stocks news ratio is associated with 1.3 more negative stock-market mentions in FOMC minutes (excluding content of the Staff Review of the Financial Situation) in the same month (t-stat = 8.65); the relationship is only about half as strong on the positive side. The two large peaks in stock market mentions related to consumption in Figure 8 occur at the time when consumers increasingly point to negative stock market news as driving their decisions (see also Appendix Figure 4).

[Figure 9 about here.]

V.B. Evidence based on the statements by the Fed chairs in the FOMC transcripts

It is possible that the minutes are written to emphasize drivers of the economy rather than predictors. We therefore turn to the FOMC transcripts to further investigate why FOMC participants perceive the stock market as informative. Since each FOMC transcript is hundreds of pages long, we focus our reading on the remarks by the current or prospective Fed chairs over the 1994–2013 period.[31] We categorize a total of 373 stock-market mentions (215 by Greenspan, 98 by Bernanke, and 60 by Yellen) into four categories consistent with 1) the driver view, 2) the predictor view, 3) mentions discussing the determinants of the stock market and valuation levels, as well as 4) those discussing an effect of the stock market on policy. A somewhat different categorization compared to the minutes serves to more

[30] Over the 1994–2016 sample, 60% of responses cite at least one piece of economic news. The stock market constitutes 8% of all news mentions and is 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 represent 6.2% of all news mentions.

[31] Since the transcripts are available with a five-year delay, our sample covers Greenspan's tenure as chair, Yellen's tenure as a governor, regional Fed president and vice chair, but not as chair, and Bernanke's tenure as governor and chair. Powell joined the Fed as governor in May 2012, and thus we do not have sufficient data to analyze his statements.

accurately capture the content in the transcripts. Also, given that the transcripts have less structure than the minutes, the categories are not mutually exclusive, i.e., one mention can belong to more than one category. Table 10 contains the results of the above classification. We provide a sample of mentions and how we classify them in Appendix Table 3.

The transcripts confirm a larger role for the driver view than the predictor view: 43% of mentions overall (37% of Greenspan's mentions, 45% of Bernanke's, and 62% of Yellen's) have a driver-view flavor. Among the three chairs, Greenspan is the least specific as to how the stock market can affect the economy, but overall the wealth effect on consumption is a common theme (e.g., Appendix Table 3, items 10, 12, 30). In recent years, the wealth effect from the stock market is frequently mentioned together with the wealth effect from housing as drivers of consumer spending (e.g., Appendix Table 3, item 14). Interestingly, especially for Greenspan, several mentions point to a direct stock market's impact on policy with no mechanism stated; we also find examples evidencing reluctance to admit both internally and externally that such an effect may exist (e.g., Appendix Table 3, item 5 and 6).

About 15% of cases indicate a predictive content of the stock market, i.e., the stock market treated as a signal about the economy, with the shares similar across the three chairs (e.g., Appendix Table 3, items 1, 8, 16, 19, 27). While the number of such mentions in the transcripts is relatively modest, Fed officials may find the predictive aspect of the stock market sufficiently obvious that frequent explicit discussion of it is not needed.

A new piece of information from the transcripts is that the FOMC participants engage in much more discussion of the determinants of stock market movements and valuation levels than is reflected in the minutes. Across the three chairs, 38% of stock market mentions fall in this category, compared to 3% in the Participants' Views section of the minutes (7 of 274). Given its importance in the transcripts, we subdivide this category into non-policy related versus discussions about policy as a determinant of the stock market (12% of overall mentions). Discussions of valuation determinants and levels could be consistent with either the driver view or the predictor view. Consistent with the driver view, some cases in this category are about whether the market is overvalued and thus whether its decline could

pose a risk to the economy (e.g., Appendix Table 3, items 7, 20, 24). Consistent with the predictor view, some cases are about learning from the market about how the economy is performing (e.g., Appendix Table 3, item 11).

In line with our results in Section III.D based on the stock return decomposition, the transcripts also suggest that policymakers pay attention to the risk-premium variation. When chairs discuss the (non-policy) determinants of stock market valuation (26% of cases in Table 10), they draw a distinction between cash-flow news (earnings expectations), or discount-rate news (in particular, risk premia). We find 35 cases that use language related to risk aversion, risk preferences, investor sentiment or mood, and market psychology (e.g., items 2 and 20 in Appendix Table 3).[32]

[Table 10 about here.]

Overall, the results based on the transcripts are broadly consistent with our coding of the minutes in that the driver view appears more important than the predictor view, when the two views can cleanly be separated.

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

In this section, we use several benchmarks to empirically evaluate whether the Fed may be reacting too strongly to the stock market.[33] We analyze whether the Fed's growth and

[32]We find 80 risk-premium related mentions in the minutes' paragraphs discussing the stock market. We do not classify them as a separate category in Table 8 but these mentions occur frequently in discussions of factors impacting the stock market. Reifschneider et al. (1999) demonstrate the impact of an exogenous shift in the equity risk premium on consumers and investment in the FRB/US model. Bernanke discusses policy implication of such an exogenous adjustment to the risk premium as recently as in the transcript of the October 2013 meeting.

[33]There is a debate on whether the Fed should respond to the stock market beyond its effects on expectations of inflation and output gap. Gilchrist and Leahy (2002) extend the model of Bernanke and Gertler (1999) to study the optimal response of monetary policy to asset prices in a setting with technology shocks and net worth shocks. For the technology shocks, they confirm that the Fed should react to asset prices only to the extent that they affect expected inflation. However, for the net worth shocks, such 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 bubbles create distortions in investment and consumption. Related, Peek et al. (2016) argue that some response to the stock market could be optimal given the fiscal costs of financial instability. Alternatively, the Fed may view the equilibrium

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.

VI.A. Private sector forecasts

To compare the Fed's forecast updating (documented in Table 3) to that of the private sector, we rely on 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 the 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 the Fed's expectations may over-react to the stock market.

Table 11 Panel A presents results for the SPF.[34] The explanatory power of the stock market for private sector expectations of both real output growth and the unemployment rate is present over the range of negative excess stock returns. A 10% lower inter-survey excess stock return predicts a reduction of the total expected real GDP growth over the next four quarters of 0.88 percentage point (column (1)), similar to the 0.96 percentage point found for the Fed in Table 3, and a 0.54 percentage point increase in SPF unemployment expectations (column (2)), similar to the 0.47 percentage point for the Fed. Furthermore, the SPF data also show no clear relation between the stock market and updates to inflation expectations.

Table 11 Panel B presents result based on the BCEI survey. This survey is available monthly back to 1980.[35] Column (1) and (2) show that BCEI expectations for both real GDP growth

real rate (the natural FFR) as dependent on the stock market, as argued by Taylor (2008), Meyer and Sack (2008), and Curdia and Woodford (2010).

[34]The SPF conducts four surveys per year, resulting in 92 observations over the 1994–2016 period. The deadline for respondents supplying their expectations are only available from 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 the scheduled FOMC meetings as well as days with intermeeting target changes as defined in Section II.A.

[35]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

and the unemployment rate comove significantly with stock returns over the range of negative stock returns (with some significance for positive returns too). BCEI expectations update somewhat less strongly with negative stock returns than the expectations of the Fed or the SPF in economic terms but the 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 pre-1994 period though less strongly so than in the post-1994 period.

[Table 11 about here.]

VI.B. Forecasting realized macro variables with the stock market

In Table 12, we document the strength of the relationship between excess stock returns and realized macro variables. Quarterly NIPA data on the 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 of the dependent variable since the current table is for realized values as opposed to expectations, and lags in Tables 3 and 11 were motivated by gradual expectations updating.

For the 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% drop in the stock market, almost the same effect as for the Fed growth expectations in Table 3. For the unemployment rate changes, the coefficient of -6.23 post-1994 implies a 0.62 percentage point change in response to a 10% drop in the stock market, slightly larger than the 0.47 percentage point

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. BCEI started reporting forecast for the GDP deflator in 1992, therefore we do not report results for this variable in the pre-1994 sample.

for the Fed. The relation between excess stock returns and the realized GDP growth or unemployment rate changes is asymmetric, stronger over the range of negative returns. The main difference between the results for the realized variables and for the Fed expectations is that the realized data show similar relations to the stock market pre- and post-1994. Realized inflation 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.

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.

[Table 12 about here.]

VII. Moral hazard and financial stability considerations

An important issue in assessing the consequences of the Fed's accommodation following stock market declines is its effects on risk-taking in financial markets (e.g., Blinder and Reis, 2005). The Fed put could affect risk-taking in an ex-post or an ex-ante sense.

Ex-post, agents may add leverage as the Fed lowers the interest rate and thereby reduces the cost of leverage (as in the model of Drechsler et al. (2018) where financial institutions hold liquidity buffers in response to leverage and the Fed controls the cost of liquidity). The existing empirical literature on the effects of monetary policy on financial stability studies the effect of the policy rate on risk-taking in this ex-post sense (see Adrian and Liang (2016) for a survey of this work).

Alternatively, the Fed put may generate moral hazard, i.e., excess ex-ante risk taking by the private sector in the expectation that the Fed will diminish the impact of any negative economic shocks on asset values. To the extent that policy makers want to influence risk premia to promote economic expansion, additional risk-taking may be desirable, albeit to a

limit given the large costs of financial crises. The important question is therefore whether the Fed put creates substantial moral hazard.[36]

In order for the Fed put to induce moral hazard, agents need to (1) understand that the Fed put is there to reduce the impact of an adverse shock, and (2) react to this belief by increasing risk-taking ex-ante. CMVJ (2019) argue that the even-week mean-reversion in stock returns is driven by a reduction in the equity risk premium via the Fed's promise of accommodation should the economy deteriorate. A reduction in the equity risk premium could be consistent with markets learning about the Fed put. Below, we provide more direct evidence on the how the public's perception of the Fed put has evolved and link it to risk-taking. We also study whether policy-makers themselves are concerned about the Fed put and its possible effects on ex-ante risk-taking.

VII.A. Newspaper evidence on public perceptions of the Fed put

To understand when a public perception of a Fed put emerges and how it evolves, we search the Financial Times (FT) and the Wall Street Journal (WSJ) for any of the terms "Fed put," "Greenspan put," "Bernanke put," "Yellen put," or "Powell put" using all years up to the end of 2018. After filtering out articles not related to the Fed put as well as online articles and duplicates, we are left with 164 FT articles and 58 WSJ articles. Appendix Figure 5 graphs the article count by year. The first article on the Fed put appears in the FT on February 7, 2000. It cites a concurrent Merrill-Lynch equity analysis for coining the term "the Greenspan put" and refers to Greenspan accommodating the 1987 crash, the 1990 US banking crisis, the 1994 Mexican peso devaluation, and the 1998 LTCM crisis.[37] A large spike in the article count occurs in 2007 as financial turmoil made investors question if there would be a Bernanke put (Bernanke took office as the Fed chair in February 2006). Similarly, a spike in article count in 2018 corresponds to debate about whether there would be a Powell put (Powell took office as the Fed chair in February 2018). The uncertainty about the new

[36] We thank our referees and several discussants for emphasizing the importance of the moral hazard issue.

[37] In academic work, the first mentions of the Fed put we could find were in Cecchetti, Genberg, Lipsky and Wadhwani (2000) and Miller, Weller and Zhang (2002).

Fed chairs' response to the stock market suggests that the public is continuously learning about the strength of the Fed put. This is consistent with the fact that the even-week mean-reversion in stock returns documented by CMVJ (2019) is present even in the post-crisis period (Figure 2 Panel C).

Public awareness of the Fed put from at least early 2000s implies that the Fed put may have contributed to a risk build-up in the late 1990s and leading up to the financial crisis. In reading the FT/WSJ articles, the concern that the Fed put may lead to excessive risk-taking is a frequent theme. We next turn to quantifying whether it is likely that the private sector acted on the emerging Fed put belief.

VII.B. Does perception of reduced risk lead to increased leverage?

As the public gradually became aware of the Fed put, agents may have responded to this perception by adding risk. One can think about the effect of the Fed put on risk-taking though the lens of the model by Adrian and Shin (2014) in which a financial intermediary changes leverage in response to changing risk (VaR per dollar of assets, also called Unit VaR) such as to keep VaR relative to equity constant. Within this framework, an exogenous reduction in risk is fully countered by an endogenous increase in leverage of the financial sector with no reduction in financial sector risk on net. Empirically, Adrian and Shin (2014) show that, over the period 2001-2012, leverage of eight large US banks does in fact increase in response to lower Unit VaR, though only by about half of what would be needed to keep VaR relative to equity constant. They also document a strong positive correlation between the banks' self-reported Unit VaR and their equity implied volatility from options.

Applying their results to our context, one would expect the Fed put to lead to increased risk-taking by large banks if the Fed put lowers their Unit VaR, as is likely given the evidence in CMVJ (2019) that the Fed has lowered the equity risk premium in the post-1994 period.[38] To assess the strength of the channel highlighted by Adrian and Shin (2014), we study

[38] CMVJ (2019) proxy for the equity risk premium using the measure from Martin (2017), which is tightly correlated with the equity implied volatility (VIX).

the leverage-risk relation using data from the Financial Accounts of the US. We calculate leverage as Assets/Equity for different sectors (broker-dealers, all financials, non-financials, and households) and regress log leverage on the log of the stock market implied volatility (to proxy for Unit VaR). We expect a negative relation if a sector aggressively manages its leverage and increases it in response to lower perceived risk in the economy. By contrast, a positive relation arises if agents do little active adjustment of their liabilities and equity implied volatility is high in times of low asset values (high Assets/Equity), with no relation suggestive of some active leverage management. We find a negative relation between broker-dealer leverage and equity implied volatility (consistent with Adrian and Shin (2014)) in the pre-crisis and crisis period, but an insignificant relation when we expand the sample to include the post-financial-crisis years. Details of the regressions are reported in Appendix Table 4. The break-down of the negative relation between broker-dealer leverage and equity implied volatility post-crisis is illustrated in Appendix Figure 6. We find a positive relation between equity implied volatility and leverage of the overall financial sector, of the non-financial non-corporate sector, and of the household sector. The results therefore suggest that aggressive leverage management in response to fluctuations in equity implied volatility is confined to the broker-dealer sector in the pre-crisis period. Stricter regulations following the financial crisis may have reduced any link between perceived risk and leverage.

VII.C. Policy-maker perceptions of the Fed put and its possible moral hazard effects

With the Fed put discussed in newspaper articles, and some parts of the financial sector potentially increasing leverage in response to a put-induced reduction in risk premia, did concerns about potential moral hazard affect policy? We offer some preliminary evidence on this issue based on the textual analysis of the FOMC documents. This evidence suggests that (a) There is some discussion in the transcripts of a Fed put, but not until 2007 and only at a handful of FOMC meetings; (b) Analysis of the minutes indicates more discussion of financial stability post-crisis, including the effect of policy on financial stability, but only a minority of decision-makers appear concerned; (c) Consistent with (a) and (b), analysis

of FOMC dissents reveals that while hawkish dissents based on concerns about financial stability occur quite frequently post-crisis they are due to a few policymakers dissenting repeatedly. We thus conclude that while the FOMC is clearly aware of the potential moral hazard effects of loose policy, especially post-crisis, such concerns do not appear to have a major impact on policy. This part of our analysis should be viewed as suggestive, since we do not have a benchmark to quantitatively assess the extent to which moral hazard concerns *should* affect policy.

VII.C.1. The Fed put in FOMC transcripts

There are few explicit mentions of the Fed/Greenspan/Bernanke put in the transcripts: seven in 2007, five in 2011 and one in 2013. Appendix E list the 13 Fed put occurrences we have found. Several participants (including Governors Kohn and Mishkin, and Chair Bernanke) explicitly state that the Fed has *not* been acting under a Fed put policy, i.e., accommodating stock market declines for the sake of bailing out financial markets. This is consistent with our earlier analysis which suggests that the Fed's accommodation is motivated by a concern about the economy. Participants' statements indicate some awareness and concern about the potential moral hazard effects of accommodating following poor stock returns and note the challenge of crafting careful communication that avoids creating such an impression in the markets (e.g., items 2 and 5 in Appendix E).

VII.C.2. Evidence from financial stability mentions in the FOMC minutes

To document whether the Fed is concerned with the causal effect of policy on risk-taking more broadly, we search for financial-instability-related phrases in the FOMC minutes and transcripts, focusing on the mentions of "moral hazard," "risk-taking," "speculat*," "bubble," "financial imbalance*," "financial stability," "financial instabilit*," "mispric*," dropping any mentions that are not related to risk-taking or speculation in financial markets. We read those paragraphs and flag the instances that suggest either a concern or a statement of the

fact that the Fed's easy policy may be causing financial instability; we refer to those mentions as "concern about policy-induced risk-taking."

In the minutes, we find 210 financial-instability-related mentions between 1994 and 2016.[39] We classify 70 (one-third) of those as related to concern about policy-induced risk-taking. The majority of these occurrences (43) are in the "Participants' views" section (see Appendix Table 5 for details). Figure 10 displays the time series of overall counts of financial-instability-related phrases along with counts of mentions of concern about policy-induced risk-taking. The plot suggests that financial (in)stability considerations, including the effects of policy on risk-taking, are a more frequent topic in recent years, especially from 2012 onward.

To further assess the strength of the concern within the FOMC with an effect of policy on financial stability, we exploit the careful crafting of the minutes' language. As Danker and Luecke (2005) explain, the minutes use quantitative wording such as "all," "most," "many," "several," "few," or "one," in descending order, to indicate how widely a particular view is held at a meeting. For each paragraph that contains a policy-induced risk-taking mention, we therefore code the quantifier (if available). The words "all" and "most" never appear; there is one instance of "many" (Nov 2, 2016); all remaining cases are qualified with weaker words "several," "some," "a few," "a couple," or "one." Overall, this suggests that the financial-instability concerns due to easy policy are not a majority view among the FOMC participants.

[Figure 10 about here.]

VII.C.3. Evidence based on FOMC dissents

Analyzing dissents also helps assess the strength of opposition within the FOMC to the observed policy of accommodation following stock market declines. The FOMC minutes (and since 2002 also the FOMC statements) report the names of members voting for or

[39] This number excludes mentions of speculative-grade bonds, most of which occur in the review sections by the staff. These mentions are part of a discussion of general conditions in the bond market and are not intended to describe speculative behavior in financial markets.

against a given policy action and provide the reason for each dissent.[40] Over the period from 1994 to 2018, there are a total of 2102 votes cast (between 8 and 12 per meeting), 97 (4.6%) are dissents, of which 19 are dovish and 76 hawkish (the remaining two are indeterminate). With only four governor dissents (three dovish and one hawkish), nearly all of the dissenting votes are due to regional Reserve Bank Presidents.[41]

Among the hawkish dissents, 35 contain a reference to financial conditions/markets, financial instability, and/or volatility: 25 of those cases imply or explicitly state a concern about policy-induced risk-taking, i.e., Fed's easy policy leading to market instability/volatility and, perhaps, economy, and 10 cases express the opinion that the Fed is overreacting to financial markets given its longer-term objectives. For the dovish dissents, we find two that suggest the Fed is not responding enough to the stress in financial markets.

Hawkish dissents motivated by the policy-induced risk-taking become more common in the aftermath of the financial crisis, as indicated in Figure 10.[42] However, the fact that such dissents are rare implies that only a few FOMC members were sufficiently concerned with potential moral hazard issues to dissent from the observed policy. It is therefore unlikely that the FOMC has refrained from cutting rates as much as they otherwise would because of moral hazard concerns.

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

[40]The description of the dissents may differ in scope and wording between the minutes and the statements. Thus, we code the content of the dissents using both sources.

[41]Thornton and Wheelock (2014) study the history of FOMC dissents. They classify votes against a policy action into those for easier/tighter policy and other. The other category contains cases of officials voting against a particular language adopted in the statement (e.g., regarding forward guidance). Based on the arguments for dissent provided in the statement and/or minutes, we code such situations as either dovish (2 votes) or hawkish (3 votes).

[42]Perhaps the two most explicit examples are hawkish dissents by president Hoenig, who dissented 8 times in 2010 and president George who dissented 7 times in 2013. While the number hawkish dissents of this kind increases during the period of unconventional monetary policy post financial crisis, similar arguments underlie (the few) dissents in the late 1990s, e.g. by president Jordan.

the mid-1990s, negative intermeeting 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 returns predict target changes mostly due to their strong correlation with downgrades to the Fed growth expectations and the Fed's assessment of current economic growth (the nowcast). We argue in favor of a causal (rather than coincidental) interpretation of this result. Using textual analysis of the 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 the FOMC meetings predict significant cuts to the FFR target.

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. While we find a role for both, the driver view is more commonly expressed. Discussions of stock market conditions by the 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 the Fed's 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. To assess potential moral hazard implications of policy accommodation following stock market declines, we document public awareness of a Fed put from around year 2000 based on newspaper articles. Analysis of the discussions of the Fed put in the FOMC transcripts, financial stability concerns in the minutes, and reasons for dissents within the FOMC suggests that the FOMC is aware of the potential moral hazard effects of loose policy, but such concerns appear concentrated among a small number of policymakers.

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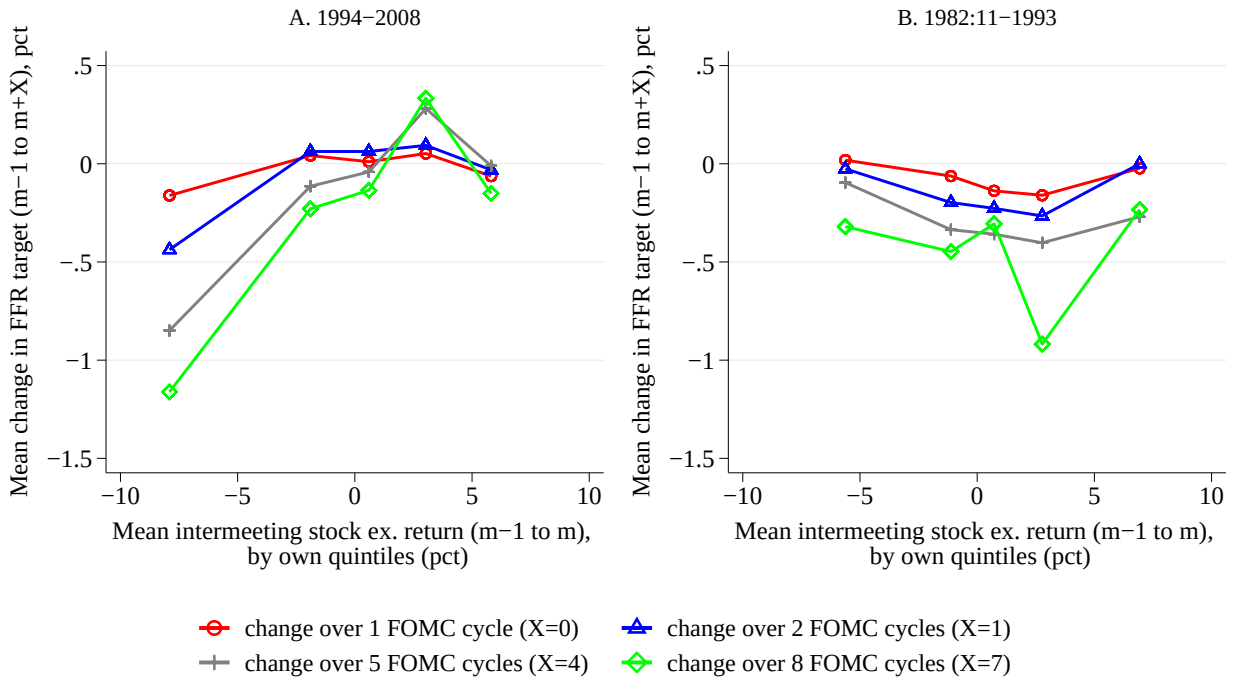

Figure 1. Changes in the FFR target conditional on the intermeeting stock excess returns. The figure plots the average cumulative FFR target change from day 0 of cycle $m-1$ to day 0 of cycle $m+7$ (approximately a one-year period) as a function of the intermeeting excess return.

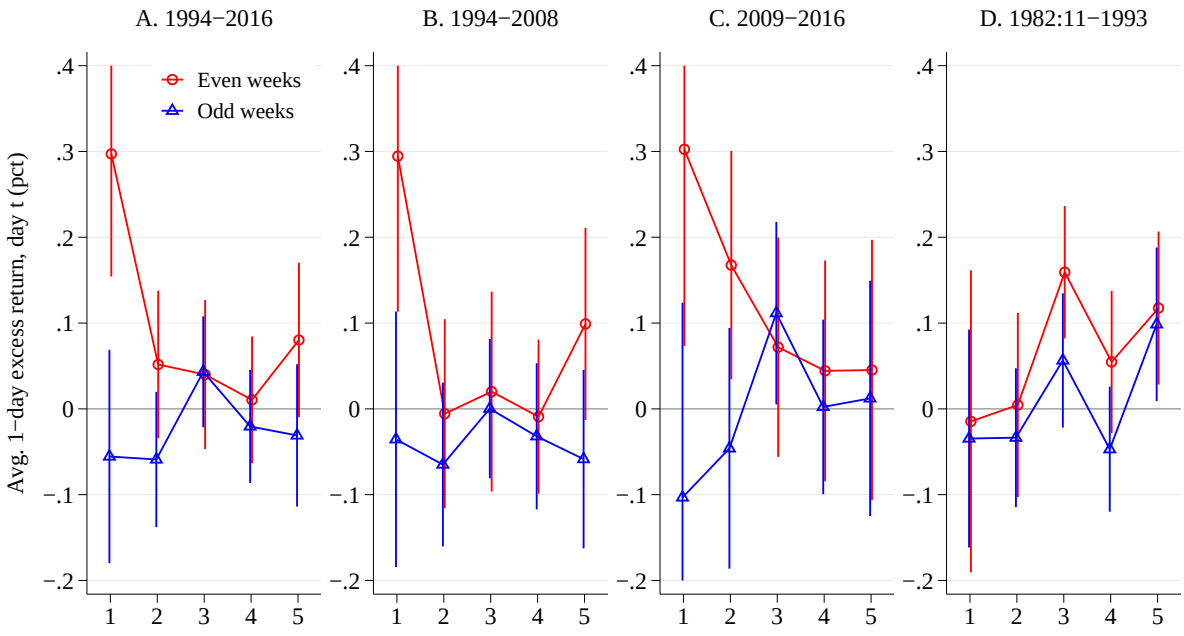

Figure 2. The Fed put in stock returns. The figure reports the average daily excess stock returns by even and odd weeks of the FOMC cycle, conditional on returns realized over the previous week (by quintiles, 1 = lowest; 5 = highest). Even and odd weeks are defined following CMVJ (2019). Return quintiles are defined over the 1994–2016 sample in Panels A through C and over the 1982:09–1993 sample in Panel D. Each plot contains 95% confidence intervals for the means. For readability of the graph, confidence intervals are truncated if they span outside of −0.2% and 0.4% range.

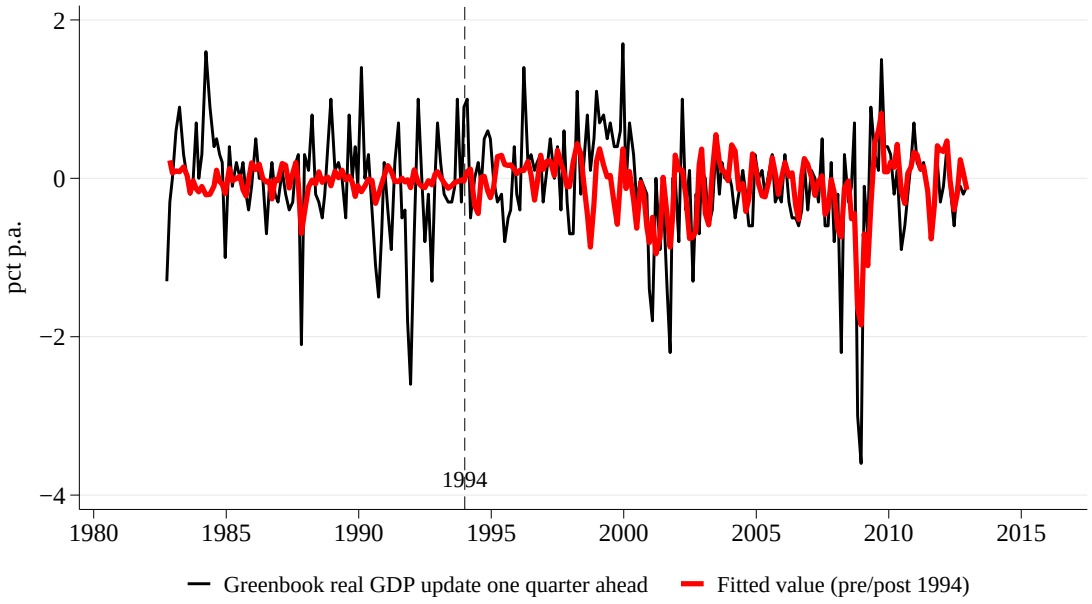

Figure 3. Greenbook growth expectations updates and intermeeting stock excess returns. The figure plots fitted values from regressions of Greenbook real GDP growth expectations updates of one-quarter-ahead forecasts on the current and lagged intermeeting stock excess returns. Updates are expressed in percent per annum. The regressions are estimated separately on the 1982:11–1993 and 1994–2012 samples (the vertical line in the graph indicates the sample split date). The estimates are (t-statistics robust to heteroscedasticity are in parentheses):

$$\text{Sample 1982:11–1993:}\quad \text{Updt}_m(g_{q1}) = \underset{(-0.82)}{-0.066} + \underset{(1.27)}{2.62}\, rx_m + \underset{(0.73)}{1.01}\, rx_{m-1},\ R^2 = 0.04, N = 90,$$

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

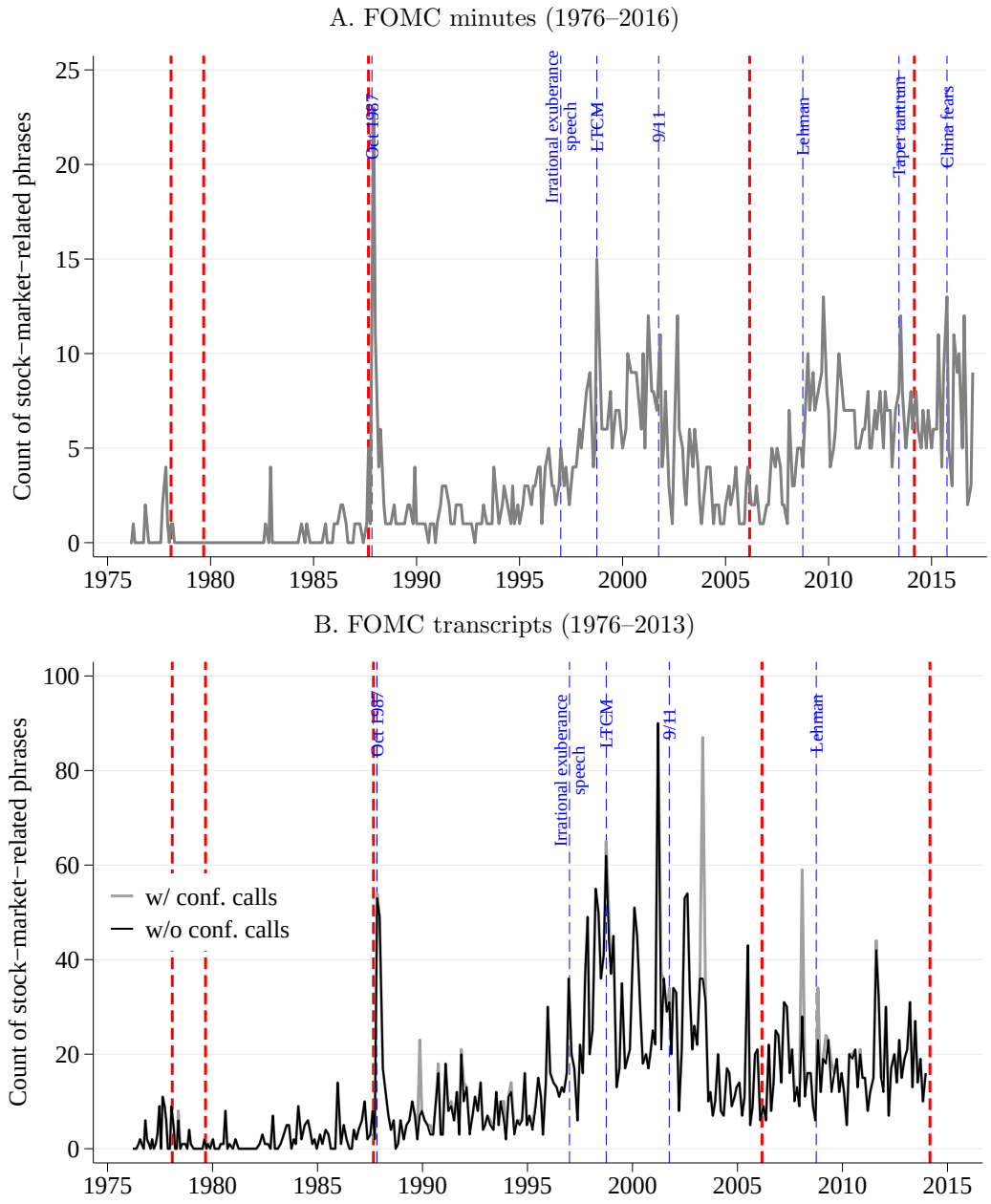

Figure 4. Counts of stock market mentions in FOMC documents. Panel A reports combined counts of stock market mentions in Records of Policy Actions and Minutes of Actions for the 1976–1992 sample and in FOMC minutes for the 1993–2016 sample. Panel B reports counts in the transcripts of FOMC meetings (solid black line) and those combined with counts in the 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.

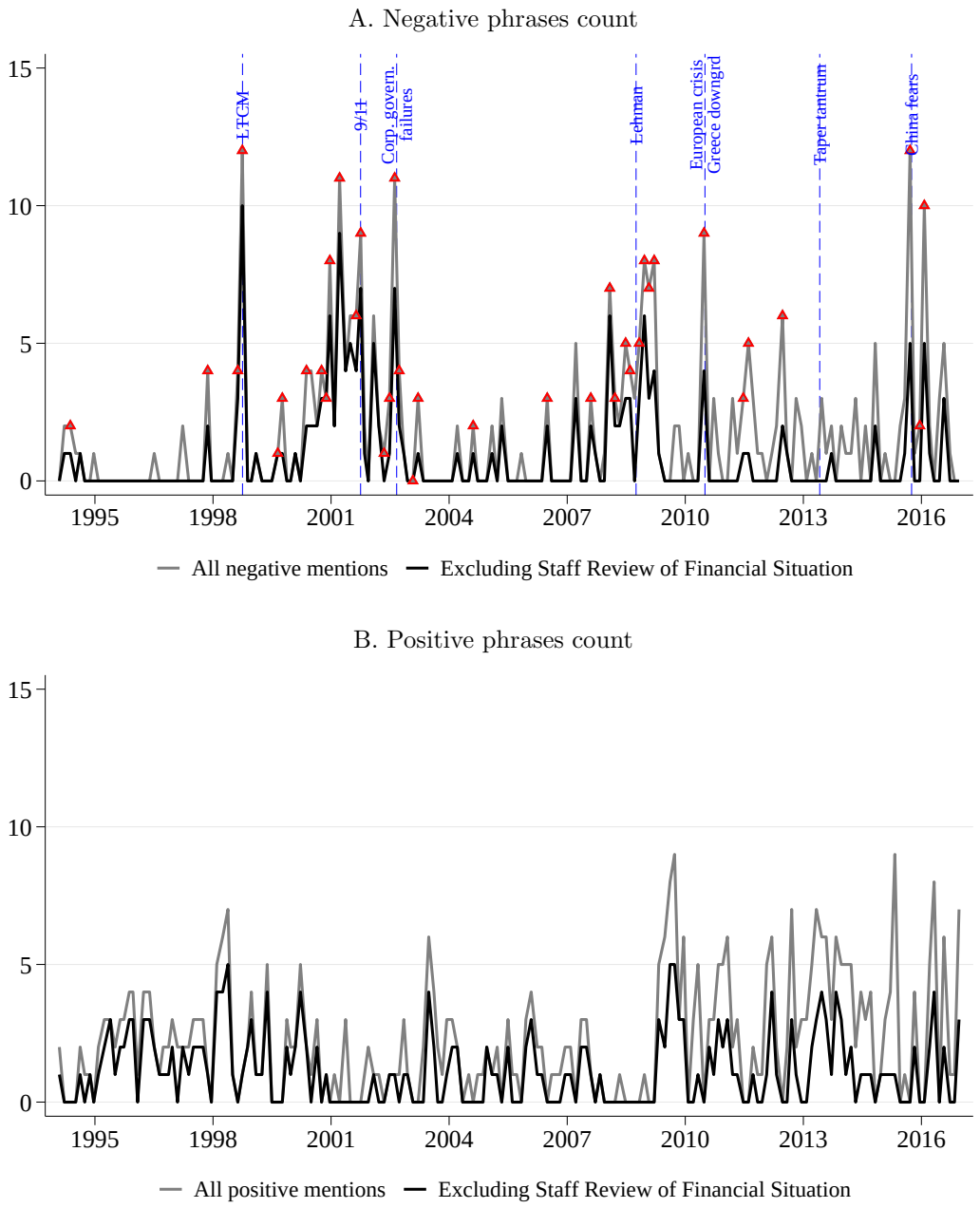

Figure 5. Time series of positive and negative stock market phrases in FOMC minutes. The figure presents the time series of negative and positive stock market phrases in FOMC minutes based on human coding. We present the overall counts as well as excluding the counts in the Staff Review of the Financial Situation (minutes' section 2). 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.

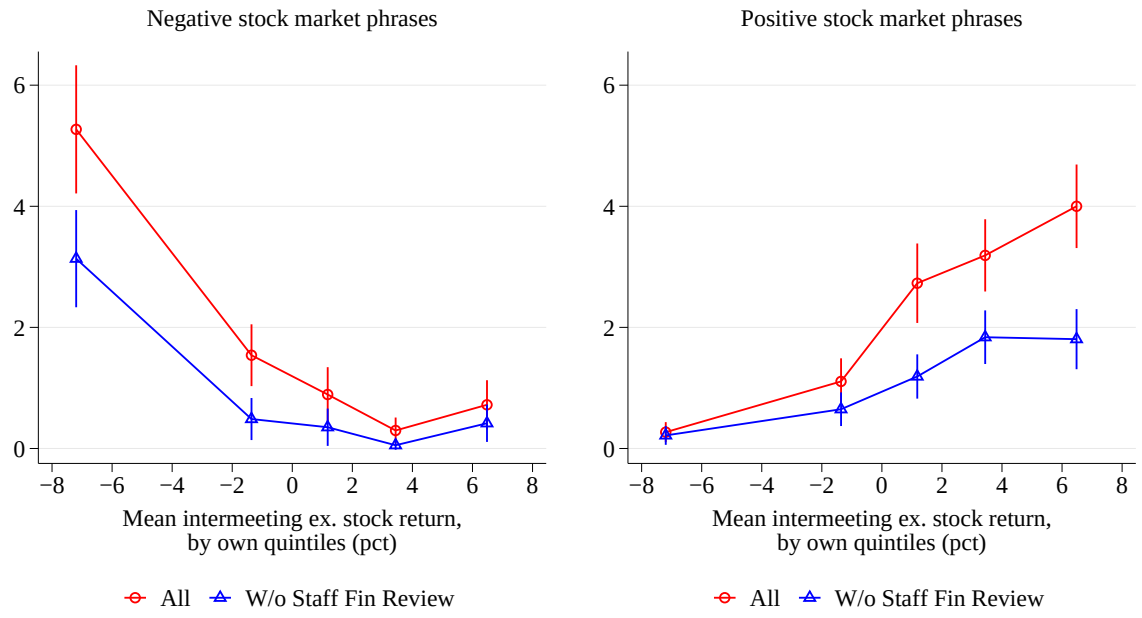

Figure 6. Intermeeting stock returns and negative/positive stock market mentions in FOMC minutes. The figure presents the average count of positive and negative stock market phrases conditional on the quintiles of intermeeting stock excess returns (x-axis labels report the average intermeeting return within a given quintile). Averages are for overall counts and for counts excluding the Staff Review of the Financial Situation section. The sample period is 1994–2016. The results are based on human coding of the minutes content. Appendix Figure 2 scatter-plots the data at individual meetings.

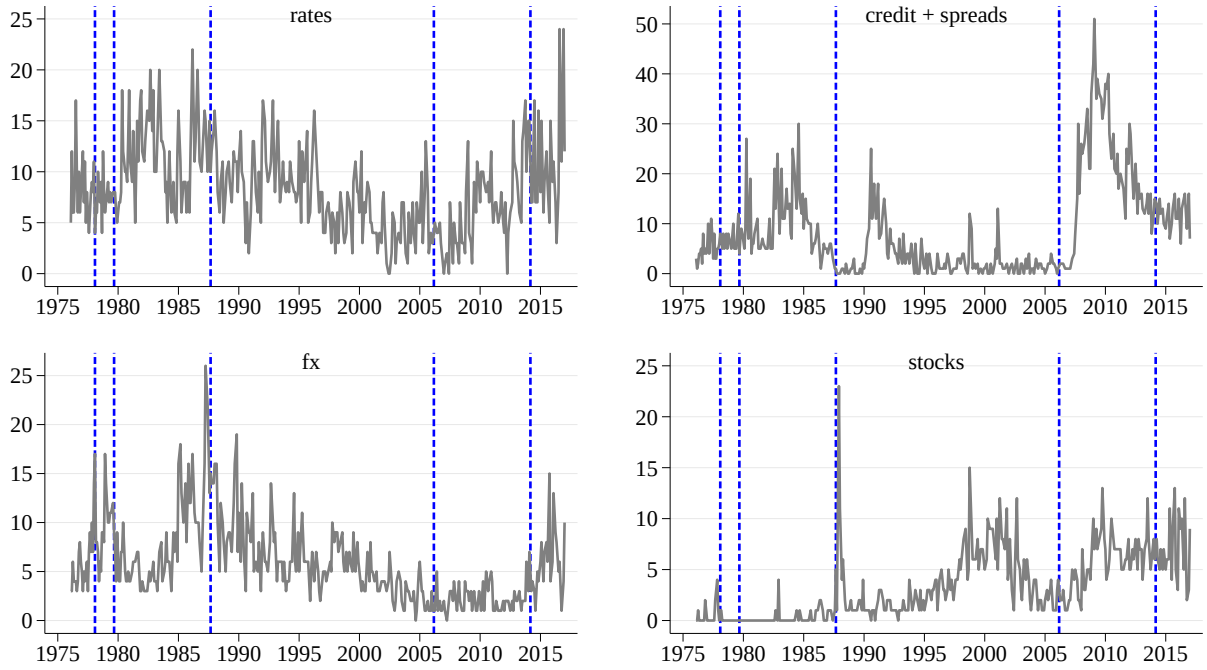

Figure 7. Mentions of specific financial conditions in FOMC minutes. The figure displays counts of mentions of different variables determining financial conditions. The counts are obtained from FOMC minutes. Dashed vertical lines indicate the end of tenures of subsequent Fed chairs. Word lists for each of the concepts graphed are available in Appendix C.

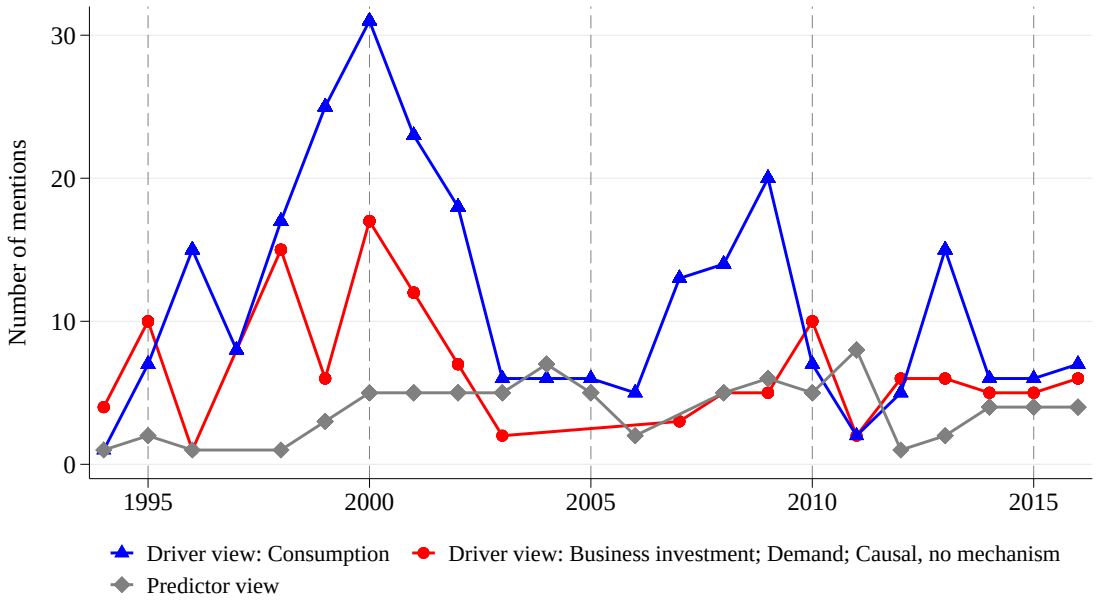

Figure 8. Content of stock market mentions in the FOMC minutes. The figure reports the counts of stock market mentions in the FOMC minutes by categories, as described in Table 8. Categories not plotted are "Financial stability," "Valuation determinants, levels," "Other," and "Descriptive." Counts are aggregated to the annual frequency over eight meetings within a calendar year.

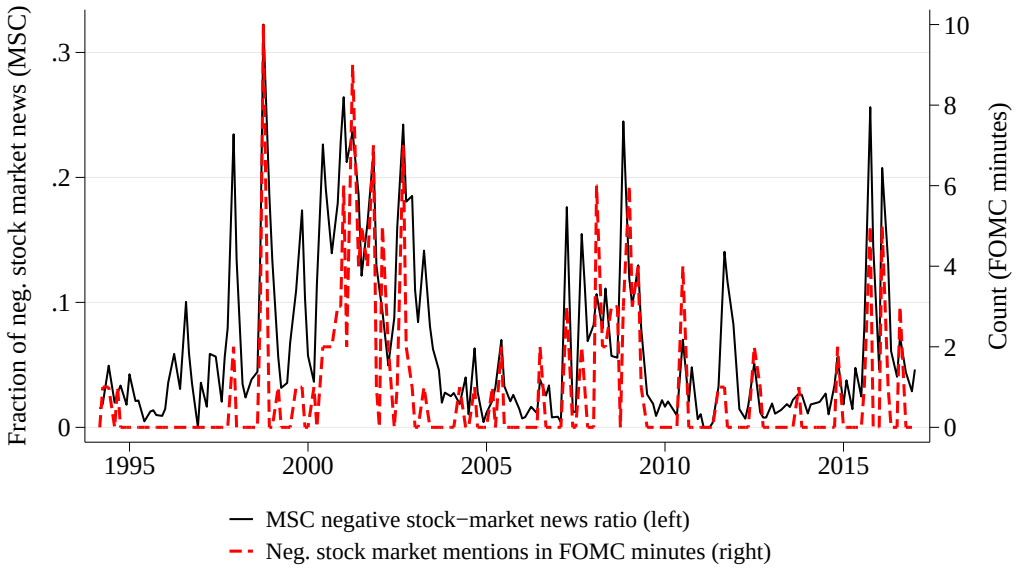

Figure 9. Consumers' attention to negative stock market news (Michigan Survey of Consumers). The plot superimposes the MSC negative stocks news ratio (number of Michigan survey respondents citing negative stock market news in a given month divided by the number of respondents citing any news in that month) with the frequency of negative stock market mentions in the FOMC minutes (excluding the Staff Review of the Financial Situation).

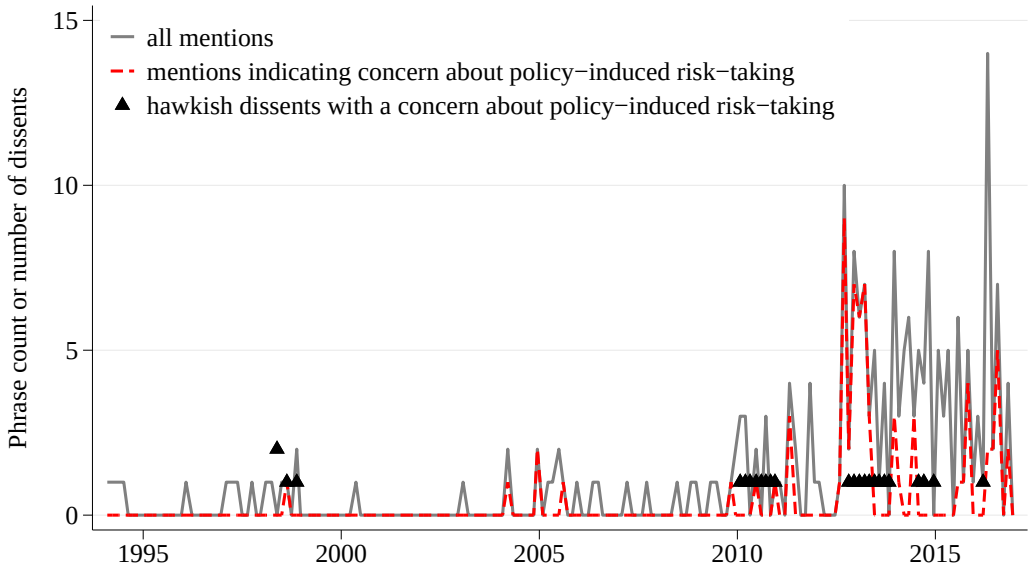

Figure 10. Financial-instability related phrases in the FOMC minutes. The figure plots the number of financial-instability related mentions in the FOMC minutes, focusing on the mentions of "moral hazard," "risk-taking," "speculat*," "bubble," "financial imbalance*," "financial stability," "financial instabilit*," "mispric*," and dropping any mentions that are not related to risk-taking or speculation in financial markets. The triangles indicate the number of dissenting votes motivated by a concern of easy policy causing financial instability.

	N	mean	std	skew	kurt	min	max
1982:11–1993	90	0.77	4.77	-1.17	8.23	-22.7	10.4
1982:11–1993 (excl. 11/3/87)	89	1.04	4.08	0.100	2.85	-9.84	10.4
1994–2016	184	0.48	5.21	-1.43	8.72	-29.8	12.6
1994–2016 (excl. 10/29/08)	183	0.64	4.71	-0.58	3.69	-17.2	12.6

Table 1. Summary statistics for intermeeting stock excess returns. The table reports summary statistics for intermeeting stock excess returns for the pre- and post-1994 sample. We also drop the most extreme intermeeting return in each subsample, i.e., Nov 3, 1987 and Oct 29, 2008. Intermeeting stock returns are in percentage points (e.g., mean of 0.77 meaning 0.77%). For consistency with our subsequent results, the pre-1994 sample starts with the November 16, 1982 meeting as this is the first meeting for which we are able to compute the FFR target change (from October 5, 1982 meeting).

	Dependent variable: $\text{FFR}_{m+X} - \text{FFR}_{m-1}$							
	A. 1994–2008				B. 1982:11–1993			
	$X = 0$	$X = 1$	$X = 4$	$X = 7$	$X = 0$	$X = 1$	$X = 4$	$X = 7$
rx_m^-	3.15***	7.13***	10.3***	12.7***	0.25	0.0047	0.25	-3.35
	(4.11)	(6.32)	(3.54)	(3.05)	(0.17)	(0.00)	(0.09)	(-0.75)
rx_m^+	-1.91*	-2.30	1.58	2.08	-0.23	0.58	-1.77	1.55
	(-1.75)	(-1.35)	(0.40)	(0.33)	(-0.17)	(0.22)	(-0.40)	(0.26)
Constant	0.075**	0.13*	0.026	-0.058	-0.064	-0.15	-0.25	-0.51
	(2.00)	(1.77)	(0.10)	(-0.12)	(-1.01)	(-1.21)	(-0.84)	(-1.05)
R^2	0.13	0.22	0.13	0.096	0.00043	0.00063	0.0016	0.0034
N	120	120	120	120	90	90	90	90

Table 2. Predicting target changes with stock returns. The table presents regressions of FFR target changes on positive and negative intermeeting stock excess returns. 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. Intermeeting returns are in decimals (e.g., 0.1, meaning 10% return) and FFR target changes are in percentage points (e.g., -0.25 meaning a 25 bps cut).

	Real GDP growth forecast update		Unemployment rate forecast update	
	(1)	(2)	(3)	(4)
	1994–2012	1982:9-1993	1994–2012	1982:11-1993
$\sum$coef rx^-	9.57***	1.45	-4.70***	-1.30
	(4.89)	(0.63)	(-5.66)	(-1.15)
$\sum$coef rx^+	3.79*	5.09*	0.11	-0.74
	(1.69)	(2.11)	(0.095)	(-0.40)
N	152	90	152	90
R^2	0.38	0.12	0.37	0.045

	Inflation forecast update					
	(1)	(2)	(3)	(4)	(5)	(6)
	1994–2012			1982:11–1993		
	GDP defl.	CPI (all)	CPI (core)	GDP defl.	CPI (all)	CPI (core)
$\sum$coef rx^-	1.04	4.62**	1.53**	0.23	-0.68	-0.27
	(1.37)	(2.58)	(2.01)	(0.28)	(-0.37)	(-0.17)
$\sum$coef rx^+	-2.10**	-2.68	-1.65*	-0.86	-3.13	0.58
	(-2.48)	(-1.50)	(-1.86)	(-0.64)	(-1.41)	(0.37)
N	152	152	152	90	90	62
R^2	0.054	0.24	0.16	0.11	0.14	0.14

Table 3. Stock market and the Fed's growth, unemployment and inflation expectations (Greenbook forecasts). The table reports regressions of Greenbook expectations updates of macroeconomic variables on intermeeting stock excess returns. All regressions are estimated with two lags of rx^+ and rx^-, a lag of the dependent variable and a constant. We summarize the results by reporting the sum of the coefficients on the two lags of the intermeeting stock returns in rows "$\sum$coef," with stars indicating statistical significance for the null hypothesis that the sum of coefficients is zero. For the real GDP growth and inflation, we sum the updates from current quarter through three quarters forward (q1+q2+q3+q4), i.e., spanning one year ahead. Since Greenbook unemployment forecasts are for the level of the unemployment rate (as opposed to a growth rate), we use the update three quarters forward (q3). Core CPI expectations data start in 1986. The growth rates of inflation and real GDP 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). t-statistics robust to heteroscedasticity are in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ΔFFR_m						$E(g_{q0})$	$\text{Updt}(g_{q1})^-$	$E(\pi_{q1})$
FFR_{m-1}	0.22***	-0.0089	-0.0068						
	(3.21)	(-0.11)	(-0.09)						
FFR_{m-2}	0.096	0.23	0.24*						
	(0.76)	(1.63)	(1.78)						
FFR_{m-3}	-0.34***	-0.26***	-0.28***						
	(-3.98)	(-2.91)	(-3.19)						
rx_m^-	2.38**		0.73	1.89**		0.57	7.07**	5.41***	1.90
	(2.37)		(0.89)	(2.16)		(0.79)	(2.44)	(2.65)	(1.31)
rx_{m-1}^-	2.97***		0.92	3.31***		0.84	14.8***	6.94***	0.69
	(5.58)		(1.39)	(5.29)		(0.90)	(3.62)	(3.45)	(0.55)
rx_{m-2}^-				1.99***		0.22	18.3***	-0.78	0.24
				(2.77)		(0.30)	(5.13)	(-0.87)	(0.18)
rx_{m-3}^-				1.15*		-0.014	14.9***	0.18	1.29
				(1.93)		(-0.02)	(3.75)	(0.14)	(1.14)
rx_{m-4}^-				1.86*		0.96	5.06**	-0.76	1.95
				(1.84)		(1.43)	(2.12)	(-0.50)	(1.28)
rx_m^+	-1.31		-0.65						
	(-1.22)		(-0.77)						
rx_{m-1}^+	-0.49		0.27						
	(-0.51)		(0.34)						
$E_m(g_{q0})$		0.084***	0.075***		0.11***	0.10***			
		(4.68)	(4.02)		(7.11)	(5.90)			
$E_m(\pi_{q1})$		0.14***	0.12***		0.099***	0.080***			
		(4.88)	(3.87)		(3.67)	(2.65)			
$\text{Updt}_m(g_{q1})^-$		0.17***	0.13**		0.15***	0.10			
		(3.64)	(2.12)		(2.86)	(1.58)			
$\text{Updt}_m(g_{q1})^+$		-0.010	-0.00045		-0.074	-0.063			
		(-0.20)	(-0.01)		(-1.40)	(-1.22)			
Constant	0.24***	-0.26***	-0.19*	0.16***	-0.44***	-0.35***	3.45***	-0.069*	1.95***
	(3.83)	(-3.04)	(-1.81)	(5.68)	(-4.88)	(-3.44)	(24.73)	(-1.67)	(26.06)
$\sum_k \text{coef FFR}_{m-k}$	-0.029***	-0.045***	-0.045***						
$\sum \text{coef } rx^-$	5.35***		1.66	10.2***		2.57*	60.1***	11.0**	6.07*
$\sum \text{coef } rx^+$	-1.80		-0.39						
AIC	-11.6	-45.2	-42.0	19.4	-27.6	-22.2	517.5	158.7	313.1
BIC	10.7	-22.9	-8.56	36.1	-13.7	5.71	535.6	176.8	331.3
R^2	0.54	0.65	0.67	0.39	0.58	0.59	0.52	0.44	0.041
$\bar{R}^2$	0.51	0.63	0.63	0.36	0.56	0.56	0.50	0.42	0.0086
N	120	120	120	120	120	120	152	152	152

Table 4. Taylor rules. The dependent variable in column (1)–(6) is the FFR target change from meeting $m-1$ to m, ΔFFR_m. $E_m(\cdot)$ denotes Greenbook forecasts: $E_m(g_{q0})$ is the forecast of the real GDP growth (current quarter, q0) and $E_m(\pi_{q1})$ denotes GDP deflator inflation, one quarter ahead (q1). $\text{Updt}_m(g_{q1})$ is the forecast update of the next quarter's (q1) real GDP growth rate between the previous and the current FOMC meeting, and $\text{Updt}_m(g_{q1})^+ = \max(\text{Updt}_m(g_{q1}), 0)$, $\text{Updt}_m(g_{q1})^- = \min(\text{Updt}_m(g_{q1}), 0)$. 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), considering combinations of forecast horizons between $h = 0$ and $h = 4$ quarters ahead for macro variables and FFR up to four lags ($K = 4$). We find that robust t-statistics are more conservative for the stock market variables than HAC t-statistics, therefore we use robust t-statistics throughout the table. The sample period in columns (1)–(6) is 1994–2008 and in columns (7)–(8) it is 1994–2012.

	(1) ΔFFR_m	(2) ΔFFR_m
FFR_{m-1}	0.23***	-0.091
	(3.26)	(-0.86)
FFR_{m-2}	0.089	0.42**
	(0.70)	(2.51)
FFR_{m-3}	-0.35***	-0.34***
	(-4.04)	(-3.35)
Overal return (−), $ret^{-}_{m,m-1}$	2.29***	
	(5.51)	
Overal return (+), $ret^{+}_{m,m-1}$	-1.21	
	(-1.21)	
Monetary news component (−), $ret^{mp-}_{m,m-1}$		-1.68
		(-1.49)
Monetary news component (+), $ret^{mp+}_{m,m-1}$		-4.56***
		(-2.83)
Growth news component (−), $ret^{g-}_{m,m-1}$		2.63***
		(3.07)
Growth news component (+), $ret^{g+}_{m,m-1}$		0.83
		(0.61)
Risk premium news component (−), $ret^{rp-}_{m,m-1}$		1.96***
		(2.80)
Risk premium news component (+), $ret^{rp+}_{m,m-1}$		-0.25
		(-0.34)
Constant	0.26***	0.17**
	(4.36)	(2.39)
R^2	0.54	0.72
$\bar{R}^2$	0.52	0.70
N	120	120

Table 5. Effect of news in the intermeeting stock returns on the FFR target. Column (1) reports the regression of the FFR target changes on positive/negative intermeeting log return over the two last intermeeting periods, e.g., $ret^{+}_{m,m-1} = ret^{+}_{m} + ret^{+}_{m-1}$. Column (2) reports the regression of FFR target changes on return components due growth news (ret^{g}), monetary news (ret^{mp}), and risk-premium news (ret^{rp}) news, each split into positive and negative realizations and also summed over the last two intermeeting periods. The sample period is 1994–2008. Robust t-statistics are in parentheses. Intermeeting returns and return components are in decimals (e.g., 0.1 meaning 10% return), and target changes are in percentage points (e.g., 0.25 meaning 25bps).

A. Counts by phrase

Phrase	Count	% of Total
equity price*	380	39.0
stock market	154	15.8
stock pri*	136	14.0
equity market	125	12.8
equity ind*	58	6.0
s&p 500 index	51	5.2
equities	22	2.3
equity value*	20	2.1
equity and house price*	6	0.6
equity wealth	6	0.6
stock ind*	5	0.5
home and equity price*	4	0.4
equity and home price*	3	0.3
equity and housing price*	2	0.2
house and equity price*	2	0.2
housing and equity price*	1	0.1
Total	975	100.0

B. Counts by minutes' section

Section	Count	% of Total
1. Staff Review of Economic Situation	81	8.3
2. Staff Review of Financial Situation	502	51.5
3. Staff Economic Outlook	70	7.2
4. Participants' Views	274	28.1
5. Committee Policy Action	38	3.9
6. Other	10	1.0
Total	975	100

C. Counts by tone

Tone	Count	% of Total
Positive	414	42.5
Negative	322	33.0
Neutral	68	7.0
Hypothetical	36	3.7
Unclear	135	13.9
Total	975	100

Table 6. Stock market mentions in FOMC minutes.

	Minutes (human coding)				Transcripts (algo-based coding)
	(1) All	(2) Staff Fin. Rev.	(3) Other Staff	(4) Participants	(5) Participants
FFR_{m-1}	0.19***	0.31***	0.24***	0.22***	0.20***
	(2.77)	(4.57)	(3.77)	(3.00)	(2.64)
FFR_{m-2}	0.069	-0.013	0.031	0.011	-0.0092
	(0.45)	(-0.08)	(0.19)	(0.07)	(-0.04)
FFR_{m-3}	-0.27**	-0.32***	-0.29**	-0.24*	-0.19
	(-2.40)	(-2.69)	(-2.37)	(-1.98)	(-1.17)
$\#\text{Stocks}^{-}_{m}$	-0.071**	-0.054	-0.069*	-0.048**	-0.030**
	(-2.17)	(-1.58)	(-1.85)	(-2.03)	(-2.36)
$\#\text{Stocks}^{-}_{m-1}$	-0.10***	-0.14***	-0.063**	-0.070***	-0.095***
	(-3.06)	(-2.74)	(-2.43)	(-3.06)	(-4.44)
$\#\text{Stocks}^{+}_{m}$	-0.047*	-0.062	0.010	0.0059	-0.019
	(-1.75)	(-1.49)	(0.57)	(0.37)	(-1.43)
$\#\text{Stocks}^{+}_{m-1}$	0.0076	0.0052	0.0065	0.0098	-0.016
	(0.26)	(0.13)	(0.29)	(0.54)	(-1.31)
$\#\text{Doc. length}_{m}$	-0.10**	-0.072	-0.084	-0.12**	-0.14***
	(-2.19)	(-1.61)	(-1.62)	(-2.15)	(-2.83)
Constant	-0.065	-0.036	-0.000013	-0.043	-0.058
	(-0.82)	(-0.47)	(-0.00)	(-0.51)	(-0.76)
N	119	119	119	119	119
R^2	0.52	0.50	0.46	0.48	0.54
$\bar{R}^2$	0.49	0.47	0.42	0.44	0.51

Table 7. Predicting FFR target changes with positive and negative stock market mentions. The dependent variable is the FFR target change from meeting $m-1$ to m, ΔFFR_m, which is regressed on counts of positive and negative stock market mentions in the FOMC documents of meeting m and $m-1$ and three lags of the FFR. 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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Staff Rev. of Econ. Situation	Staff Rev. of Fin. Situation	Staff Econ. Outlook	Particip. Views	Committee Policy Action	Other	Total	% of all mentions
Total	**81**	**502**	**70**	**274**	**38**	**10**	**975**	**100%**
Driver view	**74**	**7**	**61**	**219**	**10**	**2**	**373**	**38%**
Consumption	70	0	43	144	0	0	257	26%
Wealth effect	*57*	*0*	*40*	*116*	*0*	*0*	*213*	*22%*
Causal, non-specific	*13*	*0*	*3*	*28*	*0*	*0*	*44*	*5%*
Business investment	1	0	1	19	0	0	21	2%
Cost of capital	*1*	*0*	*0*	*8*	*0*	*0*	*9*	*1%*
Causal, non-specific	*0*	*0*	*1*	*11*	*0*	*0*	*12*	*1%*
Demand	0	1	5	10	0	0	16	2%
Causal, no mechanism	3	6	12	46	10	2	79	8%
Predictor view	**0**	**65**	**0**	**16**	**0**	**0**	**81**	**8%**
Valuation determinants, levels	**1**	**92**	**1**	**7**	**0**	**4**	**105**	**11%**
Rates/policy affecting stocks	*0*	*32*	*0*	*1*	*0*	*0*	*33*	*3%*
Financial stability	**0**	**2**	**0**	**5**	**0**	**0**	**7**	**1%**
Other	**3**	**5**	**0**	**25**	**1**	**0**	**34**	**3%**
Descriptive	**3**	**331**	**8**	**2**	**27**	**4**	**375**	**38%**

Table 8. Content of stock market mentions in the FOMC minutes. The table reports the number of stock market mentions by category (mechanism), and by the section of the FOMC minutes. The sample period is 1994–2016. The results are based on human coding of the content. The consumption category contains mentions related to residential investment.

Phrase	(1) # in par.	(2) # in sec.	(3) Ratio (1)/(2)	(4) Odds ratio
Staff Review of the Economic Situation				
wealth/net worth	32	59	0.54	8.74
disposable income	30	65	0.46	7.44
consumer sentiment	46	103	0.45	7.20
personal consumption expenditure*	31	104	0.30	4.80
pce	38	172	0.22	3.56
retail sales	29	133	0.22	3.51
consumer spending	44	227	0.19	3.12
motor vehicle*	66	573	0.12	1.86
Staff Review of the Financial Situation				
employment/unemployment	27	49	0.55	2.09
economic activity	32	70	0.46	1.73
economic outlook	22	58	0.38	1.44
inflation	122	495	0.25	0.94
economic growth	27	124	0.22	0.83
Staff Economic Outlook				
final demand	24	26	0.92	3.42
wealth/net worth	27	33	0.82	3.03
exports	30	67	0.45	1.66
productivity	21	48	0.44	1.62
labor market*	21	50	0.42	1.56
business investment (and similar terms)	25	65	0.38	1.43
potential output	23	69	0.33	1.24
economic activity	58	176	0.33	1.22
consumer spending	21	76	0.28	1.02
real gdp	52	249	0.21	0.77
gdp growth	27	141	0.19	0.71
employment/unemployment	26	143	0.18	0.67
inflation	64	467	0.14	0.51
Participants' Views on Current Conditions and the Economic Outlook				
wealth/net worth	36	61	0.59	4.59
consumer expenditures	31	57	0.54	4.23
consumer confidence	60	122	0.49	3.82
consumer sentiment	28	58	0.48	3.75
retail sales	37	77	0.48	3.74
consumer spending	176	405	0.43	3.38
motor vehicle*	43	109	0.39	3.07
consumption	20	62	0.32	2.51
economic expansion	22	119	0.18	1.44
economic outlook	27	167	0.16	1.26
business spending (and similar terms)	22	149	0.15	1.15
productivity	52	360	0.14	1.12
business investment (and similar terms)	31	215	0.14	1.12
economic activity	52	450	0.12	0.90
energy prices	22	241	0.091	0.71
exports	21	245	0.086	0.67
employment/unemployment	68	865	0.079	0.61
economic growth	24	325	0.074	0.57
labor market*	38	547	0.069	0.54
inflation	88	2179	0.040	0.31

Table 9. Stock market co-occurrences with economic phrases. The table shows counts of economic phrases 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. The sample period is 1994–2016. The odds ratio is defined as (# economic phrase i in paragraph mentioning stocks / # all economic phrases in paragraph mentioning stocks) / (# economic phrase i in section / # all economic phrases in section). We display only economic phrases that occur 20 times or more in the same paragraph as a stock market phrase. To avoid understating the importance of concepts for which slightly different phrases are used, four of the above categories include several phrases: wealth/net worth, business investment/business fixed investment/capital investment, business spending/business capital spending/capital spending, employment/unemployment.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Greenspan		Bernanke		Yellen		Chairs overall	
	#	%	#	%	#	%	#	%
Total	**215**	**100%**	**98**	**100%**	**60**	**100%**	**373**	**100%**
Driver view	**80**	**37%**	**44**	**45%**	**37**	**62%**	**161**	**43%**
Consumption	*39*	*18%*	*24*	*24%*	*19*	*32%*	*82*	*22%*
Investment	*10*	*5%*	*2*	*2%*	*0*	*0%*	*12*	*3%*
Causal, non-specific	*33*	*15%*	*19*	*19%*	*18*	*30%*	*70*	*19%*
Stocks driving policy, no mechanism stated	**20**	**9%**	**2**	**2%**	**1**	**2%**	**23**	**6%**
Predictor view	**29**	**13%**	**18**	**18%**	**10**	**17%**	**57**	**15%**
Valuation determinants, levels	**93**	**43%**	**31**	**32%**	**16**	**27%**	**140**	**38%**
Policy affecting stocks	*28*	*13%*	*11*	*11%*	*6*	*10%*	*45*	*12%*
Other	**25**	**12%**	**12**	**12%**	**3**	**5%**	**40**	**11%**

Table 10. Classification of chairs' stock market mentions in FOMC transcripts. The table classifies the stock-market mentions by the chairs in FOMC transcripts. The total number of mentions by a person is given in the top row. The categories are not mutually exclusive and so one mention can belong to more than one category. However, category "Causal, non-specific" does not include any mentions related to consumption or investment. The sample period is 1994–2013.

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

	(1)	(2)	(3)
	Real GDP growth	Unemployment rate	Inflation (GDP deflator)
$\sum$coef rx^-	8.82***	-5.44***	1.81*
	(5.07)	(-4.47)	(1.87)
$\sum$coef rx^+	1.49	0.98	-1.16*
	(1.02)	(1.02)	(-1.79)
R^2	0.53	0.53	0.15
N	92	92	92

B. BCEI forecasts, monthly frequency

	1994–2016, q0+q1+q2+q3			1982:11–1993, q0+q1+q2+q3	
	(1)	(2)	(3)	(4)	(5)
	Real GDP growth	Unemployment rate	Inflation (GDP deflator)	Real GDP growth	Unemployment rate
$\sum$coef rx^-	5.89***	-4.41***	1.63***	3.62***	-1.40**
	(4.47)	(-4.82)	(2.73)	(4.45)	(-2.04)
$\sum$coef rx^+	2.75***	-0.65	-0.74*	2.44***	-0.016
	(3.77)	(-1.19)	(-1.66)	(3.11)	(-0.022)
R^2	0.56	0.56	0.25	0.43	0.32
N	276	276	276	141	144

Table 11. Stock market and private sector macro forecasts. The table presents regressions of forecast updates in the SPF and BCEI surveys on the inter-survey stock market returns. All regressions are estimated with a constant, two lags of rx^+ and rx^-, and a lag of the dependent variable. We summarize the results by reporting the sum of the coefficients on the two lags of the stock returns, with stars indicating statistical significance for the null hypothesis that the sum of coefficients is zero. The regressions in Panel A are estimated at the quarterly frequency; for comparison with Panel A, regressions in Panel B are estimated comparing expectations from a given survey to expectations three months earlier, defining the excess stock return since the last survey accordingly. Panel A uses robust t-statistics, and panel B uses HAC t-statistics with 2 lags to account for overlapping survey data.

	Real GDP growth			Unemployment rate change		
	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)
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)		
	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)
N (quarters)	89	186	275
R^2	0.33	0.56	0.59

Table 12. 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; the regressions include a constant and the lag of the dependent variable, both omitted from the table. HAC t-statistics are in parentheses.