Internet Appendix for: The Economics of the Fed Put

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Additional figures and tables

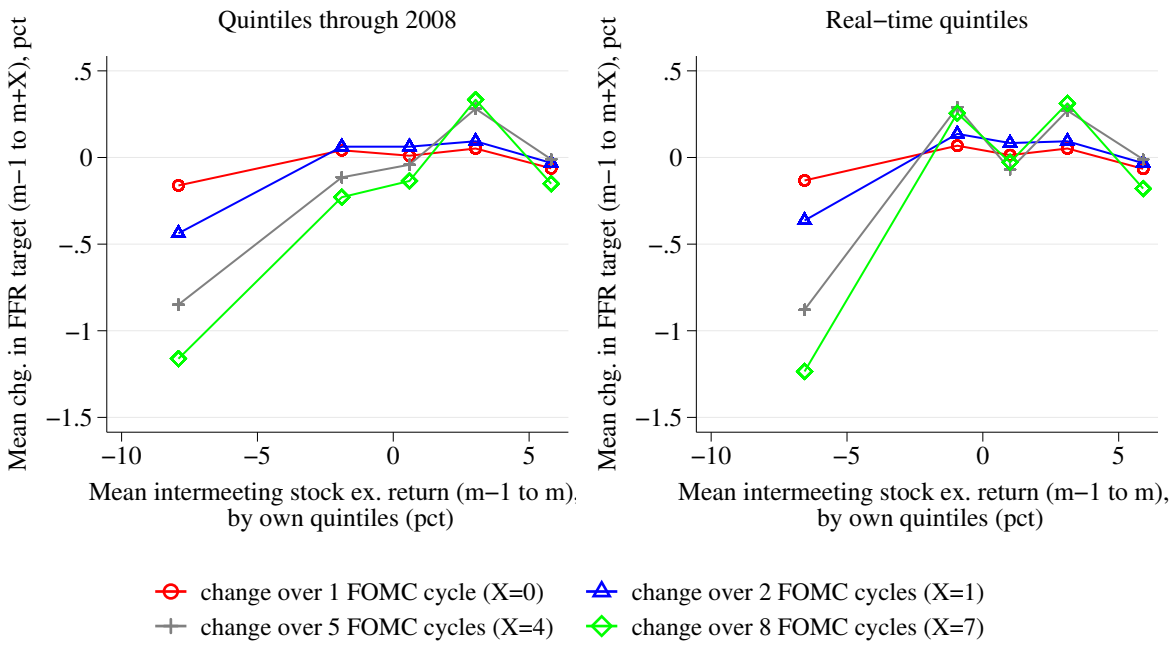

Figure 1
Changes in the FFR target conditional on intermeeting stock excess returns. In the left panel, quintiles of intermeeting excess stock returns are defined over the 1994–2008 sample. In the right panel, quintiles are defined over an expanding window, i.e., for meeting at date m quintiles only use intermeeting returns up to time m. The first quintile assignment in 1994:02 uses data for all meetings between 1983:11 (when the first change in the target can be computed) and 1994:02 (the first meeting in 1994). Subsequent quintile assignments increment the sample by one meeting at a time.

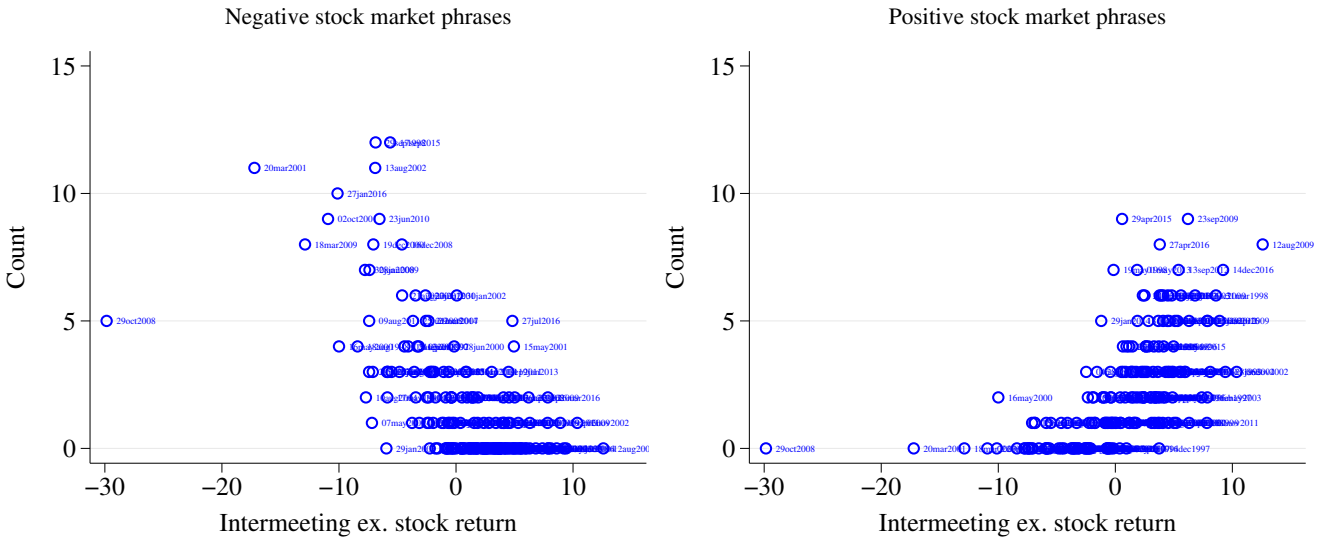

Figure 2

Intermeeting stock returns and negative/positive stock-market phrases in FOMC minutes. The scatter plots display the number of positive or negative stock market mentions against excess stock returns realized in the intermeeting period. Average number of mentions in relation to average intermeeting returns by quintiles are reported in Figure 6 of the paper. The sample period is 1994–2016. The results are based on human coding of the minutes content.

Table 1
Predicting negative and positive stock market phrases in the FOMC minutes by intermeeting stock market excess returns (human coding). The table presents regressions of counts of positive and negative stock market mentions in FOMC minutes on intermeeting stock market excess returns. The results are based on human coding of stock market mentions. In columns (2)–(4), negative coefficients mean that more negative (positive) stock returns predict more (fewer) negative mentions. Analogous interpretation applies to positive coefficients in columns (6)–(8). HAC t-statistics with 4 lags are in parentheses.

	Negative stock market mentions				Positive stock market mentions			
	(1) 1994-2016	(2) 1994-2016	(3) 1994-2008	(4) 2009-2016	(5) 1994-2016	(6) 1994-2016	(7) 1994-2008	(8) 2009-2016
rx_m	-30.1***				22.9***			
	(-6.16)				(5.90)			
rx_{m-1}	-12.4***				7.97***			
	(-5.71)				(2.98)			
rx_{m-2}	-5.78**				1.54			
	(-2.36)				(0.64)			
rx_m^-		-38.4***	-32.1**	-72.1***		7.93**	5.09**	26.5***
		(-2.92)	(-2.39)	(-4.55)		(2.26)	(1.99)	(3.31)
rx_{m-1}^-		-19.0***	-21.3***	-1.18		-1.10	-1.58	0.82
		(-7.05)	(-7.12)	(-0.20)		(-0.51)	(-0.87)	(0.12)
rx_{m-2}^-		-6.09	-12.4	2.16		2.66	3.24	0.58
		(-1.48)	(-1.62)	(0.46)		(0.83)	(0.76)	(0.18)
rx_m^+		-18.5***	-22.9***	-10.5**		44.1***	32.5***	46.8***
		(-2.66)	(-2.74)	(-2.20)		(8.44)	(6.95)	(4.93)
rx_{m-1}^+		0.56	-2.01	-4.96		27.3***	23.1***	23.1***
		(0.11)	(-0.35)	(-0.76)		(4.73)	(2.91)	(2.85)
rx_{m-2}^+		0.51	-2.90	-4.82		9.12***	7.91**	3.34
		(0.10)	(-0.46)	(-0.74)		(2.64)	(2.02)	(0.53)
Constant	1.97***	1.04**	0.88	1.68***	2.10***	0.66**	0.56**	1.77***
	(11.69)	(2.35)	(1.64)	(4.54)	(12.88)	(2.23)	(2.09)	(4.18)
$\sum$coef rx	-48.3				32.5			
	(-7.97)				(5.09)			
$\sum$coef rx^-		-63.5	-65.8	-71.1		9.49	6.76	27.9
		(-5.18)	(-4.02)	(-6.14)		(1.56)	(1.40)	(3.19)
$\sum$coef rx^+		-17.5	-27.8	-20.2		80.5	63.4	73.2
		(-1.40)	(-1.76)	(-1.96)		(8.14)	(5.05)	(6.41)
R^2	0.50	0.53	0.57	0.65	0.39	0.49	0.45	0.56
$\bar{R}^2$	0.49	0.51	0.55	0.61	0.38	0.47	0.42	0.52
N	184	184	120	64	184	184	120	64

Table 2

Algorithmic coding of economic content of housing market mentions in FOMC minutes. 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 housing market phrase is mentioned. 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. The sample period is 1994–2016. The asterisk * indicates that we allow for different grammatical forms.

Phrase	(1) # in par.	(2) # in sec.	(3) Ratio (1)/(2)	(4) Odds ratio
Staff Review of the Economic Situation				
consumer spending	99	227	0.44	3.90
wealth/net worth	20	58	0.34	3.08
consumer sentiment	31	103	0.30	2.69
retail sales	32	133	0.24	2.15
business investment	26	126	0.21	1.85
labor market*	36	193	0.19	1.67
economic activity	48	323	0.15	1.33
industrial production	40	271	0.15	1.32
energy prices	39	327	0.12	1.07
motor vehicle*	59	573	0.10	0.92
inflation	73	776	0.094	0.84
(un)employment	68	897	0.076	0.68
inventories	30	402	0.075	0.67
Staff Review of the Financial Situation				
inflation	46	495	0.093	1.21
Staff Economic Outlook				
consumer spending	42	76	0.55	1.88
business investment	26	65	0.40	1.36
potential output	27	69	0.39	1.33
exports	26	67	0.39	1.32
economic activity	65	176	0.37	1.25
pce	23	69	0.33	1.13
real gdp	72	249	0.29	0.98
(un)employment	29	143	0.20	0.69
inflation	89	467	0.19	0.65
gdp growth	25	141	0.18	0.60
Participants' Views on Current Conditions and the Economic Outlook				
residential construction	33	50	0.66	4.74
consumption	38	62	0.61	4.40
household* spending	45	85	0.53	3.80
wealth/net worth	20	51	0.39	2.82
consumer sentiment	22	58	0.38	2.73
consumer spending	151	405	0.37	2.68
retail sales	28	77	0.36	2.61
consumer confidence	38	122	0.31	2.24
motor vehicle*	30	109	0.28	1.98
economic outlook	35	167	0.21	1.51
inventories	40	221	0.18	1.30
economic expansion	21	119	0.18	1.27
energy prices	42	241	0.17	1.25
economic growth	54	325	0.17	1.19
business investment	35	215	0.16	1.17
economic activity	73	450	0.16	1.17
(un)employment	127	865	0.15	1.05
labor market*	58	547	0.11	0.76
inflation	145	2179	0.067	0.48

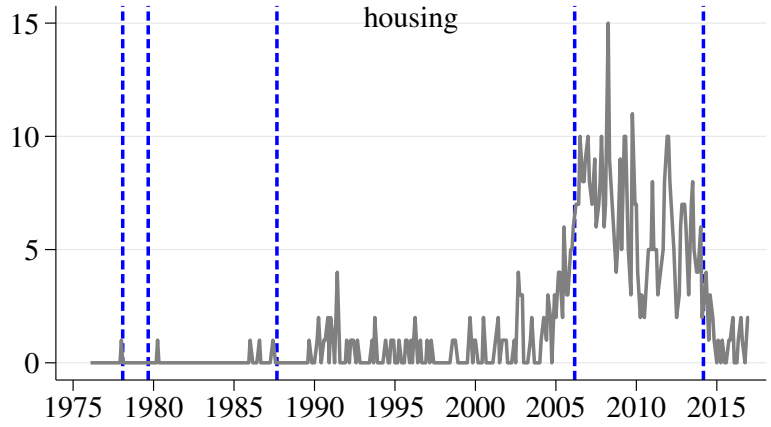

Figure 3
Mentions of the housing market in FOMC minutes. The figure displays counts of mentions of the housing market in the FOMC minutes. Dashed vertical lines indicate a change of the Fed chair. Specific search phrases are reported in Appendix Table 13.

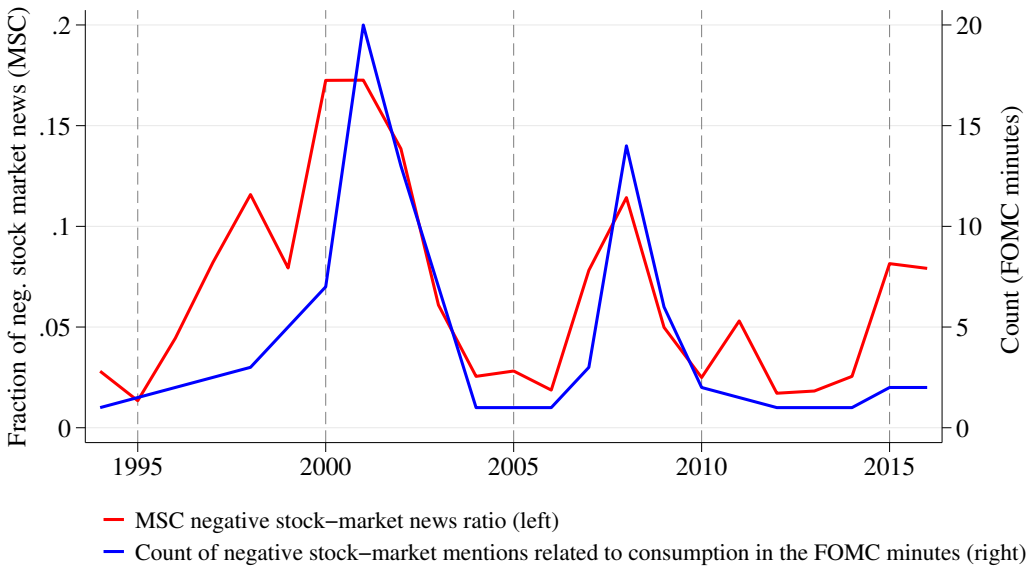

Figure 4
Consumers' attention to negative stock market news (Michigan Survey of Consumers). The plot shows the MSC negative stocks news ratio (yearly average) against the number of negative consumption-related stock-market mentions in FOMC minutes (by year), using the classification in Table 7.

Table 3

Link between the stock market and individual consumer responses in the Michigan Survey of Consumers. The table reports regressions of individual consumers' assessment of current economic condition in the Michigan survey on positive and negative stock market excess returns during the last 60 days preceding the survey (based on the preliminary survey date). The dependent variable is the index of current economic conditions (ICC) at the individual level. The Michigan survey constructs ICC based on responses of consumers to questions about their current financial situation compared to the previous year and their assessment of whether it is a good time to buy major household items. See https://data.sca.isr.umich.edu/fetchdoc.php?docid=24770 for the specific questions asked. Column (1) contains results for stockholders (INV=1) and column (2) reports results for non-stockholders (INV=0). The sample covers the period from 1994 through 2016. The regressions control for education, age group, marital status, gender, and income, and year fixed effects.

	(1) INV=1	(2) INV=0
rx_t^-	41.3***	9.67
	(8.54)	(1.58)
rx_t^+	12.6*	-0.85
	(2.56)	(-0.13)
Education	Yes	Yes
Age group	Yes	Yes
Married	Yes	Yes
Gender	Yes	Yes
Income	Yes	Yes
Year	Yes	Yes
N	64706	39144

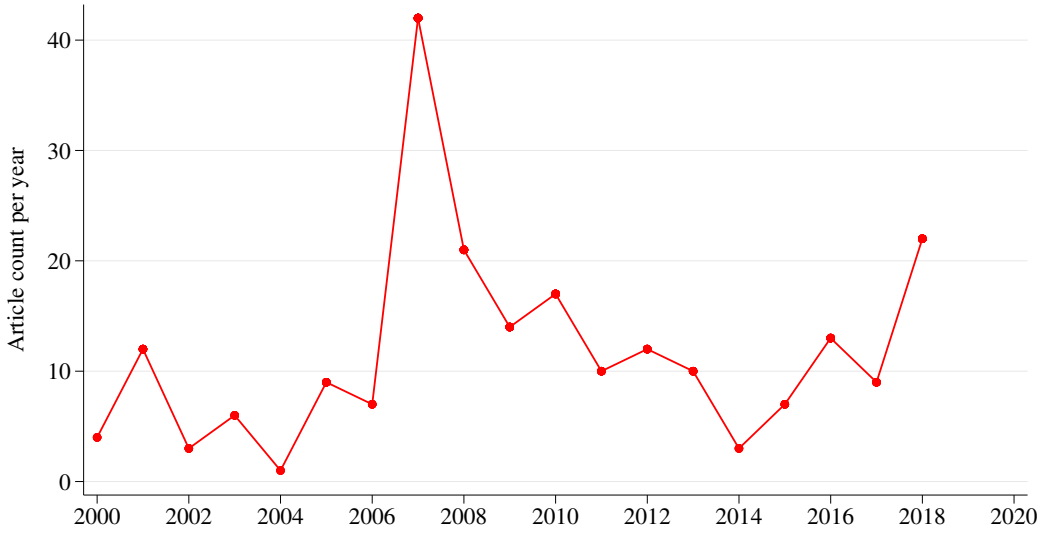

Figure 5

Number of the "Fed put" mentions in the Financial Times and Wall Street Journal

The figure graphs the number of articles per year that mention any of the terms "Fed put," "Greenspan put," "Bernanke put," "Yellen put," or "Powell put" after filtering out articles not related to the Fed put as well as online articles and duplicates. The sample period is 1994-2018 but no articles appear before year 2000.

Table 4
Excerpts from the transcripts for the Chairs.

GREENSPAN			
#	Meeting	**Category**	Statement
1	199508	**Predictive.**	The stock market is basically telling us that there has indeed been an acceleration of productivity if one properly incorporates in output that which the markets value as output.
2	199809	**Driver.**	I believe that the stock market decline has had a very profound effect, and indeed one can argue that a goodly part of the increased risk aversion is itself a consequence of the collapse in stock market values. As best I can judge, that collapse is not all that much a result of a contraction in earnings expectations, at least on the part of security analysts. It clearly is far more the result of rising discount factors against those earnings in the sense of a rise in equity premiums, as least as we measure them. What that indicates is a foreshortening of forward time preferences or, looked at another way, an increase in risk aversion.
3	199910	**Determinants.**	That is, leaving aside the question of price-earnings ratios and whether there is a bubble, there is no question that a significant part of the increase in the market value of equities and other assets reflects the fact that productivity has accelerated.
4	199912	**Determinants.**	By wealth effect, I mean a rise in the value of assets in relation to income. Such a rise does accommodate higher equity values but it cannot continue at the pace we have been seeing. There are only two ways in which such a rise can be thwarted, as indeed it must. One is a decline in long-term expected earnings, for which I find no evidence. Indeed, if anything, it is the other way around. The other is a rise in the discount factor.
5	200002	**Policy.**	Back in 1987, you will recall, long-term rates were going up as the stock market went up, and the market just ran out of steam. We are in a far worse situation now than we were then. I am concerned that, if we are too aggressive in this process of tightening, we could crack the market and end up with a very severe problem of instability.
6	200103	**Policy.**	I would propose, therefore, that we reduce the rate by 50 basis points and construct language for the press statement that leaves the door wide open on an intermeeting move. Any intermeeting action would be governed, however, by a judgment that the real economy is in some unforeseen difficulty beyond our current set of probabilities, not by a further weakening in stock prices. I do acknowledge a wealth effect, which we must take into consideration. The wealth effect itself is real in that it has an impact on spending and activity, not just psychology. (...) Even though we have almost two months to the next meeting, we will be prepared to act when and if necessary, but we recognize that when and if necessary does not merely mean a decline in the stock market. (...) In the draft language, the only reference to the market relates to equity wealth effects. At this stage there is no reference to stock prices.
7	200105	**Valuation level, Driver.**	But when we begin to look over a longer historical period, the potential corrections look rather scary. Now, such a prospect involves a relatively low probability forecast, but if we are looking at loss functions in our determination of policy, its weight is really a lot more in my judgment than I think we have put on the table. One of the reasons is that, by any relevant measure, stock market prices are still probably higher than what our models say would be consistent with their fundamental determinants.
8	200111	**Predictive.**	There is one part of our economic system that is saying in effect that the economy is stabilizing. It is called the stock market, and I hope it is right. The stock market patterns of the last several weeks are essentially projecting a bottom in the United States economy and the world economy sometime in the early months of 2002.
9	200303	**Driver (investment).**	If the stock market goes up, history tells us that people who are very depressed will rapidly cheer up a good deal. In my experience there is nothing more effective for boosting a company's capital appropriations than having its stock price go up.
10	200503	**Driver (consumption).**	My suspicion is that we're going to see real long-term rates and real mortgage rates begin to move up and that the capital gains we have seen in both the stock market and in housing values will become a lesser source of funds for borrowing. There will be less financing using realized capital gains or, indeed, even unrealized gains and that will have a significant impact on consumption expenditures. Remember, 15 to 20 percent of personal consumption expenditures do not relate to income; they are the consequence, at least econometrically, of the wealth effect.

Table 4
Excerpts from the transcripts for the Chairs (continued).

BERNANKE			
#	Meeting	**Category**	Statement
11	200208	**Valuation level, Predictive.**	As we search for the signal of an incipient recovery, we have heavy noise coming from two sides. The first source of noise is the financial markets. Our financial markets usually exhibit controlled hysteria, but lately we probably could drop the adjective controlled. The stock market in particular seems to be searching for a consensus valuation without too much luck so far.
12	200605	**Driver (consumption).**	Supporting consumption, obviously, are some increases in compensation likely coming forward both in terms of hourly wages and in terms of hours worked, job availability, and to some extent maybe increases in stock prices.
13	200705	**Driver (consumption).**	Incomes generated by the labor market, together with gains in the stock market and generally accommodative financial conditions, should provide some support for consumption going forward.
14	200708	**Driver (consumption).**	Despite lower household wealth resulting from weaker house and stock prices, consumption is likely to continue to grow as labor markets remain strong, real incomes increase, and gasoline prices moderate.
15	200801	**Driver (consumption), Predictive.**	With respect to households, consumption growth has slowed, reflecting falling house and equity prices and other factors, including generally greater pessimism about the labor market and economic prospects.
16	200801	**Predictive.**	Certainly the financial markets have deteriorated, reflecting greater concern about recession. We see it in the equity markets but also in short-term interest rates and a variety of credit measures as well.
17	200810	**Driver (consumption)**	This weakness reflects the same set of negative influences on consumption that we have been seeing for a while, now compounded by losses of equity wealth and confidence effects on prices, although lower oil prices may provide some relief.
18	200904	**Driver (consumption)**	The markets, in turn, have responded to some extent to improved news, and higher stock markets, for example, have helped confidence and probably spurred some extra consumer spending.
19	200909	**Predictive**	In particular, developments in the stock market and the shape of the yield curve are suggestive that confidence about recovery is returning.
20	201109	**Driver, Predictive.**	Not only have financial conditions affected household wealth and the cost of credit by increasing spreads, for example, but they have led to increased risk aversion, both in markets, I think, and in the real economy, and have affected sentiment as well. So part of the reason I think sentiment dropped so sharply in the summer was because of stock market swings that suggested that we were perhaps near a new crisis situation.
21	200911	**Valuation level, Driver.**	But I think we also would all agree that we need to continue to monitor any possible side effects from low rate policies that might be concerning. One set of issues is speculative excesses [...]. My sense is – and Brian Sack talked about this yesterday – that United States asset prices, so far at least, do not show any strong evidence of mispricing or asset bubbles. In particularly, equity premiums are still above normal, so stock prices don't seem unusually high.

Table 4
Excerpts from the transcripts for the Chairs (continued).

YELLEN			
#	Meeting	**Category**	Statement
22	199412	**Driver (consumption).**	We have seen, finally, a decline in the stock market, which will bring wealth effects on consumer spending into play, and for once the dollar has been appreciating which re-enforces direct interest rate effects and plays some moderating influence on the inflation forecast.
23	199512	**Driver (consumption).**	In addition, if consumption spending, in contrast to the Greenbook assumption, is currently being buoyed by the strong performance of the stock market, then any significant stock market correction imparts some downside risk to the forecast.
24	199603	**Valuation level.**	On the negative side, I am particularly concerned at this stage about the possibility of a significant stock market correction. The current level of stock prices is not impossible, but it is increasingly difficult to justify in terms of fundamentals. Disappointing earnings reports could easily set off a correction.
25	199611	**Driver (consumption).**	Indeed, I think one could easily justify a much stronger consumption forecast than in the Greenbook, given the enormous gains in stock market wealth and the huge increase in household net worth that we have seen in spite of the buildup in consumer debt.
26	199612	**Determinants.**	In fact, this stunning combination of strong corporate profits, a healthy but sustainable pace of real growth, low and maybe even declining inflation, and lower real interest rates due to enhanced prospects of a balanced budget is a mix that may indeed continue to support a level of stock prices that the Greenbook–I liked the staff's term for this–called aggressive.
27	200610	**Predictive.**	Finally, other financial developments that could presage future economic performance, like stock market movements and risk spreads, suggest some optimism on the part of financial market participants.
28	200705	**Determinants.**	But you would think that a marked slowdown in secular productivity growth would also result in downward revisions to the expected paths of future profits and real wages, weakening equity market valuations and crimping consumption growth.
29	201111	**Driver (consumption).**	The daily readings on consumer sentiment from the Gallup and Rasmussen surveys did point to some improvement over the past few days in the wake of Europe's announcement of measures to address its financial crisis and the attendant rebound in the stock market.
30	201303	**Driver (consumption).**	Spending on consumer durables has also remained solid. I see low interest rates, improved credit availability, substantial wealth gains from rising equity and house prices, and considerable pent-up demand as key drivers.
31	201303	**Driver (consumption).**	More generally, rising house and equity prices support housing and consumer spending, which in turn raises income, stimulates job creation, and improves the creditworthiness of borrowers as well as the health of the financial system, and such developments can potentially spark a self-reinforcing dynamic of recovery.

Table 5

Discussion of financial instability in the FOMC minutes. Column (1) reports the total number mentions of any of the financial-instability phrases. Column (2) reports the fraction of paragraphs containing such mentions relative to the overall number of paragraphs in a minutes' section (e.g., 4 means 4% of all paragraphs in a section). Column (3) provides the number of mentions that indicate a concern about easy Fed policy causing financial instability. Column (4) states the fraction of paragraphs that contain such causal mentions. Starting from the March 2009 meeting, the minutes begin with a new section "Developments in financial markets and the Federal Reserve's balance sheet." The title of this section changes over time to include discussion of open market operations and monetary policy normalization. In the post crisis period, minutes also summarize occasional special sessions held during the FOMC meetings (e.g., on the relationship of monetary policy and financial stability on April 27, 2016, see spike in Figure 10). We combine the counts occurring in the special sessions into the "Other" category.

Section	(1) #mentions	(2) %par	(3) #concern about policy-induced risk-taking	(4) %par
1. Staff review of the economic situation	1	0.1	0	0
2. Staff review of the financial situation	48	2.2	14	0.2
3. Staff economic outlook	0	0	0	0
4. Participants' views	95	3.8	43	1.5
5. Committee policy action	19	1.1	9	0.5
6. Other	47	0.2	4	0

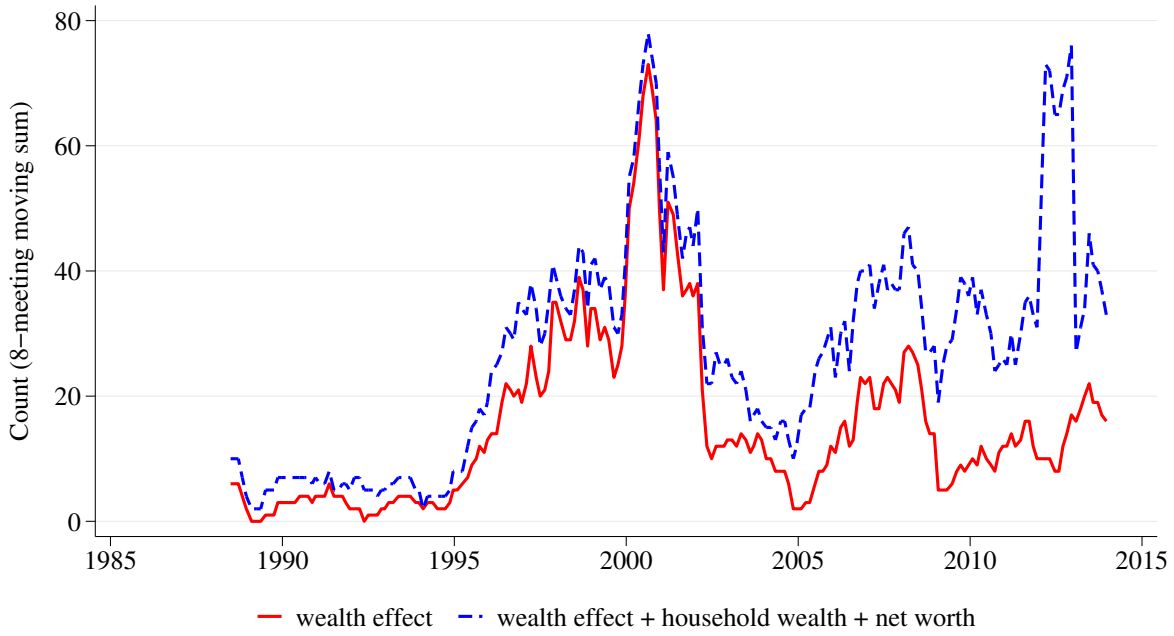

Figure 6

Wealth-related mentions in FOMC transcripts. The figure plots the number of wealth-related mentions in FOMC transcripts. The solid line shows moving sums over the last 8 meetings of the counts of "wealth effect" mentions and the dashed line shows the sum of mentions of "wealth effect," "net worth," and "household wealth" together. The spike in the dashed line toward the end of the sample is driven by the special briefing on "Debt, Leverage and the Recovery of Consumption" by the staff during the Jan 24-25, 2012 meeting.

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

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

We obtain data on macro announcements from Bloomberg. We start from the universe of variables included in Bloomberg's calendar of US economic releases. The Bloomberg data go back to October 1996. We consider macroeconomic variables for which at least 10 years of announcement data are available over the 1996:10–2008:12 sample.[39] Additionally, to assess the explanatory power of macroeconomic variables combined (as opposed to individually), we consider the Chicago Fed National Activity Index (CFNAI), available monthly. This index is the first principal component of 85 macroeconomic series. It has been made available in real time since 2001 but data are available back to 1967 for each release. We use data from the June 2018 release.

A.1. Predicting Fed growth expectation updates

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

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

The regression is estimated with one observation per scheduled FOMC meeting. x_m denotes the latest realized value of the explanatory variable that is available as of date of internal Greenbook publication. $\mathbf{1}_{x_m}$ is a dummy variable equal to one if x_m is missing and similarly for $\mathbf{1}_{x_{m-1}}$. Missing values occur mainly because some series start later than October 1996. We also code a variable as missing if there has been no announcement for this variable since the last Greenbook date. We use the actual values of the macro variables as regressors rather than the surprises relative to consensus. This is because we want our x_m variables to capture news that has arrived since the $(m-1)$-th Greenbook forecasts. Consensus forecasts for macro releases are generally dated just before the release and thus reflect information about the likely value of the release that arrives between the $(m-1)$-th meeting Greenbook forecast and (just before) the release. Surprises relative to consensus forecasts would therefore focus only on a subset of the news contained in x_m. The inclusion of x_{m-1} as a regressor allows for a delayed Fed response to the news contained in the particular macro announcement. We report the R^2 values from each of the regressions and the p-values from an F-test of $H_0 : \delta_1 = \delta_2 = 0$.

The results are reported in Table 6 for samples ending in 2008 and 2012, both starting in October 1996. Variables are listed in order of declining R^2 for the 1996:10–2008 sample (column (3)). The intermeeting stock returns rank at the top of the list in both samples, with an R^2 of about 0.38 and the p-value for the test of $H_0 : \delta_1 = \delta_2 = 0$ less than 0.1%.[40] CFNAI ranks second in the 1996:10–2008 sample with an R^2 of 0.35. Extending the sample through 2012 leads to significant declines in the explanatory power of macro variables. For example, CFNAI's R^2 drops from 35% to 14%, while the explanatory power of the stock market remains largely unchanged.

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

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

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

Table 6
Greenbook growth expectations updates, macro announcements and the stock market. The table reports estimates of regressions (1). The dependent variable is the Greenbook real GDP growth update for one-quarter-ahead forecast. The regressions are estimated over two samples: 1996:10–2008 and 1996:10-2012. We do not use any data in the intermeeting period that are after the internal Greenbook release date. The explanatory variables are listed in the order of declining R^2 for the 1996:10–2008 sample (column (3)). The p-values are for the F-test of the null hypothesis H_0: $\delta_1 = \delta_2 = 0$ in equation (1).

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

A.2. Predicting FFR target changes

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

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

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

Similar to the growth updates regressions (1), the target regressions above are estimated with one observation per scheduled FOMC meeting. $\Delta\text{FFR}_m = \text{FFR}_m - \text{FFR}_{m-1}$ is the change in the Fed funds target between meetings $m-1$ and m. x_m denotes the latest realized value of the explanatory variable that is available as of date of the m-th meeting. $\mathbf{1}_{x_m}$ is a dummy variable equal to one if x_m is missing and similarly for $\mathbf{1}_{x_{m-1}}$. We use lags of FFR changes (as opposed to lagged levels as we do in the Taylor rule estimates in Table 4) for parsimony, but the results are not sensitive to this choice. We calculate the R^2 values from each of the regressions and use the difference as a measure of the incremental R^2 generated by the particular variable. By using incremental R^2, rather than simply the R^2 from equation (2), we disregard any explanatory power due to the lags of the target changes and the dummy variables for missing data. To assess whether a given x_m-variable has statistically significant explanatory power for Fed policy, we report the p-values from an F-test of $H_0 : \delta_1 = \delta_2 = 0$.

The results are reported in Table 7. Variables are listed in order of declining incremental R^2. For the stock market put variable, the incremental R^2 is 0.180 and the p-value for the test of $H_0 : \delta_1 = \delta_2 = 0$ is less than 0.1%. Only the Philadelphia Fed Business Outlook Survey comes close in its incremental R^2 with a value of 0.159.

To assess the explanatory power of macroeconomic variables combined (as opposed to individually), we consider the Chicago Fed National Activity Index (CFNAI), available monthly. This index is the first principal component of 85 macroeconomic series. It has been made available in real time since 2001 but data are available back to 1967 for each release. We use data from the June 2018 release and re-estimate the incremental R^2 for the (non-real time) CFNAI over the 1996:10 to 2008:12 period used in Table 7. The results are included in the last row of Table 7 and show an incremental R^2 of 0.129, lower than that of the stock market put and the Philadelphia Fed Business Outlook Survey.

The strong predictive power of the stock market put suggests that the Federal funds target is particularly sensitive to bad news. To treat macro variables and the stock market similarly in terms of a functional form, and to put macro variables on equal footing with the stock market put in terms of censoring, we have re-estimated Table 7 using the minimum of the 20th percentile and the actual value of each variable as the regressor.[41] This approach also results in the stock market put, the Philadelphia Fed Business Outlook and the CFNAI having the highest incremental R^2, at 0.174, 0.182, and 0.177 respectively, with none of the other macro variables reaching incremental R^2 above 0.12.

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

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

Table 7
Ability of the stock market and macroeconomic indicators to predict FFR target changes. The table reports estimates of regressions (2) and (3). The incremental R^2 is the difference between the R^2 from regression (2) and (3). The p-values are for the F-test of the null hypothesis H_0: $\delta_1 = \delta_2 = 0$. The sample period is 1996:10–2008:12.

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

B. Algorithm-based textual analysis

B.1. Description of the algorithm

We develop an algorithm to search for positive and negative phrases associated with economic and financial conditions in FOMC minutes and transcripts. We build dictionaries associated with the following categories: The stock market; financial conditions; economic growth; inflation and wages. For each category, the dictionary contains a list of noun phrases along with two groups of direction word (group 1 and 2). Word groups 1 and 2 are assigned to each of the noun phrases to form a positive or negative match. The dictionaries are available in Appendix Table 8 through Appendix Table 10.

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

Below we describe the main steps in the algorithm. The asterisk * indicates that we allow for different grammatical forms.

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

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

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

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

Negative phrases without direction words. Phrases such as financial crisis, financial turmoil are counted as negative. These are listed separately in Appendix Table 10.

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

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

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

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

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

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

- For the minutes, the assignment is made by section of the document. We divide minutes into sections listed in Section 3 of the paper. Sections 1–3 are classified as presenting the views of the staff, and sections 4–5 as presenting the views of participants. Section headings appear explicitly in the minutes from April 2009 onward. However, given that the structure of the documents has remained essentially unchanged since the early 1990s, for the period between the start of 1994 and March 2009, we manually assign text to sections. We drop other parts of the minutes, e.g. discussions of special topics occurring only in particular meetings.
- For the transcripts, we have direct information about the speaker. A comment by a speaker starts with his/her capitalized name (e.g., CHAIRMAN GREENSPAN, MR. BROADDUS). For each meeting, we assign all governors and regional Fed presidents (who were in office at the time of the meeting) to the participants' category, and everybody else to the staff category. The names and start/end dates for the tenures of regional Fed presidents as well as members of the Board of the Governors are collected from the websites of the Federal Reserve Board and regional Federal Reserve Banks.[42]

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

To assess whether the results in Section 3 are robust to using FOMC transcripts we apply the algorithm to identify negative and positive stock market mentions in the transcripts. The algorithm looks for a set of 47 stock market related phrases. It then searches for a direction word (negative/positive) near the stock market phrase based on a list of 52 negative and 41 positive words. Negative words correspond to the market going down and positive words to it going up. The word lists are shown in Appendix Table 8. We train the algorithm on the minutes in order to identify and correctly classify as many of the 983 stock market mentions as possible. The algorithm captures 589 stock market mentions in the minutes without inducing a substantial number of misclassified phrases. A central parameter in the algorithm determines within how many words around the stock market phrase a direction word should occur (search is bounded within a sentence). The

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

lower this distance is, the more accurately a given stock market mention is classified but the more likely it is that no positive or negative word is found. We use a distance of zero words, i.e., a match is found if a direction word directly precedes or follows a stock market phrase. This rule is applied after dropping stop words as well as certain descriptive phrases, and defining sentences as laid out in the Appendix. Such a setup allows us to err on the side of obtaining an accurate classification of stock market mentions rather than to capture a maximum number of phrases. We do not seek to code neutral or hypothetical phrases in the algorithmic approach. For comparison with manual searches in the paper, in Appendix Figure 7, we provide algorithm-based searches.

Turning to the FOMC transcripts, we find a total 2,680 stock market mentions over the 1994–2011 period (whether or not they are accompanied by direction words), using the stock market search words listed in Section 3.2. Of these, our algorithm picks up 1,197 mentions that appear together with direction words, i.e., 45% of the overall count, of which 618 are negative matches and 579 are positive matches.

For robustness, we replicate our earlier results obtained using manual searches by applying the algorithm to both minutes and transcripts. Appendix Figure 8 shows the relation between intermeeting returns and negative and positive stock market mentions in the minutes and transcripts, respectively. The results indicate that our algorithmic approach is able to capture the same key features of this relationship that we have established using the manual search approach. Appendix Table 9 shows that the predictability of negative and positive stock market mentions by intermeeting excess stock returns is robust to using the algorithmic approach.

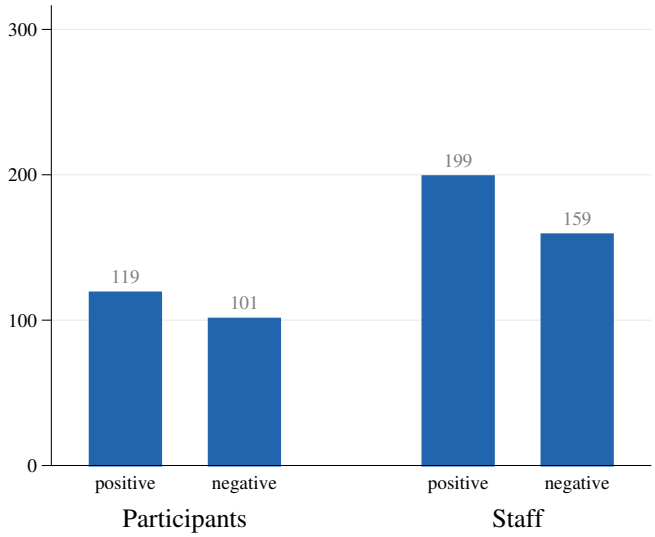

Figure 7
Positive/negative counts in FOMC minutes (1994–2016): Algorithm-based approach. The figure presents the total number of positive and negative stock market phrases, split by participants and staff, respectively. The results are based on algorithm-based coding of FOMC minutes' content. Corresponding results of manual searches are reported in Table 5 Panel C of the paper.

Table 8
Noun phrases and direction words related to the stock market

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

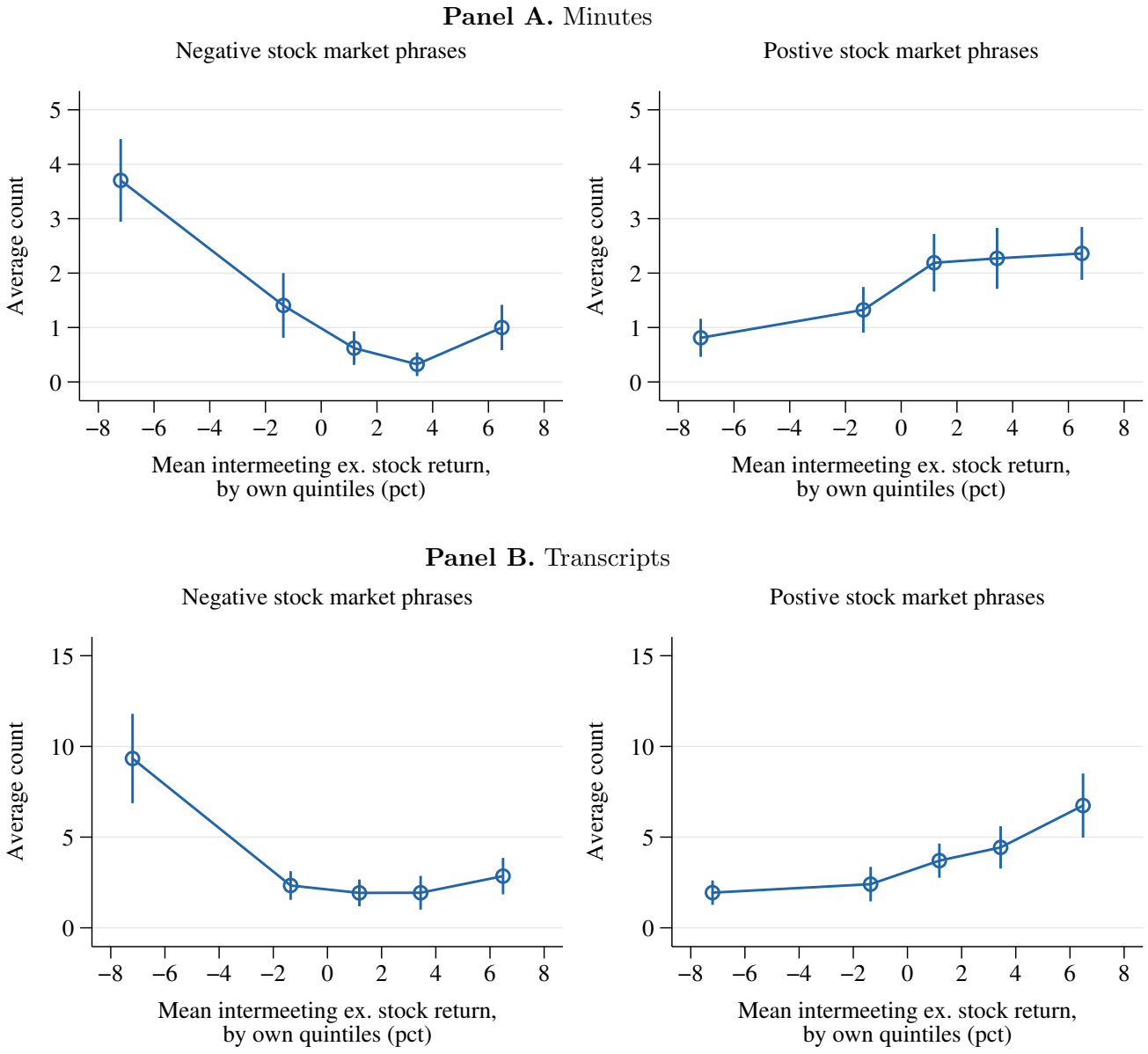

Figure 8
Impact of stock market returns in FOMC minutes and transcripts: Algorithm-based searches. The figure presents the average count of positive and negative stock market phrases in FOMC documents conditional on the quintiles of intermeeting stock market excess returns. The x-axis reports the mean of intermeeting stock return within a quintile. The counts of stock market phrases are based on our automated search algorithm. The upper panels display the results based on the FOMC minutes (sample: 1994–2016), and the bottom panels display results based on the FOMC transcripts (sample: 1994–2011).

Table 9
Predicting negative and positive stock market phrases in the FOMC minutes by intermeeting stock market excess returns (algorithm-based coding). This table reproduces results from Table 1, but uses the algorithm-based coding of the positive and negative stock market phrases. See caption of Table 1 for details.

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

C. Discussion of broader financial conditions

To assess the frequency of references to financial conditions that do not explicitly mention the stock market (and thus may not be accounted for above), we create a list of words that relate to financial conditions along with lists of positive and negative direction words used to describe them. We then algorithmically code the number of negative and positive financial conditions phrases that do not explicitly mention the stock market. The word lists are shown in the Appendix Table 10.

Appendix Figure 9 graphs the count of negative financial conditions phrases over time together with the series for manually coded negative stock market mentions included for comparison. Appendix Table 11 shows that counts of financial conditions mentions are predictable by the intermeeting stock returns in the same way as are the counts of stock market mentions (reported in Table 1). Additionally, in Appendix Table 12, we find that financial conditions predict Fed fund target changes (column (1)–(2)). Including both financial conditions mentions and stock market mentions, financial conditional have predictive power over and above the stock market (column (3) and (5)). However, this result is driven by year 2008. Dropping 2008 from the analysis, the stock market mentions subsume the explanatory power of financial conditions for target changes (columns 4 and 6).

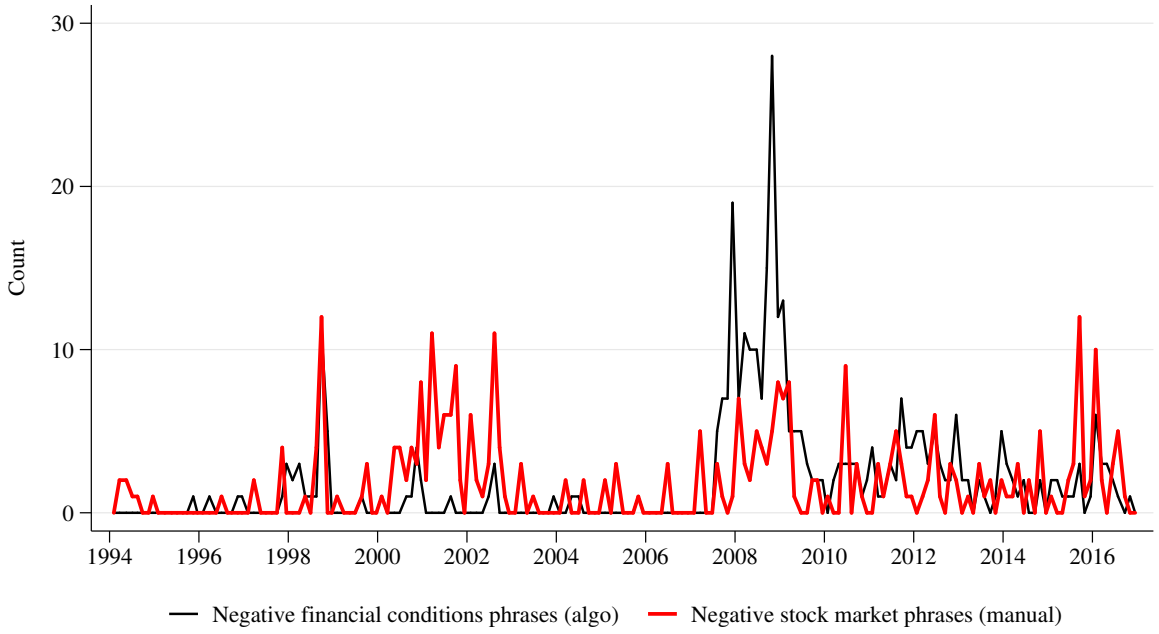

Figure 9
Negative financial conditions versus stock market phrases in FOMC minutes. The figure superimposes the counts of negative financial conditions phrases against negative stock market phrases in FOMC minutes over the 1994–2016 sample. Financial conditions phrases are obtained using algorithm-based coding, and stock market phrases are obtained by manual coding.

Table 10
Noun phrases and direction words related to financial conditions

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

Table 11

Predicting positive/negative financial conditions phrases with intermeeting returns. This table provides evidence analogous to Table 1, but using financial condition phrases as the dependent variable. Financial condition phrases are classified into positive and negative by applying the algorithm-based approach to the FOMC minutes. Other specification details are as in Table 1 for details.

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

Table 12

Predicting target changes with financial conditions and stock market phrases. This table extends the regression specification from Table 6, predicting FFR target changes with financial conditions phrases in addition to stock market phrases. The sample period is 1994–2008. The counts are obtained by algorithm-based coding of FOMC minutes.

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

Table 13

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

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

D. Excerpts from FOMC minutes

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

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

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

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

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

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

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

Valuation determinants, levels: Broad stock price indexes rose, on net, over the intermeeting period, reflecting generally better-than-expected economic news and further declines in risk premiums. The spread between an estimate of the expected real equity return over the next 10 years for S&P 500 firms and an estimate of the real 10-year Treasury yield–a rough gauge of the equity risk premium–narrowed noticeably but remained high by historical standards. (Staff Review of the Financial Situation, 6/24/2009)

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

E. Fed put in FOMC transcripts

This appendix lists all mentions of the "Greenspan put" and "Bernanke put" (including "Greenspan-Bernanke put" and "Bernanke-Greenspan put") in the FOMC transcripts, available up to 2013. We quote the full paragraph that contains the relevant phrase.

#1. June 27-28, 2007, MINEHAN
I would just like to add a comment in favor of uncertainty for the markets. Uncertainty is important in how markets work. Uncertainty is critical to market participants forming their own views about the future and managing the risks as they see them in the future. **Everybody talks about the famous Greenspan put.** We know Greenspan is going to be there to save us if the market overdoes it, so let's just play into the rising market because the Fed will save us if everything tanks. That is an overdone argument, but I have heard it made. If we give people a policy path, no matter how we characterize it, they are going to take that as far more a given than we could ever really commit to, and they are going to make bets on that basis. When those bets don't work out, it is going to be another version of the Fed leading them down the garden path. I really think we should not go there. We should encourage some uncertainty in markets about what our actual policy path is going to be, given that over a three-year period or a three-to-five-year period the range of the Committee's preferences around inflation is within some narrow band. Let the markets figure out what they think incoming data prescribe in terms of policy and make their bets on that basis. I think a certain degree of uncertainty is absolutely healthy for markets.

#2. August 7, 2007, FISHER
(. . .) my best advice would be to recognize, to an extent, in our statement what is going on in the marketplace, what ails the marketplace. The best guidance would be that we must not ourselves become a tripwire. I think we have to show a steady hand. I rather liked the reference to the Hippocratic oath earlier, "Do no harm." I think we can best accomplish this by acknowledging market turbulence and yet not implying that we are given to a reaction that might create a moral hazard. **I'm particularly mindful of the discussion in the press and by security analysts of a so-called Bernanke put, and I want to make sure that we do not take any action or say anything that might give rise to an expectation that such is to occur.** Therefore, I would suggest that alternative B offers the best policy response. That is, I am in favor of keeping the rate where it is. The wording in the second paragraph acknowledges that there has been volatility in the markets. I think it addresses the points Governor Kohn made about growth in employment, incomes, and a robust global economy. I've waited a long time to see the word "global" in these statements. [Laughter] Whether it gets left in or not, it does reflect reality. I'm mindful of President Geithner's point of softening a little, and yet that is where I worry that we might become a bit of a tripwire. I would under normal circumstances be somewhat inclined toward the last paragraph in alternative A, and yet I didn't hear around the table, nor do I fully believe myself, that things are exactly roughly balanced. I take the point that was made just now in the presentation that, by saying "downside risks to growth have increased somewhat," we are opening the door.

#3. August 7, 2007, ROSENGREN
I support leaving the target for the fed funds rate at $5\frac{1}{4}$ percent. However, the news since the last meeting would seem to be more elevated downside risk to economic growth. This elevated risk reflects the baseline growth for real GDP as 2 percent (a considerable reduction from the previous Greenbook), greater uncertainty about the evolution of the housing market, and concern about the fallout from financial market disruptions. **Given the greater downside risk, I would prefer language in the assessment of risk paragraph from alternative A, though I do like the modification to alternative B that was made, and I am worried about an interpretation of a Fed put for financial markets.** So although I'd prefer the risk assessment in alternative A, which more accurately reflects my assessment of risks, I could certainly accept removing the word "predominant." That would be my second choice. My third choice would be to bow to those who have a better understanding of nuanced language, since that is certainly not my expertise, though I hope I will develop it over the years, and I could live with the alternative B language as my third choice.

#4. August 7, 2007, KOHN
One word on the moral hazard and the concern about being seen as reacting: I am not worried about it. I think we have kept our eye, through the past twenty years, on the macro environment. We have adjusted policy to stabilize the economy, to bring inflation down, and we were pretty darn successful in all of that. Asset prices go up, and asset prices go down. **Anybody who bought a lot of high-tech stock, betting on the Greenspan put, is still waiting to recover their money.** [Laughter] I don't think it ever existed. I really don't care what people say; I care about what we do, and we just need to keep our eye on those macro implications. Now, as I said in my presentation, I think the connection between the financial markets and the macroeconomy is pretty complicated and runs through confidence and other things, too. But I'm not really worried about a moral hazard from acting. Should markets continue to be turbulent and we see that turbulence in the future—I agree with the Vice Chairman that we have to be forward looking in this—such turbulence has the potential for adversely affecting the economy. I think we should go ahead and act. I think we basically did the right thing in '87 and '98, and I don't think we need to apologize for it. Thank you, Mr. Chairman.

#5. August 7, 2007, MISHKIN
The second reason is the issue of what is going on in terms of the financial markets and what kind of impression we give outside. **I agree with Governor Kohn that we have not been operating under a Greenspan put or a Fed put.** It is very clear to me that we have not been doing so, except that I think an impression has been created, and I would like to mention that I am a little less sanguine about what was done in the past. I think that one mistake was made, perhaps because I'm looking at it ex post. When the Fed lowered interest rates 75 basis points in the LTCM episode, it was a brilliant stroke. It was exactly the right thing to do. But when you think about an operation like that, which was basically to restore confidence to the markets and was very much like a classic lender-of-last-resort operation, we know that you want to put in liquidity; but when the crisis is over, you want to take it out. **At that time, I was quite critical that the Fed did not then remove the 75 basis point decline, and I think it created an impression–I don't know about a Greenspan put, but there was some element of that—and it is very hard to dissipate that impression.** Maybe it is true that people said we weren't trying to do that, but we did create some kind of impression along those lines. So I think the issue of perception still is important. In that context, it is very important that we not give the impression that we are responding to financial markets now because the discussion here has been that we are very concerned that this might be a problem in the future but right now it is not affecting our forecast in a major way. That's exactly what we have to communicate to the public and the markets; and in that context, changing the statement too much in moving toward balance will create problems along those lines.

#6. June 21-22, 2011, BERNANKE
I agree with you, President Fisher. I think we are making very good progress, with the intermeeting memos, the operations of the Office of Financial Stability, and these kinds of discussions. Your comments raised a useful point. At the beginning you talked about a number of things, like the shadow banking system and so on, which might be amenable to regulatory or microeconomic-type policies. I think it's important for us to have enough granularity so that we can decide when the first line of defense is appropriately microeconomic regulation, which gives more cushion to monetary policy to focus on macroeconomic conditions. **But the stock market is an example where microeconomic regulation probably wouldn't work, and we want to think about that, although I resist any Greenspan–Bernanke put ideas.**

#7. June 21-22, 2011, FISHER
I want to raise one flag of caution, Mr. Chairman. I think President Williams is correct. On either side we need to think about what we will do under different scenarios, and I think I understand what Bill is saying, but I'd be extremely careful about the concluding sentence you had in your summary, Mr. Chairman, about greater or extended accommodation that may be needed to achieve the intended effects. I referenced a soufflé yesterday. **I couldn't quite hear your response, but you said something about a Bernanke–Greenspan put.** There is an expectation in the market that that is out there. I think the point that Bill was making—and I tried to make a little bit yesterday—is that the potency of our standard monetary accommodation, large-scale asset purchases, is diminishing over time. That doesn't mean we rule out trying to think of other alternatives, and I think that's a good idea. And there has even been a suggestion

from President Rosengren that we consider other variables—in your case, the interest paid on excess reserves. I would be very careful about how we state Bill's point in the minutes. And, again, I would do as little as possible in this statement and especially in your press conference—go right up the middle of the course, be very bland, and do nothing that upsets the marketplace or tilts the balance one way or another because we're at a very uncertain point.

#8. June 21-22, 2011, BERNANKE
On the Greenspan–Bernanke put, it was a statement of revulsion. By the way, I don't think it exists—you would think I would know if it did exist [laughter]—and I would like to discourage that perception.
MR. FISHER. And I would encourage you to discourage it. You can't come out and say that, but I'm glad to hear you say it.

#9. August 9, 2011 BULLARD
Our goal today, in my view, is to effectively acknowledge the slower economy and the difficult situation in financial markets and to remain prepared for action in the event that the anticipated strengthening in the second half does not materialize. I counsel against taking direct policy actions today for two reasons. **Any action today with respect to further asset purchases, number one, would be viewed as helping the Congress with fiscal problems that weren't solved and, number two, would solidify the notion that there is a so-called Greenspan–Bernanke put in the equity markets.** Still, despite not taking action today, it's completely reasonable to plan for further action if necessary, given the very volatile markets of the past few days. Any policy action we take going forward should be appropriately tied to specific outcomes in the macroeconomy and not to the calendar. We have been burned twice by tying the end dates of key policy moves to the calendar, only to have the data contradict our decisions. This occurred in March 2010; we had to reconsider our policy in August 2010. It now happened again in June 2011, and we are back here contemplating further action today. We should adopt an approach closer to our interest rate policy, in which we make adjustments meeting by meeting in response to incoming data.

#10. August 9, 2011 BULLARD
(. . .) As I said earlier, our goal is to acknowledge the reality of slower-than-expected economic growth and the difficult situation in financial markets and to remain prepared for a policy move in the event that the expected rebound in the second half does not materialize. More aggressive action than that today, in my view, could be counterproductive. Number one, it will be viewed as trying to compensate for a failure of the Congress to effectively address medium- and longer-term fiscal uncertainties. **Number two, stronger action today will definitely emphasize the idea, already popular in financial markets, that there is a Greenspan–Bernanke put on the equity markets.** Both of these will be damaging to our credibility, in my view, and credibility is our most valuable asset. Markets are not expecting much action at this meeting. So I think we'll be consistent with those market expectations if that's the way we play this. This does not prohibit us from having meetings during the intermeeting period if we think that the situation is deteriorating further or that we're simply going to have to take action.

#11. June 18-19, 2013, FISHER
Now, Governor Tarullo made a very good point. There is risk here. There is risk no matter what we do, and for some, there is an expectation or a hope this will go on almost forever. **What we're effectively doing here, and I know you are repulsed by this term, Mr. Chairman, but you're putting a ceiling on the Bernanke put, and that will be disappointing to some—those who somehow have these dreams that we go to "QE infinity."** So Governor Tarullo is right: There is no no-risk option. We might have a reaction, but so be it. I just want to make one more comment here. Governor Stein used the operative words "expressed properly." I think you should do this in a press conference. I don't think it should be in the statement, and it really hinges on your expressing it properly. Once it is properly expressed and out there and all eyes are on this press conference, one thing we cannot afford to do is go up to the line and cave in if we get a negative reaction. Because given the way I look at the world, if we blink, we really will have a test, and then we're in real trouble.