Monetary Policy Communications
and their Effects on Household Inflation Expectations

Olivier Coibion
UT Austin and NBER

Yuriy Gorodnichenko
UC Berkeley and NBER

Michael Weber
University of Chicago and NBER

May 24, 2019

Motivation

"Since I've become a central banker, I've learned to mumble with great incoherence. If I seem unduly clear to you, you must have misunderstood what I said."

<div align="right">A. Greenspan, September 22, 1987</div>

"[B]ecause monetary policy affects everyone, I want to start with a plain-English summary of how the economy is doing, what my colleagues and I at the Federal Reserve are trying to do, and why."

<div align="right">J. Powell, June 13, 2018</div>

Motivation cont.

- Large change in policy communication

- Focus typically on financial markets

    - Low financial volatility

    - Shape path of long-term interest rates

- Successful in affecting long-term rates

    Swanson (2018)

- Communication as policy tool when conventional policy constrained

Research Question

How can central bank communication reach the general public?

- Idea: economic agents change decisions based on long-term rates

- **BUT** large fraction of households do not

  D'Acunto, Hoang, Paloviita, & Weber (2018)

- For households, focus is on anchoring expectations

- **BUT** large upward bias and little knowledge of monetary policy

- Sign of success? Households worry little?

- **BUT** not innocuous: forward guidance cannot be effective

This Paper

- Field large-scale survey on 20,000 households in the U.S.

- Randomize pieces of information to individuals

- Study how different communications shape inflation expectations

Overview of Results

- Simple statistics most effective

    - Current inflation

    - FOMC target

    - FOMC inflation forecast

- Changes in expectations of 1.0-1.5%

- Dwarfs effets of QE and forward guidance on real interest rates

- Media as a source of information transmission less effective

- To do: reaction in actual consumption (AC Nielsen baskets)

AC Nielsen Panel

- 40,0000 – 60,000 households across the U.S.

- Rich set of demographics: age, income, # kids, martial status, etc

- Balanced panel along demographics

- Actual purchases in "grocery bundle"

- Incentives to report accurately
  - Monthly prize drawings
  - Points to purchase goods
  - Structured to not distort shopping behavior

Chicago Booth Expectations and Communications Survey

- Nielsen runs regular small-scale surveys and larger customized surveys

- Mainly retailers and consumer-goods producers

- Three waves in June, September, & December 2018

- All members of AC Nielsen panelist households

- Similar to Michigan Survey and NY Fed Survey of Expectations
    - But larger in scale: 20,000 vs 500 and 1,500

- Sample weights from Nielsen

Survey Response Rate

- First wave in June 2018

- Survey sample of 83,061 households

- 24,510 unique responses (response rate of 26.50%)

- Average response time of 15 minutes

- 32,658 respondends in 2nd wave (shorter); mainly follow-up questions

- 29,348 unique respondents for 3rd wave

Survey Questions

- Detailed additional demographics incl. financial constraints

- Past spending behavior beyond Nielsen categories

- Gas price perceptions and expectations

- Info on who is the main grocery shopper
  Malmendier, D'Acunto, Ospina, Weber (2018)

- Savings and portfolio questions

Inflation

- Directly ask about *inflation* (New York Fed Survey)

- First perception of current inflation

- Expectations of 12-months ahead inflation via probability distribution
    - Allows to test for Bayesian updating

- Also ask for perception of current unemployment and expectations

Information Treatments: Setup

- After initial questions information provision experiment

- Study how different information affects updating

- Assign to 9 groups: 8 information treatments and 1 control group

- 1 placebo treatment to disentangle learning from anchoring effects

- Treatments randomly assigned

Information Treatments

1 Actual CPI inflation rate over the last twelve month (2.3%)

2 Inflation target of the Federal Reserve of 2% per year

3 FOMC forecast for inflation in 2018 of 1.9%

4 Most recent FOMC statement

5 Coverage of most recent FOMC decision in USA Today

6 Most recent unemployment numbers (Philipps curve in mind?)

7 Average gas price inflation over the previous three months of 6.4%

8 U.S. population growth of 2% over the last two years (placebo)

FOMC Statement

Information received since the Federal Open Market Committee met in March indicates that the labor market has continued to strengthen and that economic activity has been rising at a moderate rate. Job gains have been strong, on average, in recent months, and the unemployment rate has stayed low. Recent data suggest that growth of household spending moderated from its strong fourth-quarter pace, while business fixed investment continued to grow strongly. On a 12-month basis, both overall inflation and inflation for items other than food and energy have moved close to 2 percent. Market-based measures of inflation compensation remain low; survey-based measures of longer-term inflation expectations are little changed, on balance.

[...]

In view of realized and expected labor market conditions and inflation, the Committee decided to maintain the target range for the federal funds rate at 1-1/2 to 1-3/4 percent. The stance of monetary policy remains accommodative, thereby supporting strong labor market conditions and a sustained return to 2 percent inflation.

[...]

USA Today

Inflation is creeping higher, and that's making the Federal Reserve more confident about raising interest rates.

The Fed held its key interest rate steady Wednesday but noted that inflation has climbed close to its 2% goal, paving the way for another rate hike in June.

As expected, the Fed kept its benchmark short-term interest rate at a range of 1.5% to 1.75%. The central bank's policymaking committee lifted the rate by a quarter percentage point in March for the sixth time since late 2015 after holding it near zero for years following the 2008 financial crisis and recession.

In a statement after a two-day meeting, the Fed reiterated that it plans to continue to raise rates gradually, a pace that economists have interpreted as roughly every other meeting.

Fed policymakers have forecast two more rate increases this year, according to their median estimate, but faster inflation could trigger three additional moves. Before the statement release, Fed fund futures indicated a 90% chance of a hike in June, according to CME Group.

[...]

# Information Treatments: Follow-up Questions & Survey

- Ask again for inflation expectations (point estimate)
  - Ensure individuals not asked same question twice

- Measure instantaneous updating of expectations

- Only information treatments in first wave of survey

- Follow-up surveys only solict inflation expectations and perceptions

- Same questions across all participants

Descriptive Statistics: Pre-Treatment

	Expected Inflation Mean	Std.	Perceived Inflation Mean	Std.
All	2.64%	2.87%	2.66%	2.95%
Male	2.53%	2.34%	2.64%	2.32%
Female	2.69%	3.07%	2.66%	3.21%
Income: tercile 1 (low)	2.64%	3.19%	2.57%	3.30%
Income: tercile 2	2.75%	3.13%	2.80%	3.26%
Income: tercile 3	2.59%	2.47%	2.65%	2.52%

- Upward bias in expectations
- Large cross-sectional dispersion in inflation expectations
- High correlation btw perceived & expected inflation: 0.79
- Women higher and more dispersed expectations

Fed Inflation Target
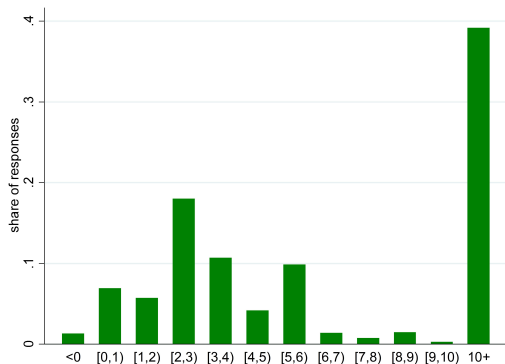
- Only 50% think inflation target between 0% and 5%
- 40% thinks Fed has inflation target $>= 10\%$

Empirical Specification

- Regress forecast revision on treatment dummy & controls $\forall$ treatment

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times Treatment_i + \beta X_i + error_i$$

- $\mathbb{E}_i^{post}$: posterior forecast of individual i

- $\mathbb{E}_i^{pre}$: prior belief (mean of distribution)

- $Treatment_i$: dummy variable for treatment

- X_i: vector of controls

  - Quadratic polynomial in age

  - Dummies for gender, employment status, income, household size, race, census region, lifestyle

Forecast Revisions

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times Treatment_i + \beta X_i + error_i$$

Treatments	Immediate revision		Revision after 3 months	
	(1)	(2)	(3)	(4)
Population growth	$-0.224*$	$-0.271**$		
	(0.116)	(0.120)		
Past inflation (2.3%)				
Inflation Target				
Fed inflation forecast (1.9%)				
FOMC statement				
USA today coverage				
Unemployment				
Gas Price				
Controls for demographics	No	Yes	No	Yes
Nobs	19,654	17,979	13,600	12,805

- Number equal to inflation target results in anchoring effect
- Anchoring effect small: $< 1/10$ of cross-sectional standard deviaton

Forecast Revisions

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times \textit{Treatment}_i + \beta X_i + \textit{error}_i$$

Treatments	Immediate revision		Revision after 3 months	
	(1)	(2)	(3)	(4)
Population growth	−0.224∗	−0.271∗∗		
	(0.116)	(0.120)		
Past inflation (2.3%)	−1.170∗∗∗	−1.241∗∗∗		
	(0.114)	(0.120)		
Inflation Target	−1.087∗∗∗	−1.130∗∗∗		
	(0.113)	(0.120)		
Fed inflation forecast (1.9%)	−1.166∗∗∗	−1.240∗∗∗		
	(0.113)	(0.120)		
FOMC statement				
USA today coverage				
Unemployment				
Gas Price				
Controls for demographics	No	Yes	No	Yes
Nobs	19,654	17,979	13,600	12,805

- Simple inflation statistics lower inflation expectations by 1.1% – 1.3%

Forecast Revisions

$$\mathbb{E}_i^{post}\,\pi - \mathbb{E}_i^{pre}\,\pi = a + b \times Treatment_i + \beta X_i + error_i$$

Treatments	Immediate revision		Revision after 3 months	
	(1)	(2)	(3)	(4)
Population growth	−0.224∗	−0.271∗∗		
	(0.116)	(0.120)		
Past inflation (2.3%)	−1.170∗∗∗	−1.241∗∗∗		
	(0.114)	(0.120)		
Inflation Target	−1.087∗∗∗	−1.130∗∗∗		
	(0.113)	(0.120)		
Fed inflation forecast (1.9%)	−1.166∗∗∗	−1.240∗∗∗		
	(0.113)	(0.120)		
FOMC statement	−1.284∗∗∗	−1.298∗∗∗		
	(0.113)	(0.119)		
USA today coverage				
Unemployment				
Gas Price				
Controls for demographics	No	Yes	No	Yes
Nobs	19,654	17,979	13,600	12,805

- Actual FOMC statement from May 2nd 2018 large effect on forecast revisions
- Included statement on current inflation and 2% symmetric inflation target

Forecast Revisions

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times \text{Treatment}_i + \beta X_i + \text{error}_i$$

Treatments	Immediate revision		Revision after 3 months	
	(1)	(2)	(3)	(4)
Population growth	−0.224*	−0.271**		
	(0.116)	(0.120)		
Past inflation (2.3%)	−1.170***	−1.241***		
	(0.114)	(0.120)		
Inflation Target	−1.087***	−1.130***		
	(0.113)	(0.120)		
Fed inflation forecast (1.9%)	−1.166***	−1.240***		
	(0.113)	(0.120)		
FOMC statement	−1.284***	−1.298***		
	(0.113)	(0.119)		
USA today coverage	−0.469***	−0.555***		
	(0.116)	(0.121)		
Unemployment				
Gas Price				
Controls for demographics	No	Yes	No	Yes
Nobs	19,654	17,979	13,600	12,805

- Newspaper more accessible than FOMC statement but less effective

"The Fed held its key interest rate steady Wednesday but noted that inflation has climbed closer to its 2% goal, paving the way for another rate hike in June."

Forecast Revisions

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times \textit{Treatment}_i + \beta X_i + \textit{error}_i$$

Treatments	Immediate revision		Revision after 3 months	
	(1)	(2)	(3)	(4)
Population growth	−0.224∗	−0.271∗∗		
	(0.116)	(0.120)		
Past inflation (2.3%)	−1.170∗∗∗	−1.241∗∗∗		
	(0.114)	(0.120)		
Inflation Target	−1.087∗∗∗	−1.130∗∗∗		
	(0.113)	(0.120)		
Fed inflation forecast (1.9%)	−1.166∗∗∗	−1.240∗∗∗		
	(0.113)	(0.120)		
FOMC statement	−1.284∗∗∗	−1.298∗∗∗		
	(0.113)	(0.119)		
USA today coverage	−0.469∗∗∗	−0.555∗∗∗		
	(0.116)	(0.121)		
Unemployment	−0.348∗∗∗	−0.352∗∗∗		
	(0.115)	(0.121)		
Gas Price				
Controls for demographics	No	Yes	No	Yes
Nobs	19,654	17,979	13,600	12,805

- Elicit unemployment expectations before treatment: mean of 6.3% with std. of 3.9%
- Only 12% report number $<= 3.9\%$
- Actual information results in downward revision in expectations
- Opposite from Phillips curve prediction but consistent with supply-side view

Forecast Revisions

$$\mathbb{E}_i^{post} \, \pi - \mathbb{E}_i^{pre} \, \pi = a + b \times \textit{Treatment}_i + \beta X_i + \textit{error}_i$$

Treatments	Immediate revision		Revision after 3 months	
	(1)	(2)	(3)	(4)
Population growth	−0.224*	−0.271**		
	(0.116)	(0.120)		
Past inflation (2.3%)	−1.170***	−1.241***		
	(0.114)	(0.120)		
Inflation Target	−1.087***	−1.130***		
	(0.113)	(0.120)		
Fed inflation forecast (1.9%)	−1.166***	−1.240***		
	(0.113)	(0.120)		
FOMC statement	−1.284***	−1.298***		
	(0.113)	(0.119)		
USA today coverage	−0.469***	−0.555***		
	(0.116)	(0.121)		
Unemployment	−0.348***	−0.352***		
	(0.115)	(0.121)		
Gas Price	1.490***	1.420***		
	(0.125)	(0.130)		
Controls for demographics	No	Yes	No	Yes
Nobs	19,654	17,979	13,600	12,805

- Information on gas price increase of 11% over last 3 months
- Substantial upward revision in expectations
- Implied pass-through of 10%, well above expenditure share

Forecast Revisions

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times Treatment_i + \beta X_i + error_i$$

| Treatments | Immediate revision | | Revision after 3 months | |
	(1)	(2)	(3)	(4)
Population growth	−0.224*	−0.271**	−0.118	−0.110
	(0.116)	(0.120)	(0.099)	(0.099)
Past inflation	−1.170***	−1.241***	−0.016	−0.049
	(0.114)	(0.120)	(0.100)	(0.102)
Inflation Target	−1.087***	−1.130***	−0.304***	−0.318***
	(0.113)	(0.120)	(0.101)	(0.105)
Fed inflation forecast	−1.166***	−1.240***	−0.211**	−0.230**
	(0.113)	(0.120)	(0.102)	(0.105)
FOMC statement	−1.284***	−1.298***	−0.137	−0.124
	(0.113)	(0.119)	(0.101)	(0.106)
USA today coverage	−0.469***	−0.555***	−0.223**	−0.208**
	(0.116)	(0.121)	(0.102)	(0.104)
Unemployment	−0.348***	−0.352***	−0.239**	−0.243**
	(0.115)	(0.121)	(0.102)	(0.104)
Gas Price	1.490***	1.420***	−0.170*	−0.200**
	(0.125)	(0.130)	(0.101)	(0.101)
Controls for demographics	No	Yes	No	Yes
Nobs	19,654	17,979	13,600	12,805

- Some persistence in treatment effects but 75% dissipates
- Effects fully disappear after 6 months (not reported)

Persistence of Treatment Effect

- Mild persistence alleviate concerns of experimenter demand effects

- But: Treatment effect dissipates by 75% 3 months post treatment

- Might reflect weak treatment and transitory knowledge

- Study persistence in recalling information

Persistence in Treatments

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times Treatment_i + \beta X_i + error_i$$

	Revision after 3 months		Revision after 6 months	
	(1)	(2)	(3)	(4)
	Panel A: Perceptions of Inflation Target			
$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre}$	$-0.219***$	$-0.290***$	-0.161	$-0.184*$
	(0.08)	(0.10)	(0.10)	(0.11)
	Panel B: Perceptions of Past Inflation			
$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre}$	$-0.239***$	$-0.221**$	-0.106	-0.107
	(0.09)	(0.10)	(0.10)	(0.10)
	Panel C: Perceptions of Unemployment Rate			
$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre}$	$-0.192**$	$-0.208*$	-0.12	-0.149
	(0.10)	(0.11)	(0.11)	(0.11)
Controls for demographics	No	Yes	No	Yes

- People forget treatment information
- One-off messages unlikely successful
- Suggests persistent communication necessary

Taking Stock

- Simple messages can be extremely powerful in moving expectations

- FOMC statements no more powerful than simple statistics

- Simple facts & information about policy instead of "Fed speak"?

- Purely relying on media possible not effective
    - Many individuals do not read news about monetary policy
    - Even if exposed, individuals seem to discount information

Heterogeneity

- Do treatment effects differ by observables?

- Relevant for policy makers

  - Affect certain sub-populations

  - Target most responsive sub-population

- Study heterogeneity by gender, income, education, etc.

Forecast Revisions: Heterogeneity by Gender

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times Treatment_i + \beta X_i + error_i$$

Treatments	Female (1)	Male (2)
Population growth	$-0.318**$	-0.068
	(0.148)	(0.183)
Past inflation	$-1.479***$	$-0.574***$
	(0.142)	(0.192)
Inflation Target	$-1.402***$	$-0.488***$
	(0.143)	(0.180)
Fed inflation forecast	$-1.375***$	$-0.788***$
	(0.144)	(0.181)
FOMC statement	$-1.557***$	$-0.772***$
	(0.143)	(0.183)
USA today coverage	$-0.640***$	-0.167
	(0.146)	(0.190)
Unemployment	$-0.597***$	0.114
	(0.146)	(0.185)
Gas Price	$1.504***$	$1.443***$
	(0.159)	(0.201)
Controls for demographics	Yes	Yes
Observations	14,575	5,079

- Stronger response by women than men to all treatments including placebo
- Men ex-ante more confident in expectations

Forecast Revisions: Heterogeneity by Income

$$\mathbb{E}_i^{post} \, \pi - \mathbb{E}_i^{pre} \, \pi = a + b \times Treatment_i + \beta X_i + error_i$$

Treatments	Bottom Tercile (1)	Middle Tercile (2)	Top Tercile (3)
Population growth	−0.078	−0.433∗	−0.217
	(0.227)	(0.255)	(0.157)
Past inflation	−1.318∗∗∗	−1.661∗∗∗	−0.872∗∗∗
	(0.221)	(0.252)	(0.156)
Inflation Target	−0.932∗∗∗	−1.731∗∗∗	−0.901∗∗∗
	(0.212)	(0.250)	(0.155)
Fed inflation forecast	−1.381∗∗∗	−1.652∗∗∗	−0.817∗∗∗
	(0.224)	(0.242)	(0.153)
FOMC statement	−1.150∗∗∗	−1.812∗∗∗	−1.137∗∗∗
	(0.212)	(0.248)	(0.158)
USA today coverage	−0.221	−0.841∗∗∗	−0.457∗∗∗
	(0.224)	(0.252)	(0.158)
Unemployment	−0.216	−0.640∗∗	−0.298∗
	(0.226)	(0.253)	(0.156)
Gas Price	1.585∗∗∗	1.145∗∗∗	1.576∗∗∗
	(0.236)	(0.276)	(0.173)
Controls for demographics	Yes	Yes	Yes
Observations	6,080	5,786	7,788

- Middle income respondents ($40,000 < income < $100,000) respond significantly more
- Low income respondents don't respond at all to USA today treatment

Forecast Revisions: Heterogeneity by Education

$$\mathbb{E}_i^{post}\,\pi - \mathbb{E}_i^{pre}\,\pi = a + b \times \mathit{Treatment}_i + \beta X_i + \mathit{error}_i$$

Treatments	Highschool of less (1)	Associate degree (2)	College + (3)
Population growth	−0.053	−0.436 ∗∗	−0.171
	(0.267)	(0.216)	(0.158)
Past inflation	−1.088∗∗∗	−1.588∗∗∗	−0.945∗∗∗
	(0.274)	(0.204)	(0.158)
Inflation Target	−0.693∗∗∗	−1.323∗∗∗	−1.127∗∗∗
	(0.252)	(0.213)	(0.153)
Fed inflation forecast	−1.328∗∗∗	−1.180∗∗∗	−1.096∗∗∗
	(0.264)	(0.214)	(0.152)
FOMC statement	−1.260∗∗∗	−1.298∗∗∗	−1.294∗∗∗
	(0.261)	(0.203)	(0.159)
USA today coverage	−0.213	−0.523 ∗∗	−0.559∗∗∗
	(0.261)	(0.217)	(0.159)
Unemployment	−0.303	−0.337	−0.382 ∗∗
	(0.266)	(0.212)	(0.158)
Gas Price	1.463∗∗∗	1.594∗∗∗	1.435∗∗∗
	(0.291)	(0.233)	(0.170)
Controls for demographics	Yes	Yes	Yes
Observations	6,080	5,786	7,788

- **Less than college educated** don't react to USA today
- They do react to other treatments

Disagreement and Convergence in Beliefs

- So far only study average responses

- Treatments plausibly also reduce disagreement across individuals

- Compare disagreement pre and post treatments and over time

- Higher moments sensitive to outliers

- Measure standard deviation as $\hat{\sigma} = 1.4826 \times MAD$
  Median Absolute Deviation $= median(|\pi_i - \tilde{\pi}|)$ with $\tilde{\pi} = median(\tilde{\pi})$

- Normalize disagreement by disagreement in control group

Treatment Effect on Disagreement

Treatments	Pre-Treatment	Post-Treatment Immediate	Post 3 Months	Post 6 Months
Population Growth	1.150	1.000	0.842	0.914
	(0.142)	(0.040)	(0.056)	(0.075)
Past inflation	1.000	0.500	0.921	0.800
	(0.115)	(0.044)	(0.059)	(0.060)
Inflation target	1.750	0.750	0.737	0.943
	(0.123)	(0.064)	(0.055)	(0.075)
Fed inflation forecast	1.500	0.500	0.979	0.857
	(0.135)	(0.029)	(0.053)	(0.056)
FOMC statement	1.600	0.500	0.842	0.800
	(0.135)	(0.025)	(0.055)	(0.058)
USA today coverage	1.000	0.850	0.842	0.914
	(0.101)	(0.141)	(0.052)	(0.059)
Unemployment	1.400	1.000	0.979	0.943
	(0.144)	(0.034)	(0.052)	(0.068)
Gas Price	1.600	1.000	0.905	0.914
	(0.127)	(0.061)	(0.047)	(0.064)

- Similar disagreement pre-treatment
- Immediate reduction post-treatment
- Effect dissipates
- Pseudo treatment no effect

Margins of Adjustment

- Some differences in treatment effects across arms

- Do individuals react differently to information: intensive margin

- Or does different fraction of individuals react: extensive margin

- We elicit pre-expectations with distribution vs point estimates post

- Define threshold for extensive margin: $\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi > 2\%$

- Compare margin of adjustment of treatments to control group

Margins of Adjustment

Treatments	Extensive Margin		Intensive Margin	
Population growth	−0.01	−0.029	−0.387 ∗∗	−0.365 ∗∗
	(0.02)	(0.02)	(0.18)	(0.18)
Past inflation	0.006	−0.006	−2.109∗∗∗	−2.094∗∗∗
	(0.02)	(0.02)	(0.18)	(0.19)
Inflation target	−0.02	−0.034	−2.047∗∗∗	−2.042∗∗∗
	(0.02)	(0.02)	(0.19)	(0.20)
Fed inflation forecast	−0.048 ∗∗	−0.062∗∗∗	−2.136∗∗∗	−2.161∗∗∗
	(0.02)	(0.02)	(0.19)	(0.20)
FOMC statement	−0.032	−0.051 ∗∗	−2.305∗∗∗	−2.235∗∗∗
	(0.02)	(0.02)	(0.19)	(0.20)
USA today coverage	−0.03	0.048 ∗∗	−0.735∗∗∗	−0.767∗∗∗
	(0.02)	(0.02)	(0.18)	(0.19)
Unemployment	−0.009	−0.024	−0.609∗∗∗	−0.502∗∗∗
	(0.02)	(0.02)	(0.18)	(0.18)
Gas prices	0.184∗∗∗	0.162∗∗∗	1.327∗∗∗	1.368∗∗∗
	(0.02)	(0.02)	(0.16)	(0.17)
Controls for demographics	No	Yes	No	Yes
Observations	19,269	17,629	11,502	10,498

- Little difference in extensive margin of adjustment across treatments
- Intensive margin fully drives difference with USA today treatment

Initial Beliefs

- So far do not consider initial expectations

- Split sample into subsets above and below 2%

- Compare change in inflation expectations relative to control group

Treatment Effect by Initial Inflation Expectations

$$\mathbb{E}_i^{post} \pi - \mathbb{E}_i^{pre} \pi = a + b \times Treatment_i + \beta X_i + error_i$$

Treatments	$\mathbb{E}_i^{pre} < 2\%$		$\mathbb{E}_i^{pre} > 2\%$	
Population growth	0.197	0.08	-0.597***	-0.645***
	(0.143)	(0.149)	(0.138)	(0.146)
Past inflation	0.239*	0.180	−2.048***	−2.111***
	(0.141)	(0.149)	(0.135)	(0.143)
Inflation target	0.144	0.023	−1.774***	−1.792***
	(0.139)	(0.148)	(0.132)	(0.142)
Fed inflation forecast	−0.106	−0.132	−1.872***	−1.922***
	(0.135)	(0.143)	(0.135)	(0.143)
FOMC statement	−0.098	−0.173	−1.988***	−1.949***
	(0.137)	(0.145)	(0.134)	(0.142)
USA today coverage	0.064	−0.088	−0.883***	−0.952***
	(0.143)	(0.151)	(0.138)	(0.146)
Unemployment	0.013	0.042	−0.624***	−0.664***
	(0.144)	(0.151)	(0.138)	(0.149)
Gas prices	1.957***	1.781***	1.264***	1.221***
	(0.166)	(0.171)	(0.147)	(0.157)
Controls for demographics	No	Yes	No	Yes
Observations	7,157	6,555	12,020	11,016

- Individuals with high initial beliefs drive updating
- Gas price expectations results in larger upward revision for low initial beliefs

Conclusion

- Direct communication to public can have large effects on expectations

- Dwarfs Δ in real interest rates for conventional policy annoucements

- Expectations management strong policy tool in times of low rates?

- Low income & less income individuals less informed about policy
  - Higher believes about Fed inflation target

- Same groups that incorporate less information from news media

- Traditional communication channels of central banks less effective