

Fed Sentiment and Expectations: Evidence from Speeches by FOMC Members*

Eleonora Granziera [†] Vegard H. Larsen [‡] Greta Meggiorini [§]

February 28, 2023

Abstract

This paper investigates whether the Federal Reserve (Fed) can influence the expectations of economic agents through the speeches of the Federal Open Market Committee (FOMC) members and regional Fed presidents. Using textual analysis, we construct a sentiment index for inflation. We find that this index drives inflation expectations of households, professional forecasters and market participants. However, the speeches are able to sway inflation expectations only in the sample that starts with the Great Financial Crisis. We find that also FOMC inflation projections are able to steer inflation projections of both expert and non-experts. Finally, inflation expectations are more affected by the sentiment index when inflation is rising. These results bear important implications for the Fed communication strategy: economic agents are listening and speeches are an effective communication tools.

JEL-codes: D80, E31, E32, E66

Keywords: Central bank communication, Inflation Expectations, Textual analysis, Expectation formation

*This working paper should not be reported as representing the views of Norges Bank. The views expressed are those of the author and do not necessarily reflect those of Norges Bank. We would like to thank Francesco D’Acunto, Michael Ehrmann, Annette Vissing-Jørgensen, Michael Weber, and conference and seminar participants at the 2nd Dolomiti Macro Meetings, the Federal Reserve Bank of Boston, and the Red conference on “Monetary Policy: Heterogeneity, Communication and Subjective Inflation Expectations” for helpful comments and suggestions.

[†]**Eleonora Granziera:** Norges Bank. Email eleonora.granziera@norges-bank.no

[‡]**Vegard H. Larsen:** BI Norwegian Business School. Email vegard.h.larsen@bi.no

[§]**Greta Meggiorini:** University of California, Irvine. Email gmeggior@uci.edu

1 Introduction

Communication has become a major policy tool for central banks over the last couple of decades. Its importance has increased because of a demand for transparency and accountability by the public, but also because of a shrinking set of tools when economies have been lingering around the zero lower bound.

One key objective of central bank communication is to keep inflation expectations anchored. This is crucial both in times of low inflation and interest rates stuck at the zero lower bound, and in times of surging inflation caused by temporary supply shocks which do not call for an immediate monetary policy response. In addition, if central banks implement make-up rules such as average inflation targeting, communication tools can be used to create the expectation that inflation will overshoot (or undershoot) its target in the future.

Central banks have several communication tools at their disposal, such as published projections, statements after monetary policy decisions, transcripts of the minutes of monetary policy meetings, and speeches. In this article we focus on the latter and we analyze whether speeches by the leadership in the Federal Reserve (Fed) can help steer expectations of a variety of economic agents: households, professional forecasters and financial market participants.

The literature on communication by central banks is sizable and rapidly growing. Up to now, most studies have focused on transcripts and statements. In contrast, we analyze speeches given by Federal Open Market Committee (FOMC) members and regional Fed presidents. We focus on speeches rather than other form of communications, such as minutes or statements, for several reasons: they constitute real-time publicly accessible information, cover a variety of topics, and reflect a diversity of opinions cross-section and time series. Finally, their time series is longer than the one for statements (starts in January 2000) or FOMC projections (starts in October 2007) and available at a higher frequency.¹

Our dataset consists of about 4725 speeches by FOMC members and regional Fed presidents from January 1995 until April 2022. We split all the speeches into sentences and identify a sentence as being about inflation if it contains one of the three terms:

¹The Fed started to release statements in 1994 but only for meetings that were associated with a policy rate change.

inflation, price, or cost. This gives us a total of 79431 sentences. We then use the dictionaries from [Gardner et al. \(2022\)](#) which analyzes FOMC statements to compute the inflation specific sentiment by scoring the sentences about inflation based on modifier words. A high (low) inflation sentiment reflects high (low) current or expected inflation.

We test whether the sentiment index constructed from Fed speeches affects inflation expectations of households, professional forecasters and financial market participants. For household expectations we use the Michigan Survey of Consumers (MSC), for professional forecasters the Survey of Professional Forecasters (SPF) and for financial market participants the one-year expected inflation series computed by the Federal Reserve Bank of Cleveland.

Several economic developments might drive both our constructed sentiment measures and inflation expectations. To account for this potential endogeneity issue we follow the approach by [Belloni and Chernozhukov \(2013\)](#) and proceed in two steps. First we regress expectations on a large number of possible explanatory variables using LASSO techniques. This procedure selects among about 120 macro-financial variables from FRED-MD data set assembled in [McCracken and Ng \(2016\)](#) the ones that have explanatory power for inflation expectations. In a second step we regress inflation expectations on the lagged sentiment and on the variables surviving the selection procedure.

The Fed conveys the forecasts of economic conditions of the FOMC members through the Summary of Economic Projections. While the sentiment we construct might reflect both current and future assessments of economic conditions, and statements in speeches might be qualitative, the projections are quantitative and related to specific horizons. Therefore, we include them in the regression as potential explanatory variable of agents' expectations. This allows us to determine the relative effectiveness of different communication channels in managing expectations.

We find that the inflation sentiment drives inflation expectations of households and market participants. The speeches, however, affect inflation expectations only in the sample that starts with the Great Financial Crisis. We also find that the FOMC inflation projections are able to steer inflation projections for professional forecasters and financial markets.

The literature that analyzes speeches by Fed presidents or FOMC members is limited. [Neuhierl and Weber \(2019\)](#) document that speeches of the FED chair or vice chair predict

the slope of the yield curve. [Ehrmann et al. \(2021\)](#) find that voting rights affect Fed presidents' number and tone of speeches (more speeches and stronger tone when voting). Moreover, speeches move financial markets less in years that presidents vote. [Malmendier et al. \(2021\)](#) uses speeches to test whether FOMC members' attitude towards monetary policy can be detected in the language, or tone, they use in their speeches. [Istrefi et al. \(2021\)](#) check whether Fed policy actions can be explained by FOMC members' financial stability concerns, captured by a financial concern index constructed on FOMC speeches.

The rest of this paper is organized as follows: Section 2 presents the speeches, the sentiment measures, and the survey and macro data. Section 3 describes the modeling framework mapping speech sentiments to expectations data, and section 4 presents the main results. Section 5 concludes.

2 Data and measurement

In this section we describe the Fed speeches corpus and how we compute the category specific sentiment from these documents. We also describe the expectations data and our set of macroeconomic controls.

2.1 Speeches and Inflation Sentiment

We collect speeches by FOMC members and regional Fed presidents downloaded from the web sites of the Federal Reserve Board and from the web pages of the regional Federal Reserve Banks. The FOMC consists of twelve voting members. The first seven of these members belong to the Board of Governors of the Federal Reserve System, including the chair. The eighth permanent member is the president of the Federal Reserve Bank of New York. The last four members are taken from the rotating pool of the remaining eleven Reserve Bank presidents, and these rotating members serve one-year terms. Non-voting Reserve Bank presidents attend the meetings of the FOMC.

Our sample includes all 7 Governors and 12 regional presidents regardless of their voting right. In a year where all seats are filled we should count 19 potential speakers. We collect speeches from January 1995 until August 2022. This includes a total of 66 speakers adding up to a total of 4756 speeches.²

²The total number of speakers is 64, but Janet Yellen and John Williams are included twice because they

Identifiers	Modifiers	
	Additive Terms (+1)	Subtractive Terms (-1)
inflation, price, cost	elevat, expand, foster, height, high, increas, persist, pressure, moderate, rise, risk remain, rising, rose, risen, solid, sustain, strong, strength, upward, up, upside risk	below, damp, ease, easing, decline, diminish, down, low, moderate, moderated, muted, reduction, restrain, set back, slow, soft, subdued, weak

Table 1. Identifier and modifier terms for constructing the inflation index.

To measure the category specific sentiment in the FOMC speeches, we start out by splitting all the speeches into sentences. Then, we select a sub-set of the sentences by identifying the ones that contain a term (or terms) from the inflation category specific list. The inflation category specific measure is calculated by using the word lists in [Gardner et al. \(2022\)](#). In particular, the identifying terms for the inflation sentiment are *inflation*, *price*, and *cost*. We perform string matching when we identify sentences, hence searching for these terms will give positive results for words such as *inflationary* and *costs*. This results in a total of 4334 speeches and 79661 sentences about inflation. The inflation specific sentiment is calculated by adapting the scored dictionary from [Gardner et al. \(2022\)](#) for inflation. This scored dictionary is given by a set of modifier terms where some are subtractive and some are additive. A sentence is then given a sentiment score given by the sum of the subtractive (-1) and additive (+1) terms in the sentence. All the words identifying the inflation category and the modifying words selected to construct the sentiment are listed in [Table 1](#).

We create a daily sentiment series as the sum of the scored sentences within one day. Trivially, in case of multiple speeches given in one day, the daily sentiment is the sum of the sentiments for each speech. [Appendix A](#) shows example sentences for several speeches and highlights the identifiers and modifiers terms found in the sentences. We also report the sentiment calculated for the overall speech and the sentiment computed for the day. How do we interpret our inflation sentiment measure? The sentiment does not express an assessment of whether the inflation outlook is good or bad, i.e. inflation is close to target or too high/low with respect to the target. Rather, it captures whether inflation is high or low in absolute terms, such that a higher level of the index reflects higher current or expected inflationary pressures. For this reason we did not include in our modifiers the

have served on the FOMC in different roles.

word *improv*, which was instead included in the dictionary of [Gardner et al. \(2022\)](#).

We aggregate the daily sentiment index to monthly and quarterly series by summing over the daily sentiment. Finally, we standardized the series by subtracting the mean and dividing by the standard deviation computed over the full sample. The monthly series is shown in [Figure 1](#), together with the monthly year over year inflation for the consumer price index, all items.³ The sentiment positively co-moves with actual inflation, although the former seems less persistent. [Table 2](#) confirms that the sentiment index is positively correlated with measures of inflation, in particular with CPI all items and personal consumption expenditure (PCE) and to a lesser extent with oil prices. Finally, the sentiment is highly correlated with the economic projections for the one year ahead PCE inflation.

We also consider two sentiment sub-indices: one that includes only the so-called Troika (the Chair of the Board of Governors, the Vice and the President of the New York Fed), and one that includes the regional FED president excluding the New York FED president. [Figure 2](#) shows the two standardized indices.⁴ They are positively correlated (0.30), although the non-Troika index has increased sharply since 2021, while the Troika index stayed close to zero, with a negative outlier in July 2021.

³Figure 3 in [Appendix A](#) shows the non-standardized monthly series for the aggregate sentiment.

⁴Figure 4 in [Appendix A](#) shows the non-standardized sub-indices for Troika and non-Troika.

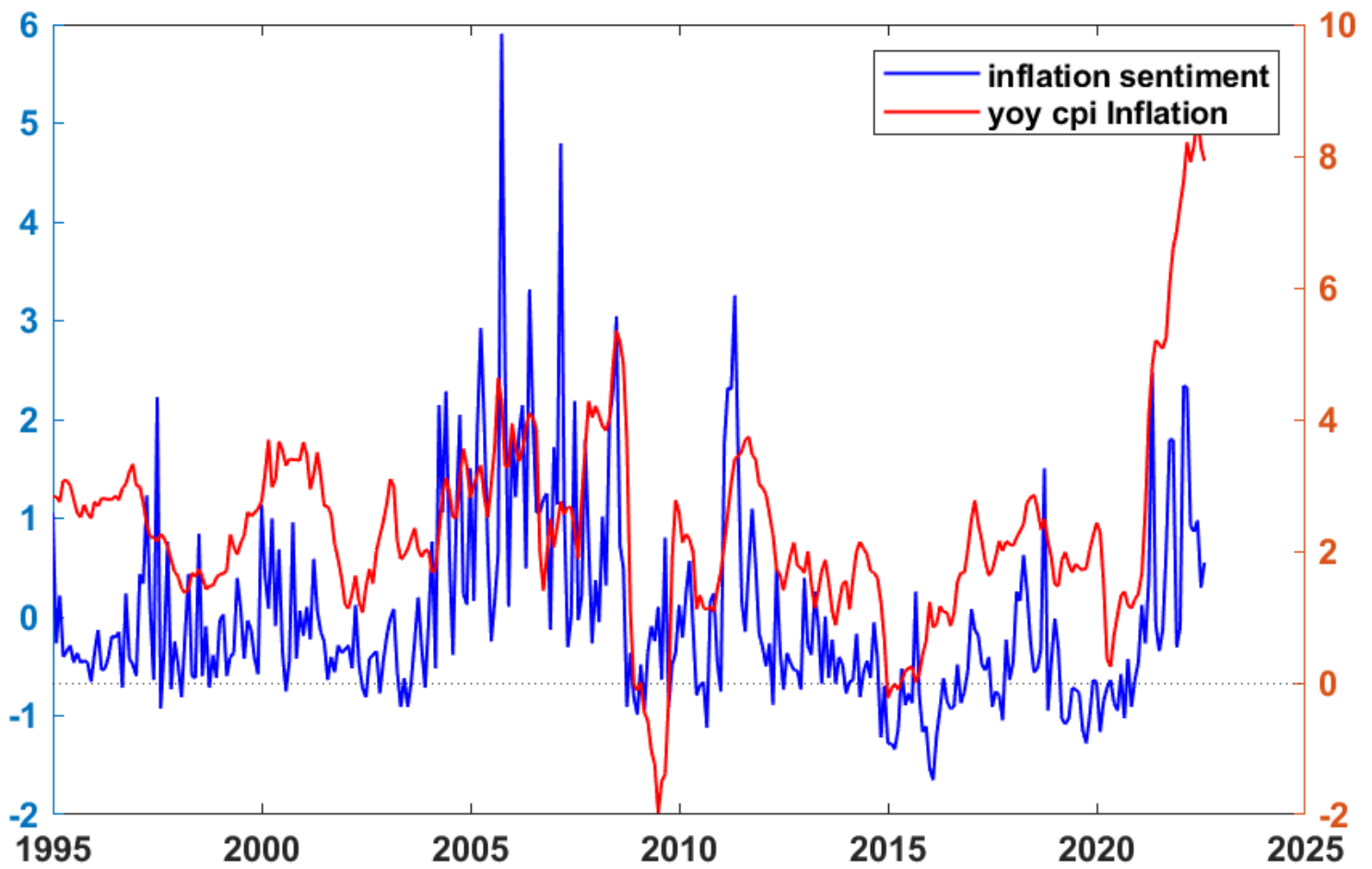


Figure 1. The monthly inflation sentiment index (left vertical axis) and year over year CPI all items inflation (right vertical axis). The monthly sentiment is the monthly sum of the daily inflation sentiment.

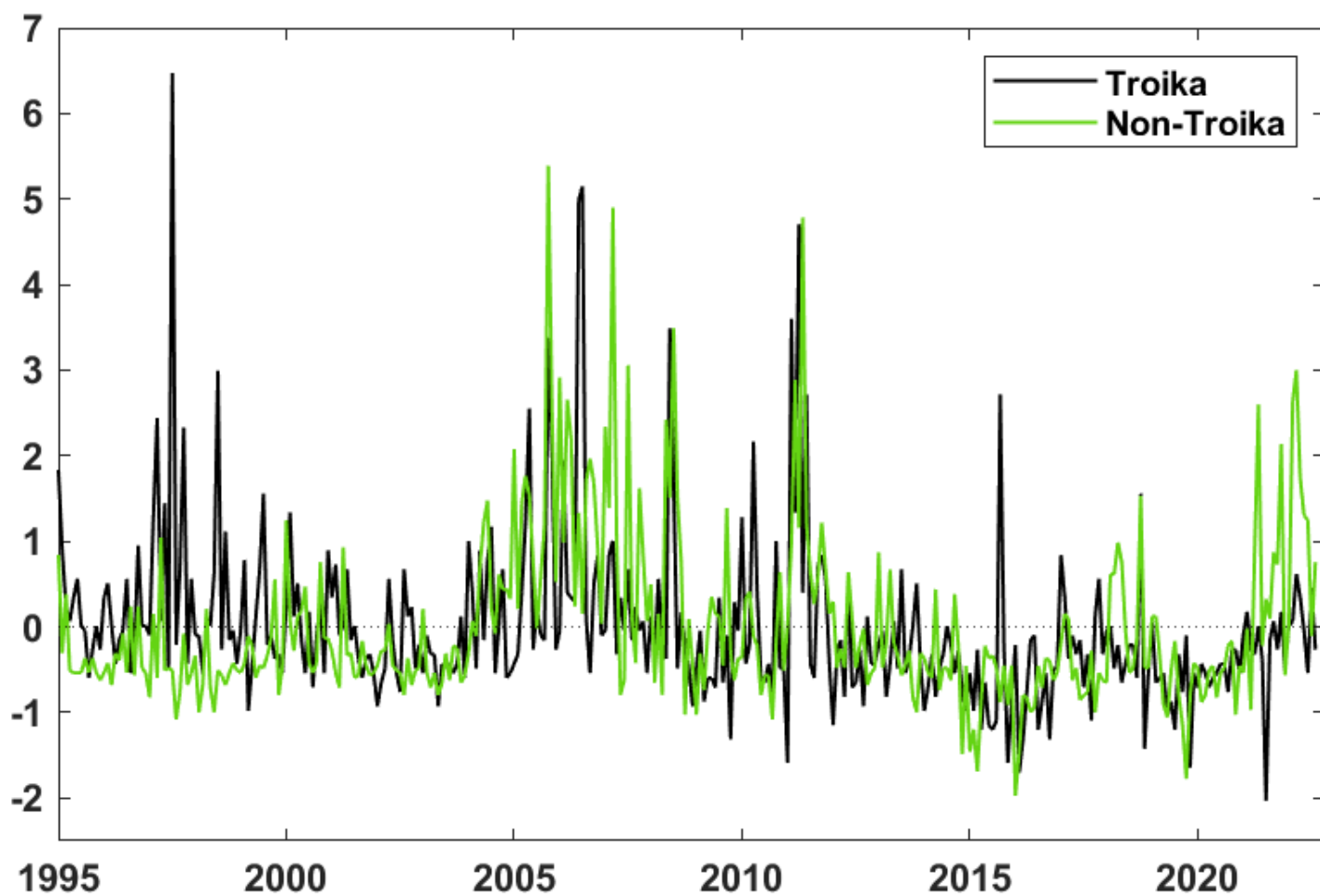


Figure 2. The monthly inflation sentiment sub-indices for Troika (the Chair of the Board of Governors, the Vice and the President of the New York Fed) and all other speakers.

	Correlations: Monthly Variables					
	Troika	Non-Troika	CPI: All Items	PCE	Oil Prices	SEP
Overall	0.63	0.89	0.48	0.50	0.40	0.54
Troika	1	0.32	0.23	0.22	0.20	0.30
Non-Troika		1	0.45	0.48	0.36	0.46
CPI-All Items			1	0.98	0.70	0.83
PCE				1	0.73	0.79
Oil Prices					1	0.56

Table 2. Contemporaneous correlation across monthly indices and variables over the sample 1995M1-2022M8. The oil price series is the West Texas Intermediate (WTI) - Cushing, Oklahoma. SEP refers to the Summary of Economic Projections of the Federal Reserve Board members and Federal Reserve Bank presidents.

2.2 Macroeconomic Forecasts

As a measure of professional inflation forecasts, we use the one year ahead annual average headline CPI inflation rate from the SPF, which covers professional forecasters in a variety of institutions. The survey is available at the quarterly frequency and computed as the geometric average of the quarter-over-quarter median forecasts for CPI inflation. The deadline for the response is set on the second to third week of the middle month of each quarter. Therefore, we assume that forecasters observe the sentiment measure of the first month of the quarter when the forecasts are made. Expectations from the SPF are important for monetary policy, as they are often used, for example, to estimate the slope of the Phillips Curve (Ball and Sandeep, 2018), to increase the accuracy of empirical forecasting models (Gergely and Odendahl, 2021) or to improve the fit of structural models (Del Negro et al., 2015).

While expectations from professional forecasters have been extensively used in the literature, ultimately households are the agents making economic decisions regarding consumption and saving choices (Coibion et al., 2022), mortgage uptaking (Malmendier and Nagel (2016) and Botsch and Malmendier (2020)), stock market participation (Das et al., 2020), labor supply and wage bargaining. These decisions depend crucially on expectations of future inflation. Therefore, we also study inflation expectations from households from the Michigan Survey of Consumers (MSC), which is esign to be representative of the US population. In this survey a minimum of 500 members of the general public are contacted by phone each month and asked approximately 50 questions. We take the inflation forecast as the mean response to the question about price increases. The exact question is “*By about what percent do you expect prices to go (up/down) on the average, during the next 12 months?*”. The Michigan Consumer Survey is one of the most commonly used US surveys in the literature (Weber et al., 2022) and is available for a longer time series than the New York Fed Survey of Consumer Expectations, which was launched in 2013. This allows us to study the impact of the Fed sentiment on household expectations over a longer sample and over sub-samples.

We also consider financial market inflation forecasts that are extracted from asset prices by the Federal Reserve Bank of Cleveland based on the method developed in Haubrich et al. (2012). They use the term structure of interest rates and inflation swaps to extract monthly measures of market expectations of CPI inflation at multiple yearly

horizons starting in 1982. We focus on the one-year ahead inflation expectations and assume that forecasters observe the sentiment measure of the month before the forecasts are made.

The Fed conveys the forecasts of economic conditions of the FOMC members through the Summary of Economic Projections (SEP). The SEP are the economic projections of Federal Reserve Board members and Federal Reserve Bank presidents. They reflect the individual members' assumptions of future developments and are conditional on "appropriate" monetary policy. While the sentiment we construct might reflect both current and future assessments of economic conditions, and statements in speeches might be qualitative, the projections are quantitative and related to specific short and long term future horizons. Therefore, we include them in the regression as potential explanatory variable of agents' expectations. This allows us to determine the relative effectiveness of different communication channels in managing expectations. The FOMC forecasts have been published in March, June, September and December since June 2012 but irregularly in the earlier part of our sample, starting in July 1996. We consider the simple average of the lower and upper central tendency for personal consumption expenditure inflation. The projections are made for a fixed date (e.g. current year and next year) rather than fixed horizon (e.g. one quarter ahead and two quarters ahead). Following [Dovern et al. \(2012\)](#), we transition from fixed date to fixed horizon by taking the weighted average of the current and next calendar years, where the weights are given by the share of the forecast horizon at the forecast origin.

2.3 Macro data

Expectations of economic agents as well as the content and tone of the FOMC speeches might be both driven by recent economic developments. If so, regressing the expectations on the sentiment index alone, might wrongly lead us to conclude that the sentiment affects expectations. To address this potential issue we control for past information using a set of lagged macrofinancial variables extracted from the collection of monthly variables assembled in [McCracken and Ng \(2016\)](#). They provide a downloadable monthly macroeconomic dataset for the United States (FRED-MD), consisting of 130 time series

that covers all the main macroeconomic aggregates and a number of financial indicators.⁵ The dataset is extensively used in the forecasting literature ([Granziera and Sekphosyan, 2019](#)) and includes series capturing output, income, labor market, housing, consumption, orders, money, credit, interest and exchange rates, consumer and producer prices, energy prices and asset prices.

The series are made stationary using the transformations suggested in [McCracken and Ng \(2016\)](#), with the exception that we use first order differences instead of second order differences. For the log-difference transformation we use the year over year, i.e. $\log(x_t) - \log(x_{t-h})$ where $h = 12$ for the regressions involving the MCS and the financial market expectations and $h = 4$ in the regressions for the SPF expectations. Therefore, we control for year over year inflation of the cpi all items as well as several subcomponents of inflation. This is important because it has been documented that agents' beliefs about recent inflation is an accurate predictor of expectations about future inflation ([Weber et al. \(2022\)](#), [D'Acunto et al. \(2021\)](#)).

3 Methodology

We project inflation expectations onto the FED inflation sentiment:

$$E_t\pi_{t+h} = \alpha + \beta s_{t-1} + \gamma' X_{t-1} + u_t, \quad (1)$$

where $E_t\pi_{t+h}$ is the expected inflation rate between the current period and h periods ahead, such that $h = 12$ for monthly data and $h = 4$ for quarterly data, s is the inflation specific sentiment index which we introduced in [Section 2.1](#), X_{t-1} is a set of controls discussed below and u_t is a normally distributed i.i.d. error term.

The timing of the sentiment index is consistent with the information set available to the agents when the forecasts are made and it differs between the monthly and quarterly regressions. In the monthly regressions the sentiment index enters the regression with a one period lag, reflecting the fact that agents forming forecasts and completing the survey in month t have information available up to (at most) time $t - 1$. In the SPF expectations

⁵We delete two of the series from the original dataset because they start later than January 1995: the S&P/Case-Shiller 20-City Composite Home Price Index (first observation: January 2000) and the U.S. Dollars to Euro Spot Exchange Rate (first observation: January 1999). We also disregard the series Non-borrowed Reserves of Depository Institutions because of its explosive behavior post 2008.

regressions we use the sentiment index from the first month of the quarter, as agents completing the survey in the middle of a quarter t have information available up to (at most) the end of the first month in quarter t . For the control variables we use the lagged values to take into account the publication lags of most series, so that in month/quarter t agents observe the value of the series up to month/quarter $t - 1$.

The analysis is conducted in two steps. First, we regress the expectations on all the 130 macrofinancial variables included in [McCracken and Ng \(2016\)](#) using the Least Absolute Shrinkage and Selection Operator (LASSO). We target the tuning parameter in the LASSO estimator such that the LASSO procedure selects a number of variables equal to about 10% of the number of observations. Second, the surviving regressors are collected in X_{t-1} and are used as controls in our specification (1).

LASSO is a regression analysis method that performs variable selection and thereby favors parsimonious models. Therefore, it allows us to exclude unimportant variables from the regression model (1). The two step procedure has been suggested by [Belloni and Chernozhukov \(2013\)](#) which shows that the estimated coefficients from the OLS regression post-LASSO exhibit a smaller bias than the coefficients estimated from a one step LASSO regression. Importantly, this holds even if the OLS post-LASSO model is misspecified, i.e. it does not include some of the explanatory variables of the "true" regression model. In a second regression model we also control for the FOMC projections:

$$E_t\pi_{t+h} = \alpha + \beta s_{t-1} + \delta f_{t-1} + \gamma' X_{t-1} + u_t, \quad (2)$$

where f_{t-1} are the one year ahead inflation forecasts from the Summary of Economic Projections, computed as described in [2.2](#).

In a robustness check we run the following regression model:

$$E_t\pi_{t+h} = \alpha + \beta s_{t-1} + \delta' P_{t-1} + u_t, \quad (3)$$

where P_{t-1} is a vector collecting the first K principal components extracted from the control variables X_{t-1} . Principal component is an alternative way to deal with parameter proliferation and reduce the number of regressors. We use LASSO as our baseline because it allows us to identify the specific series that are more important in affecting inflation expectations.

4 Results

In the first step of our analysis we use the LASSO approach to select the series that are most important in explaining inflation expectations. These are listed in Table 4. Households' expectations are affected by commodity prices and the prices of durable goods consistent with findings in previous studies. Professional forecasters are more sophisticated. They base their predictions not only on past inflation but also on capacity utilization, suggesting that they rely on a Philips curve type relationship between inflation and labor market conditions to make their forecasts. Interestingly, they look at cpi all items less food, rather than more volatile measures of changes in prices. As for the professional forecasters, expectations of financial markets participants are driven by lagged inflation and a labor market indicator. However, they also depend on the conditions of the real estate market.

Next, we regress expectations on the variables selected by the LASSO procedure and on the "soft" and "hard" information provided by the FED. Table 3 reports the results of our baseline regressions. We consider two specifications: one that includes only the sentiment indicator and one that conditions also on the FOMC projections.

In the first specification the coefficient for the inflation sentiment is statistically significant for the regressions that span the full sample and for all types of agents. The coefficient is positive, suggesting that a higher sentiment, which signals higher inflation, translates into higher inflation expectations. The magnitude is comparable across types of agents. When we add the FOMC projections to the set of explanatory variables, the sentiment ceases to be significant for the households' expectations. In contrast, the coefficients for the FOMC projections is significant for all agents.

The FED communication strategy has changed over time, in an effort to become more transparent. For example the FOMC projections have been published every quarter since 2012, while they were published irregularly before then. Therefore, the ability of the FED to affect expectations might differ over our sample. For this reason we repeat our analysis over two subsamples: one that runs from 1996 to 2007 and a second one from 2008 till 2022. The subsample results show that prior to the Great Financial Crisis, the FED was unable to affect households and professional forecasters' expectations. However, both the inflation sentiment and the FOMC projections are significant from 2008 onwards. For households, the coefficients are much larger than in the full sample regressions.

Michigan Survey of Consumers						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.07*	0.15	-0.04	0.15	0.34***	0.37***
FOMC Projections		0.35*		-0.13		0.77***
R-Squared	0.71	0.71	0.61	0.59	0.79	0.78
Observations	331	82	155	24	176	58
Tuning Parameter	0.005	0.005	0.005	0.005	0.005	0.005

Survey of Professional Forecasters						
	1995:Q1-2022:Q3		1995:Q1-2007:Q4		2008:Q1-2022:Q3	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.05**	0.07***	0.01	0.02	0.11***	0.08***
FOMC Projections		0.16***		0.15		0.15**
R-Squared	0.78	0.86	0.70	0.60	0.82	0.86
Observations	111	77	52	23	58	53
Tuning Parameter	0.01	0.01	0.01	0.01	0.01	0.01

Market based forecasts						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.09***	0.21***	-0.06*	-0.07	0.19***	0.19**
FOMC Projections		0.51***		0.47***		0.53***
R-Squared	0.57	0.73	0.29	0.69	0.50	0.70
Observations	331	82	155	24	176	58
Tuning Parameter	0.003	0.003	0.003	0.003	0.003	0.003

Table 3. Baseline regressions. The dependent variables are the one year ahead expectation (mean) of inflation from the MSC, the one year ahead expectation (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectation. Inflation Sentiment is the standardized index of total Fed inflation sentiment constructed in Section 2. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

MSC	PPI by Commodity: Final Demand: Finished Goods CPI: Commodities PCE: Durable goods Manufacturers’ Unfilled Orders: Durable Goods
SPF	Capacity Utilization: Manufacturing CPI : All Items Less Food
MKT	CPI: All Items Less Food Civilian Labor Force Level New Privately-Owned Housing Units Started: Total Units in the Midwest New Privately-Owned Housing Units Authorized in Permit-Issuing Places: Total Units in the Midwest

Table 4. Variables selected from the LASSO estimation.

We assess the robustness of our results with respect to the methodology. We reduce

the dimensionality of the control variables by shrinking the information with principal components, rather than select individual variables through the LASSO approach. Results for this exercise are shown in Table 14 for a specification that includes the first three principal components.

4.1 Troika

Next we ask whether agents are more responsive to the speeches of the Troika or the regional FED presidents. Therefore, we construct two inflation sentiment indices: one based on the speeches of Troika members, and one based on speeches given by the presidents of all regional FEDs, excluding the NY FED. We then include both indices as explanatory variables in our regressions.

Table 7 shows some interesting differences across agents. Households' expectations are affected by regional presidents, suggesting that they might pay more attention to regional economic conditions. Professional forecasters instead are influenced by the Troika's sentiment index, as they might form expectations based on the overall US economic conditions. Finally, market based forecasts are swayed by both indices.

Michigan Survey of Consumers						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	0.00	-0.02	-0.01	-0.01	0.06	0.07
Non-Troika Sentiment	0.07*	0.28**	-0.03	0.26*	0.33***	0.45**
FOMC Projections		0.37*		-0.06		0.70**
R-Squared	0.71	0.72	0.61	0.62	0.79	0.78
Observations	331	82	155	24	176	58
Tuning Parameter	0.005	0.005	0.005	0.005	0.005	0.005

Survey of Professional Forecasters						
	1995:Q1-2022:Q3		1995:Q1-2007:Q4		2008:Q1-2022:Q3	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	0.05***	0.06***	0.02	0.01	0.05**	0.06**
Non-Troika Sentiment	0.01	0.03*	-0.00	0.02	0.08***	0.03
FOMC Projections		0.15***		0.15		0.16**
R-Squared	0.78	0.86	0.70	0.58	0.81	0.86
Observations	111	77	52	23	58	53
Tuning Parameter	0.01	0.01	0.01	0.01	0.01	0.01

Market based forecasts						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	0.12***	0.09***	0.04	-0.00	0.09**	0.07*
Non-Troika Sentiment	0.02	0.14**	-0.09***	-0.19	0.14***	0.14
FOMC Projections		0.51***		0.36**		0.54***
R-Squared	0.58	0.73	0.31	0.70	0.50	0.70
Observations	331	82	155	24	176	58
Tuning Parameter	0.003	0.003	0.003	0.003	0.003	0.003

Table 5. Troika and Non-Troika. The dependent variables are the one year ahead expectation (mean) of inflation from the MSC, the one year ahead expectation (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectation. Troika and Non-Troika Sentiment are the standardized index of Fed inflation sentiment by the Troika and non-Troika members, respectively, as described in Section 2. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

Michigan Survey of Consumers						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	-0.01	-0.02	-0.02	-0.00	0.04	0.08
Presidents Sentiment	0.09**	0.15	-0.02	0.21	0.22***	0.17
FOMC Projections		0.41**		-0.12		0.89***
R-Squared	0.71	0.71	0.61	0.57	0.77	0.76
Observations	331	82	155	24	176	58
Tuning Parameter	0.005	0.005	0.005	0.005	0.005	0.005

Survey of Professional Forecasters						
	1995:Q1-2022:Q3		1995:Q1-2007:Q4		2008:Q1-2022:Q3	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	0.05***	0.05**	0.03	0.01	0.03	0.04*
Presidents Sentiment	0.02	0.04**	-0.01	0.02	0.09***	0.05*
FOMC Projections		0.13**		0.14		0.14**
R-Squared	0.79	0.86	0.70	0.58	0.82	0.87
Observations	111	77	52	23	58	53
Tuning Parameter	0.01	0.01	0.01	0.01	0.01	0.01

Market based forecasts						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	0.11***	0.08***	0.03	-0.01	0.07	0.05
Presidents Sentiment	0.04	0.13**	-0.08**	-0.23**	0.13***	0.13*
FOMC Projections		0.52***		0.35**		0.60***
R-Squared	0.59	0.74	0.30	0.75	0.50	0.70
Observations	331	82	155	24	176	58
Tuning Parameter	0.003	0.003	0.003	0.003	0.003	0.003

Table 6. Troika vs Regional Presidents. The dependent variables are the one year ahead expectation (mean) of inflation from the MSC, the one year ahead expectation (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectation. Troika and Non-Troika Sentiment are the standardized index of Fed inflation sentiment by the Troika and non-Troika members, respectively, as described in Section 2. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

Michigan Survey of Consumers						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	0.00	-0.00	-0.02	0.01	0.07	0.10
Presidents Sentiment	0.08**	0.13	-0.02	0.22	0.21***	0.15
FOMC Projections		0.40**		-0.11		0.87***
R-Squared	0.71	0.70	0.61	0.58	0.77	0.76
Observations	331	82	155	24	176	58
Tuning Parameter	0.005	0.005	0.005	0.005	0.005	0.005

Survey of Professional Forecasters						
	1995:Q1-2022:Q3		1995:Q1-2007:Q4		2008:Q1-2022:Q3	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	0.06***	0.06***	0.03	0.02	0.05**	0.06**
Presidents Sentiment	0.02	0.03	-0.01	0.01	0.08***	0.04
FOMC Projections		0.14***		0.14		0.15**
R-Squared	0.78	0.86	0.70	0.58	0.82	0.86
Observations	111	77	52	23	58	53
Tuning Parameter	0.01	0.01	0.01	0.01	0.01	0.01

Market based forecasts						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Troika Sentiment	0.11***	0.09***	0.03	-0.02	0.09**	0.07*
Presidents Sentiment	0.04	0.14***	-0.09**	-0.21**	0.13***	0.14**
FOMC Projections		0.51***		0.36**		0.56***
R-Squared	0.58	0.74	0.30	0.74	0.50	0.71
Observations	331	82	155	24	176	58
Tuning Parameter	0.003	0.003	0.003	0.003	0.003	0.003

Table 7. Troika vs Regional Presidents (excluding NY FED). The dependent variables are the one year ahead expectation (mean) of inflation from the MSC, the one year ahead expectation (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectation. Troika and Non-Troika Sentiment are the standardized index of Fed inflation sentiment by the Troika and non-Troika members, respectively, as described in Section 2. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

4.2 State Dependence

Agents might pay more attention to FED’s speeches or projections during different phases of the business cycle, or when inflation is high rather than low.

4.2.1 Output

To test the first hypothesis we run our regressions over different phases of the business cycle. We consider three possible definitions: (i) recessions vs expansions, as classified by the NBER dating committee; (ii) periods of positive or negative output gap, computed by the CBO; (iii) periods of real output growth below or above average, i.e. 3 percent.

Regardless of the definition used, we find that for all agents, the sentiment index significantly affects expectations during bad times. For all agent types, the magnitude of the coefficients is largest during NBER recessions.

Michigan Survey of Consumers						
	NBER		CBO Output Gap		Output Growth	
	Recession	Expansion	Negative	Positive	Below Average	Above Average
Inflation Sentiment	0.91***	0.02	0.18***	-0.03	0.12**	-0.01
R-Squared	0.60	0.78	0.73	0.74	0.62	0.86
Observations	31	300	240	91	214	117
Tuning Parameter	0.005	0.005	0.005	0.005	0.005	0.005

Survey of Professional Forecasters						
	NBER		CBO Output Gap		Output Growth	
	Recession	Expansion	Negative	Positive	Below Average	Above Average
Inflation Sentiment	0.18*	0.04*	0.09***	0.03	0.04**	0.06
R-Squared	0.61	0.79	0.79	0.59	0.82	0.67
Observations	11	100	81	30	72	39
Tuning Parameter	0.01	0.01	0.01	0.01	0.01	0.01

Market based forecasts						
	NBER		CBO Output Gap		Output Growth	
	Recession	Expansion	Negative	Positive	Below Average	Above Average
Inflation Sentiment	0.54***	0.07**	0.13***	-0.02	0.16***	-0.05
R-Squared	0.73	0.54	0.51	0.28	0.58	0.47
Observations	31	300	240	91	214	117
Tuning Parameter	0.003	0.003	0.003	0.003	0.003	0.003

Table 8. Output state dependence. The dependent variables are the one year ahead expectations (mean) of inflation from the MSC, the one year ahead expectations (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectations. Inflation Sentiment is the standardized index of total Fed inflation sentiment constructed in Section 2. Recession vs Expansions refers to the NBER dates. Negative and Positive CBO output Gap (May 2022 vintage). Below vs Above Average defined as year over year growth rate of Real Gross Domestic Product above or below 3 percent. The sample is 1995m1-2022m8 and 1995Q1-2022Q3. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

4.2.2 Inflation

Second, we check whether inflation forecasts are affected differently by the FED sentiment when inflation is low vs when inflation is high. We consider three definitions of low vs high inflation based on whether: (i) year over year CPI All Items inflation is below (above) 2 percent; (ii) inflation is decreasing (increasing) for more than 3 subsequent quarters; (iii) year over year Brent inflation is below (above) its mean. The results for these regressions are shown in Table 9. Surprisingly, in this case we find that the inflation sentiment is never significant for households, and it is significant for experts only when inflation is low or decreasing. However, these periods overlap with the second part of our sample, where the index was significant due to the increased communication efforts of the FED.

Michigan Survey of Consumers						
	Low CPI Inflation		Decreasing CPI		Low Oil Price Growth	
	Low CPI	High CPI	Decreasing	Increasing	Low Oil	High Oil
Inflation Sentiment	0.10	0.02	0.00	0.07	0.01	0.06
R-Squared	0.28	0.76	0.33	0.76	0.38	0.76
Observations	150	179	120	209	189	140
Tuning Parameter	0.005	0.005	0.005	0.005	0.005	0.005
Survey of Professional Forecasters						
	Low CPI Inflation		Decreasing CPI		Low Oil Price Growth	
	Low CPI	High CPI	Decreasing	Increasing	Low Oil	High Oil
Inflation Sentiment	0.09***	0.00	0.12***	0.02	0.09***	0.00
R-Squared	0.71	0.79	0.82	0.82	0.77	0.83
Observations	50	61	40	71	64	47
Tuning Parameter	0.01	0.01	0.01	0.01	0.01	0.01
Market based forecasts						
	Low CPI Inflation		Decreasing CPI		Low Oil Price Growth	
	Low CPI	High CPI	Decreasing	Increasing	Low Oil	High Oil
Inflation Sentiment	0.14**	0.04	0.17***	0.06	0.15***	0.04
R-Squared	0.47	0.40	0.60	0.52	0.58	0.45
Observations	150	179	120	209	189	140
Tuning Parameter	0.003	0.003	0.003	0.003	0.003	0.003

Table 9. Inflation state dependence. The dependent variables are the one year ahead expectation (mean) of inflation from the MSC, the one year ahead expectation (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectation. Low (High) CPI refers to year over year CPI All Items inflation below (above) 2percent. Decreasing (Increasing) refers to year over year CPI all items inflation decreasing (increasing) for more than 3 quarters. Low (High) Oil refers to year over year Brent inflation below (above) the mean computed over the full sample. The sample is 1995m1-2022m6 and 1995Q1-2022Q2. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

Therefore, we repeat the analysis focusing on the sample starting in 2008 and find that agents expectations are affected by FED's sentiment in periods where inflation is increasing. There seem not to be a statistically significant difference in the coefficients when oil prices are low vs high or when inflation is high vs low.

Michigan Survey of Consumers						
	Low CPI Inflation		Decreasing CPI		Low Oil Price Growth	
	Low CPI	High CPI	Decreasing	Increasing	Low Oil	High Oil
Inflation Sentiment	0.38***	0.24***	0.22	0.33***	0.28***	0.31***
R-Squared	0.40	0.83	0.38	0.85	0.40	0.81
Observations	108	66	75	99	105	69
Tuning Parameter	0.005	0.005	0.005	0.005	0.005	0.005

Survey of Professional Forecasters						
	Low CPI Inflation		Decreasing CPI		Low Oil Price Growth	
	Low CPI	High CPI	Decreasing	Increasing	Low Oil	High Oil
Inflation Sentiment	0.13**	0.12***	0.10	0.09***	0.10*	0.09**
R-Squared	0.62	0.87	0.60	0.88	0.59	0.88
Observations	36	21	25	32	35	22
Tuning Parameter	0.01	0.01	0.01	0.01	0.01	0.01

Market based forecasts						
	Low CPI Inflation		Decreasing CPI		Low Oil Price Growth	
	Low CPI	High CPI	Decreasing	Increasing	Low Oil	High Oil
Inflation Sentiment	0.10	0.17**	0.20*	0.16***	0.14***	0.12**
R-Squared	0.15	0.47	0.14	0.55	0.15	0.50
Observations	108	66	75	99	105	69
Tuning Parameter	0.003	0.003	0.003	0.003	0.003	0.003

Table 10. Inflation state dependence. The dependent variables are the one year ahead expectation (mean) of inflation from the MSC, the one year ahead expectation (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectation.. Low (High) CPI refers to year over year CPI All Items inflation below (above) 2percent. Decreasing (Increasing) refers to year over year CPI all items inflation decreasing (increasing) for more than 3 quarters. Low (High) Oil refers to year over year Brent inflation below (above) the mean computed over the full sample. The sample is 2008m1-2022m6 and 2008Q1-2022Q2. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

4.3 Long Run Forecasts

We test whether longer horizons expectations are affected by the inflation sentiment. Long run inflation expectations are important because they indicate whether expectations are anchored to the central bank inflation target. Our dependent variables are the five year ahead expectations (mean) of inflation from the MSC, the ten year ahead expectations (mean) of CPI all items inflation from the SPF, and the five year ahead market based

inflation expectations. Table 11 shows that the inflation sentiment significantly affects long run expectations of all agents over the second subsample. The coefficient associated to the sentiment is positive but its magnitude is much smaller than for the short run expectations in the case of households and financial markets. Differently from short run inflation expectations, long run expectations are not affected by the SEP, except in the case of professional forecasters.

Michigan Survey of Consumers						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.02	0.02	-0.02	0.01	0.05***	0.06*
FOMC Projections		0.03		0.13		-0.08
R-Squared	0.41	0.52	0.23	0.12	0.57	0.66
Observations	331	82	155	24	176	58
Tuning Parameter	0.006	0.006	0.006	0.006	0.006	0.006

Survey of Professional Forecasters						
	1995:Q1-2022:Q3		1995:Q1-2007:Q4		2008:Q1-2022:Q3	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.04**	0.06***	0.00	0.02*	0.10***	0.06***
FOMC Projections		0.11***		-0.04		0.12***
R-Squared	0.57	0.52	0.87	0.67	0.46	0.56
Observations	111	77	52	23	58	53
Tuning Parameter	0.01	0.01	0.01	0.01	0.01	0.01

Market based forecasts						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.04*	0.18***	-0.11***	0.05	0.11***	0.07*
FOMC Projections		-0.04		0.47***		0.11
R-Squared	0.61	0.64	0.28	0.76	0.52	0.61
Observations	331	82	155	24	176	58
Tuning Parameter	0.004	0.004	0.004	0.004	0.004	0.004

Table 11. Long run forecasts. The dependent variables are the five year ahead expectations (mean) of inflation from the MSC, the ten year ahead expectations (mean) of CPI all items inflation from the SPF, and the five year ahead market based inflation expectations. Inflation Sentiment is the standardized index of total Fed inflation sentiment constructed in Section 2. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

5 Conclusion

Using textual analysis applied to the speeches of the FOMC members and regional Fed presidents, we construct a FED inflation sentiment index, which identifies soft information in Fed's communication. We find that economic agents are listening to Fed speeches, as the inflation sentiment drives inflation expectations of households. The effect is significant and stronger in magnitude for the sample after the financial crisis. The FOMC projections are also significant for more sophisticated agents, namely professional forecasters and financial market participants. Finally, we find that the communication efforts have stronger effects in bad times than in good times, i.e. during recessions and periods of rising inflation. The results are consistent with an improvement in the communication strategy of the Fed in recent years and suggests that speeches are an effective communication tools for the management of inflation expectations.

References

- Ball, L. and M. Sandeep (2018). A phillips curve with anchored expectations and short-term unemployment. *Journal of Money, Credit and Banking* 51(1), 111–137.
- Belloni, A. and V. Chernozhukov (2013). Least squares after model selection in high-dimensional sparse models. *Bernoulli* 19(2), 521 – 547.
- Botsch, M. and U. Malmendier (2020). The long shadow of the great inflation: Evidence from residential mortgages. mimeo.
- Coibion, O., Y. Gorodnichenko, and M. Weber (2022). Monetary policy communications and their effects on household inflation expectations. *Journal of Political Economy* 130(6), 1537–1584.
- D’Acunto, F., U. Malmendier, J. Ospina, and M. Weber (2021). Exposure to grocery prices and inflation expectations. *Journal of Political Economy* 129(5), 1615–1639.
- Das, S., C. M. Kuhnen, and S. Nagel (2020). Socioeconomic status and macroeconomic expectations. *The Review of Financial Studies* 33(1), 395–432.
- Del Negro, M., M. P. Giannoni, and F. Schorfheide (2015). Inflation in the great recession and new keynesian models. *American Economic Journal: Macroeconomics* 7(1), 168–196.
- Dovern, J., U. Fritsche, and J. Slacaleck (2012). Disagreement among forecasters in g7 countries. *Review of Economics and Statistics* 94(4), 1081–1096.
- Ehrmann, M., R. Tietz, and B. Visser (2021). Voting right rotation, behavior of committee members and financial market reactions: Evidence from the u.s. federal open market committee. Working Paper 2569, European Central Bank.
- Gardner, B., C. Scotti, and C. Vega (2022). Words speak as loudly as actions: Central bank communication and the response of equity prices to macroeconomic announcements. *Journal of Econometrics* 231(2), 387–409.
- Gergely, G. and F. Odendahl (2021). Bvar forecasts, survey information and structural change in the euro area. *International Journal of Forecasting* 37(2), 971–999.

- Granziera, E. and T. Sekphosyan (2019). Predicting relative forecasting performance: An empirical investigation. *International Journal of Forecasting* 35, 1636–1657.
- Haubrich, J., G. Pennacchi, and P. Ritchken (2012). Inflation expectations, real rates, and risk premia: Evidence from inflation swaps. *Review of Financial Studies* 25(5), 1588–1629.
- Istrefi, K., F. Odendahl, and G. Sestieri (2021). Fed communication on financial stability concerns and monetary policy decisions: Revelations from speeches. Working Paper 2110, Banco de Espana.
- Malmendier, U. and S. Nagel (2016). Learning from inflation experiences. *The Quarterly Journal of Economics* 131(1), 53–87.
- Malmendier, U., S. Nagel, and Z. Yan (2021). The making of hawks and doves. *Journal of Monetary Economics* 117, 19–42.
- McCracken, M. W. and S. Ng (2016). Fred-md: A monthly database for macroeconomic research. *Journal of Business & Economic Statistics* 34(4), 574–589.
- Neuhierl, A. and M. Weber (2019). Monetary policy communication, policy slope, and the stock market. *Journal of Monetary Economics* 108, 140–155.
- Weber, M., F. D’Acunto, Y. Gorodnichenko, and O. Coibion (2022, August). The subjective inflation expectations of households and firms: Measurement, determinants, and implications. *Journal of Economic Perspectives* 36(3), 157–84.

Appendices

Appendix A Speeches

Date	Speaker	Sentiment	Example sentences: Identifiers and Modifiers
1999-10-12	Laurence Meyer	-17 -17	<i>And that target should be price stability or, at the least, a low rate of inflation.</i>
2004-10-29	Roger Ferguson	-5 -5	<i>That should gradually return the economy to full utilization of its resources, while inflation remains subdued.</i>
2005-10-18	Timothy Geithner	94 -1	<i>We have been through a period of relatively favorable overall macroeconomic conditions in the united states, ... and relatively low and stable, long-term inflation expectations.</i>
	Roger Ferguson	48	<i>And higher energy costs were expected to place continued upward pressure on the prices of other goods and services.</i>
	Janet Yellen	27	<i>And a key question is whether higher energy prices also will elevate core inflation.</i>
	Alan Greenspan	20	<i>Additionally, the longer-term crude price has presumably been driven up by renewed fears of supply disruptions in the middle east and elsewhere.</i>
2007-05-22	Jeffrey Lacker	-16 -16	<i>If expectations do not adapt to lower inflation, a sustained reduction in employment and output would be required to push inflation down.</i>
2014-11-10	Eric Rosengren	-33	<i>European inflation rates have continued to decline, and combined with very weak economic growth, have raised concerns among some observers that the Eurozone could experience mild deflation as well.</i>

Table 12.

Date	Speaker	Sentiment	Example sentences
2015-11-12		-14	
	Stanley Fisher	-5	Monetary policy <i>easing</i> helps through crowding in domestic demand, which in turn helps boost <i>price inflation</i> and makes it less likely that <i>inflation</i> expectations drift <i>below</i> our percent target.
	William Dudley	-13	It is possible that factors such as very <i>low</i> headline <i>inflation</i> and <i>weak</i> productivity growth are holding <i>down</i> what workers receive in compensation.
	Charles Evans	10	One possibility is that we begin to raise rates only to learn that we have misjudged the <i>strength</i> of the economy or the <i>upward</i> tilt in <i>inflation</i> .
	James Bullard	-4	In that case, policymakers may wish to <i>lower</i> the <i>inflation</i> target to remain more consistent with the actual <i>inflation</i> outcomes.
	Jeffrey Lacker	0	I will argue that a central bank's ability to influence <i>inflation</i> and how it does so is essentially unchanged.
2021-05-05		78	
	Charles Evans	37	If resource <i>pressures</i> were maintained, <i>inflation</i> would continue to spiral <i>upward</i> .
	Eric Rosengren	21	Given the <i>strong</i> support from both fiscal and monetary policy, some analysts are worried that <i>inflation</i> - dormant for most of the past decade, if not longer - could pick <i>up</i> significantly.
	Loretta Mester	18	Many of our contacts say that they have been able to pass on at least some of their <i>cost increases</i> to their customers in the form of <i>higher prices</i> - which brings me to <i>inflation</i> .
	Michelle Bowman	2	Although I expect these <i>upward price pressures</i> to <i>ease</i> after the temporary supply bottlenecks are resolved, the exact timing of that dynamic is uncertain.
2021-07-21		-27	
	John Williams	-27	Our analysis shows that due to the presence of the <i>lower</i> bound on interest rates, standard <i>inflation</i> targeting under discretion leads to inflation that is, on average, <i>below</i> the target level.

Table 13.

Figure 3. The monthly inflation sentiment index (left vertical axis) and year over year CPI all items inflation (right vertical axis). The monthly sentiment is the monthly sum of the daily inflation sentiment.

Figure 4. The monthly inflation sentiment sub-indices for Troika (the Chair of the Board of Governors, the Vice and the President of the New York Fed) and all other speakers.

Appendix B Robustness Checks

B.1 Principal Components

Michigan Survey of Consumers						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.10**	0.07	0.03	0.08	0.45***	0.21
FOMC Projections		0.88***		-0.18		1.55***
R-Squared	0.53	0.60	0.52	0.59	0.66	0.70
Observations	331	82	155	24	176	58
# Principal Components	3	3	3	3	3	3
Survey of Professional Forecasters						
	1995:Q1-2022:Q3		1995:Q1-2007:Q4		2008:Q1-2022:Q3	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.04	0.06***	-0.10**	-0.01	0.13***	0.04
FOMC Projections		0.44***		0.31**		0.50***
R-Squared	0.46	0.76	0.41	0.48	0.48	0.76
Observations	111	77	52	23	58	53
# Principal Components	3	3	3	3	3	3
Market based forecasts						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.06*	0.22***	-0.06**	-0.19*	0.16***	0.15*
FOMC Projections		0.42***		0.37*		0.62***
R-Squared	0.49	0.65	0.49	0.63	0.48	0.70
Observations	331	82	155	24	176	58
# Principal Components	3	3	3	3	3	3

Table 14. Principle Components Analysis. The dependent variables are the one year ahead expectations (mean) of inflation from the MSC, the one year ahead expectations (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectations. Inflation Sentiment is the standardized index of total Fed inflation sentiment constructed in Section 2.

*, **, and *** indicate significance levels at the 10, 5 and 1 percent respectively.

B.2 Outliers

Michigan Survey of Consumers						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.10**	0.07	0.03	0.08	0.45***	0.21
FOMC Projections		0.88***		-0.18		1.55***
R-Squared	0.53	0.60	0.52	0.59	0.66	0.70
Observations	331	82	155	24	176	58
% Outliers	3	3	3	3	3	3

Survey of Professional Forecasters						
	1995:Q1-2022:Q3		1995:Q1-2007:Q4		2008:Q1-2022:Q3	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.04	0.06***	-0.10**	-0.01	0.13***	0.04
FOMC Projections		0.44***		0.31**		0.50***
R-Squared	0.46	0.76	0.41	0.48	0.48	0.76
Observations	111	77	52	23	58	53
% Outliers	10	10	10	10	10	10

Market based forecasts						
	1995:m1-2022:m8		1995:m1-2007:m12		2008:m1-2022:m8	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.06*	0.22***	-0.06**	-0.19*	0.16***	0.15*
FOMC Projections		0.42***		0.37*		0.62***
R-Squared	0.49	0.65	0.49	0.63	0.48	0.70
Observations	331	82	155	24	176	58
% Outliers	3	3	3	3	3	3

Table 15. Exclusion of outliers. The dependent variables are the one year ahead expectations (mean) of inflation from the MSC, the one year ahead expectations (mean) of CPI all items inflation from the SPF, and the one year ahead market based inflation expectations. Inflation Sentiment is the standardized index of total Fed inflation sentiment constructed in Section 2.

‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.