

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

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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 sentiment indices for inflation. We find that the inflation sentiment drives inflation expectations of households and market participants. However, the speeches 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 but only for financial markets. These results bear important implications for the Fed communication strategy.

JEL-codes: D80, E31, E32, E66

Keywords: Central bank communication, Textual analysis, Expectation formation

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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 sizeable and rapidly growing. However, most studies have been focusing on transcripts and statements. We instead 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 statements¹ (January 2000) or FOMC projections (October 2007).

Our dataset consists of about 4200 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 has started to release statements in 1994 but only for meetings that were associated with a policy rate change.

inflation, price, and cost.² We then use the dictionaries from [Gardner et al. \(2021\)](#) which analyzes FOMC statements. We 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 check 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 Cleveland Fed.

Several economic developments might drive both our constructed sentiment measures and inflation expectations. To account for this potential issue we follow [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, professional forecasters, and market participants. However, the speeches 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 but only for professional forecasters and financial markets.

The literature that analyzes speeches by Fed presidents or FOMC members is limited. [Ehrmann, Tietz, and Visser \(2021\)](#) find that voting rights affect Fed presidents' number

²This gives us a total of 79431 sentences.

and tone of speeches (more speeches and stronger tone when voting). Moreover, speeches move financial markets less in years that presidents vote. Malmendier, Nagel, and Yan (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, Odendahl, and Sestieri (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 modelling 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

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 Feds. 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. Nonvoting Reserve Bank presidents attend the meetings of the FOMC and we will include all presidents in our sample no matter if they are voting or not. In a year where all seats are filled we should have 18 potential speakers.

We collect speeches from January 1995 until April 2022. This includes a total of 66 speakers adding up to a total of 4725 speeches.³ For the FOMC members we have

³The total number of speakers is 64, but Janet Yellen and John Williams are included twice because they

information on the state the speech was given in as well as the audience the speech was given too.

2.2 Inflation specific sentiment

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 a category specific list. These category specific measures are calculated by using the word lists in [Gardner et al. \(2021\)](#). We create a category specific sentiment for inflation. The identifying terms for 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 gives us a total of 79431 sentences about inflation. The inflation specific sentiment is calculated by using the scored dictionary from [Gardner et al. \(2021\)](#) for inflation. This scored dictionary is given by a set of modifier terms where some are negative and some are positive. A sentence is then given a sentiment score given by the sum of the negative (-1) and positive (+1) terms in the sentence. All the words identifying the category and the modifying words selected to construct the sentiment are given in [Table 1](#).

We create a daily sentiment series as the sum of the scored sentences within one day. We also aggregate this data to monthly and quarterly series by summing over the daily sentiment. The monthly series is shown in [Figure 1](#), together with the monthly year over year inflation for cpi all items. The sentiment is positively correlate with actual inflation, although the former is more volatile. A higher level of the index reflects higher current or expected inflationary pressures.

We also consider two sentiment sub-indices: one that includes only the Trinity (the Chair of the Board of Governors , the Vice and the President of the New York Fed), and one that includes only the remaining FOMC members. [Figure 2](#) shows the two indices.

have served on the FOMC in different roles.

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

Table 1. Identifiers and Modifiers for Inflation

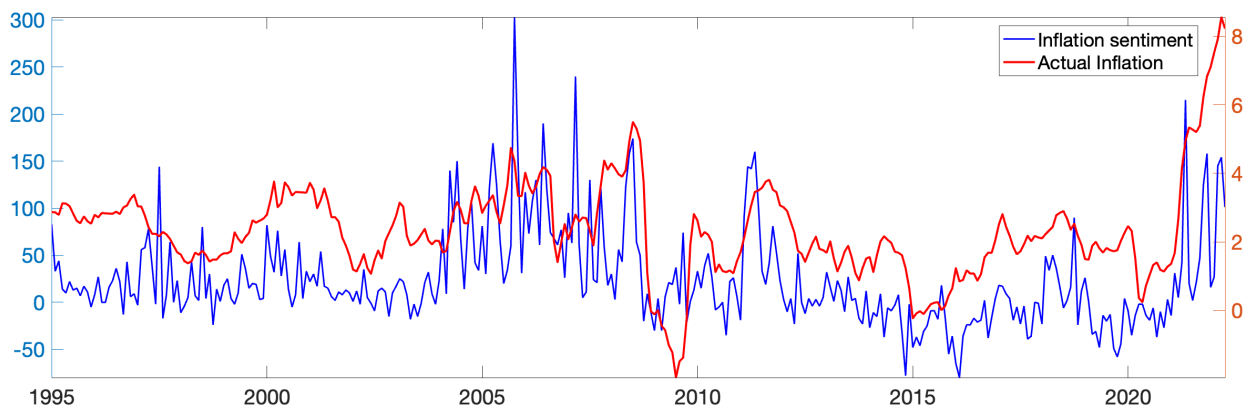


Figure 1. The monthly inflation sentiment index (left vertical axis) and actual inflation (right vertical axis). The monthly sentiment is the monthly sum of daily inflation sentiment.

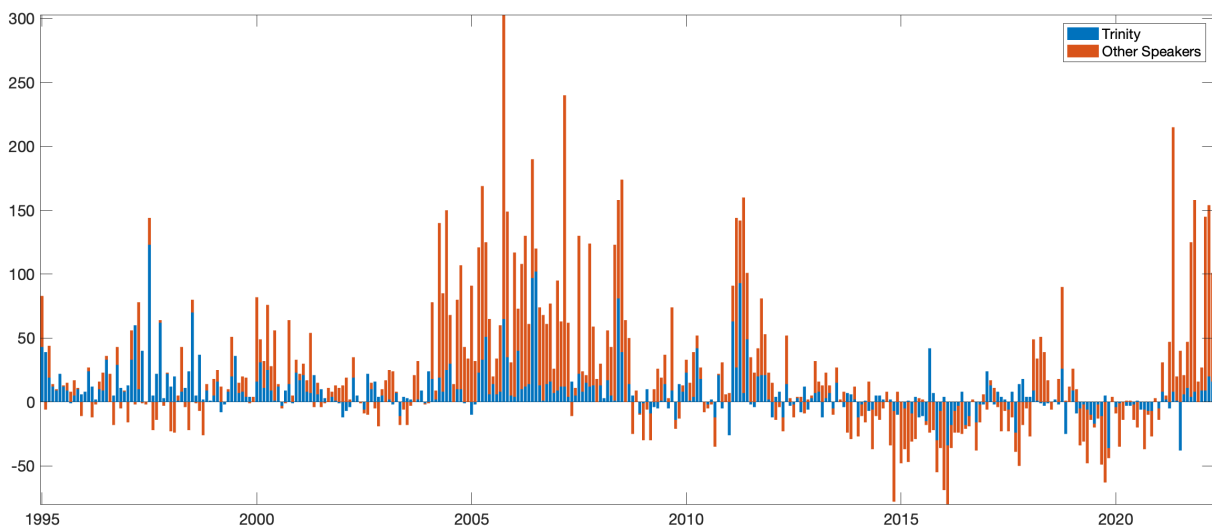


Figure 2. The monthly inflation sentiment sub-indices for Trinity and all other speakers.

2.3 Macroeconomic Forecasts

We use the mean response for the headline CPI inflation rate from the SPF, available at the quarterly frequency. The deadline for the response is set to 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 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. Therefore, we also study expectations from households from the Michigan Consumer Survey (MCS). 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?*”.

We also consider inflation expectations of financial market participants from the Cleveland Fed. These forecasts are based on the method developed in Haubrich, Pennacchi, and Ritchken (2008), which uses 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. 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.

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 PCE 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, Fritsche, and Slacalek (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.

2.4 Macro data

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 127 time series that covers all the main macroeconomic aggregates and a number of financial indicators.⁴ The series are made stationary using the transformations suggested in McCracken and Ng (2016). Given the delays in publication of the series, we assume that in month t agents observe the value of the series up to month $t - 1$.

3 Methodology

Using MSC and market based expectational data at the monthly level, we run the following regressions that project expectations onto the sentiment index

$$E_t \pi_{t+12} = \alpha + \beta s_{t-1} + \gamma' X_{t-1} + u_t \quad (1)$$

for y equal to inflation, unemployment, and output, and s^y equal to the inflation specific, labor specific and output specific sentiment index which we introduced in Section 2.2. The sentiment index enters the regression with a one month lag, reflecting the fact that agents forming forecasts and completing the survey in month t have information available up to (at most) month $t - 1$. We use the LASSO estimator to select a number of macrofinancial

⁴We 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 because of its explosive behaviour post 2008.

variables assembled in McCracken and Ng (2015) to use as controls. We target the tuning parameter in the LASSO estimator to select 10% of the sample size. These are collected in X_{t-1} and are used as controls in our specification.

Using SPF expectational data at the quarterly level, we run the following regressions

$$E_t \pi_{t+4} = \alpha + \beta s_t + \gamma' X_t + u_t \quad (2)$$

for y equal to inflation, unemployment, and output, and s^y equal to the inflation specific, labor specific and output specific sentiment index which we introduced in Section 2.2. The sentiment index enters the regression contemporaneously, reflecting the fact that 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 . Therefore, we use the sentiment index from the first month of the quarter. Again, we use the LASSO estimator to select a number of macrofinancial variables assembled in McCracken and Ng (2015) to use as controls. We use the first month of each quarter from the monthly data set. The timing is similar and reflects the fact that 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 . We target the tuning parameter in the LASSO estimator to select 10% of the sample size. These are collected in X_t and are used as controls in our specification.

4 Results

Table 2 reports the results from our baseline regressions for the three expectations considered and for the sample January 1995 to April 2022. We consider two specifications: one that includes only the sentiment indicator and one that conditions on the FOMC projections. Both specifications include the variables selected by the LASSO regressions.

The coefficient for the inflation sentiment is statistically significant only for households. When we add the FOMC projections to the set of explanatory variables, the sentiment stays significant for households and becomes significant also for the professional forecasters and financial market expectations. The coefficient is positive, suggesting that a higher sentiment, which signals higher inflation, translates into higher inflation expectations.

The FOMC projections are available for a shorter period than the sentiment index. This sample selection might determine the results discussed above. For this reason, we repeat our analysis over two subsamples: before the financial crisis, from January 1995

Sample: 1995:M2-2022M4 or 1995Q1-2022Q1						
	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.23***	0.41**	0.00	0.00*	0.08	0.44***
FOMC Projections		0.24		0.09*		0.43**
R-Squared	0.69	0.53	0.77	0.75	0.73	0.70
Observations	326	80	110	76	326	80
Tuning Parameter	0.02	0.021	0.01	0.01	0.02	0.017

Table 2. The dependent variable is the one year ahead expectations (mean) of CPI all items inflation from the MSC, the SPF, and the market based one. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

to December 2007, and after the financial crisis, from January 2008 to April 2022. These are shown in Table 3. As suspected, the inflation sentiment is not significant in the first sub-sample, while it is highly significant and larger in magnitude in the sample that starts with the financial crisis. This result is consistent with the notion that the communication strategies of the Fed have increased in recent years, and complements the results in Hoesch, Rossi, and Sekhposyan (2022), who find that the relevance of the Fed information channel has declined over time.

We run additional analyses that are presented in Tables 4–7 in Appendix A. First, we look at inflation sentiment from speeches given by the Chair, Vice Chair, and New York Fed President (i.e. the Trinity). In the full sample analysis, we show that most of the effects on households are driven by this index. This result is driven by the fact that most speeches were given by the Trinity in the first part of the sample. When we focus on the sub-sample analysis, we find that both sentiments are equally impactful in the second part of the sample. We also look at inflation expectations from different demographic groups, focusing on education, which are provided by the MSC.

5 Conclusion

Using textual analysis applied to the speeches of the FOMC members and regional Fed presidents, we find that inflation sentiment drives inflation expectations of households and market participants. The effect is significant and stronger in magnitude for the sample

Sample: 1995:M2-2007M12 or 1995Q1-2007Q4						
	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	-0.02	0.39**	0.00	0.00	0.00	-0.09
FOMC Projections		-0.12		-0.07		0.57***
R-Squared	0.63	0.60	0.88	0.70	0.73	0.51
Observations	155	24	52	23	155	24
Tuning Parameter	0.02	0.021	0.01	0.01	0.02	0.017

Sample: 2008:M1-2022M4 or 2008Q1-2022Q1						
	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.63***	0.82***	0.00*	0.00	0.26*	0.44***
FOMC Projections		0.67**		0.08		0.37*
R-Squared	0.76	0.60	0.78	0.79	0.47	0.60
Observations	171	56	57	52	171	56
Tuning Parameter	0.02	0.021	0.01	0.01	0.02	0.017

Table 3. The dependent variable is the one year ahead expectations (mean) of CPI all items inflation from the MSC, the SPF, and the market based one. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

after the financial crisis. The FOMC projections are also significant for more sophisticated agents, namely professional forecasters and financial market participants. 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.

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Appendices

Appendix A Additional results

Sample: 1995:M2-2022M4 or 1995Q1-2022Q2						
	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment (Trinity Only)	0.20***	0.37**	0.00	0.00	0.07	0.37***
FOMC Projections		0.12		0.09*		0.31**
R-Squared	0.75	0.65	0.77	0.74	0.83	0.71
Observations	326	80	110	76	326	80
Tuning Parameter	0.095	0.04	0.01	0.01	0.115	0.035
	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment (All Others)	0.20	0.22	-0.00	0.00	0.07	0.54***
FOMC Projections		0.18		0.09*		0.26**
R-Squared	0.74	0.57	0.76	0.74	0.83	0.71
Observations	326	80	110	76	326	80
Tuning Parameter	0.095	0.04	0.01	0.01	0.115	0.035

Table 4. The dependent variable is the one year ahead expectations (mean) of CPI all items inflation from the MSC, the SPF, and the market based one. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively. Inflation sentiment for the Trinity is built from speeches given by the Fed Chair, Vice Chair, and New York Fed President (i.e. the Trinity).

Sample: 1995:M2-2007M12 or 1995Q1-2007Q4

	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	Inflation Sentiment (Trinity Only)	-0.07	0.30*	0.00	0.00	0.05
FOMC Projections		0.09		-0.08		0.32*
R-Squared	0.70	0.60	0.89	0.71	0.78	0.72
Observations	155	24	52	23	155	24
Tuning Parameter	0.065	0.035	0.01	0.01	0.045	0.04

	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	Inflation Sentiment (All Others)	-0.15	0.07	0.00	0.00	0.03
FOMC Projections		0.14		-0.06		0.36*
R-Squared	0.70	0.55	0.89	0.69	0.78	0.72
Observations	155	24	52	23	155	24
Tuning Parameter	0.065	0.035	0.01	0.01	0.045	0.04

Table 5. The dependent variable is the one year ahead expectations (mean) of CPI all items inflation from the MSC, the SPF, and the market based one. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively. Inflation sentiment for the Trinity is built from speeches given by the Fed Chair, Vice Chair, and New York Fed President (i.e. the Trinity).

Sample: 2008:M1-2022M4 or 2008Q1-2022Q1						
	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment (Trinity Only)	0.48***	0.84***	0.00	0.00	0.15*	0.30**
FOMC Projections		0.56**		0.11*		0.40**
R-Squared	0.70	0.60	0.77	0.79	0.78	0.72
Observations	155	56	58	53	155	24
Tuning Parameter	0.065	0.05	0.01	0.01	0.045	0.04
	MSC		SPF		MKT	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment (All Others)	0.55**	0.83*	0.00*	0.00	0.16	0.30
FOMC Projections		0.69**		0.08		0.52***
R-Squared	0.79	0.63	0.78	0.79	0.53	0.61
Observations	171	56	58	53	171	56
Tuning Parameter	0.075	0.05	0.01	0.01	0.065	0.03

Table 6. The dependent variable is the one year ahead expectations (mean) of CPI all items inflation from the MSC, the SPF, and the market based one. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively. Inflation sentiment for the Trinity is built from speeches given by the Fed Chair, Vice Chair, and New York Fed President (i.e. the Trinity).

Sample: 1995:M2-2022M4 or 1995Q1-2022Q1						
	Highschool		Some/Full College		Everyone	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Inflation Sentiment	0.26***	0.46**	0.21***	0.19	0.23***	0.41**
FOMC Projections		0.31		0.36**		0.24
R-Squared	0.745	0.61	0.77	0.62	0.69	0.53
Observations	326	80	326	80	326	80
Tuning Parameter	0.02	0.021	0.02	0.021	0.02	0.021

Table 7. The dependent variable is the one year ahead expectations (mean) of inflation from the MSC for individuals with high school education and some college or college degree. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.