

Fed Inflation Pressure and Expectations: Evidence from Speeches by FOMC Members

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The use of surveys for monetary and economic policy

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"I think monetary policy is 98% talk and 2% action, and communication is a big part."

- Ben Bernanke, former Fed Chair

Central Bank communication essential for policy making:

- increased demand of transparency from public
- larger set of tools
- useful to steer or anchor expectations
- crucial at the ZLB

Motivation

Some skepticism about effectiveness of central banks' communication:

“Central banks will keep trying to communicate with the general public, as they should. But for the most part, they will fail.”

“Many economic models presume that central bank communication is aimed at wage-setters, price-setters, consumers, or investors—maybe all of them. But are they listening?”

- Alan Blinder (2018), former Fed Vice Chair

Research Question

Are Fed speeches steering inflation expectations?

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- Which **expectations**?
 - **Households**: basis for consumption and savings decisions (Coibion, Gorodnichenko, and Weber, 2022)
 - **Professional Forecasters**: used to estimate the slope of the Phillips Curve (Ball and Sandeep, 2018) , to increase the accuracy of empirical forecasting models (Gergely and Odendahl, 2021) and fit of structural models (Del Negro et al., 2015)
 - **Market investors**: affect asset prices, e.g. stock prices and interest rates (Bernanke and Kuttner, 2005)

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 - Market investors: affect asset prices, e.g. stock prices and interest rates (Bernanke and Kuttner, 2005)
- Why analyze **speeches** rather than minutes or statements?
 - real-time publicly accessible information
 - longer time series than statements (January 2000) or SEP (October 2007)
 - different speakers: diversity of opinions (cross-section and time series)
 - variety of topics and heterogeneous environments

Contribution and Preview of Results

1. Construct inflation pressure index from Fed speeches
 - new monthly index based on 4400 speeches from 1995M1 to 2023M2
2. Estimate impact of index on agents' forecasts
 - households (MSC), professionals (SPF) and market based (MKT)

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 - Fed inflation pressure steers expectations of both experts and non-experts
 - (soft) communication efforts effective after the Great Financial Crisis
 - agents expecting inflation higher than median are more affected by inflation pressure
 - larger effects in bad times (recessions) compared to good times
 - long run forecasts are significantly less affected

Related Literature

Role of central bank communication

- Impact on financial market instruments

Gürkaynak et al. (2005), Boukus and Rosenberg (2006), Blinder et al. (2008),
Carvalho et al. (2016)

- Information conveyed through language

Lucca and Trebbi (2009), Bholat et al. (2015), Hansen and McMahon (2016), Shiller
(2017), Haldane and McMahon (2018), Gardner, Scotti, and Vega (2022) , Shapiro
and Wilson (2022)

Managing expectations

Pedemonte (2019), Coibion et al. (2021), Coibion, Gorodnichenko, and Weber (2022),
D'Acunto et al. (2022), Kumar, Coibion, Afrouzi, and Gorodnichenko (2015),
McMahon and Rholes (2022)

Fed speeches

Neuhierl and Weber (2019), Ehrmann, Tietz, and Visser (2021), Malmendier, Nagel,
and Yan (2021), Istrefi, Odendahl, and Sestieri (2021), Ahrens and McMahon (2021)

Data: Fed Inflation Pressure and Inflation Forecasts

Who speaks within the Fed?

- The Federal Open Market Committee (FOMC) consists of 12 members
 - the seven members of the Board of Governors (Chair+Vice Chair+5 governors)
 - the president of the Federal Reserve Bank of New York
 - four of the remaining eleven regional Reserve Bank presidents
- The FOMC holds eight regularly scheduled meetings during the year
 - Chair releases statement immediately after
 - minutes released with a 3 week lag
- All members speak publicly all year round (except for blackout periods-2 weeks around FOMC meetings)

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We focus on:

- Speeches by 7 members of Board of Governors and 12 regional Fed presidents
- Speeches from 1995 until today (\approx 4400 speeches)
 - collected from the federal reserves web pages, the regional Fed's online archives including the FOMC Speak repository from St. Louis Fed.

Constructing daily inflation pressure (I)

- Split all the speeches into sentences
- Identify a sentence as being about inflation if it contains one of the terms: **inflation**, **price**, or **cost**
- Total of 82,099 sentences
- Score each sentence using dictionary
we adapt the dictionary proposed in Gardner, Scotti, and Vega (2022)
- Aggregate the index at daily, monthly, quarterly frequency

Costructing daily inflation pressure (II)

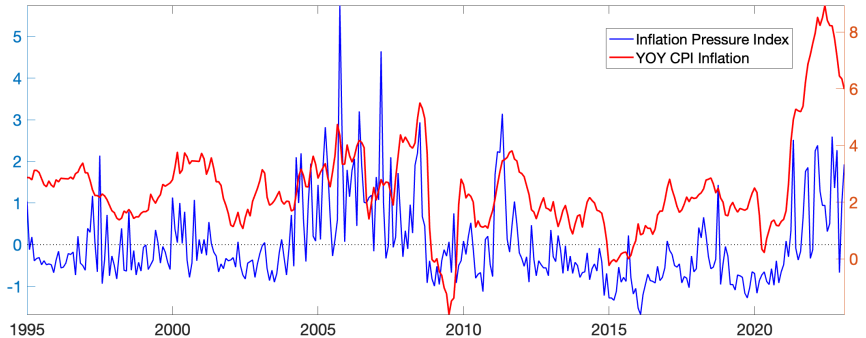
We score the sentences about inflation based on modifier words:

| Identifiers | Additive Modifiers (+1) | Subtractive Modifiers (-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, declin, diminish, down, low, modest, moderated, muted, reduction, restrain, set back, slow, soft, subdued, weak |

Identifiers and Modifiers: Example Sentences

| Date | Speaker | Inflation Pressure | Example sentences |
|------------|--------------|--------------------|--|
| 2004-10-29 | Total | -5 | |
| | R. Ferguson | -5 | <i>That should gradually return the economy to full utilization of its resources, while inflation remains subdued.</i> |
| 2005-10-18 | Total | 94 | |
| | J. Yellen | 27 | <i>And a key question is whether higher energy prices also will elevate core inflation.</i> |
| | A. 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> |
| 2015-11-12 | Total | -14 | |
| | W. Dudley | -13 | <i>It is possible that factors such as very low headline inflation and weak productivity growth are holding down what workers receive in compensation.</i> |
| | J. Bullard | -4 | <i>In that case, policymakers may wish to lower the inflation target to remain more consistent with the actual inflation outcomes.</i> |

Inflation Pressure Index



correlations

Inflation forecasts and timing assumptions

Michigan Survey of Consumers (MSC): monthly frequency

- Median of 12 months ahead inflation forecasts
- Inflation Pressure: Previous month

Survey of professional forecasters (SPF): quarterly frequency

- Median of implied 1 year ahead CPI forecast
- Inflation Pressure: First month of the quarter when the SPF is released

Market expectations (MKT): monthly frequency

- Market based one year expected inflation constructed by Haubrich, Pennacchi, and Ritchken (2012, FRB of Cleveland)
- Inflation Pressure: Previous month

Methodology

Analysis: Two Step Procedure

Second Step: OLS

$$\underbrace{E_t \pi_{t+h}}_{\text{MSC, SPF or MKT}} = \alpha + \beta \underbrace{s_{t-1}}_{\text{inflation pressure}} + \gamma' \overbrace{X_{t-1}}^{\text{selected in first step}} + u_t$$

Timing:

- MSC or MKT: s_{t-1} is the inflation pressure of the previous month
- SPF: s_{t-1} is the inflation pressure of the first month of the quarter

Analysis: Two Step Procedure

First step: Least absolute shrinkage and selection operator (LASSO)

- select among ≈ 120 macro-financial variables from FRED data set by McCracken and Ng (2016)
- target 10% of sample size to use as controls in second step

Second Step: OLS

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- MSC or MKT: s_{t-1} is the inflation pressure of the previous month
- SPF: s_{t-1} is the inflation pressure of the first month of the quarter
- Control for FOMC projections from SEP

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Timing:

- MSC or MKT: s_{t-1} is the inflation pressure of the previous month
- SPF: s_{t-1} is the inflation pressure of the first month of the quarter
- Control for FOMC projections from SEP

Rationale: Belloni and Chernozhukov (2013)

- smaller bias compared to one step LASSO regression even when OLS post-LASSO model is misspecified

Regression results

LASSO: controls

| | |
|------------|--|
| 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 1: Variables selected from the LASSO estimation.

Results: Michigan Survey of Consumers

Second Step: OLS

$$\text{Model 1: } E_t \pi_{t+h} = \alpha + \beta s_{t-1} + \gamma' X_{t-1} + u_t$$

$$\text{Model 2: } E_t \pi_{t+h} = \alpha + \beta s_{t-1} + \gamma' X_{t-1} + \delta \text{ SEP} + u_t$$

| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
|--------------------|-----------------|---------|------------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Inflation Pressure | 0.14*** | 0.15** | 0.07** | 0.13** | 0.30*** | 0.22** |
| SEP | | 0.18 | | -0.14 | | 0.50** |
| R-Squared | 0.64 | 0.72 | 0.42 | 0.53 | 0.74 | 0.76 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |
| Tuning Parameter | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |

Table 2: The dependent variable is the twelve month ahead expectations (median) from the MCS. '*', '**' and '***' indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

- 1σ \uparrow Fed inflation pressure: households expect 0.22pp \uparrow inflation next 12 months
- 1pp \uparrow SEP: households expect 0.50pp \uparrow inflation next 12 months

Results: Survey of Professional Forecasters

Second Step: OLS

$$\text{Model 1: } E_t \pi_{t+h} = \alpha + \beta s_{t-1} + \gamma' X_{t-1} + u_t$$

$$\text{Model 2: } E_t \pi_{t+h} = \alpha + \beta s_{t-1} + \gamma' X_{t-1} + \delta \text{ SEP} + u_t$$

| | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
|--------------------|-----------------|---------|-----------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Inflation Pressure | 0.05** | 0.06*** | 0.01 | 0.02 | 0.11*** | 0.06** |
| SEP | | 0.18*** | | 0.15 | | 0.20*** |
| R-Squared | 0.79 | 0.87 | 0.70 | 0.61 | 0.88 | 0.91 |
| Observations | 113 | 79 | 52 | 23 | 61 | 56 |
| Tuning Parameter | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

Table 3: The dependent variable is the one year ahead expectations (median) of CPI all items inflation from the SPF. '*', '**' and '***' indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

Results: Market-based expectations

Second Step: OLS

$$\text{Model 1: } E_t \pi_{t+h} = \alpha + \beta s_{t-1} + \gamma' X_{t-1} + u_t$$

$$\text{Model 2: } E_t \pi_{t+h} = \alpha + \beta s_{t-1} + \gamma' X_{t-1} + \delta \text{ SEP} + u_t$$

| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
|--------------------|-----------------|---------|------------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Inflation Pressure | 0.09*** | 0.19*** | -0.06* | -0.07 | 0.17*** | 0.14** |
| FOMC Projections | | 0.52*** | | 0.47*** | | 0.60*** |
| R-Squared | 0.58 | 0.73 | 0.29 | 0.69 | 0.55 | 0.73 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |
| Tuning Parameter | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 |

Table 4: The dependent variable is the market based one year expected inflation constructed by Haubrich, Pennacchi, and Ritchken (2012, FRB of Cleveland). ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

Takeaway

- we find that Fed speeches steer inflation expectations of
 - households
 - professional forecasters
 - markets
- higher Fed inflation pressure implies higher agents' inflation expectations
- more effective starting from the Great Financial Crisis
- even after controlling for
 - “quantitative” information provided by the Fed in the projections
 - lagged CPI, among other macro variables

Baseline results are robust to:

- using **mean** forecast rather than median forecast
- taking out **outliers** (5% of the sample)
- using **3 principal components** instead of LASSO
- including **two lags** of the inflation pressure and controls
- using **forecast revisions** instead of forecast levels
- alternative household expectations **NY Fed SCE**

Additionally, we look at:

- different “types” of forecasters
- state dependency
- long run forecasts
- building different indexes for different speakers: troika versus non-troika

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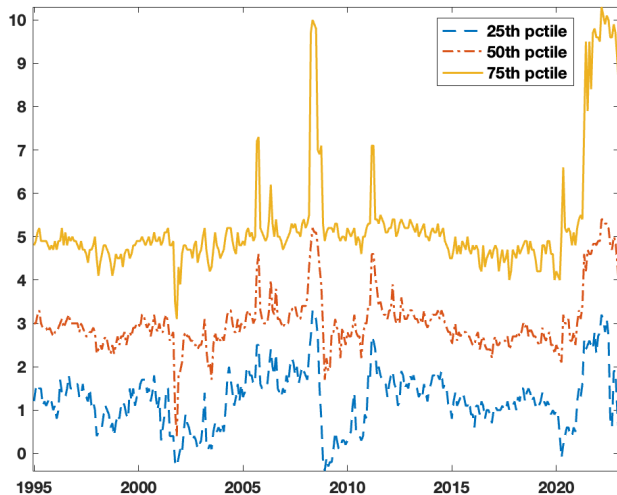
Percentiles analysis

Are some agents more affected than others?

→ analysis by respondent type:

- types are those in specific percentiles of the time t survey forecast distribution
 - follows Bianchi, Ludvigson and Ma (2022)
- does not assume types are invariant over time, not about optimistic vs pessimistic

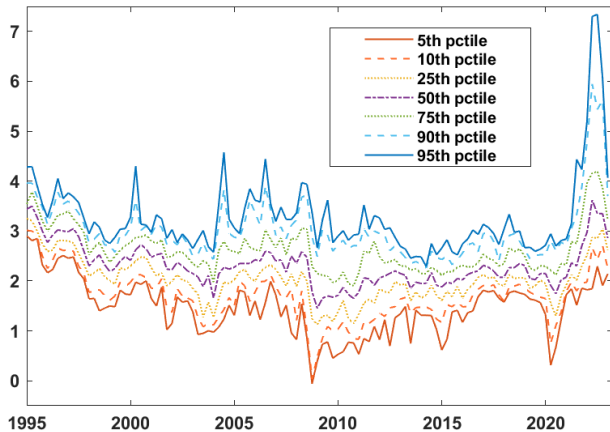
Percentile Types: MSC



Percentile Types: MSC

| Pctile | | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
|--------|--------------------|-----------------|--------|------------------|---------|-----------------|--------|
| 25th | | | | | | | |
| | Inflation Pressure | 0.18*** | 0.20** | 0.17*** | 0.32*** | 0.19*** | 0.15 |
| | SEP | | 0.25 | | -0.08 | | 0.70** |
| 50th | | | | | | | |
| | Inflation Pressure | 0.14*** | 0.15** | 0.07** | 0.13** | 0.30*** | 0.22** |
| | SEP | | 0.18 | | -0.14 | | 0.50** |
| 75th | | | | | | | |
| | Inflation Pressure | 0.13*** | 0.13 | 0.01 | 0.08* | 0.53*** | 0.36* |
| | SEP | | 0.48* | | -0.23** | | 0.86* |
| | Observations | 337 | 84 | 155 | 24 | 182 | 60 |

Percentile Types: SPF



Percentile Types: SPF

| Pctile | | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
|--------|---------------------------|-----------------|--------------------|-----------------|--------------------|-----------------|-------------------|
| 10th | Inflation Pressure SEP | 0.01 | 0.01 0.04 | -0.03 | 0.03 0.55*** | 0.15** | -0.11* 0.53*** |
| 25th | Inflation Pressure SEP | 0.03 | 0.03* 0.12** | -0.02 | 0.02 0.47*** | 0.11*** | 0.02 0.27*** |
| 50th | Inflation Pressure SEP | 0.05** | 0.06*** 0.18*** | 0.01 | 0.02 0.15 | 0.11*** | 0.06** 0.20*** |
| 75th | Inflation Pressure SEP | 0.05** | 0.07*** 0.21*** | -0.01 | 0.04 0.40*** | 0.13*** | 0.08** 0.27*** |
| 90th | Inflation Pressure SEP | 0.14*** | 0.14*** 0.07 | 0.09* | 0.16*** 0.33*** | 0.17*** | 0.14* 0.26 |

Additionally, we look at:

- different “types” of forecasters
- state dependency
- long run forecasts
- building different indexes for different speakers: troika versus non-troika

Are the effects different in [different phases of the business cycle](#)?

We look at:

- NBER recession dates
- CBO output gap
- Output growth
defined as year over year growth rate of real GDP below or above 3% average

State dependence: MSC

| | NBER | | CBO Output Gap | | Output Growth | |
|--------------------|-----------|-----------|----------------|----------|---------------|---------------|
| | Recession | Expansion | Negative | Positive | Below Average | Above Average |
| Inflation Pressure | 0.64*** | 0.10*** | 0.21*** | 0.01 | 0.19** | -0.01 |
| R-Squared | 0.61 | 0.74 | 0.67 | 0.66 | 0.56 | 0.86 |
| Observations | 31 | 306 | 247 | 90 | 220 | 117 |
| Tuning Parameter | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |

Table 5: Recessions defined as: NBER recession dates; CBO estimates of the output gap; year over year growth rate of Real Gross Domestic Product below 3%. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

State dependence: SPF

| | NBER | | CBO Output Gap | | Output Growth | |
|--------------------|-----------|-----------|----------------|----------|---------------|---------------|
| | Recession | Expansion | Negative | Positive | Below Average | Above Average |
| Inflation Pressure | 0.18* | 0.03* | 0.10*** | 0.03 | 0.04* | 0.06 |
| R-Squared | 0.61 | 0.80 | 0.83 | 0.19 | 0.82 | 0.67 |
| Observations | 11 | 102 | 83 | 30 | 74 | 39 |
| Tuning Parameter | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

Table 6: Recessions defined as: NBER recession dates; CBO estimates of the output Gap; year over year growth rate of Real Gross Domestic Product below 3%. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

State dependence: MKT

| | NBER | | CBO Output Gap | | Output Growth | |
|--------------------|-----------|-----------|----------------|----------|---------------|---------------|
| | Recession | Expansion | Negative | Positive | Below Average | Above Average |
| Inflation Pressure | 0.56*** | 0.07** | 0.12** | -0.01 | 0.15*** | -0.05 |
| R-Squared | 0.73 | 0.55 | 0.53 | 0.28 | 0.59 | 0.47 |
| Observations | 31 | 306 | 247 | 90 | 220 | 117 |
| Tuning Parameter | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 |

Table 7: Recessions defined as: NBER recession dates; CBO estimates of the output Gap; year over year growth rate of Real Gross Domestic Product below 3%. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively.

State dependence

Are the effects different in [different phases of the business cycle](#)?

We look at:

- NBER recession dates
- CBO output gap
- Output growth
defined as year over year growth rate of real GDP below or above 3% average

[Takeaway](#): effects are significantly larger in bad times compared to good times

Additionally, we look at:

- different “types” of forecasters
- state dependency
- long run forecasts
- building different indexes for different speakers: troika versus non-troika

Are long-run forecasts affected by Fed inflation pressure?

We use data from:

Michigan Survey of Consumers: 5 year ahead inflation

Survey of Professional Forecasters: 10 year ahead CPI

Market based: 5 year ahead

Long Run Forecasts: MSC

| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
|--------------------|-----------------|---------|------------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Inflation Pressure | 0.05*** | 0.08*** | -0.01 | -0.03 | 0.08*** | 0.06 |
| SEP | | -0.03 | | 0.06 | | -0.01 |
| R-Squared | 0.16 | 0.23 | 0.43 | 0.28 | 0.32 | 0.31 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |
| Tuning Parameter | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |

Table 8: The dependent variable is the five year ahead expectations (median) of inflation from the MSC. '*', '**' and '***' indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

Long Run Forecasts: SPF

| | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
|--------------------|-----------------|---------|-----------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Inflation Pressure | 0.04*** | 0.05*** | 0.01 | 0.02 | 0.10*** | 0.06** |
| SEP | | 0.13*** | | 0.02 | | 0.14*** |
| R-Squared | 0.70 | 0.65 | 0.88 | 0.79 | 0.48 | 0.60 |
| Observations | 113 | 79 | 52 | 23 | 61 | 56 |
| Tuning Parameter | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

Table 9: The dependent variable is the ten year ahead expectations (median) of CPI all items inflation from the SPF. ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

Long Run Forecasts: MKT

| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
|--------------------|-----------------|---------|------------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Inflation Pressure | 0.06* | 0.20*** | -0.08*** | -0.19** | 0.05** | 0.02 |
| SEP | | 0.07 | | 0.33* | | 0.34** |
| R-Squared | 0.29 | 0.34 | 0.55 | 0.59 | 0.42 | 0.54 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |
| Tuning Parameter | 0.004 | 0.004 | 0.004 | 0.004 | 0.004 | 0.004 |

Table 10: The dependent variable is the market based five year expected inflation constructed by Haubrich, Pennacchi, and Ritchken (2012, FRB of Cleveland). ‘*’, ‘**’ and ‘***’ indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

Are long-run forecasts affected by Fed inflation pressure?

We use data from:

Michigan Survey of Consumers: 5 year ahead inflation

Survey of Professional Forecasters: 10 year ahead CPI

Market based: 5 year ahead

Takeaway: long-run forecasts are significantly less affected than short-run

→ Good news? We like these to be well anchored

Additionally, we look at:

- different “types” of forecasters
- state dependency
- long run forecasts
- building different indexes for different speakers: troika versus non-troika

Are some speakers more influential than others?

Build different inflation pressure index by speaker:

- Troika (Chair+Vice Chair+NY Fed President) versus non-Troika (other speakers)
- Troika considered the most important figures in the Fed System

Troika versus Non Troika: indexes

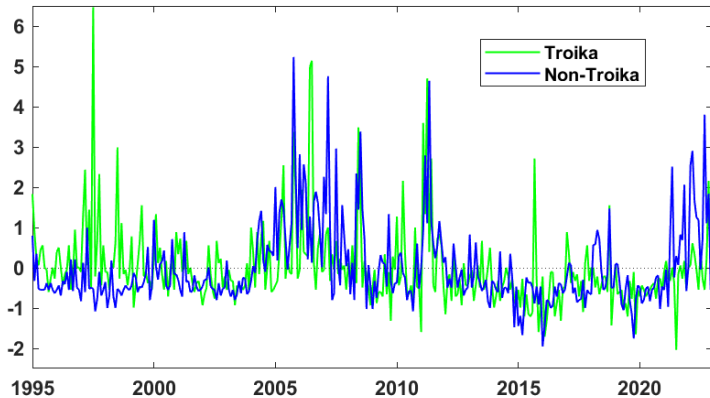


Figure 1: Inflation pressure index for Troika (Chair+Vice Chair+NY Fed President) and Non-Troika (all other speakers). The contemporaneous correlation between indices is 0.32.

Troika vs. Non-Troika: MSC

$$\text{Model 1: } E_t \pi_{t+h} = \alpha + \beta_1 s_{t-1}^{\text{troika}} + \beta_2 s_{t-1}^{\text{non-troika}} + \gamma' X_{t-1} + u_t$$

$$\text{Model 2: } E_t \pi_{t+h} = \alpha + \beta_1 s_{t-1}^{\text{troika}} + \beta_2 s_{t-1}^{\text{non-troika}} + \gamma' X_{t-1} + \delta \text{ SEP} + u_t$$

| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
|---------------------------|-----------------|---------|------------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Troika Infl. Pressure | 0.03 | 0.03 | 0.01 | 0.01 | 0.08** | 0.09 |
| Non-Troika Infl. Pressure | 0.12*** | 0.08 | 0.08** | 0.16** | 0.18*** | 0.04 |
| SEP | | 0.21 | | -0.15 | | 0.63** |
| R-Squared | 0.64 | 0.70 | 0.42 | 0.53 | 0.72 | 0.74 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |
| Tuning Parameter | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |

Table 11: The dependent variable is the one year ahead expectations (median) of inflation from the MSC. '*', '**' and '***' indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

Troika vs. Non-Troika: SPF

$$\text{Model 1: } E_t \pi_{t+h} = \alpha + \beta_1 s_{t-1}^{\text{troika}} + \beta_2 s_{t-1}^{\text{non-troika}} + \gamma' X_{t-1} + u_t$$

$$\text{Model 2: } E_t \pi_{t+h} = \alpha + \beta_1 s_{t-1}^{\text{troika}} + \beta_2 s_{t-1}^{\text{non-troika}} + \gamma' X_{t-1} + \delta \text{ SEP} + u_t$$

| | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
|-------------------------|-----------------|---------|-----------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Troika Infl. Press. | 0.05*** | 0.06** | 0.03 | 0.02 | 0.06** | 0.05** |
| Non-Troika Infl. Press. | 0.02 | 0.03 | -0.01 | 0.01 | 0.07** | 0.02 |
| SEP | | 0.16*** | | 0.14 | | 0.20*** |
| R-Squared | 0.79 | 0.87 | 0.70 | 0.58 | 0.88 | 0.87 |
| Observations | 113 | 79 | 52 | 23 | 61 | 56 |
| Tuning Parameter | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

Table 12: The dependent variable is the one year ahead expectations (median) of CPI all items inflation from the SPF. '*', '**' and '***' indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

Troika vs. Non-Troika: MKT

$$\text{Model 1: } E_t \pi_{t+h} = \alpha + \beta_1 s_{t-1}^{\text{troika}} + \beta_2 s_{t-1}^{\text{non-troika}} + \gamma' X_{t-1} + u_t$$

$$\text{Model 2: } E_t \pi_{t+h} = \alpha + \beta_1 s_{t-1}^{\text{troika}} + \beta_2 s_{t-1}^{\text{non-troika}} + \gamma' X_{t-1} + \delta \text{ SEP} + u_t$$

| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
|---------------------------|-----------------|---------|------------------|---------|-----------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Troika Infl. Pressure | 0.11*** | 0.10*** | 0.03 | -0.02 | 0.08* | 0.07* |
| Non-Troika Infl. Pressure | 0.03 | 0.11** | -0.09** | -0.21** | 0.11** | 0.08 |
| SEP | | 0.51*** | | 0.36** | | 0.62*** |
| R-Squared | 0.59 | 0.74 | 0.30 | 0.74 | 0.55 | 0.73 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |
| Tuning Parameter | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 |

Table 13: The dependent variable is the market based one year expected inflation constructed by Haubrich, Pennacchi, and Ritchken (2012, FRB of Cleveland). '*', '**' and '***' indicate significance levels at the 10, 5 and 1 percent respectively. Tuning parameter is the regularization parameter in the LASSO regression.

Conclusion

- We construct a Fed inflation pressure index
 - identify the “soft” information in Fed communication
- Economic agents are listening
 - Fed communication reaches both experts and non-experts
 - speeches affect inflation expectations
 - quantitative information (SEP) is also useful
- Communication strategies have improved over time
 - larger effectiveness after the Great Financial Crisis
- Heterogeneity across speakers and agent “types”
 - Troika affect professionals, non-Troika affect households and markets
 - agents expecting inflation higher than median are more affected by inflation pressure
 - we don't make claims about the accuracy of the forecasts RMSE

Implications

- Lessons for policy-makers
 - switch to transparency pays off: expectations are now affected by Fed communication
 - central banks can rely on speeches as well as SEP to manage expectations
 - speakers matter
- Communication has stronger effects in bad times compared to good times

Thank you

What does inflation pressure capture?

| | Correlations: Monthly Variables | | | | | |
|---------------|---------------------------------|------------|----------------|------|------------|------|
| | Troika | Non-Troika | CPI: All Items | PCE | Oil Prices | SEP |
| Overall | 0.63 | 0.90 | 0.51 | 0.53 | 0.40 | 0.56 |
| Troika | 1 | 0.32 | 0.23 | 0.22 | 0.20 | 0.25 |
| Non-Troika | | 1 | 0.48 | 0.50 | 0.36 | 0.51 |
| CPI-All Items | | | 1 | 0.98 | 0.66 | 0.86 |
| PCE | | | | 1 | 0.69 | 0.82 |
| Oil Prices | | | | | | 0.52 |

Table 14: Contemporaneous correlation for monthly indices and variables: 1995M1-2023M1. Troika: Chair of the Board of Governors, Vice and the President of the New York Fed), Non-Troika: regional Fed presidents excluding the New York Fed president.

Robustness: Mean

Michigan Consumer Survey

| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
|--------------------|-----------------|--------|------------------|--------|-----------------|--------|
| Inflation Pressure | 0.14*** | 0.18* | -0.00 | 0.21** | 0.39*** | 0.31** |
| SEP | | 0.40** | | 0.05 | | 0.91** |
| R-Squared | 0.72 | 0.73 | 0.55 | 0.58 | 0.79 | 0.78 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |
| Tuning Parameter | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |

Survey of Professional Forecasters

| | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
|--------------------|-----------------|---------|-----------------|------|-----------------|---------|
| Inflation Pressure | 0.06*** | 0.07*** | 0.02 | 0.05 | 0.12*** | 0.06** |
| SEP | | 0.20*** | | 0.15 | | 0.23*** |
| R-Squared | 0.80 | 0.88 | 0.70 | 0.66 | 0.87 | 0.90 |
| Observations | 113 | 79 | 52 | 23 | 61 | 56 |
| Tuning Parameter | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

Robustness: Outliers

| Michigan Consumer Survey | | | | | | |
|--------------------------|-----------------|-------|------------------|--------|-----------------|--------|
| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
| Inflation Pressure | 0.16*** | 0.12* | 0.13*** | 0.17** | 0.35*** | 0.31** |
| SEP | | 0.12 | | -0.11 | | 0.47* |
| R-Squared | 0.61 | 0.65 | 0.43 | 0.58 | 0.70 | 0.70 |
| Observations | 320 | 79 | 147 | 23 | 173 | 57 |

| Survey of Professional Forecasters | | | | | | |
|------------------------------------|-----------------|---------|-----------------|------|-----------------|---------|
| | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
| Inflation Pressure | 0.06** | 0.10*** | 0.02 | 0.08 | 0.13*** | 0.09** |
| SEP | | 0.17*** | | 0.14 | | 0.21*** |
| R-Squared | 0.80 | 0.88 | 0.70 | 0.64 | 0.88 | 0.92 |
| Observations | 106 | 74 | 49 | 21 | 58 | 53 |

| Market based | | | | | | |
|--------------------|-----------------|---------|------------------|---------|-----------------|---------|
| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
| Inflation Pressure | 0.10** | 0.21*** | -0.15*** | -0.04 | 0.21*** | 0.16* |
| SEP | | 0.56*** | | 0.49*** | | 0.60*** |
| R-Squared | 0.58 | 0.71 | 0.31 | 0.68 | 0.51 | 0.65 |
| Observations | 320 | 79 | 147 | 23 | 173 | 57 |

Robustness: Principal Components

First step: Least absolute shrinkage and selection operator (LASSO)

- select among ≈ 120 macro-financial variables from FRED data set by McCracken and Ng (2016)
- target 10% of sample size to use as controls in second step

Second Step: OLS

$$\underbrace{E_t \pi_{t+h}}_{\text{MSC, SPF or MKT}} = \alpha + \beta \underbrace{s_{t-1}}_{\text{inflation pressure}} + \gamma' \overbrace{PC_{t-1}^{1,2,3}}^{\text{selected in first step}} + u_t$$

Timing:

- MSC or MKT: s_{t-1} is the inflation pressure of the previous month
- SPF: s_{t-1} is the inflation pressure of the first month of the quarter
- Control for FOMC projections from SEP

Robustness: Principal Components

| Michigan Consumer Survey | | | | | | |
|--------------------------|-----------------|---------|------------------|-------|-----------------|---------|
| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
| Inflation Pressure | 0.12*** | 0.11* | 0.06* | 0.09 | 0.34*** | 0.27*** |
| SEP | | 0.42*** | | -0.16 | | 0.51 |
| R-Squared | 0.54 | 0.62 | 0.46 | 0.52 | 0.70 | 0.73 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |

| Survey of Professional Forecasters | | | | | | |
|------------------------------------|-----------------|---------|-----------------|--------|-----------------|---------|
| | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
| Inflation Pressure | 0.05 | 0.07*** | -0.11*** | -0.01 | 0.13*** | 0.04 |
| SEP | | 0.45*** | | 0.30** | | 0.53*** |
| R-Squared | 0.49 | 0.80 | 0.42 | 0.47 | 0.65 | 0.90 |
| Observations | 113 | 79 | 52 | 23 | 61 | 56 |

| Market based | | | | | | |
|--------------------|-----------------|---------|------------------|---------|-----------------|---------|
| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
| Inflation Pressure | 0.06* | 0.20*** | -0.06** | -0.21** | 0.14*** | 0.10 |
| SEP | | 0.43*** | | 0.28 | | 0.71*** |
| R-Squared | 0.49 | 0.64 | 0.52 | 0.67 | 0.54 | 0.73 |
| Observations | 337 | 84 | 155 | 24 | 182 | 60 |

Robustness: Additional Lags

| Michigan Consumer Survey | | | | | | |
|--------------------------|-----------------|-------|------------------|-------|-----------------|-------|
| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
| Inflation Pressure | 0.12*** | 0.12* | 0.06* | 0.13* | 0.26*** | 0.19* |
| SEP | | 0.22 | | -0.10 | | 0.53* |
| R-Squared | 0.65 | 0.71 | 0.45 | 0.47 | 0.74 | 0.75 |
| Observations | 336 | 84 | 154 | 24 | 182 | 60 |

| Survey of Professional Forecasters | | | | | | |
|------------------------------------|-----------------|---------|-----------------|-------|-----------------|---------|
| | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
| Inflation Pressure | 0.06*** | 0.07*** | 0.01 | 0.05* | 0.12*** | 0.06* |
| SEP | | 0.20*** | | 0.18 | | 0.24*** |
| R-Squared | 0.80 | 0.88 | 0.70 | 0.69 | 0.87 | 0.90 |
| Observations | 112 | 79 | 51 | 23 | 60 | 55 |

| Market based | | | | | | |
|--------------------|-----------------|---------|------------------|--------|-----------------|---------|
| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
| Inflation Pressure | 0.05 | 0.14*** | -0.06* | -0.03 | 0.11** | 0.10 |
| SEP | | 0.56*** | | 0.44** | | 0.61*** |
| R-Squared | 0.59 | 0.78 | 0.30 | 0.63 | 0.58 | 0.77 |
| Observations | 336 | 84 | 154 | 24 | 182 | 60 |

Robustness: Revisions

| | Michigan Consumer Survey | | | | | |
|-----------------------------|--------------------------|-------|------------------|---|-----------------|--------|
| | 1995:m1-2023:m2 | | 1995:m1-2007:m12 | | 2008:m1-2023:m2 | |
| Δ Inflation Pressure | 0.01 | 0.03 | -0.02 | – | 0.07** | 0.06** |
| Δ SEP | | 0.11 | | – | | -0.06* |
| Observations | 336 | 48 | 154 | – | 182 | 179 |
| Tuning Parameter | 0.005 | 0.005 | 0.005 | – | 0.005 | 0.005 |

| | Survey of Professional Forecasters | | | | | |
|-----------------------------|------------------------------------|---------|-----------------|---|-----------------|---------|
| | 1995:Q1-2023:Q1 | | 1995:Q1-2007:Q4 | | 2008:Q1-2023:Q1 | |
| Δ Inflation Pressure | 0.05*** | 0.05*** | 0.01 | – | 0.09*** | 0.09*** |
| Δ SEP | | 0.08 | | – | | 0.07 |
| Observations | 112 | 79 | 51 | – | 60 | 56 |
| Tuning Parameter | 0.01 | 0.01 | 0.01 | – | 0.01 | 0.01 |

Robustness: New York Fed SCE

| | One Year Ahead | | Three Years Ahead | |
|--------------------|----------------|---------|-------------------|---------|
| | Model 1 | Model 2 | Model 1 | Model 2 |
| Inflation Pressure | 0.18*** | 0.22** | 0.07*** | 0.20*** |
| SEP | | 0.18 | | -0.11 |
| R-Squared | 0.91 | 0.93 | 0.78 | 0.81 |
| Observations | 117 | 38 | 117 | 38 |
| Tuning Parameter | 0.01 | 0.01 | 0.01 | 0.01 |

Are expectations accurate?

| Sample | MSC | | | SPF | | |
|------------------|------|------|------|------|------|------|
| | 25th | 50th | 75th | 25th | 50th | 75th |
| 1995-2023 | 2.18 | 1.79 | 3.16 | 1.67 | 1.61 | 1.60 |
| 1995-2007 | 1.81 | 1.02 | 2.39 | 0.96 | 0.89 | 0.91 |
| 2008-2023 | 2.47 | 2.26 | 3.73 | 2.06 | 2.01 | 2.00 |

Table 15: Root Mean Squared Error (RMSE) for CPI all items inflation from the MSC and SPF.