

# Mining the Gap: Extracting Firms' Inflation Expectations from Earnings Calls<sup>1</sup>

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BdF & OECD Conference: Leveraging Natural Language Processing (NLP) To Answer  
Economic Questions

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# Motivation

- The recent persistence in inflation sparked renewed interest on how inflation expectations are formed at the micro level, the ways to assess them, and whether Central Banks can influence them and keep them anchored
- Households and firms' inflation expectations can be crucial since they are primary price and wage setters
- Firms' inflation expectations surveys are scarce (Coibion et al. (2020))

# Main Contributions

- ① Construct and validate a new cross-country index of firms' inflation expectations from earnings call transcripts
- ② Characterized the expectation information process: rationality and heterogeneity across sectors - [US Focus](#)
- ③ Monetary policy effectiveness as a function of attention to the central bank - [US Focus](#)

# Data

Earnings calls transcripts (Quarterly calls that firms' managers held with stakeholders and discuss about current and future firm's performance)

- NL Analytics and Capital IQ
- Sample from 2002 until 2023
- Quarterly frequency

Firms' balance sheet

- Compustat

We build this index for 39 countries (over 200,000 transcripts), including developing economies. [Other countries](#)

Monetary Policy Shocks

- Gurkaynak, Sack, and E. Swanson (2005) and Nakamura and Steinsson (2018) extended by Acosta (2022) through 2022Q3

# Methodology

*Goal:* Find a proxy for firm's inflation expectations from their earnings conference calls transcripts

*Working hypothesis:* the more firms are concerned about future inflation, the more they talk about it. That is, the frequency discussion of future inflation is a good proxy for inflation expectations.

We need to identify two set of key words relate to: 1) **inflation** and 2) **expectations**

*"However, we are continuing to see **inflation** in our cost structure in other areas, and we **expect** it to continue, as George discussed."*

*"This was primarily driven by higher cost of labor and other service costs due to elevated **inflation**."*

- Americold Realty Trust NYSE:COLD FQ1 2022 Earnings Call Transcripts

# Selecting the Keywords



Keywords list

# Validation

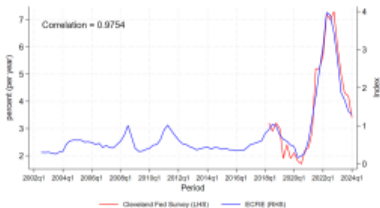
## US Firms Validation

- Aggregate level
- Sector level [Stock returns](#)
- Firm level [Andrade et al. \(2022a\) replication](#)

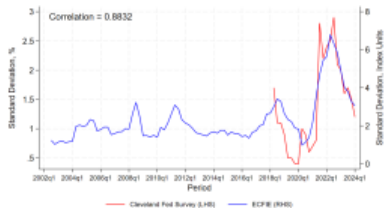
## Cross-Country Validation

- Aggregate level

## Inflation Expectations



## Disagreement



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<sup>2</sup>Disagreement is measured as the standard deviation of inflation expectations at period  $t$



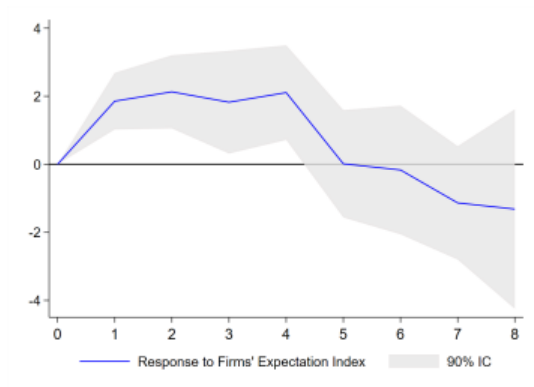
# Predictive Power - ECFIE

We estimate the following equation for each quarter ahead  $h$ :

$$\pi_{t+h} = \alpha^h + \beta^H \pi_t^e + \xi^H X_t + \epsilon_{t+h}$$

- $\pi_{t+h}$  = year-on-year CPI inflation
- $\pi_t^e$  = ECFIE Index
- $X_t$  = four lags of CPI, GDP growth and unemployment rate, 1-year ahead consensus inflation expectations

## Inflation quickly rises in response to an increase in our index



ECFIE index has predictive power on future inflation beyond Consensus (MSPE for 1-year ahead inflation is lower by 15 percent with ECFIE index)

# What are the advantages of the ECFIE Index compared to traditional firm surveys?

- 1 ECFIE it is not time-consuming to implement
- 2 It is conducted at a high frequency (quarterly)
- 3 Representative of the overall economy
- 4 Extended time coverage
- 5 Easily matched with firms' balance sheet data via Compustat

More Features

# Full Information Rational Expectations FIRE

- Do firms extrapolate from their own costs when forming inflation expectations for the economy?
  - Financial Constraint - ratio of the long-term debt maturing within one year
- Do firms with a better outlook believe that monetary policy will be more effective in lowering inflation?
  - Non-Political Sentiment (Hassan et al., (2019))

## Empirical Strategy - Testing FIRE

We employed a local projection Jorda (2005) with the following specification:

$$\pi_{j,t+h}^e = \alpha_j + \alpha_t + \delta_{t+h}^H \text{Firm Condition}_{j,t-1} \times MP_t + \beta_{t+h} X_{j,t-1} + \epsilon_{j,t}$$

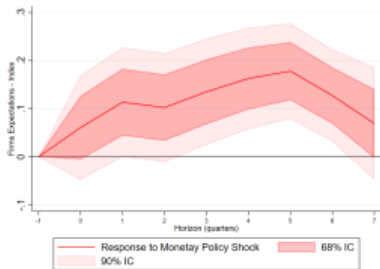
- $\alpha_j$ : firm fixed effect;  $\alpha_t$ : time fixed effect
- $MP_t$  monetary policy shock (Gürkaynak, Sack, and Swanson, 2005)<sup>3</sup>
- Controls Controls
- Standard errors are two-way clustered by firms and time
- Financial Constraint and Non-Political Sentiment are de-meanned by sectoral average at time  $t$  in the regression

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<sup>3</sup>Standardize to mean zero and standard deviation. As an alternative, we also use Nakamura and Steinsson (2018)

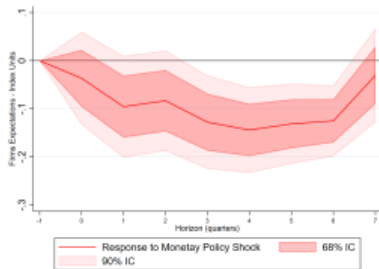
# Results - Testing FIRE

## Financial Constraint



MP is weakened by 37% in more financial constraint

## Non-Political Sentiment



MP is amplified by 33% in more optimistic firms

According to FIRE,  $\delta_{t+h}^H = 0$  (no additional effect) Average effect

# Monetary policy effectiveness as a function of attention

- Similarly to Song and Stern (2020) we construct a firm level measure of attention to the central bank using earning call transcripts
- **Share of sentences that contain any of these words:**
  - Fed, Fed Funds, monetary policy, central bank, FOMC, monetary policy, quantitative easing, quantitative tightening, monetary easing, monetary tightening, Federal Reserve

Keywords list

## Empirical Strategy - Attention Measure

Differences in attention are likely correlated with structural sectoral exposures to monetary policy

We want to disentangle sector exposure to monetary policy from attention to the central bank

- Firms' attention de-measured by sectoral average at time  $t$  in the regression
- A value of Attention $_{j,t}$  equal one, means that the firm  $j$  is paying one standard deviation more attention to the central bank than the average sector at period  $t$ <sup>4</sup>

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<sup>4</sup>We divide the sector at the NAICS 2-digit level.



# Empirical Strategy - The role of attention on monetary policy

We employed a local projection Jorda (2005) with the following specification:

$$\pi_{j,t+h}^e = \alpha_j + \alpha_t + \delta_{t+h}^H \text{Attention}_{j,t-1} \times MP_t + \beta_{t+h} X_{j,t-1} + \epsilon_{j,t}$$

- $\alpha_j$ : firm fixed effect;  $\alpha_t$ : time fixed effect
- $MP_t$  monetary policy shock<sup>5</sup>
- Controls Controls
- Standard errors are two-way clustered by firms and time

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<sup>5</sup>Standardize to mean zero and standard deviation.

# The role of attention on monetary policy



**Amplification effect of 10%**

# Conclusion

- ECFIE Index is firms' inflation expectations index
  - Easy to implement
  - Allows for cross-country comparison
  - Easily matched with firms' balance sheet data via Compustat
- Firms' attention to the Central Bank can influence the effectiveness of monetary policy

Thank You!

# Related Literature

- **data/methodology**
  - Hassan et al., (2019); Song and Stern (2020); Hassan et al., (2021a); Gallemore et al., (2021); Chava et al., (2022); Konchitchki and Xie (2023)
- **firms' inflation expectation**
  - Andrade et al., (2022); Candia et al. (2024); Weber et al., (2023); Fiori, Giuseppe, and Filippo Scoccianti, (2023); Coibon et al., (2018); Coibon et al., (2020)
- **MP and firms expectation**
  - Coibon et al., (2022); Frache et al., (2023)

# Constructing the ECFIE Index

- We feed the both keyword sets to NL Analytics
- **Share of sentences that contain information about firm's inflation expectations**
  - The measure captures the intensity of firm  $j$  discussion/concern of inflation in the future at time  $t$
  - The index is a proxy for the near-term firm's inflation expectations

# Validation - United States



Correlation of ECFIE index with inflation measures

<i>Correlations</i>	Livingston Survey	CPI
ECFIE Index	0.84	0.80
Livingston Survey	1	0.83

Correlation between EFCIE and Livingston Survey for different horizon

<b>Horizon</b>	<b>Correl with EFCIE Index</b>
Next 1M (end of the period)	0.8296
Next 6M (end of the period)	0.8339
Next 12M (end of the period)	0.8250
Following 1Y (average)	0.8415
Next 10Y (average)	0.1383

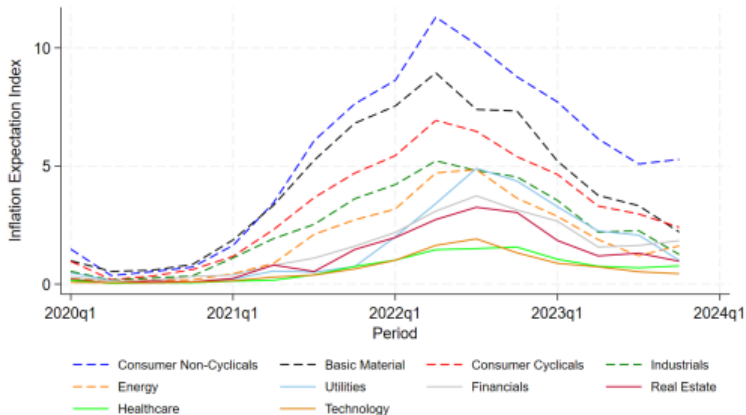
ECFIE is a short-term inflation expectation index

## Heterogeneity across sectors

- Under FIRE, sector inflation expectations for the aggregate inflation should be the same
- Firms' expectations are affected by both aggregate and industry-specific conditions
- ECFIE index allows to understand the heterogeneity on inflation expectation across sectors
- Lets take look the recent surge in inflation expectations...



# Post pandemic inflation expectation evolution by sector



## Inflation Words:

- inflation, cogs inflation, commodities inflation, core inflation, cost inflation, gross inflation, inflationary, inflationary environment, inflationary pressure, inflationary pressures, input cost inflation, market inflation, price increases, wage inflation

## Expectations Words:

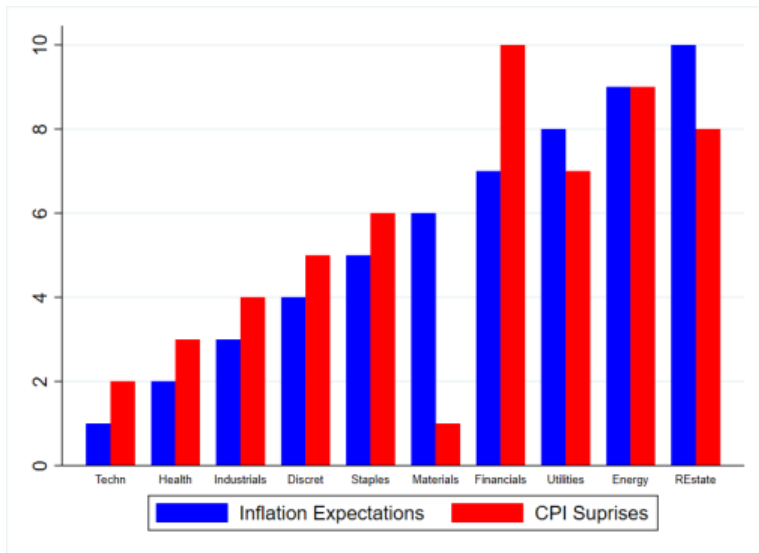
- additional, ahead, concern, continue, continued, evolution, expect, expectations, expected, first quarter, fiscal year, forecast, forecasting, forward looking, forward, full year, further, future, long term, medium term, near term, next year, next years, outlook, possibility, possible, potential, pressure, projected, projections, q4, second quarter, short term, trends, year progresses

## What are the advantages of the ECFIE Index compared to traditional firm surveys?

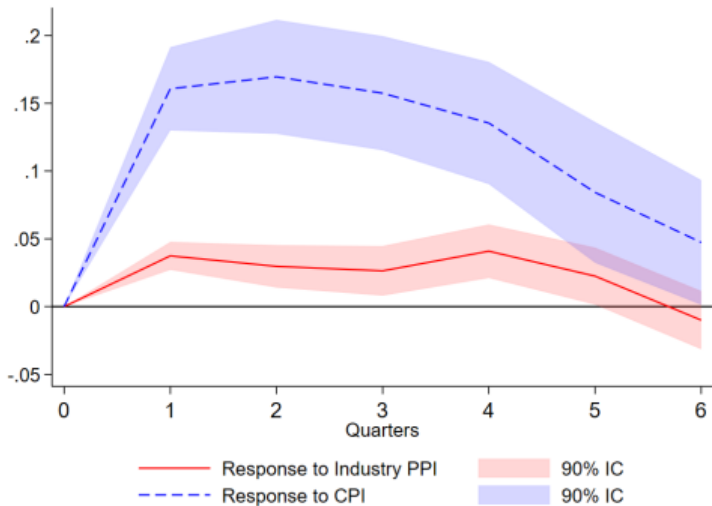
- 6 Not influence or “prime” the answers
- 7 Cross-country comparison
- 8 Sample size
- 9 Firm level and sector level inflation expectations are publicly available

[Back](#)

## Sector level validation: stock returns [Back](#)



## Firm level validation: Andrade et al., (2022a) [Back](#)



- Fed, Fed Funds, monetary policy, central bank, FOMC, monetary policy, quantitative easing, quantitative tightening, monetary easing, monetary tightening, Federal Reserve

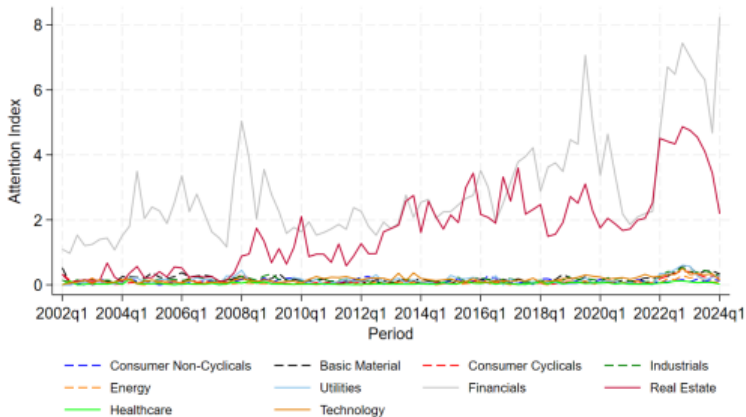
- Attention Index $_{j,t-1}$
- Total Assets $_{j,t-1}$
- Employment $_{t-1,i}$ , Leverage $_{j,t-1}$
- Liquidity Ratio $_{j,t-1}$
- Sales Growth QoQ $_{j,t-1}$
- Ratio of the long-term debt maturing within one year $_{j,t-1}$

## Why to look at attention?

- Inflation expectation is an important channel for monetary policy (IMF WEO, Chapter 2, October (2023))
- A condition for policymakers to effectively manage inflation expectations is that economic agents understand and react to monetary policy announcements
- Agents paying more attention to the central bank should react more to monetary policy

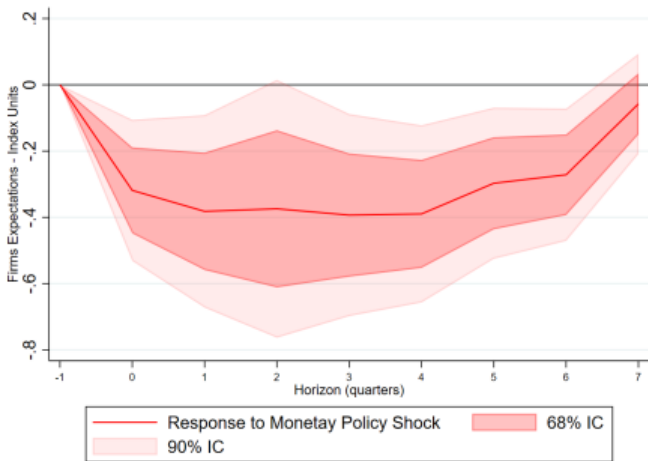


# Heterogeneity in attention to the Central Bank by sector



# The average effect of monetary policy [Back](#)

$$\pi_{j,t+h}^e = \alpha_j + \gamma_{t+h}^H MP_t + \delta_{t+h}^H \text{Firm Condition}_{j,t-1} \times MP_t + \beta_{t+h} X_{j,t-1} + \epsilon_{j,t}$$



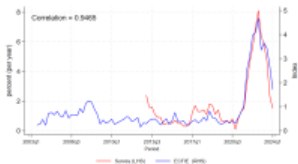
## For each country, can ECFIE Index be constructed? [Back](#)

Any country with companies that regularly hold earning call conferences. For example:

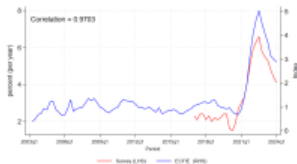
- Argentina, Australia, Austria, Belgium, Bermuda, Brazil, Canada, Chile, China, Colombia, Denmark, Finland, France, Germany, Greece, Hong Kong, India, Ireland, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States

# The Index Across Countries - Part I

(a) Italy



(b) United Kingdom



(c) Norway

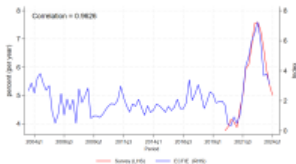


(d) Japan



# The Index Across Countries - Part II

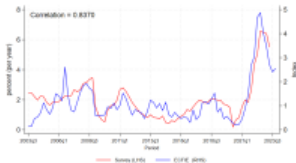
(e) Mexico



(f) New Zealand



(g) Sweden



(h) Turkey



# Attention vs Actual Inflation and Disagreement

## Actual Inflation



## Disagreement

