

Stagflationary Stock Returns ¹

Ben Knox Yannick Timmer

Federal Reserve Board

Frontier Topics in Macro-Finance

¹The views expressed in these slides are those of the authors and do not necessarily reflect the views of the Federal Reserve Board or the Federal Reserve System.

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Households and firms generally dislike inflation

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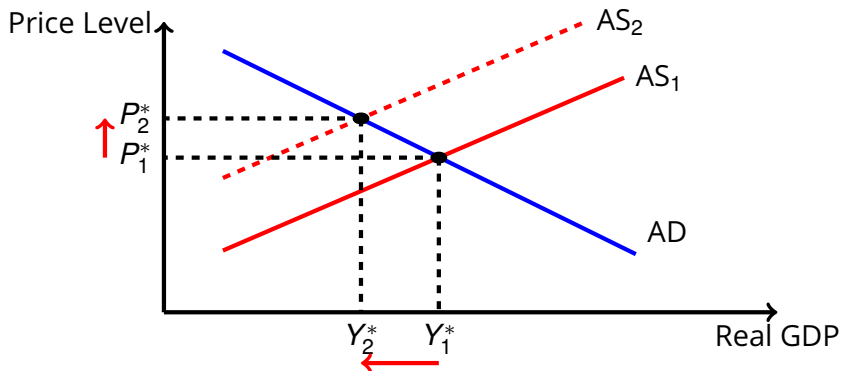
- Associate inflation with low growth: a “stagflationary view”
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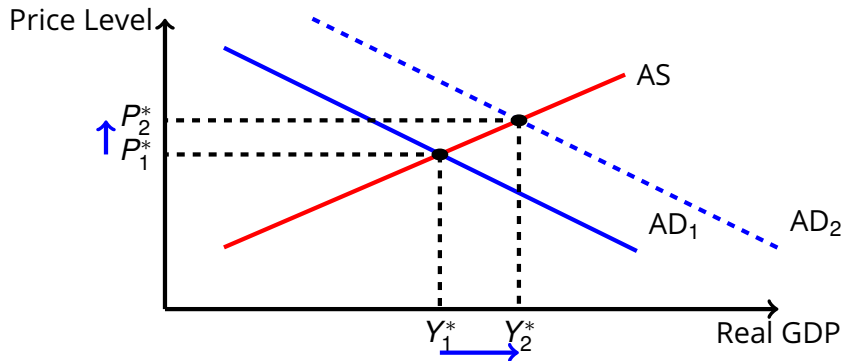


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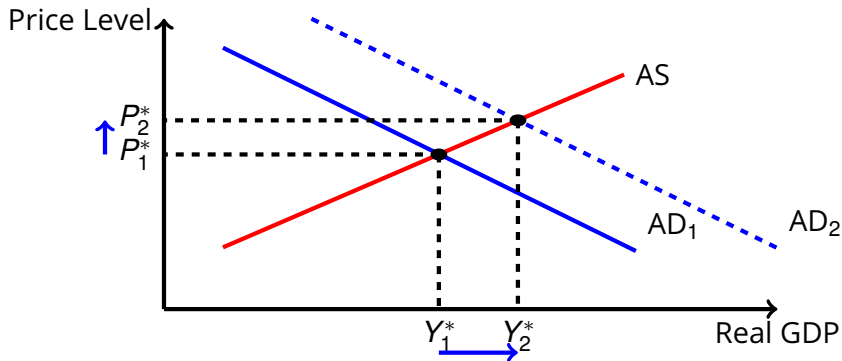


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- Potentially unsophisticated and irrational agents?

Paper Overview

What is the **view of financial market participants**?

- do they **share the perception of households** and firms?
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Event-study approach

- **high-frequency identification** around surprise in CPI releases
- study **multi-day asset price responses** to inflation surprises
- extract measures of **investors cash flow expectations**
- supplement analysis by **leveraging the cross section of firms**

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Findings point to a stagflationary view

- **nominal cash flow expectations stagnant** with inflationary news, while **real cashflow expectations decline**
- firms with **low market power** are expected to suffer **larger declines** in cash flows

Empirical Strategy - Time Series

Event study around CPI announcement days:

$$\Delta^k y_t = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k \quad \text{for all } k \in [-5, 10]$$

where

$$\text{Inflationary News}_t = \pi_t - E_{t'}(\pi_t | I_{t'})$$

Dependent variables, $\Delta^k y_t = y_{t+k} - y_{t-1}$:

- measures k -day asset price response to inflation news

Inflation Data, π_t :

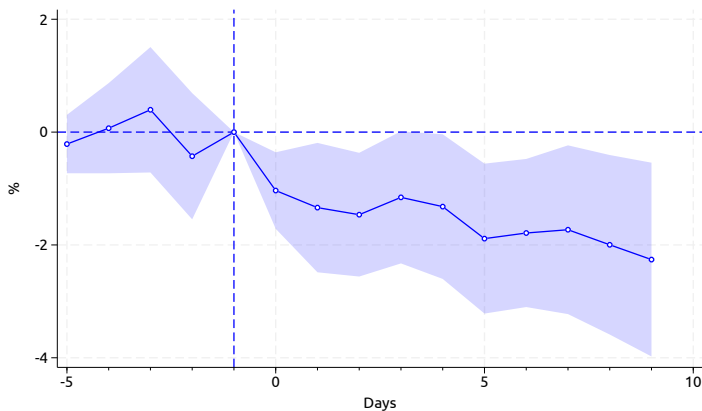
- month-on-month headline CPI (released 8.30am by BLS)

Inflation Forecast, $E_{t'}(\cdot | I_{t'})$:

- Bloomberg and Haver Analytics's Money Market Services, median forecasts (longest sample starts 1977)

Stock Market Response to Inflation News

$$\text{Return}_{i,t}^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_{i,t}^k$$



Observable Stock Return Components

Under the **present value formula** of the stock price:

$$\text{Return}_{t+1} = \text{Yield curve news}_{t+1} + \text{Equity risk premium news}_{t+1} + \text{Cash flow news}_{t+1}$$

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Observable yield curve data:

- rich term-structures of **nominal/real government bond yields**
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- available out to 2-year from 1996

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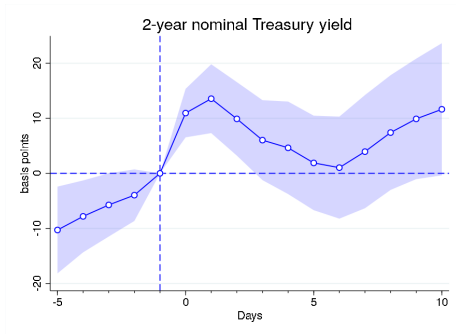
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Observable cash flow expectations data:

- **dividend futures** from 2017 (risk premium and liquidity)
- **analyst earnings expectations** (longer sample but slower moving?)
- **stock decompenation approach** (removes observable discount rate component from stock return, i.e. Knox and Vissing-Jorgensen (2024))

Short-Maturity Yield Responses to Inflation News

$$\Delta^k 2\text{-yield}_t = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$

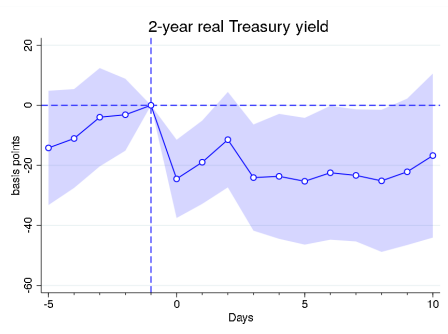
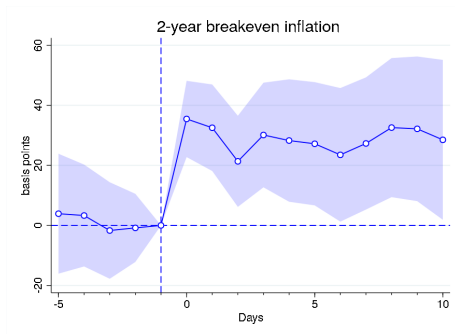


Short-dated **nominal yields increase**

- consistent with monetary policy response

Short-Maturity Yield Responses to Inflation News

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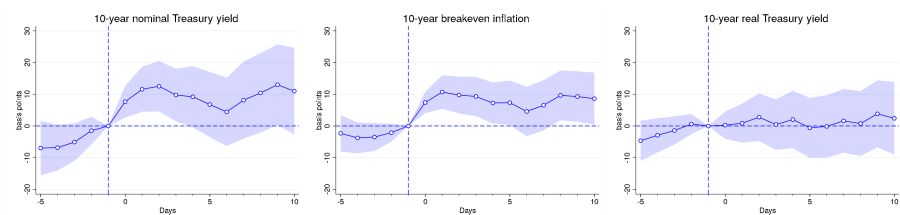


Short-dated **real yields decline** as **inflation compensation increases**

- contrary to a Taylor rule prediction (looser *real* monetary stance)

Long-Maturity Yield Responses to Inflation News

$$\Delta^k \text{yield}_t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$

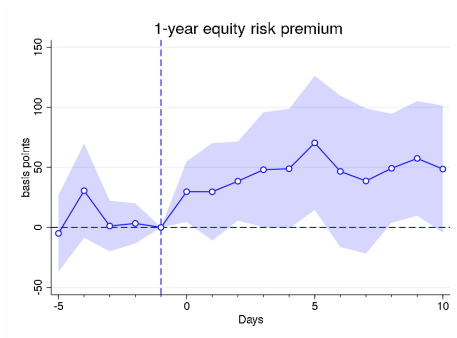


Long-maturity real yields are unchanged

- long maturities more important for equity valuations (cashflows into perpetuity \implies long-duration asset)
- real yields relevant if we think of stocks as real assets

Equity Risk Premium Response to Inflation News

$$\Delta^k \text{Equity Risk Premium}_t = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$



Equity risk premium increases

- contributes to declining stock prices

Cash Flow Response to Inflation News

To **calculate cash flow measure** we first use method based on Knox and Vissing-Jorgensen (2024) stock return decomposition

Implement two-stage estimation

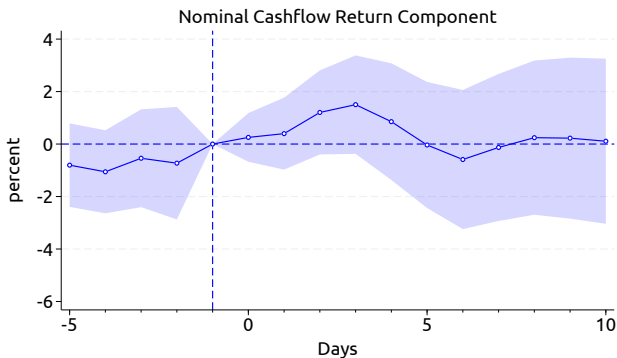
- 1 compute yield curve return component
 - stock market's duration weighted changes in yields
 - weights computed from dividend futures
- 2 regress yield-adjusted stock return on short-maturity equity premium
 - regressions predicted component is equity premium return

The **regression residual is the cash flow return component**

- expectations of nominal (real) cashflow expectations if using nominal (real) yields in the first stage

Stagnant nominal cash flow expectations

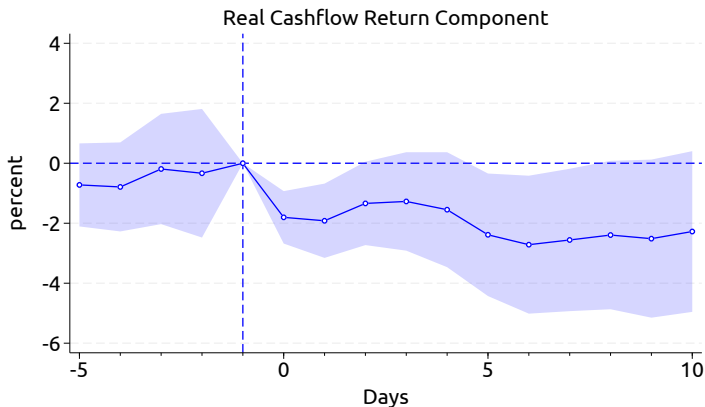
$$\text{Nominal Cash Flow Component}_t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$$



Cashflow component = return – yield curve component – equity premium component

Declining real cash flow expectations

Real Cash Flow component $t^k = \alpha^k + \beta^k \text{Inflationary News}_t + \epsilon_t^k$

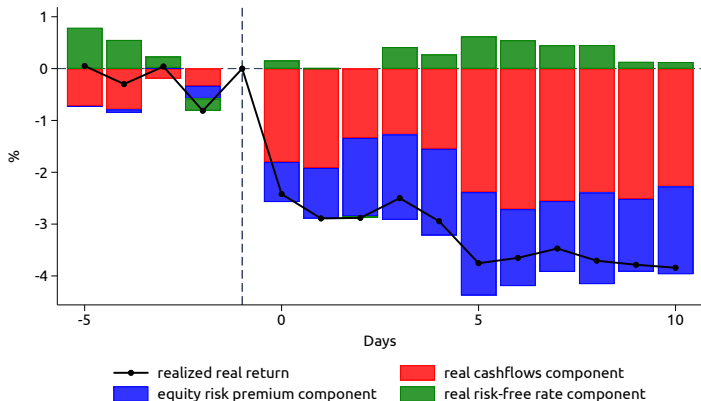


Real cash flows expected to decline with inflationary news

- adjusts for increase in immediate price-level jump and the increase in future inflation expectations (from real yields)

Stock return decomposition

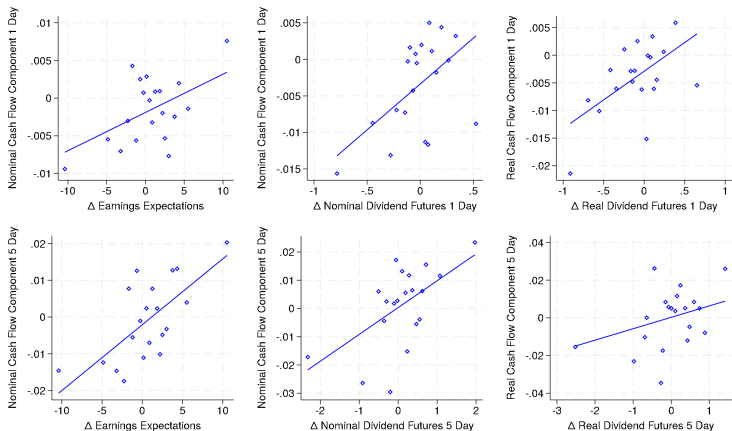
$$Return_t^{k,component} = \alpha^{k,c} + \beta^{k,c} \text{Inflationary News}_t + \epsilon_t^{k,c}$$



Quantifies contribution of components to aggregate stock returns

Verification of Cashflow Component (a)

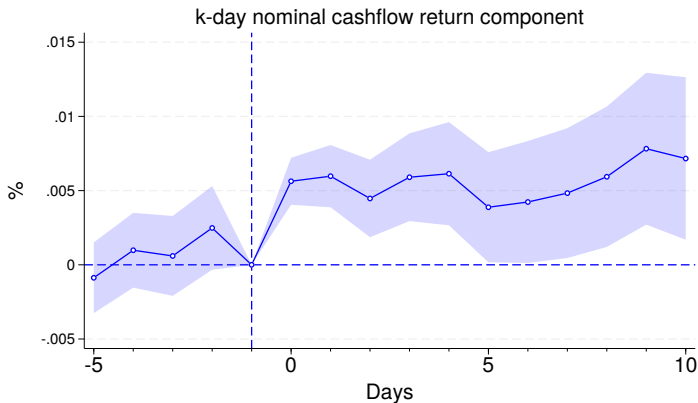
Consistent results with other cashflow measures



Verification of Cashflow Component (b)

Nominal cash flow increases with nonfarm payroll surprises

- reverse placebo test for measurement error



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- Policy-sensitive real yields decline
 - inconsistent with the Taylor rule hypothesis
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 - New Keynesian model: a positive stock-bond correlation is indicative of the economy being hit by supply shocks

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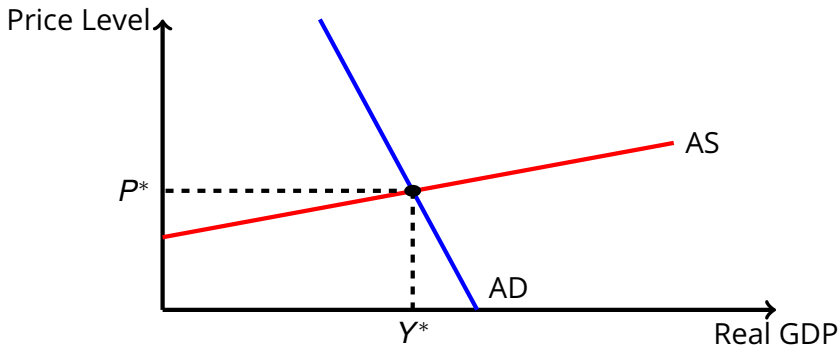
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- ⇒ Inflation news interpreted supply-driven marginal cost shock?

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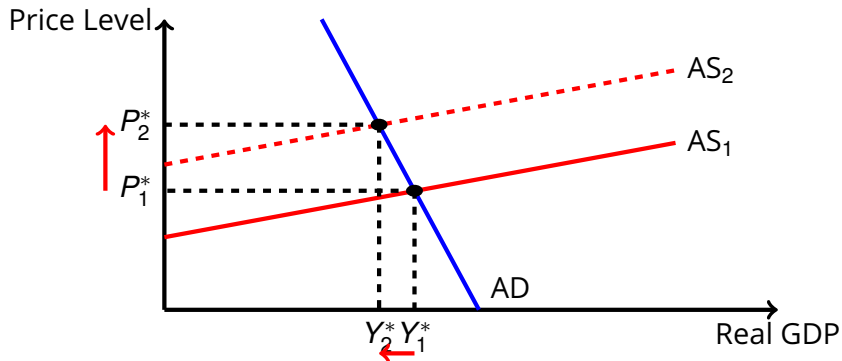
Discussion of findings

- Inflation considered supply-driven even when economy was considered to be demand-driven?
- Can rationalize these findings with AS-AD framework
 - a flat supply curve (consistent with globalization)
 - a steeper demand curve (consistent with the rise in aggregate market power (Philippon, 2019; De Loecker et al., 2020))



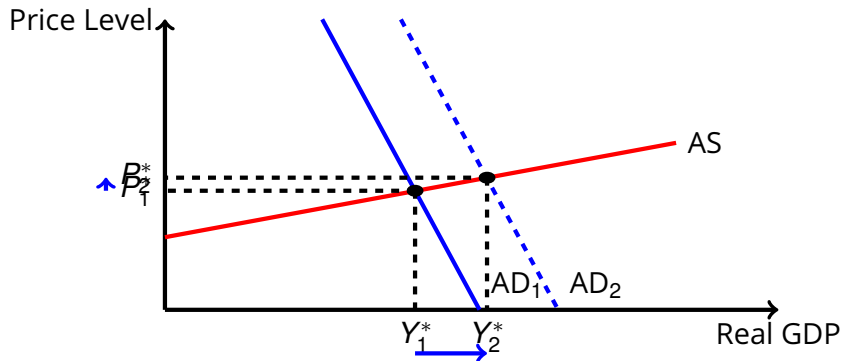
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Model of imperfect competition (Tirole, 1989)

Consider a **firm maximizing profits** with respect to pricing decision:

Hypothesis (**firm profitability and marginal costs**)

Firm profitability declines following an increase in marginal costs.

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Firm profitability declines following an increase in marginal costs.

Hypothesis (market power, firm profitability and marginal costs)

Firms with higher elasticity of demand—i.e., less market power—suffer more negative declines in profitability in response to marginal cost shocks as compared to firms with lower elasticity of demand.

Testing model hypothesis

Exploit cross-sectional heterogeneity across firms

- empirical approach to test this hypothesis:

$$Return_{i,t}^k = \alpha^k + \beta_1^k \text{Inflationary News}_t * \text{MarketPower}_{i,y(t)-1} + \alpha_i + \alpha_t + \mathbf{X}'\gamma + \epsilon_{i,t}^k$$

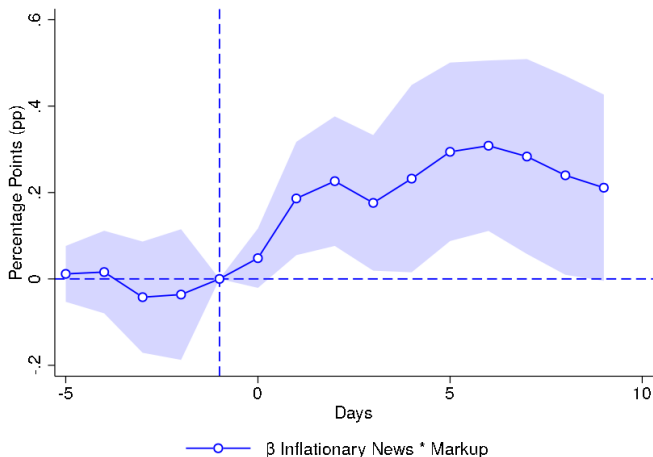
- if investors interpret inflation as marginal cost shock, more market power dampens the negative stock price effect ($\beta > 0$)

Measuring market power

- main measure based on [production approach](#) from De Loecker et al. (2020)
- alternative measure based on the [profit-cost elasticity from a network oligopoly demand system](#) from Pellegrino (2024)

Exploiting X-Sectional Markup Heterogeneity

$$Return_{i,t}^k = \alpha^k + \beta_i^k \text{Inflationary News}_t * Markup_{i,y(t)-1} + \alpha_i + \alpha_t + \mathbf{X}'\gamma + \epsilon_{i,t}^k$$



Exploiting X-Sectional Markup Heterogeneity

$$Return_{i,t}^5 = \alpha + \beta_1 \text{Inflationary News}_t * \text{Markup}_{i,y(t)-1} + \alpha_i + \alpha_t + \mathbf{X}'\gamma + \epsilon_{i,t}$$

	Dependent Variable: $Returns_{i,t}^5$					
	(1)	(2)	(3)	(4)	(5)	(6)
Inflationary News	-1.446 (1.006)					
Markup	0.00479 (0.0159)	0.00805 (0.0158)	-0.00564 (0.0103)	0.00326 (0.0104)	-0.00495 (0.0103)	0.00335 (0.0104)
Inflationary News × Markup	0.286** (0.121)	0.294** (0.125)	0.185** (0.0889)	0.192** (0.0806)	0.191** (0.0881)	0.192** (0.0801)
R-squared	0.015	0.130	0.158	0.158	0.158	0.159
N	1,947,431	1,947,429	1,943,129	1,894,237	1,920,435	1,883,037
Firm FE	✓	✓	✓	✓	✓	✓
Time FE		✓	-	-	-	-
Industry-Time FE			✓	✓	✓	✓
Firm Characteristics Controls				✓		✓
Factor Exposure Controls					✓	✓

- *Int. Firm Controls*: log assets, tangibility, leverage, market-to-book value
- *Int. Factor Controls* : Fama-French 3-factors: market beta, size, and value. Calculate firm-level 5-year rolling betas to factors (Fama-Macbeth approach)

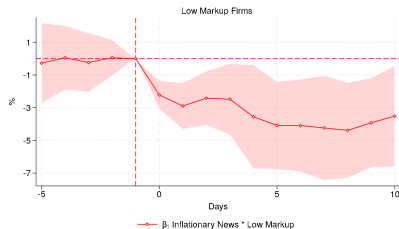
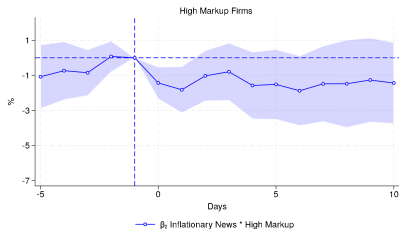
Controlling For X-sectional Discount Rate Sensitivity

Stage 1. Control for cross-sectional sensitivity to discount rates:

$$Return_{i,t}^k = \alpha_i^k + (\Delta_k \mathbf{DCR}'_t \times Markup_{i,y(t)-1}) \Theta^k + \Gamma_{i,t} \Psi^k + \epsilon_{i,t}^k$$

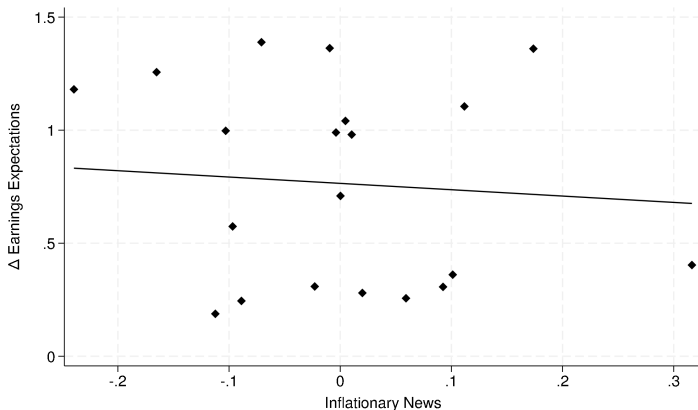
Stage 2. Extract predicted cashflows component of return, $\widehat{Return}_{i,t}^{k,CF}$, and regress this component on inflation news

$$\widehat{Return}_{i,t}^{k,CF} = \alpha + \beta_1 \text{Inflationary News}_t * \text{Low Markup}_{i,y(t)-1} + \beta_2 \text{Inflationary News}_t * \text{High Markup}_{i,y(t)-1} + \beta_3 \text{Low Markup}_{i,y(t)-1} + \epsilon_{i,t}$$



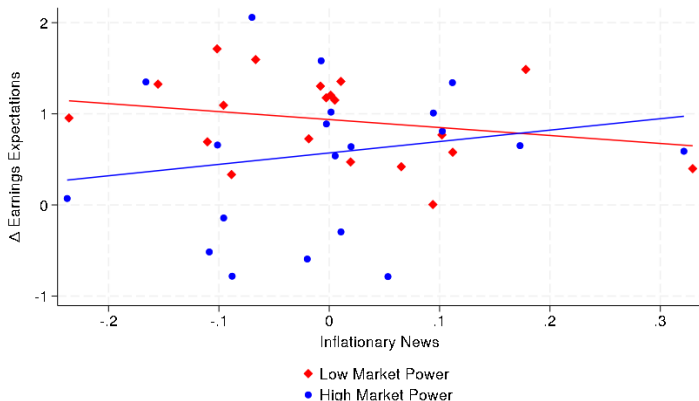
Evidence from Analyst Earnings Expectations

- Do analysts adjust their earnings expectations around inflationary news?
 - differentially across the market power distribution?



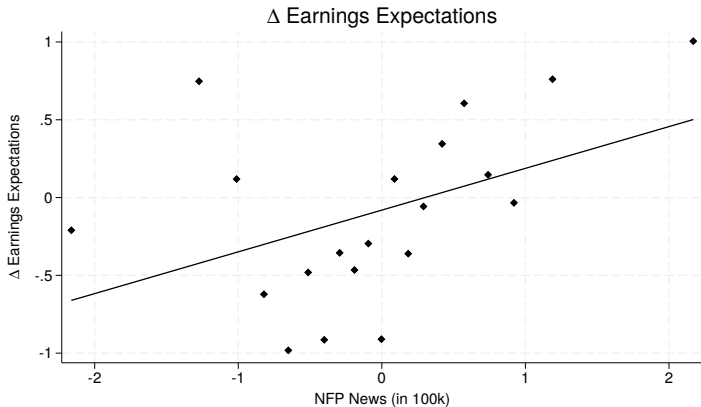
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Evidence from Analyst Earnings Expectations

- Do analysts adjust their earnings expectations around **payroll** news?



Conclusion

Research question

- How do financial markets view inflation?

Main observations following inflationary news

- short-dated real yields fall
- equity risk premium increases
- investors' expectations of future real cash flows decline
- firms with low market are expected to suffer larger declines in expected cash flows

Main Takeaway

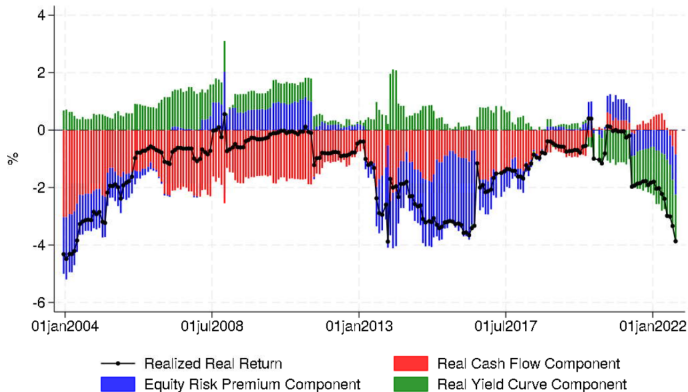
- Investors have a stagflationary view in which they see inflation as a negative supply shock

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State-(In)dependence

	Dependent Variable: $Return_t^5$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inflationary News	-1.880** (0.800)	-2.007** (0.866)	-2.070** (0.982)	-2.846* (1.458)	-1.718** (0.842)	-0.975 (1.502)	-1.706** (0.804)	-3.402** (1.431)	-1.839** (0.812)
State		0.00265 (0.115)	0.0781 (0.127)	-0.0700 (0.189)	0.0184 (0.112)	-0.112 (0.431)	-0.0395 (0.111)	-0.606*** (0.185)	-0.0242 (0.112)
Inflationary News \times State		0.266 (0.636)	2.008* (1.036)	0.0345 (1.765)	-0.402 (0.643)	-1.166 (2.630)	0.653 (0.879)	-0.250 (1.121)	-0.183 (0.584)
R-squared	0.010	0.011	0.018	0.015	0.011	0.011	0.009	0.051	0.011
N	529	504	467	279	528	529	528	279	529
State		Stock-Bond	Inflation RP	Supply	Inflation	Positive	U-gap	$\Delta_5 2yr$	$\Delta_5 2yr$

Decomposition over Time



Textbook model of imperfect competition (Tirole, 1989)

1989)

Firm profit:

$$\Pi(p) = (p - c) Q(p)$$

where p is the product price, c is the marginal cost of production, and $Q(p)$ is the quantity produced.

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$$\xrightarrow{FOC} p^* = mc$$

where markup $m = \frac{\epsilon}{\epsilon - 1} > 1$ is a decreasing function of the elasticity of demand $\epsilon > 1$ facing the firm

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Substitute p^* into profit and take derivatives

$$\frac{\partial \Pi^* / \Pi^*}{\partial c / c} = 1 - \epsilon < 0$$

$$\frac{\partial^2 \Pi^* / \Pi^*}{(\partial c / c) (\partial \epsilon)} = -1.$$

Measuring Market Power

Production approach (De Loecker et al., 2020)

Estimate markups from the firm's cost minimization decision:

$$\text{Markup}_{i,t} = \theta_{i,t}^{\nu} * \frac{(P_{i,t}Q_{i,t})}{(P_{i,t}^{\nu}V_{i,t})}$$

where

- $\frac{(P_{i,t}Q_{i,t})}{(P_{i,t}^{\nu}V_{i,t})}$: the ratio of sales to variable inputs
- $\theta_{i,t}^{\nu}$: the output elasticity of variable inputs of production (industry-level estimates)

Calculate markups using firm-level data from Compustat

- variable inputs measured through 'cost of goods sold'
- well documented time series trends in aggregate markups \Rightarrow we demean each year

Exploring the yield curve results further

Hanson and Stein (2015) regressions

$$\Delta^2 \text{long-term forward rate}_t = \alpha^k + \beta^2 \Delta^2 \text{2-year nominal rate}_t + \epsilon_t^2$$

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$$\Delta^2 \text{long-term forward rate}_t = \alpha^k + \beta^2 \Delta^2 \text{2-year nominal rate}_t + \epsilon_t^2$$

	FOMC			CPI releases		
	nominal	real	inflation	nominal	real	inflation
2-year treasury	0.49*** (0.15)	0.50*** (0.12)	-0.01 (0.09)	0.56*** (0.10)	0.17** (0.08)	0.40*** (0.09)
R-squared	0.068	0.104	0.000	0.131	0.019	0.090
N	146	146	146	218	218	218

Exploring the yield curve results further

Hanson and Stein (2015) regressions

$$\Delta^2 \text{long-term forward rate}_t = \alpha^k + \beta^2 \Delta^2 \text{2-year nominal rate}_t + \epsilon_t^2$$

	FOMC			CPI releases		
	nominal	real	inflation	nominal	real	inflation
2-year treasury	0.49*** (0.15)	0.50*** (0.12)	-0.01 (0.09)	0.56*** (0.10)	0.17** (0.08)	0.40*** (0.09)
R-squared	0.068	0.104	0.000	0.131	0.019	0.090
N	146	146	146	218	218	218

While there is surely **monetary news on CPI release days**

- Yield curve dynamics very different on CPI days
- **CPI days are not *just* monetary days**
(consistent evidence in Fang et al. (2024))