Inflation Surprises and Equity Returns

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Motivation

- What are the drivers of stock prices' response to inflation surprises? Long standing research question!

- We focus on the "high frequency" response of stock prices to better identify the sensitivity to inflation surprises

- Use a large panel of U.S. publicly traded firms
  - to explore the average response of equity prices to inflation surprises and its time-varying nature

    $\Rightarrow$ **When do inflation surprises matter for stock returns?**
  - to identify firm-level characteristics that explain differences in the response to inflation surprises

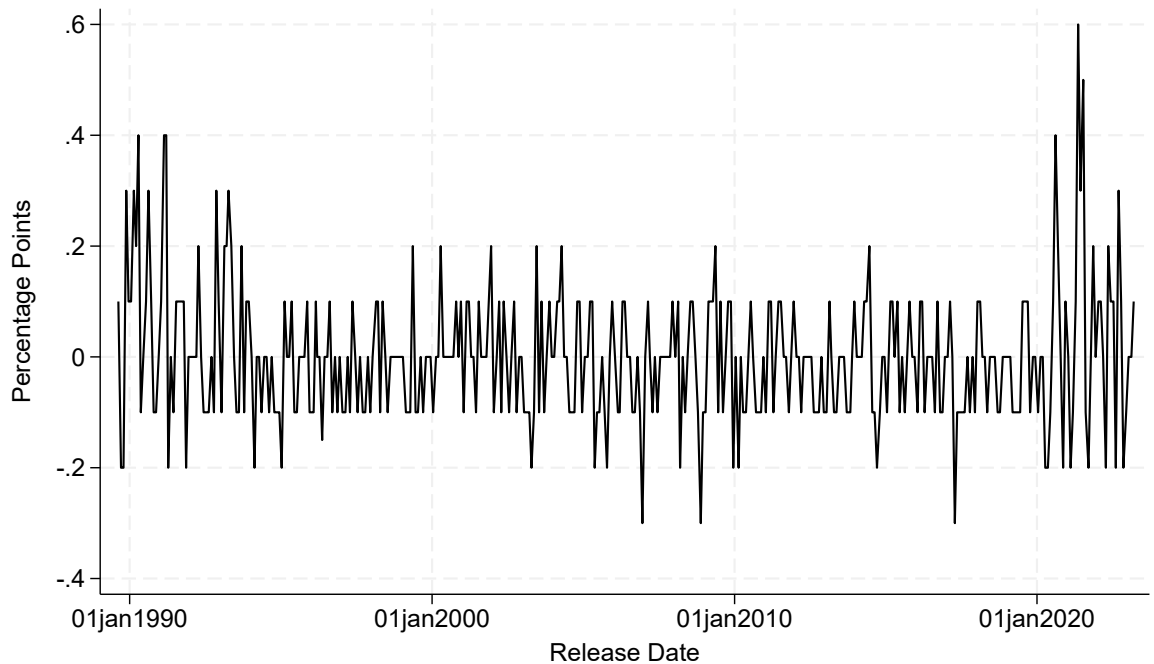
    $\Rightarrow$ **What are the stocks that react more?**

Main findings

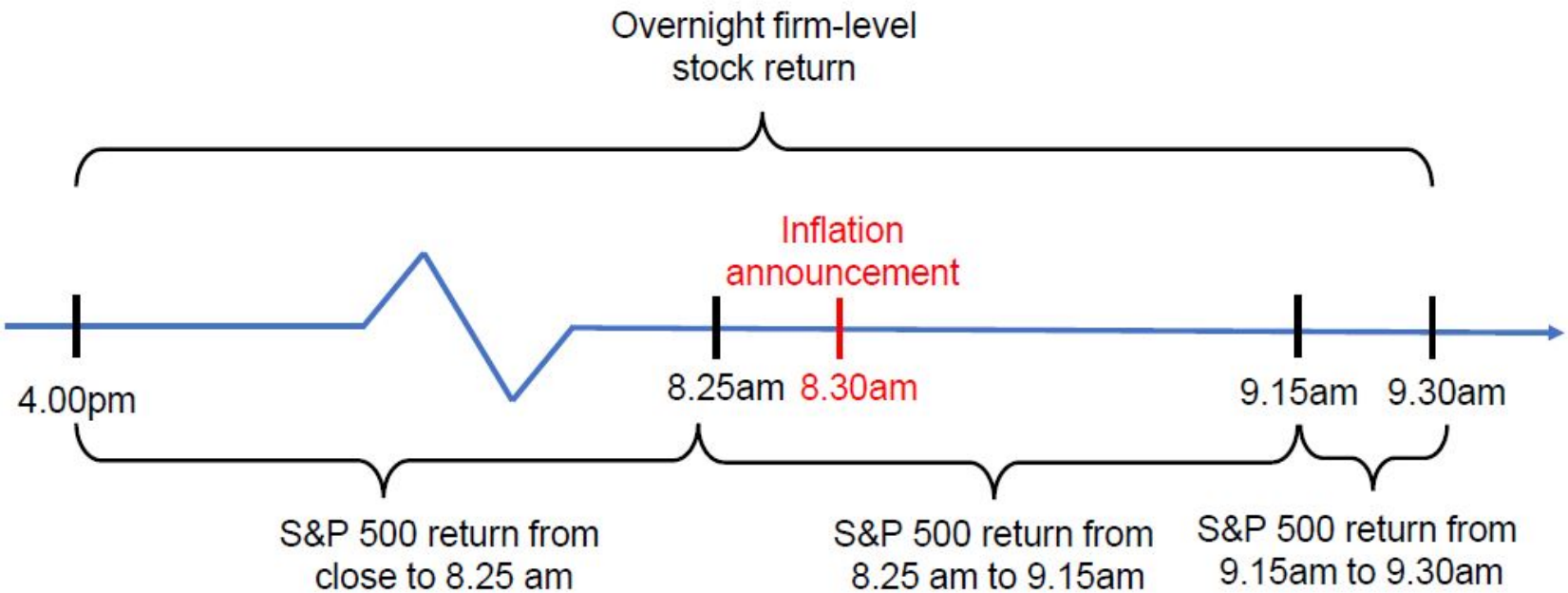
- Stock prices' response to inflation surprises is robustly negative
- The response to positive surprises exhibits more time variation than the response to negative surprises
- The time variation in the response is partly explained by deviations of inflation and output from policy targets
- Firms with low leverage, large market capitalization, high market beta, low book-to-market, and low markups are especially sensitive to inflation surprises

Core inflation surprises

- Inflation is month-on-month change in CPI excluding food and energy (core inflation) from August 1989 to March 2023
  - surprise = realized inflation net of inflation survey median
- The modal outcome is no surprise (36%)
- Negative surprises account for 36% of the observations
- Positive surprises account for 28% of the observations



Inflation Announcement Window



Average equity response robustly negative

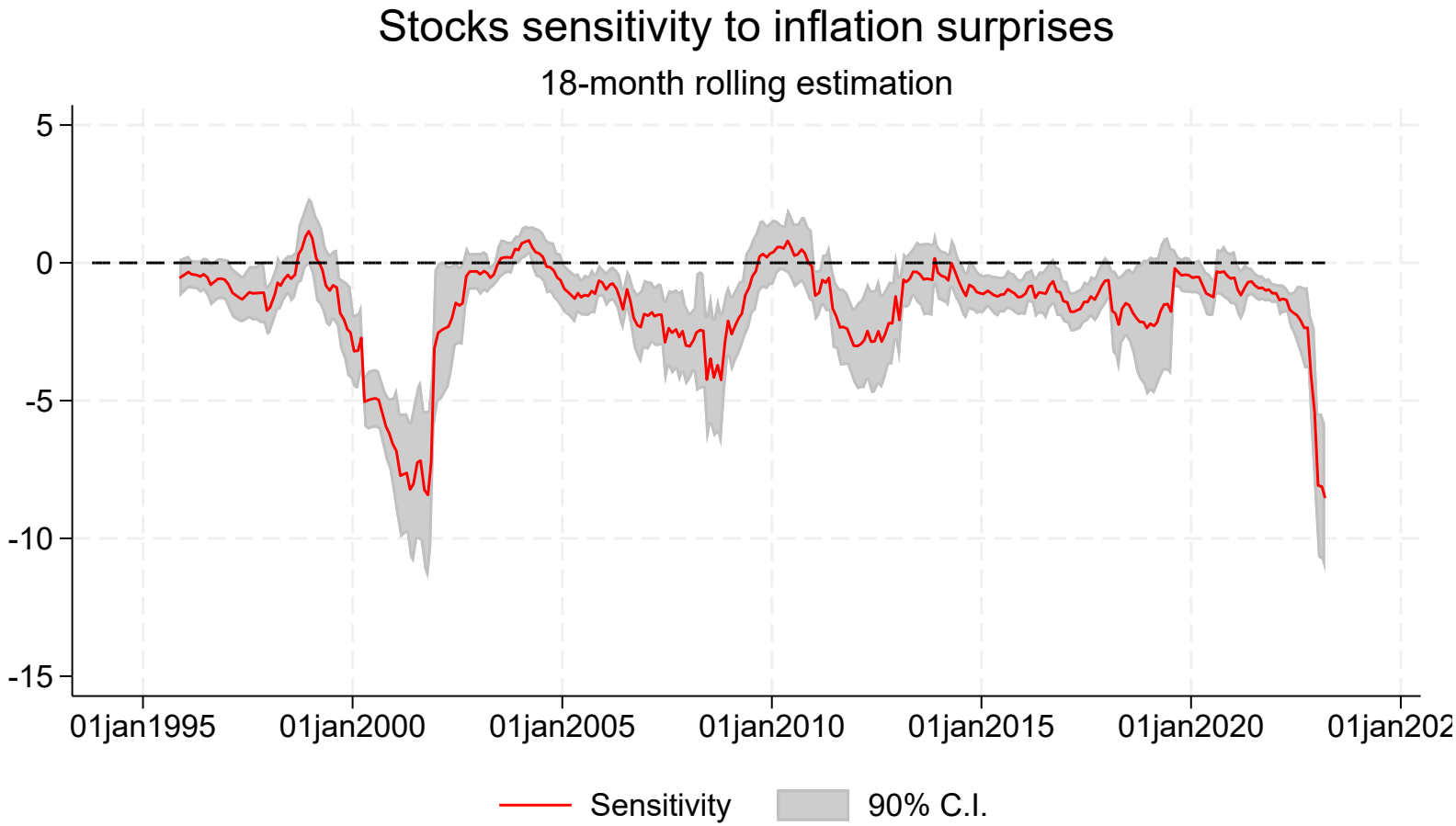
	(1)	(2)	(3)	(4)	(5)
surprise core	-1.807***		-1.486***	-1.860***	0.049
	(-4.484)		(-3.653)	(-4.743)	(0.307)
surprise headline		-1.100***	-0.478		
		(-3.409)	(-1.516)		
Close-to-825 (SP500)				0.600***	0.634***
				(8.013)	(17.117)
915-to-930 (SP500)				0.121	0.470***
				(0.324)	(2.786)
ret_{t-1}				-0.051***	-0.048***
				(-8.609)	(-11.132)
825-to-915 (SP500)					0.877***
					(19.899)
Obs	802,487	802,487	802,487	802,487	802,487
R^2	0.015	0.012	0.016	0.052	0.093

A 0.1 inflation surprise is associated, on average, with a 0.18% decrease in stock prices.

Related results

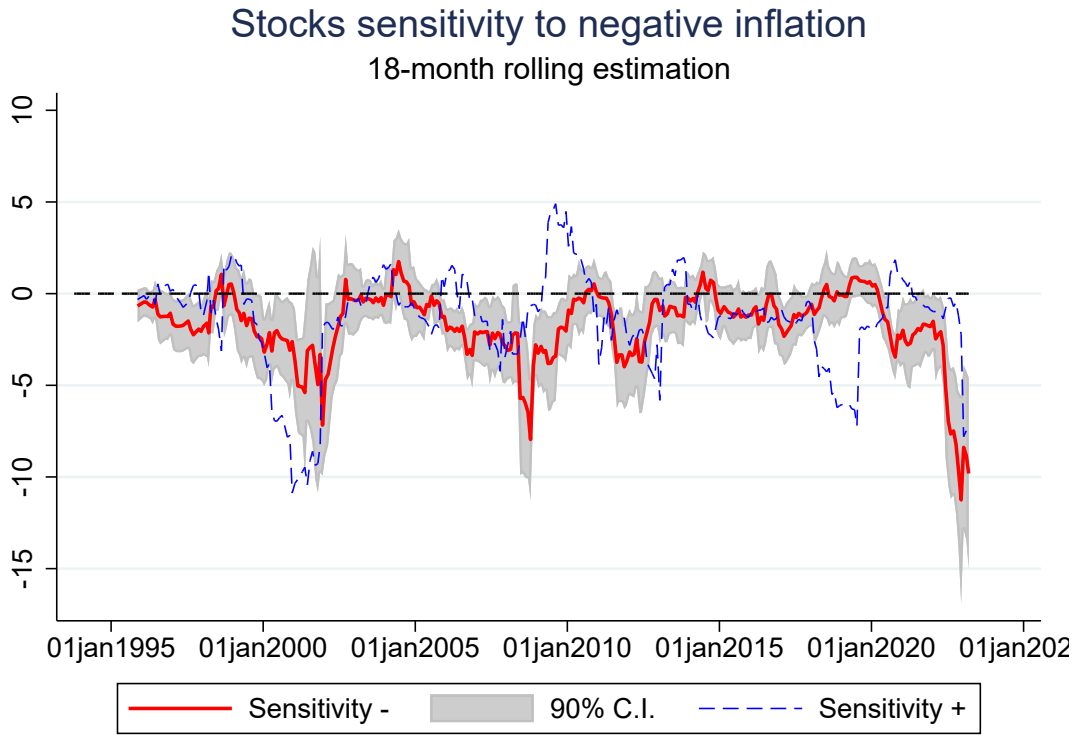
- Inflation news fully incorporated at opening
- Negative reaction robust across industries
- Firms in industries that adjust prices more frequently react significantly less (in absolute value) to inflation surprises

Significant time variation in sensitivity



"Between 1999 and 2019 stock market responses to inflation surprises do not follow a clear cyclical pattern and the estimated sensitivities are rarely significantly different from the average" (ELSY JFE 2024)

Asymmetries



The sensitivity to negative surprises fluctuates less than the sensitivity to positive surprises; their correlation is only 0.19

"In sum, there is no evidence for asymmetry in the response to good and bad MNA surprises" (ELSY JFE 2024)

Sub-sample analysis

	(1) 1993m10-2023m3	(2) 1993m10-2007m12	(3) 2008m1-2023m3	(4) 2008m3-2009m8	(5) 2021m10-2023m3
-surprise	-2.416***	-1.240***	-3.388***	-3.415**	-9.810***
	(-4.178)	(-3.011)	(-3.764)	(-2.317)	(-3.096)
+surprise	-1.408**	-2.062**	-1.316*	4.904*	-7.490***
	(-2.277)	(-1.982)	(-1.758)	(2.023)	(-3.279)
Close-to-825 (SP500)	0.599***	0.490***	0.794***	0.962***	0.477
	(8.041)	(6.559)	(6.744)	(7.997)	(0.925)
915-to-930 (SP500)	0.140	-0.350	0.760	-0.095	1.944
	(0.361)	(-0.793)	(1.465)	(-0.169)	(1.256)
ret_{t-1}	-0.051***	-0.069***	-0.027***	-0.039**	-0.064*
	(-8.666)	(-12.077)	(-2.702)	(-2.753)	(-1.998)
Obs	802,487	399,284	403,187	40,823	47,507
R^2	0.052	0.036	0.094	0.106	0.248

What drives the time-variation in sensitivity?

Stock price reaction to inflation surprises may depend on the anticipated policy response to the news

$$FFR_t = r_t^* + \pi_t^* + \beta_\pi(\pi_t - \pi_t^*) + \beta_x x_t + \varepsilon_t$$

- $\pi_t - \pi_t^*$: Deviations from inflation target ($TargetDev$)
- Inflation target (π_t^*) proxied by 30-year inflation expectations from the Cleveland Fed
- Output gap (x_t) proxied by total capacity utilization (TCU)

What drives the time-variation in sensitivity?

	(7) 1993m10-2023m3	(8) 1993m10-2007m12	(9) 2008m1-2023m3
surprise	-2.175***	-1.506***	-2.524***
	(-6.414)	(-3.347)	(-5.777)
surpriseX$TargetDev$	-2.848***	-1.222	-3.568***
	(-4.457)	(-1.152)	(-5.181)
$TargetDev$	-0.228***	-0.229**	-0.201**
	(-3.107)	(-2.473)	(-2.232)
surpriseXTCU	-0.644***	-0.917***	-0.615***
	(-5.604)	(-2.838)	(-4.566)
TCU	-0.034***	-0.01	-0.040**
	(-2.829)	(-0.557)	(-2.449)
surpriseX$TargetDev$XTCU	-0.639***	-1.284*	-0.646***
	(-6.602)	(-1.811)	(-6.569)
$TargetDev$XTCU	-0.039***	-0.038	-0.043***
	(-3.022)	(-0.916)	(-2.725)
Close-to-825 (SP500)	0.672***	0.484***	0.918***
	-12.52	-6.504	(12.898)
915-to-930 (SP500)	0.181	-0.207	0.797**
	-0.604	(-0.590)	(2.096)
ret_{t-1}	-0.050***	-0.070***	-0.024***
	(-9.267)	(-12.929)	(-2.638)
Obs	799,844	399,284	400,544
R^2	0.072	0.04	0.142

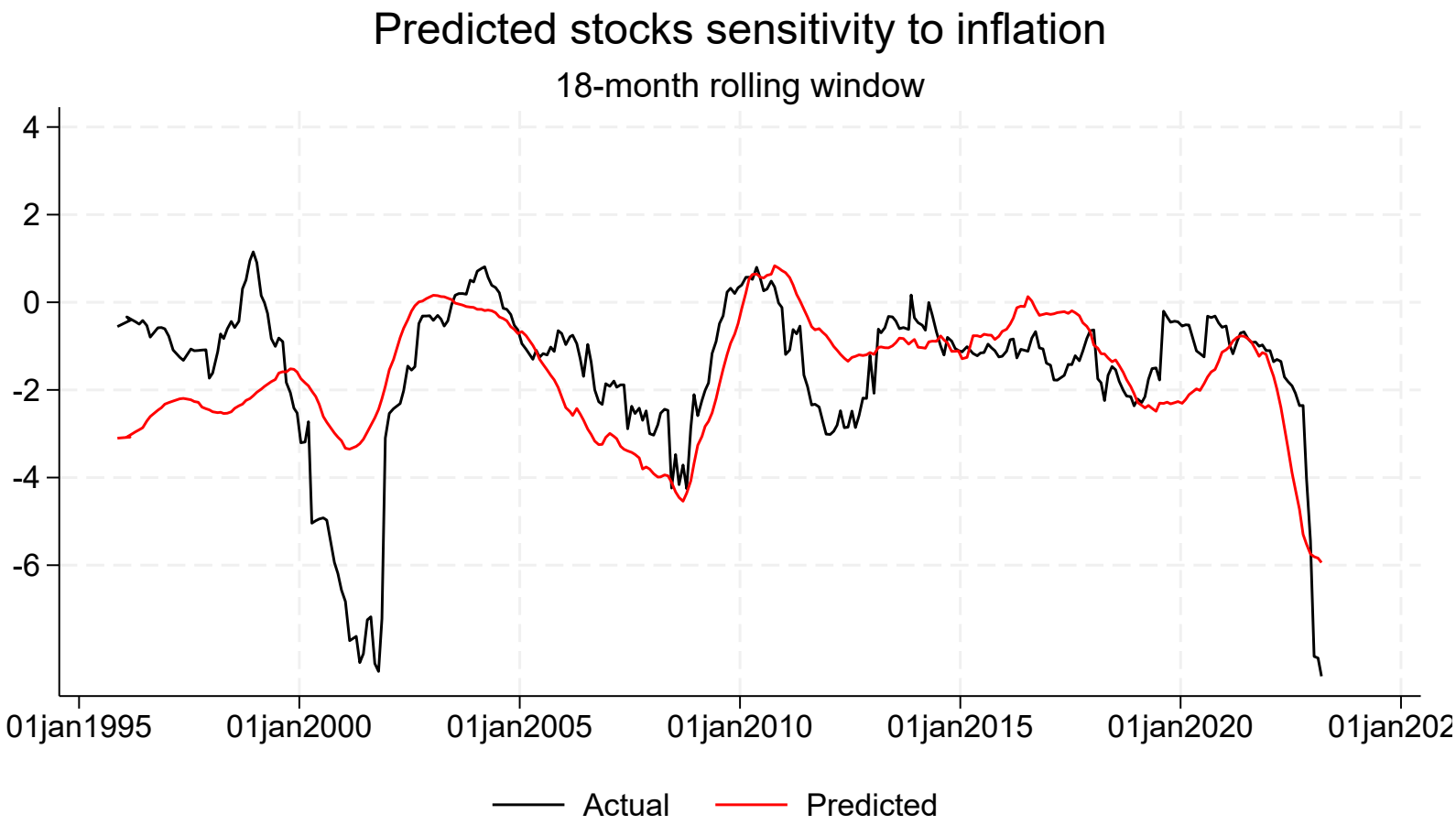
What drives the time-variation in sensitivity?

	Positive 0.1 inflation surprise		
	$TargetDev$=-1σ	$TargetDev$=0	$TargetDev$=+1σ
TCU=-1σ	**0.00**	-0.06	-0.13
TCU=0	-0.08	-0.22	-0.36
TCU=+1σ	-0.15	-0.37	**-0.59**

More significant positive deviations from output and inflation targets are associated with stronger stock price responses to inflation surprises

Reminder: A 0.1 inflation surprise is associated, on average, with a 0.18% decrease in stock prices in the baseline scenario.

What drives the time-variation in sensitivity?



What are the stocks that react more?

Firm-level characteristics I

- Financial position of the corporation
  - Cash-to-asset: $CHEQ/ATQ$
  - Leverage: LTQ/ATQ
  - Receivables: $RECTQ/ATQ$
- Real assets
  - Inventories: $INVTQ/ATQ$
  - Tangibility: $PPENTQ/ATQ$
- Profitability
  - Gross margin: $(SALEQ - COGSQ)/SALEQ$
  - Cash flow:$(IBQ + DPQ)/ATQ$
  - Markup

Firm-level characteristics II

- Market-based characteristics
  - Equity return from the last trading day before the inflation announcement day (to control for short-term reversal)
  - Market size: $SHROUT \times PRC$ measured the last trading day before the announcement day
  - Market Beta, measured using the previous 24 months (minimum) to 60 months (maximum)
  - Book-to-market: $(ATQ - LTQ)/(PRCCQ * CSHOQ)$

Firm-level drivers

$$Ret_{i,t}^{CO} = \alpha_i + \nu_t + \beta_{S,k} X_{i,t,k} \times Surprise_t + \sum_{k=1}^{K} \beta_k X_{i,t,k} + \varepsilon_{i_t}$$

	(1) Full Sample	(2) 1993m10-2007m12	(3) 2008m1-2023m3
surpriseXnet leverage	0.252***	0.395***	0.195***
	(3.832)	(3.224)	(2.940)
surpriseXmarkup	0.241***	0.165*	0.249***
	(4.897)	(1.692)	(4.263)
surpriseXsize	-0.477***	-0.539***	-0.440***
	(-4.844)	(-4.103)	(-3.224)
surpriseXbm	0.200***	0.179*	0.200***
	(4.812)	(1.893)	(4.708)
surpriseXbeta	-0.422***	-0.316***	-0.551***
	(-4.440)	(-3.015)	(-3.722)
ret_{t-1}	-0.069***	-0.093***	-0.030***
	(-16.938)	(-19.087)	(-5.307)
Obs	601,376	309,857	291,503
R^2	0.116	0.061	0.227

Firm-level drivers

- *Net leverage:* Real value of cash balances is eroded by high inflation, while real debt obligations become smaller (e.g., Summers (1981), French, Ruback, and Schwert (1983), Bernard (1986), Pearce and Roley (1988), among many others)
- *Size:* Large firms react more to inflation surprises. Small stocks are more volatile and less likely to be traded around market opening (e.g., Adams, McQueen, and Wood (2004))
- *BM:* Firms with a higher book-to-market ratio are distressed and might benefit from lower real debt obligations (See also Wei (2009))
- *CAPM beta:* High systematic risk firms are more sensitive to inflation news (e.g., Bernard and Frecka (1983))
- *Markup:* "Firms with more market power are shielded from stagflationary stock returns" (e.g., Knox and Timmer (2023)).

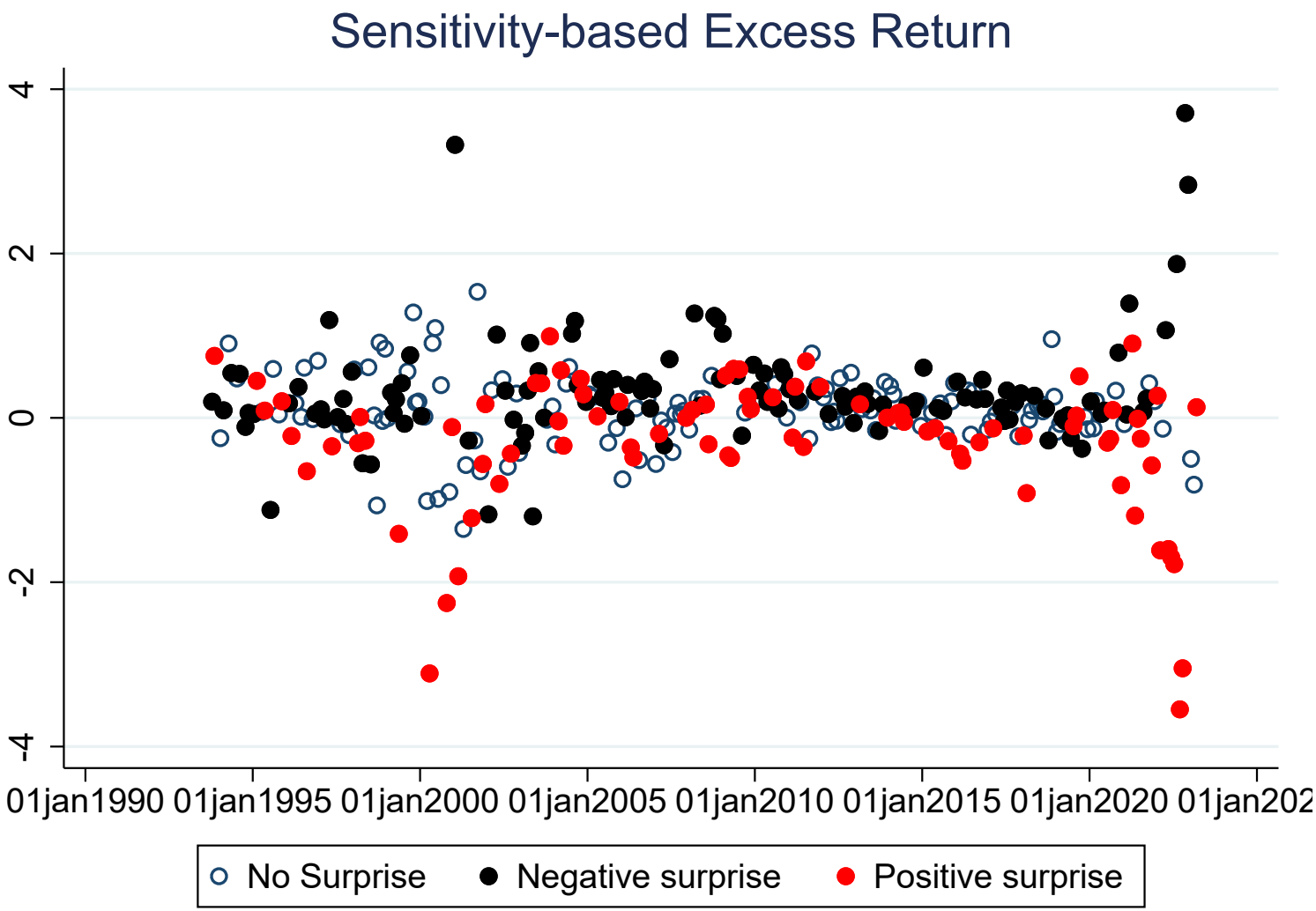
Inflation Sensitive vs Inflation Insensitive Firms

$$\begin{aligned} Score_{i,t} \quad = \quad & -(0.252 \times \text{Net Leverage}_{i,t} + 0.241 \times \text{Markup}_{i,t} \\ & -0.477 \times \text{Size}_{i,t} + 0.200 \times \text{BM}_{i,t} - 0.422 \times \text{Beta}_{i,t}). \end{aligned}$$

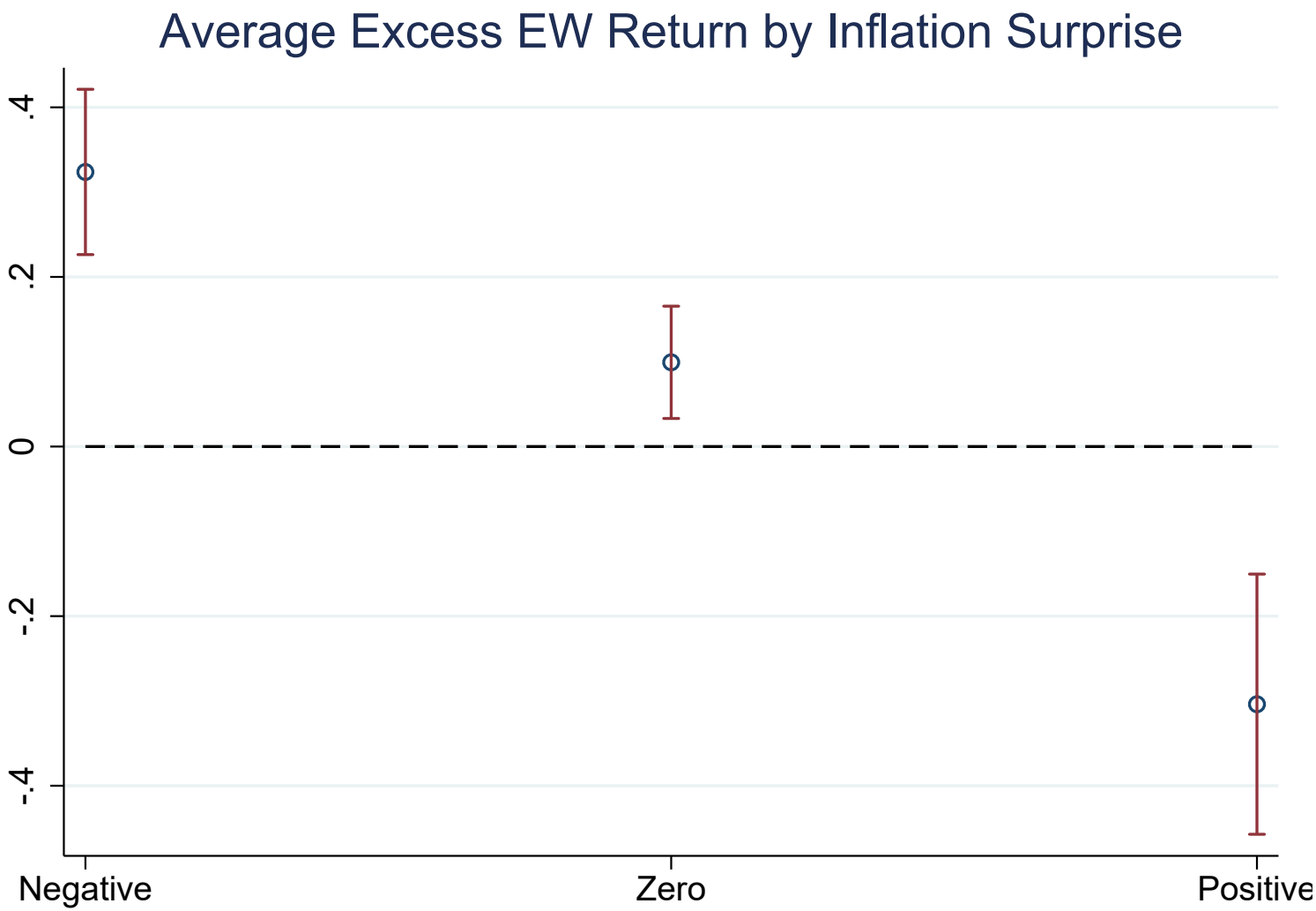
	(1) Full Sample	(2) 1993m10-2007m12	(3) 2008m1-2023m3
surpriseXinsensitive	1.004***	0.921***	1.073***
	(4.897)	(3.731)	(3.562)
surpriseXsensitive	-1.470***	-1.452***	-1.502***
	(-5.283)	(-3.091)	(-4.237)
insensitive	0.016	0.027	0.011
	(0.764)	(0.792)	(0.479)
sensitive	0.006	0.027	0.002
	(0.350)	(0.954)	(0.085)
ret_{t-1}	-0.069***	-0.093***	-0.030***
	(-16.919)	(-19.067)	(-5.286)
Obs	601,376	309,857	291,503
R^2	0.115	0.060	0.227

Sensitive_t (insensitive_t) top (bottom) 10% of score distribution at t

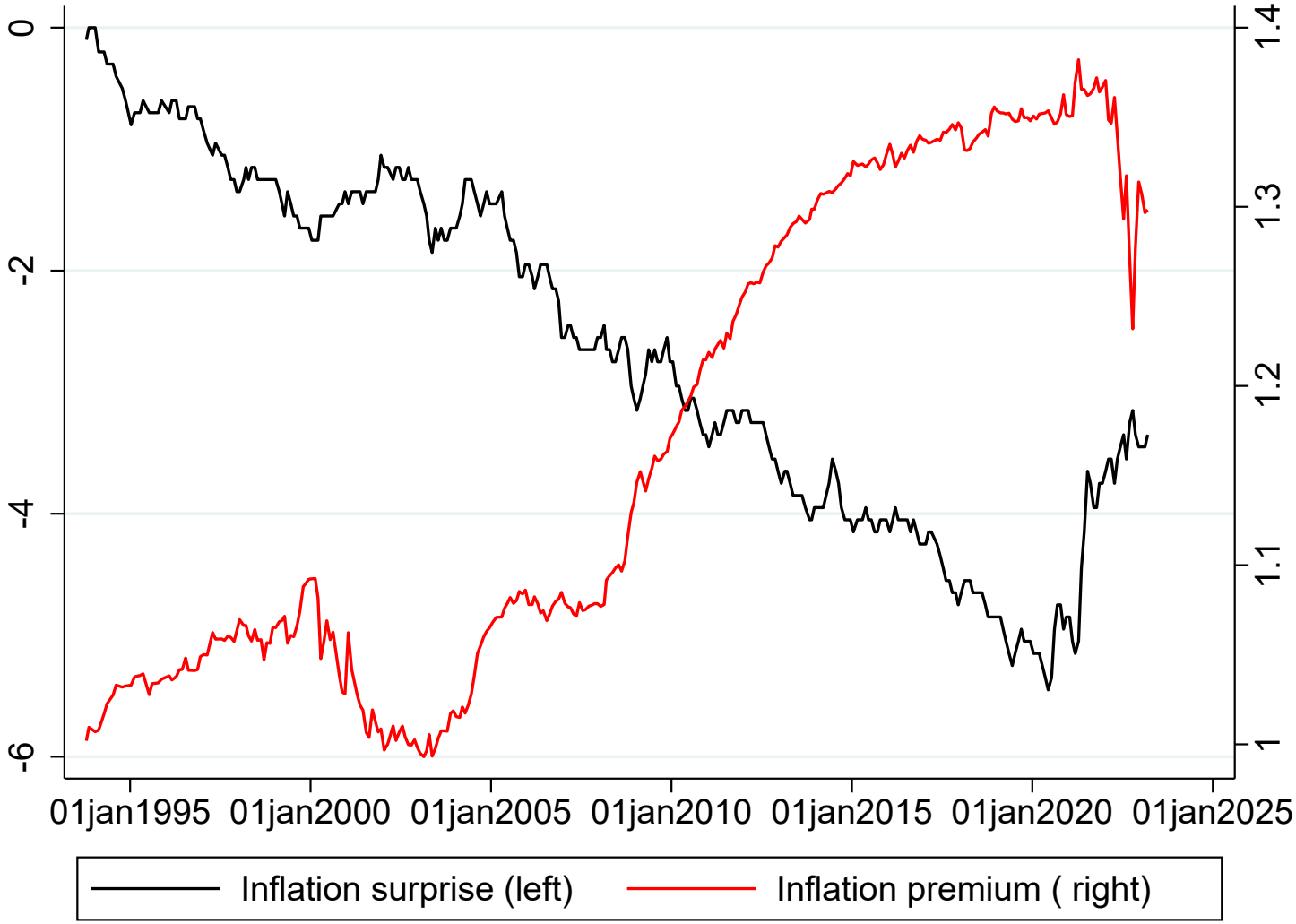
Inflation-based excess returns by surprise



Average inflation-based excess returns



Cumulative inflation-based excess returns



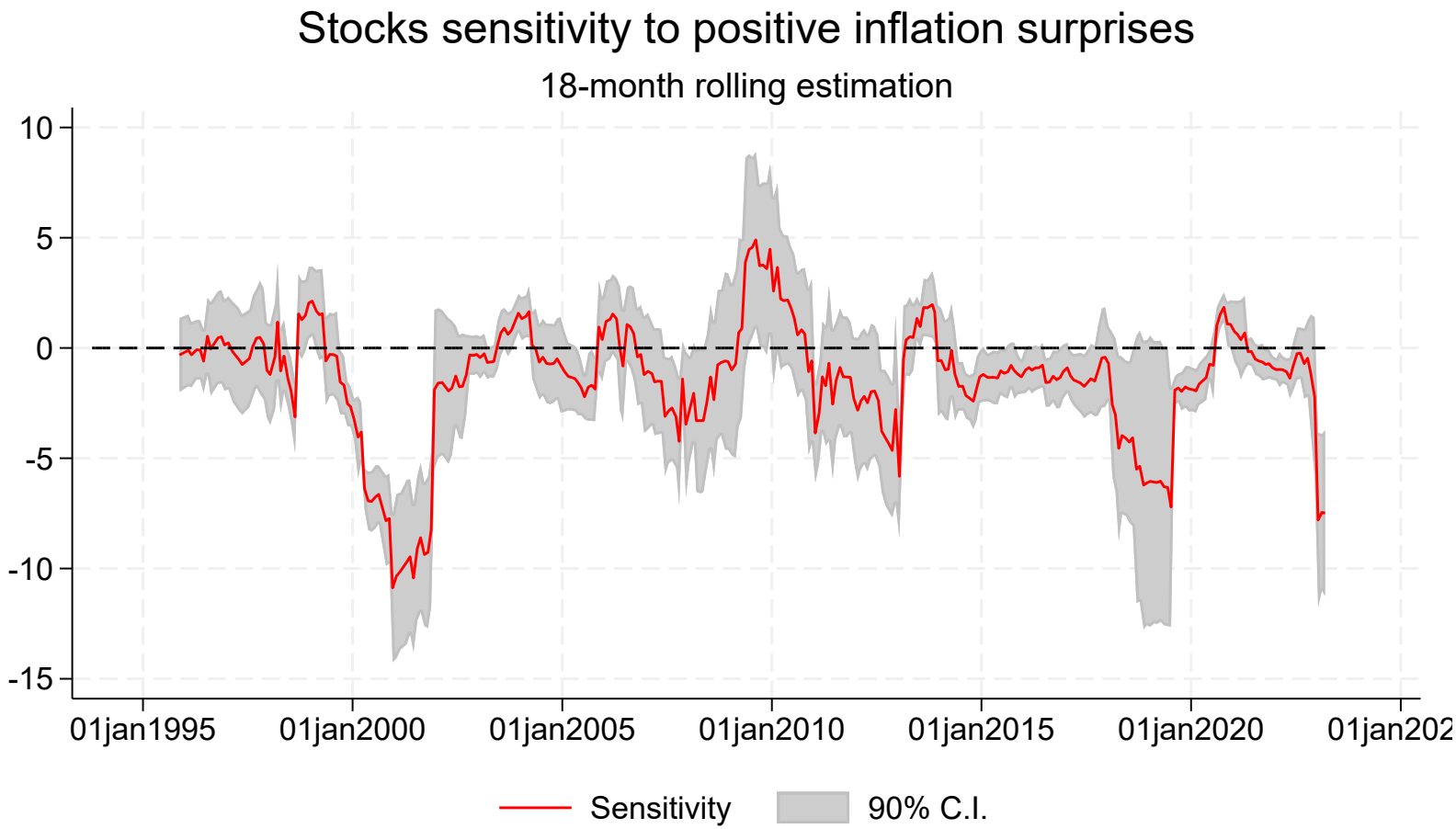
Out-of-sample performance

Conclusion

- The stock price response to core inflation shocks varies substantially over time and across firms.
- The time variation in the response can be explained by deviations of inflation and output from monetary policy targets: stronger negative responses when inflation and output are above their targets.
- Across firms, net leverage, markups, size, book-to-market, and CAPM beta affect the response to inflation surprises.
- We use these characteristics to identify inflation-sensitive and inflation-insensitive firms and construct a portfolio that captures the time-varying excess return for inflation shocks.

Backup Slides

Positive surprises



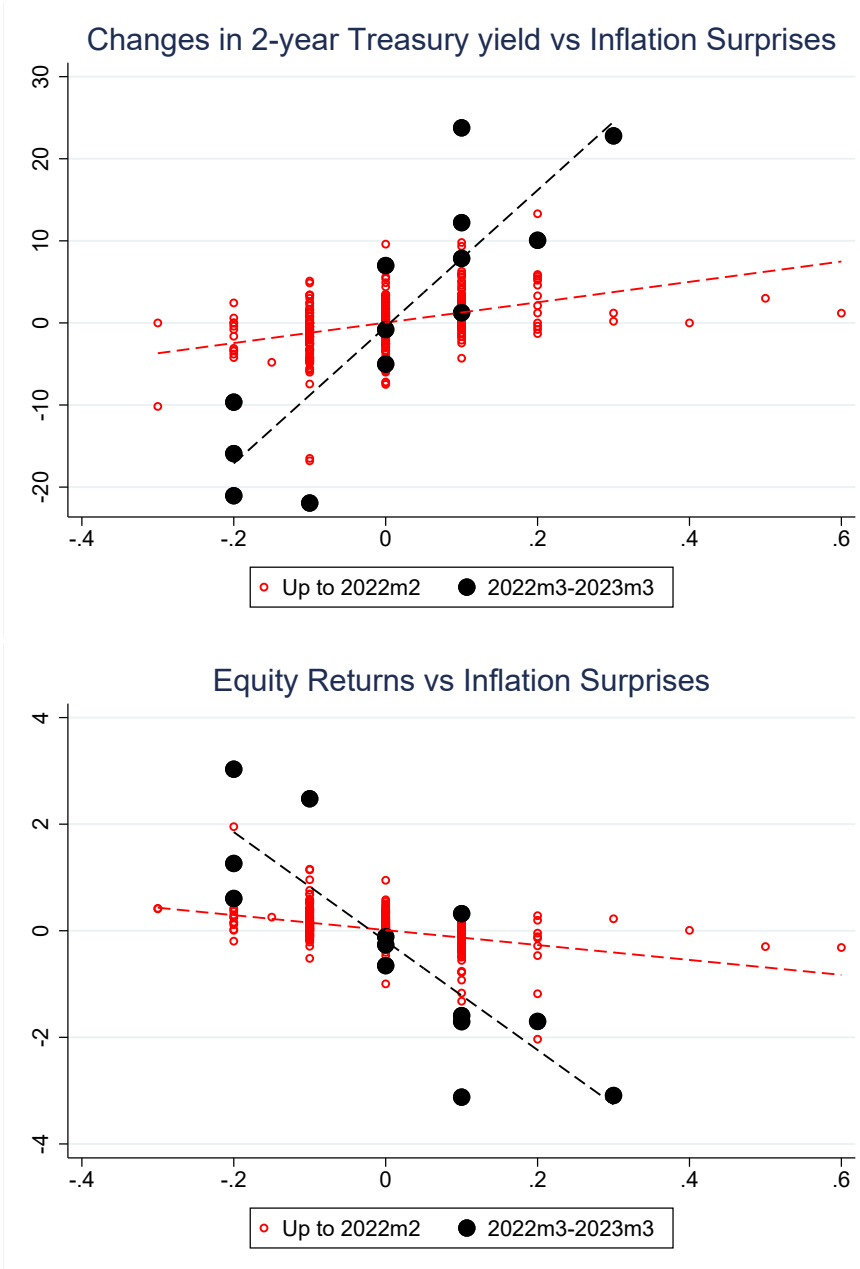
The sensitivity to positive surprises is sometimes positive in the sample, usually around recessions

Inflation surprises and monetary policy expectations

	(1) Full Sample	(4) Full Sample	(5) 1993-2022m2	(6) 2022m3-2023m3
Δ2YR	-0.075***	0.003	0.01	-0.033
	(-6.481)	-0.192	-0.863	(-1.628)
negativeXΔ2YR		-0.079***	-0.024	-0.100***
		(-3.596)	(-1.521)	(-3.445)
positiveXΔ2YR		-0.097***	-0.029	-0.125***
		(-4.362)	(-1.037)	(-3.684)
negative surprise dummy		0.105**	0.142***	0.010
		-2.188	-3.215	(0.018)
positive surprise dummy		0.033	-0.1	0.757
		-0.334	(-1.080)	(1.612)
Close-to-825 (SP500)	0.629***	0.634***	0.631***	0.953***
	-8.301	-8.674	-8.903	(4.888)
915-to-930 (SP500)	-0.195	-0.222	-0.219	1.584***
	(-0.472)	(-0.562)	(-0.572)	(3.322)
ret_{t-1}	-0.047***	-0.049***	-0.047***	-0.053**
	(-8.134)	(-8.812)	(-9.040)	(-2.623)
Obs	751,724	751,724	717,031	34,679
R^2	0.064	0.07	0.047	0.417

Co-movement of stock returns and Treasury yield changes only if there is an inflation surprise

Inflation surprises and monetary policy expectations



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