

The Fed Information Effect and Firm-level Investment: Evidence and Theory

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Debate: Is the Fed information effect there?

- Fed information effect: FOMC announcements can change private agents' beliefs regarding future economic conditions
- Evidence for: Romer and Romer (2000), Campbell et al. (2012), Melosi (2017), Nakamura and Steinsson (2018)
- Evidence against: Bauer and Swanson (2022, 2023) show Fed info effect not there after controlling for macro news released prior to FOMC announcements (e.g., jobs report)

Our contribution

- Key idea: use power of cross-section to detect Fed info effect
- Logic: if Fed info effect is there, then more cyclical firms respond more strongly to Fed info
- Statistical power
 - ↪ Approach using aggregate variables: 1 outcome per FOMC meeting
 - ↪ Our approach: at least 1300 firm outcomes *per* meeting

Key findings

- Cross-sectional differences in firms' investment response consistent with Fed info effect
- Cross-sectional differences in revisions in analyst forecasts of firm-level outcomes consistent with Fed info effect
- Document “profitability channel”: ROA of more cyclical firms respond more strongly to Fed info
- Results robust to Bauer and Swanson (2022, 2023) critique
- HANK model
 - Microfound Fed information shock
 - Explanation for persistent inflation in 2022-23 despite aggressive rate hikes

Investment response

$$\Delta \log k_{i,t-1 \rightarrow t-1+h} = \boldsymbol{\delta}'_{m,h} (\beta_i \times \mathbf{m}_t) + \boldsymbol{\gamma}'_h \mathbf{X}_{i,t-1} + \eta_i + \theta_{s,t} + \epsilon_{i,t} \quad (1)$$

- $\Delta \log k_{i,t-1 \rightarrow t-1+h}$ is investment response of firm i , h quarters following FOMC announcement
- β_i measures cyclicity of firm i , measured using CAPM beta
- Following Jarociński and Karadi (2020), $\mathbf{m}_t = [CBI_t \ MP_t]$ decomposes FOMC announcement into conventional monetary shock MP_t and Fed information CBI_t
- Control for news from Bauer and Swanson (2022) data set
- Include: firm-level controls $\mathbf{X}_{i,t-1}$, firm FEs η_i , sector-by-time FEs $\theta_{s,t}$

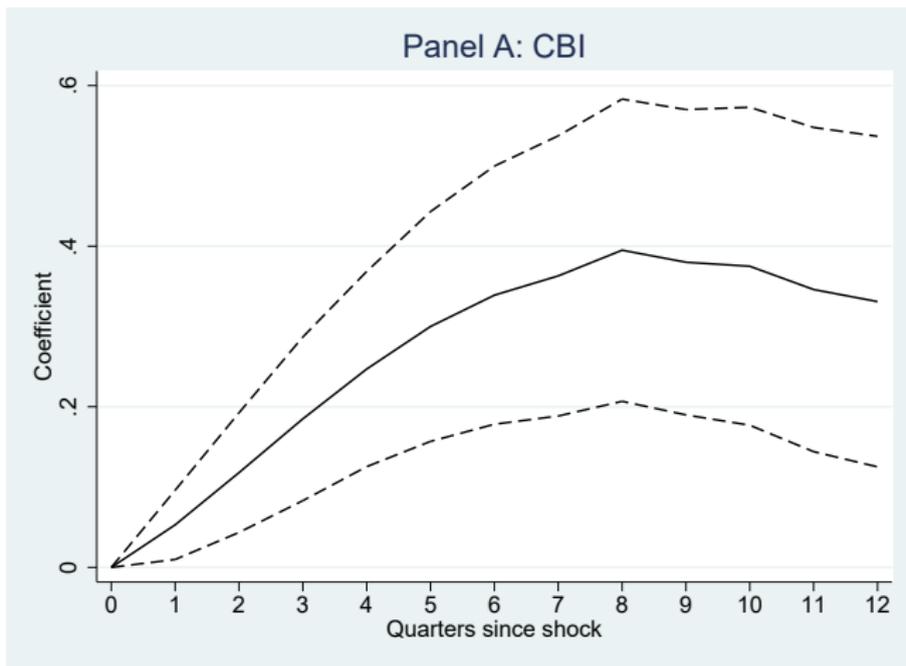
Table: Firm cyclicity and the investment response to monetary shocks. This table reports the results for regression (1) with $h = 8$ quarters. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Standard errors are clustered at the firm and year-quarter level and are reported in parentheses.

	(1)	(2)
CBI $\times \beta$	0.543***	0.395***
	(0.103)	(0.096)
MP $\times \beta$	0.031	-0.041
	(0.063)	(0.053)
Observations	331,364	331,364
R^2	0.350	0.351
Bauer-Swanson News $\times \beta$		✓
Firm-level Controls	✓	✓
Firm FE	✓	✓
Sector \times Time FE	✓	✓

Key finding: investment of more cyclical firms respond more strongly to Fed info

(See paper for additional robustness checks)

Dynamic investment response to Fed info



Coefficients for Fed info $\delta_{CBI,h}$, h quarters following FOMC announcement

Revisions in firm-level analyst forecasts

$$\text{UpRev}X_{i,t} = \widehat{\delta}_{CBI}(\beta_i \times CBI_t) + \widehat{\delta}_{MP}(\beta_i \times MP_t) + \gamma' X_{i,t-1} + \eta_i + \theta_{s,t} + \epsilon_{i,t}. \quad (2)$$

- $\text{UpRev}X_{i,t}$ = net upward revision in one-year ahead analyst forecast of outcome X following FOMC announcement
- Investigate X=earnings per share and X=sales

Table: Revisions in analyst forecasts of firm fundamentals following FOMC announcements. This table reports the results for regression (2). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Standard errors are clustered at the firm and year-quarter level and are reported in parentheses.

	UpRevEPS		UpRevSales	
	(1)	(2)	(3)	(4)
$\text{CBI} \times \beta$	0.317***	0.217**	0.442***	0.377***
	(0.098)	(0.084)	(0.095)	(0.111)
$\text{MP} \times \beta$	0.023	0.017	0.066	0.066
	(0.042)	(0.042)	(0.046)	(0.052)
Observations	430,038	430,038	305,501	305,501
R^2	0.079	0.079	0.092	0.092
Firm-level Controls	✓	✓	✓	✓
Bauer-Swanson News $\times \beta$		✓		✓
Firm FE	✓	✓	✓	✓
Sector \times Time FE	✓	✓	✓	✓

Key finding: revisions in analyst forecasts of EPS and sales of more cyclical firms respond more strongly to Fed info

Profitability channel

$$\text{Profit}_{i,t-4+4n \rightarrow t-1+4n} = \widehat{\delta}_{CBI}(\beta_i \times CBI_t) + \widehat{\delta}_{MP}(\beta_i \times MP_t) + \boldsymbol{\gamma}' \mathbf{X}_{i,t-1} + \eta_i + \theta_{s,t} + \epsilon_{i,t} \quad (3)$$

- $\text{Profit}_{i,t-4+4n \rightarrow t-1+4n}$ is realized annual ROA in n th year following FOMC announcement at quarter t

Table: Firm cyclicality and realized profitability following monetary shocks. This table reports the results for regression (3) for $n \in \{1, 2, 3\}$ years. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Standard errors are clustered at the firm and year-quarter level and are reported in parentheses.

	$n = 1$ year		$n = 2$ year		$n = 3$ year	
	(1)	(2)	(3)	(4)	(5)	(6)
$CBI \times \beta$	0.021 (0.032)	-0.009 (0.031)	0.094*** (0.033)	0.065* (0.036)	0.081** (0.036)	0.107** (0.041)
$MP \times \beta$	0.024 (0.020)	-0.003 (0.020)	-0.041** (0.018)	-0.055*** (0.020)	-0.003 (0.021)	-0.004 (0.022)
Observations	341,604	341,604	307,663	307,663	283,926	283,926
R^2	0.775	0.775	0.703	0.703	0.699	0.699
Firm-level Controls	✓	✓	✓	✓	✓	✓
Bauer-Swanson News $\times \beta$		✓		✓		✓
Firm FE	✓	✓	✓	✓	✓	✓
Sector \times Time FE	✓	✓	✓	✓	✓	✓

Key finding: profitability of more cyclical firms respond more strongly to Fed info

Model

■ Structure:

- ↪ Wholesalers: produces input goods, heterogeneous cyclicalities
- ↪ Retailers: set prices
- ↪ Households: supplies labor & owns firms
- ↪ Monetary authority: sets monetary policy & communicates knowledge of future aggregate productivity

Wholesalers

- Output:

$$y_i(t) = e^{\beta_i z(t)} K_i(t)^\alpha N_i(t)^{1-\alpha}$$

- Heterogeneous productivity betas:

$$\beta_i \sim \Gamma$$

Cross-sectional distribution Γ fitted from data

- Capital accumulation:

$$dK_i(t) = [l_i(t) - \delta] K_i(t) dt$$

subject to adjustment costs $[l_i(t) + \frac{\kappa}{2} l_i(t)^2] K_i(t)$

Retailers and households

- Retailers: sets prices \Rightarrow NKPC

$$\left[r(t) - \frac{Y'(t)}{Y(t)} \right] \pi(t) = \pi'(t) + \frac{\epsilon}{\theta} [p_w(t) - p_w^*]$$

- Households:

\hookrightarrow Labor supply:

$$w(t)C(t)^{-\gamma} = \varphi$$

\hookrightarrow Consumption Euler equation:

$$\frac{C'(t)}{C(t)} = \frac{r(t) - \rho}{\gamma}$$

Monetary authority

- Taylor rule:

$$i(t) = \rho + \phi_{\pi}\pi(t) + \varepsilon^m(t)$$

- Fisher equation:

$$i(t) = r(t) + \pi(t)$$

- Pure monetary shock ("MP shock")

$$\varepsilon^m(t) = \Delta_m e^{-\psi_m t}$$

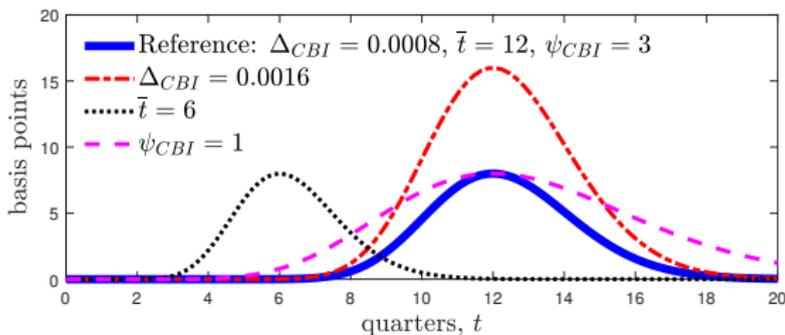
Fed information shock

- Fed learns + communicates shock to future aggregate productivity:

$$\varepsilon^{CBI}(t) = \Delta_{CBI} \times (t/\bar{t})^{\psi_{CBI}\bar{t}} e^{-\psi_{CBI}(t-\bar{t})} \quad (4)$$

Then all agents respond accordingly

Figure: Illustration of central bank information shocks. This figure illustrates the central bank information (CBI) shock (4) for various parameter values. For reference, the solid line plots a CBI shock with parameter values $\Delta_{CBI} = 0.0008$, $\psi_{CBI} = 3$, and $\bar{t} = 12$. The other lines illustrate the effect of a change in the value of a single parameter (with all other parameters remaining unchanged from the reference values).



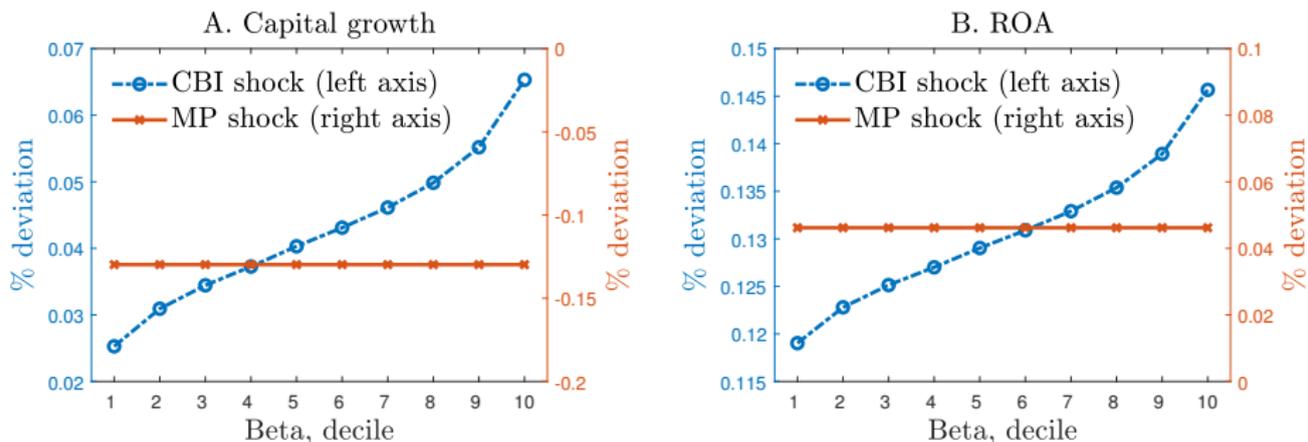
Key implications

- Microfoundation of Fed info effect: in equilibrium, Fed info shock (4) generates outcomes consistent with Fed information effect
 - ↳ Aggregate response: positive comovement between interest rates and aggregate stock returns
- Cross-sectional response: model rationalizes documented relation between firm cyclicalities β_i and investment/profitability following Fed information shock

Figure: Aggregate responses to an expansionary CBI shock. This figure plots the aggregate impulse response to a CBI shock (4) with $\Delta_{CBI} = 0.0008$, $\psi_{CBI} = 3$, and $\bar{t} = 12$. The transition path is the perfect foresight path following an unexpected shock with the economy starting from its steady state.



Figure: Cross-sectional response: $h = 8$ quarters. Panels A and B plot cumulative growth in capital and ROA $h = 8$ quarters following a shock, respectively. The lines with the crosses and circles report results for pure monetary and CBI shocks, respectively.



Application to 2022-23

- Fed Chair Powell, August 25, 2023 Jackson Hole speech:

[a]dditional evidence of persistently above-trend growth could put further progress on inflation at risk and could warrant further tightening of monetary policy

- Our premise: positive Fed information of future productivity \Rightarrow muted response of inflation to rate hikes
- Consider combined Fed information + pure monetary shock:

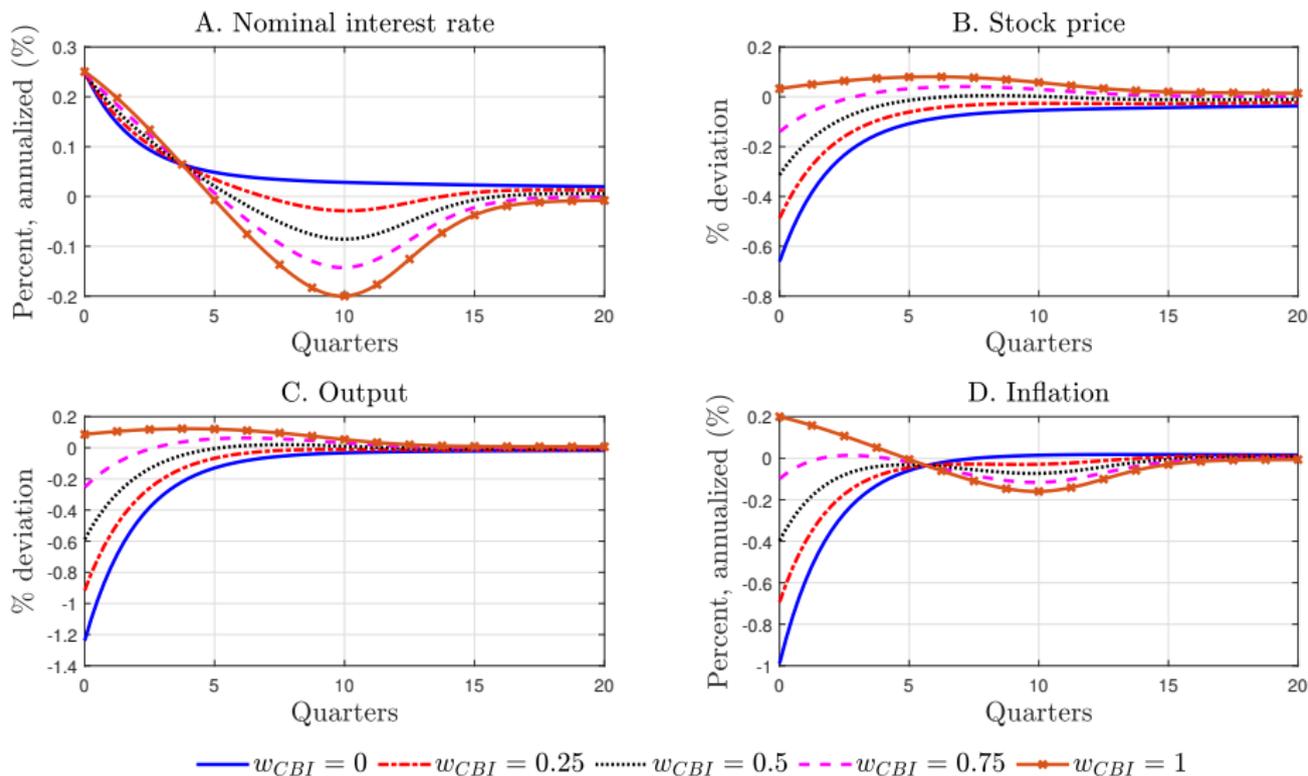
$$w_{CBI} \times \varepsilon^{CBI}(t)$$

and

$$(1 - w_{CBI}) \times \varepsilon^m(t),$$

$w_{CBI} \in [0, 1]$ is strength of information effect

Figure: Fed information effect and inflation. This figure plots the transition path following a mixed interest rate shock consisting of a CBI shock of size $w_{CBI} \times \varepsilon^{CBI}(t)$ and a MP shock of size $(1 - w_{CBI}) \times \varepsilon^m(t)$.



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