The Equity Constraint Channel of Monetary Policy

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- To understand the full picture of monetary policy transmission, it is crucial to understand how financial constraints shape firms' responses

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- However, no clear evidence about firms relying on **equity financing**

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- Since they rely on equity financing on the margin, changes in the cost of equity may be a **more important** mechanism
- Monetary policy **may not only** transmit through its impact on **debt financing** terms

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$\Rightarrow$ Novel **Equity constraint channel** of monetary policy transmission

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- Equity constraint channel is supported by **financing/issuance policies**
  - Firms with high *FCE* issue much less equity after contractionary shocks
- Mechanism: short-horizon investors withdraw capital more aggressively from firms that rely heavily on external equity financing when monetary policy tightens

Literature Review

- Monetary policy transmission to investment
  - *Bernanke et. al. (1999), Fazzari et. al. (1988), Gertler and Gilchrist (1994), Ippolito et. al. (2018), Ottonello and Winberry (2020), Jeenas (2019), Lakdawala et. al. (2021), Durante et al. (2022), Cao et. al. (2023), Cloyne et al. (2023) ...*
  - **Equity constraint channel matters more, and it plays a potentially critical role for the long-term growth due to its impact on R&D and innovation**

- The effect of monetary policy on stock market
  - *Bernanke and Kuttner (2005), Lamont et al. (2001), Ozdagli (2017), Chava and Hsu (2020), Bianchi et al. (2022), Pflueger and Rinaldi (2022), Kekre and Lenel (2022), Bauer and Swanson (2023) ...*
  - **Financing constraints and capital structure affect stock price sensitivity to MP, consistent with the financial accelerator mechanism**

- The role of equity in the transmission of monetary policy
  - *Beyhaghi et. al. (2024), Jeenas and Lagos (2024)*
  - **First paper to show that constraint in accessing equity financing has an amplification effect to MP**

Data

Firm-level Data

- Text-based measure of financial constraint
- COMPUSTAT Quarterly: Balance sheet information
- CRSP Daily: Stock return
- SDC Platinum: SEO issuance
- USPTO: Patent filings
- SEC 13 F: Institutional ownership
- Sample period: 1991-2019

▸ summary statistics

Financial Constraint Measure

- A firm is considered **equity-focused constrained** if it mentions in 10-K that
  - its investments/projects get *"abandon"*,*"curtail"*, or *"postpone"* etc.
  - AND it intends to issue *"equity"* financing for liquidity needs ▸ example

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- *FCE* and *FCD* denote equity-focused and debt-focused constraint, respectively

▸ comparison

Identification of Monetary Policy Shocks

- We employ a high frequency identification (HFI) strategy to construct *mps*
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- The price change of Fed Funds Rate futures contracts in the 30-minute window around the FOMC announcement
  - It captures market-based unexpected changes in the Federal funds rate

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  - It captures market-based unexpected changes in the Federal funds rate
- Identifying assumption: this narrow window contains no other information that may affect the interest rate expectations

Separate “Pure” Monetary Policy Shocks

- Fed “Information effect”: an unexpected monetary tightening might be interpreted as a signal of a strong economy
- Follow *Jarocinski and Karadi (2020)* to separate the “pure” *mps* ▸ figure and sum stats
- Conceptually simple exercise
  - “Pure” *mps*: leads to negative comovement between stock price and interest rate expectations
  - “Information” shock: leads to positive comovement between stock price and interest rate expectations

Methodology and Results

Stock Price Response

$$r_{ij,t} = \alpha + \beta mps_t + \gamma I_{ij,t} + \delta[mps_t \times I_{ij,t}] + Controls_{ij,t} + FE_{j,y} + e_{ij,t}$$

- $r_{ij,t}$: daily stock returns of firm i in industry j on day of FOMC announcement t
- mps_t: "pure" monetary policy shock (standardized)
- $I_{ij,t}$: 1 if in the group of (lagged) *FCE*, 0 otherwise
  - Other groups are included in the regression, except for unconstrained group
- δ: response to *mps* (standardized) of *FCE* firms relative to unconstrained firms
- Controls: size, book-to-market, leverage, profitability, cash holding, and their interactions with *mps*, industry-year FE
- Return window: (0, 0), (+1, +1), (+2, +2), (0, +1), (0, +2), (0, +5) ▸ average response

Heterogeneous Stock Price Response

Window:	(0,0)	(+1,+1)	(+2,+2)
	(1)	(2)	(3)
mps × *equity_focused*	-0.179***	-0.026	-0.119***
	(0.039)	(0.041)	(0.038)
mps × *debt_focused*	-0.110***	0.035	-0.102***
	(0.032)	(0.033)	(0.030)
Observations	844,031	795,949	728,257
R^2	0.020	0.016	0.015
Industry-year FE	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes

- On the day of FOMC, 25 bps shock leads to 75 bps lower return for *FCE* firms relative to unconstrained firms
- 46 bps lower return for *FCD* firms

Equity Constraint Channel Amplifies Stock Price Response

Cumulative Window:	(0,+1)	(0,+2)	(0,+5)
	(1)	(2)	(3)
mps × *equity_focused*	-0.201***	-0.292***	-0.481***
	(0.055)	(0.063)	(0.081)
mps × *debt_focused*	-0.077*	-0.183***	-0.153**
	(0.043)	(0.048)	(0.062)
Observations	843,764	843,501	842,718
R^2	0.025	0.023	0.030
Industry-year FE	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes

- In the 5-day cumulative window, 25 bps shock leads to 2% lower return for *FCE* firms relative to unconstrained firms
- 0.63% lower return for *FCD* firms
- For comparison, average stock price response in the 5-day window is 4.4%

Investment Policy

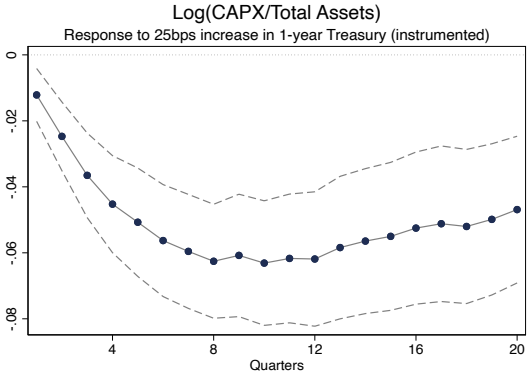
- Instrumental variable local projection for impulse response functions
  - 1-year Treasury rate instrumented by *mps*, controlling for macroeconomic variables (*Dottling and Ratnovski, 2023*) ▸ first stage
- The instrumented 1-year Treasury rate ($\hat{y}t$) represents the monetary policy stance which firms make decisions on ▸ figure
  - Because the adjustment of investment policy is slow-moving, with long and uncertain lags, and measured at quarterly frequency
  - The economy was in ZLB for a long time (*Gertler and Karadi, 2015*)

Investment Policy

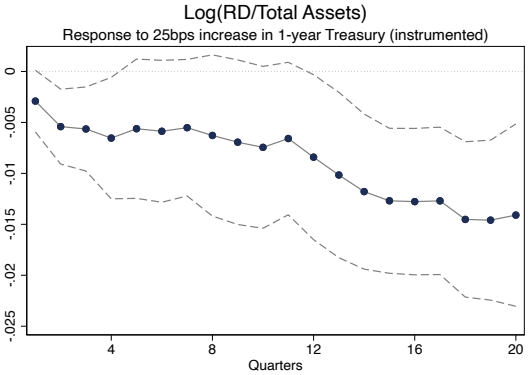
$$
\begin{aligned}
y_{ij,t+h} - y_{ij,t-1} = {} & \beta_1^h \, FCE_{ij,t-1} + \beta_2^h \, FCD_{ij,t-1} \\
& + \beta_3^h \, FCE_{ij,t-1} \times \hat{y}t_t + \beta_4^h \, FCD_{ij,t-1} \times \hat{y}t_t \\
& + \gamma_1^{h'} \, Z_{ij,t-1} \times \hat{y}t_t + \gamma_2^{h'} \, Z_{ij,t-1} + \alpha_i + \eta_{jt} + \mu_{fq} + \epsilon_{ij,t}
\end{aligned}
$$

- $y_{ij,t+h}$: CAPX or R&D in logs at h quarters after the *mps* at time t for firm i in industry j
- $\hat{y}t$: instrumented 1-year Treasury rate
- β_3^h and β_4^h: the heterogeneous impulse response to *mps*
- Firm level controls and their interactions with $\hat{y}t$, firm FE, fiscal quarter FE, and industry-time FE

Average Response: CAPX and R&D



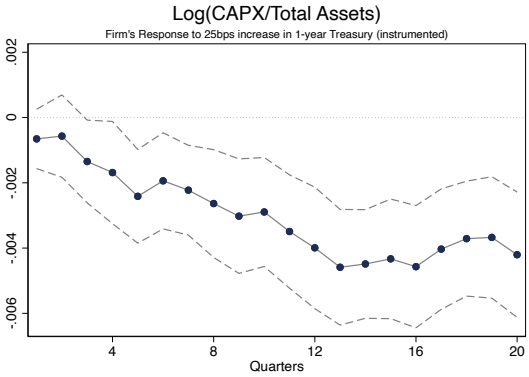
CAPX



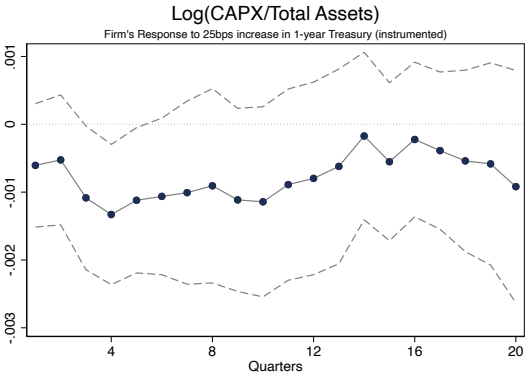
R&D

- 25bps higher rate leads to ↓ CAPX by 5.2% and R&D by 1.3% over 3-5 years

FCE Amplifies Response of CAPX



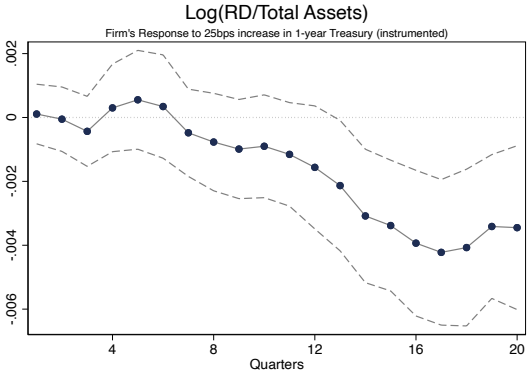
FCE



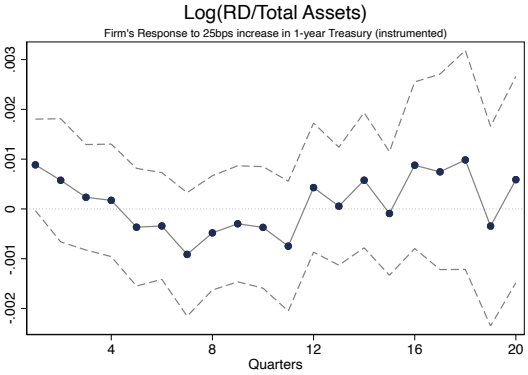
FCD

- One s.d. increase in *FCE*: **5%** amplification relative to the average response
- One s.d. increase in *FCD*: **1.5%** amplification relative to the average response

FCE Amplifies Response of R&D



FCE



FCD

- One s.d. increase in *FCE*: **17%** amplification relative to the average response
- **NO** amplification effect of *FCD* on R&D ▸ robustness

Impact Translated into Patents

	Log(Number of Patents Filed)	
	$h = 17$	$h = 20$
$mps \times FCE$	-0.011*	-0.017***
	(0.006)	(0.006)
$mps \times FCD$	-0.003	-0.004
	(0.007)	(0.007)
Observations	39,634	36,079
Firm Controls	Yes	Yes
Firm FE	Yes	Yes
Fiscal Quarter FE	Yes	Yes
Industry $\times$ Time	Yes	Yes

- One s.d. increase in *FCE*: **9.3%** amplification relative to the average response
- **NO** amplification effect of *FCD* on patents

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- *Equity constraint channel* is potentially important for **long-term growth**

More Evidence: Financing Decisions

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- We look at **equity and debt** issuance of firms in response to monetary policy shocks

Financing Decisions Support the Equity Constraint Channel

	Equity issuance (1)	Public SEO issuance (2)	Debt issuance (3)
mps	-0.0024***	-0.001*	-0.0002
	(0.0005)	(0.0006)	(0.0004)
mps × *equity_focused*	-0.0023***	-0.002***	-0.001**
	(0.0007)	(0.0007)	(0.0004)
mps × *debt_focused*	0.0002	-0.000	0.0003
	(0.0004)	(0.0004)	(0.0004)
Observations	306,279	314,614	293,471
R^2	0.038	0.013	0.014
Firm Controls	Yes	Yes	Yes
Aggregate Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Fiscal Quarter FE	Yes	Yes	Yes
Quarter × Sector FE	Yes	Yes	Yes

- After a 25bps contractionary shock, *FCE* firms issue less equity, of which the magnitude is 6.9% of average
- Measured by SEO issuance, the magnitude is 10% of average

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- The drop in debt issuance for *FCE* firms is 0.9% of average

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- We do not see significant heterogeneous response among *FCD* firms

What Happens to Cash Holding

	Δ Cash	
mps	-0.0029***	-0.0029***
	(0.0003)	(0.0004)
mps $\times$ *equity_focused*		0.0014**
		(0.0006)
mps $\times$ *debt_focused*		-0.0002
		(0.0003)
Observations	316,593	316,593
R^2	0.0783	0.0797
Firm Controls	Yes	Yes
Aggregate Controls	Yes	Yes
Firm FE	Yes	Yes
Fiscal Quarter FE	Yes	Yes
Quarter $\times$ Sector FE	Yes	Yes

- Contractionary shocks lead to $\downarrow$ cash holdings on average

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mps $\times$ *debt_focused*		-0.0002
		(0.0003)
Observations	316,593	316,593
R^2	0.0783	0.0797
Firm Controls	Yes	Yes
Aggregate Controls	Yes	Yes
Firm FE	Yes	Yes
Fiscal Quarter FE	Yes	Yes
Quarter $\times$ Sector FE	Yes	Yes

- Contractionary shocks lead to $\downarrow$ cash holdings on average
- *FCE* firms are reluctant to run down cash holding (precautionary), likely due to increased difficulty in raising new equity to replenish cash (*McLean, 2011*)

What Happens to Cash Holding

	Δ Cash	
mps	-0.0029***	-0.0029***
	(0.0003)	(0.0004)
mps $\times$ *equity_focused*		0.0014**
		(0.0006)
mps $\times$ *debt_focused*		-0.0002
		(0.0003)
Observations	316,593	316,593
R^2	0.0783	0.0797
Firm Controls	Yes	Yes
Aggregate Controls	Yes	Yes
Firm FE	Yes	Yes
Fiscal Quarter FE	Yes	Yes
Quarter $\times$ Sector FE	Yes	Yes

- Contractionary shocks lead to $\downarrow$ cash holdings on average
- *FCE* firms are reluctant to run down cash holding (precautionary), likely due to increased difficulty in raising new equity to replenish cash (*McLean, 2011*)
- Help explain why *FCE* firms cut real investments by more than other firms

Rule Out Debt Channel

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  - Interaction of these shocks with *FCE* and *FCD* measures
- If investment policies of *FCE* firms mainly react to *EIS* but NOT *DIS*
  - It is unlikely MP affects *FCE* firms' investment decisions via the debt channel

Rule Out Debt Channel

$$y_{ij,t+h} - y_{ij,t-1} = \beta_1^h \, FCE_{ij,t-1} + \beta_2^h \, FCE_{ij,t-1} \times EIS_t + \beta_3^h \, FCE_{ij,t-1} \times DIS_t$$
$$+ \gamma_1^{h'} \, Z_{ij,t-1} \times EIS_t + \gamma_2^{h'} \, Z_{ij,t-1} \times DIS_t + \gamma_3^{h'} \, Z_{ij,t-1} + \alpha_i + \eta_{jt} + \epsilon_{ij,t}$$

- $y_{ij,t+h}$: CAPX or R&D in logs at h quarters after the *EIS* or *DIS* at time t for firm i in industry j
- *EIS* and *DIS*: aggregate level financing shocks in equity and debt markets
- $\beta_2^h (> 0)$ and $\beta_3^h (\approx 0)$: relative impulse response of *FCE* to *EIS* and *DIS*
  - *FCD* and its interactions with *EIS* and *DIS* are also included in the regression
- Firm level controls and their interactions with $\hat{y}t$, as well as firm, fiscal quarter, and industry-time FE

Rule Out Debt Channel

	$h = 4$		$h = 5$	
	CAPX	R&D	CAPX	R&D
$EIS \times FCE$	0.011***	0.006*	0.007**	0.005*
	(0.004)	(0.003)	(0.003)	(0.002)
$DIS \times FCE$	0.001	0.001	-0.0001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
R^2	0.4385	0.4580	0.4589	0.4967
Observations	50,581	18,911	44,707	16,657
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry $\times$ Time	Yes	Yes	Yes	Yes

- Shocks in equity market affect the investment of *FCE* firms
- The impact of debt market shocks is not significant $\longrightarrow$ unlikely transmission of monetary policy operates through the debt channel

Mechanism: Investor Horizon

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- Their high sensitivity to macroeconomic shocks and limited internal cash flows may make them more appealing to **short-horizon**, performance-sensitive investors
- If these investors exit more aggressively when monetary tightens, *FCE* firms may face higher cost of equity—amplifying their financing constraints and dampening investment

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- Classify institutional investors as “transient,” “quasi-indexer,” or “dedicated” following *Bushee (1998, 2001)* and *Borochin and Yang (2017)*

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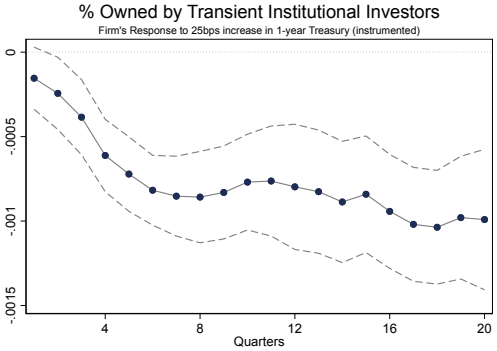
- Classify institutional investors as “transient,” “quasi-indexer,” or “dedicated” following *Bushee (1998, 2001)* and *Borochin and Yang (2017)*
- “**transient**”: short investment horizons (high portfolio turnover and highly diversified portfolio holdings)
- “dedicated”: long investment horizons (low portfolio turnover and focused portfolio holdings)
- “quasi-indexers”: long-horizon, low turnover investors that are highly diversified

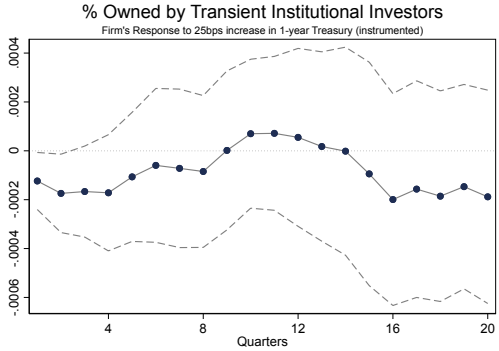
Mechanism: Investor Horizon

- Define a quarterly measure **Percent Owned by Transient Investors**, as the number of shares held by transient investors divided by the total institutional shares outstanding
- We use this measure as the outcome variable, examining whether *FCE* firms experience a larger decline in transient ownership following contractionary monetary policy shocks relative to other firms
- A greater outflow of short-term investors from *FCE* firms would support our hypothesis: investor demand shifts serve as the mechanism, consistent with *Koijen and Yogo (2019)*, *Choi et al. (2025)*

Transient Investors Exit Aggressively for *FCE* Firms



FCE



FCD

- After a contractionary shock, *FCE* firms experience a larger decline in transient ownership relative to other firms, but not *FCD* firms
- Stock price sensitivity to MPS through investor demand channel for *FCE* firms is more than twice as large as that for unconstrained firms

Conclusion

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  - Decrease significantly more CAPX and R&D than unconstrained firms do
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Conclusion

- First evidence that **equity constraint channel** is quantitatively important in the transmission of monetary policy
- After a contractionary monetary policy shock, equity-focused constrained firms
  - Decrease significantly more CAPX and R&D than unconstrained firms do
  - Such decrease in investment is translated into innovation output
  - It is also reflected in stock price responses
- The **equity constraint channel** is supported by the financing policies
  - These firms cut equity issuance by a significant magnitude and are reluctant to run down cash holdings
- The mechanism likely driven by shifts in horizon of investor demand

Appendix

Example: AMERIGON INC

- *…Should the Company not achieve profitability in the near future from the two abovementioned products, additional* ***equity financing*** *would be required. If additional funds are not obtained when needed, the Company will be required to significantly* ***curtail*** *its development activities, dispose of one or more of its technologies and/or cease operations and liquidate …*

  ▸ Back

Correlation

	FCE	*FCD*	KZ index	WW index	Size
FCD	-0.14				
KZ index	-0.10	0.19			
WW index	0.14	-0.16	-0.01		
Size	-0.09	0.174	0.08	-0.90	
Log age	-0.18	0.06	0.07	-0.29	0.36

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Summary Statistics

	Obs	Mean	Std. Dev.
CAPX/Assets	451,559	0.021	0.043
R&D/Assets	178,272	0.020	0.038
Cash Flow	429,404	0.024	0.053
Cash holdings	468,193	0.139	0.176
Size	471,315	6.038	1.952
Q	395,554	1.892	2.154
Duration	210,848	62.24	67.64
Age	471,315	14.63	11.86
Dividend	471,315	0.086	0.281
FCE	401,639	-0.138	0.572
FCD	401,639	0.173	0.616
Book Leverage	452,275	0.272	0.286
Long-term Leverage	467,572	0.227	0.258
Long-term Debt/Assets	448,026	0.229	0.273
Short-term Debt/Assets	435,038	0.054	0.135
Maturity	393,388	0.743	0.314
RFC	386,617	0.032	0.129
Public SEO issuance/ Assets	386,256	0.0075	0.113
Debt issuance/ Assets	364,683	0.0342	0.135
Equity issuance/ Assets	377,086	0.0172	0.131
Repurchase/ Assets	360,848	0.0041	0.022

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Summary Statistics

	Equity-Focused Constrained Firms			Unconstrained Firms		
	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.
CAPX/Assets	65,934	0.028	0.057	30,056	0.014	0.022
R&D/Assets	32,598	0.044	0.064	15,902	0.018	0.022
Cash Flow	61,861	-0.011	0.085	28,219	0.038	0.035
Cash holdings	65,742	0.294	0.242	30,023	0.196	0.164
Size	65,934	4.948	1.857	30,056	6.183	1.930
Q	62,688	2.607	3.442	27,855	2.074	1.498
Duration	21,311	92.41	106.1	21,816	49.08	43.09
Age	65,934	9.474	8.441	30,056	20.77	12.49
Dividend	65,934	0.062	0.242	30,056	0.047	0.213
FCE	64,697	0.560	0.498	29,696	-0.681	0.290
FCD	64,697	-0.453	0.322	29,696	-0.442	0.395
Book Leverage	63,887	0.149	0.269	29,000	0.146	0.178
Long-term Leverage	65,475	0.118	0.219	29,743	0.122	0.167
Long-term Debt/Assets	65,475	0.118	0.232	29,743	0.123	0.177
Short-term Debt/Assets	64,053	0.040	0.162	29,146	0.028	0.060
Maturity	42,230	0.645	0.355	22,314	0.714	0.319
RFC	39,141	0.053	0.179	21,435	0.035	0.127

Summary Statistics

	Debt-Focused Constrained Firms			Unconstrained Firms		
	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.
CAPX/Assets	58,472	0.015	0.022	30,056	0.014	0.022
R&D/Assets	20,948	0.007	0.013	15,902	0.018	0.022
Cash Flow	55,341	0.032	0.029	28,219	0.038	0.035
Cash holdings	58,099	0.056	0.080	30,023	0.196	0.164
Size	58,472	5.917	1.518	30,056	6.183	1.930
Q	54,304	1.414	0.794	27,855	2.074	1.498
Duration	36,725	51.79	52.91	21,816	49.08	43.09
Age	58,472	17.40	11.84	30,056	20.77	12.49
Dividend	58,472	0.056	0.231	30,056	0.047	0.213
FCE	57,639	-0.689	0.294	29,696	-0.681	0.290
FCD	57,639	0.857	0.457	29,696	-0.442	0.395
Book Leverage	56,860	0.306	0.205	29,000	0.146	0.178
Long-term Leverage	58,243	0.254	0.202	29,743	0.122	0.167
Long-term Debt/Assets	58,243	0.255	0.212	29,743	0.123	0.177
Short-term Debt/Assets	56,974	0.059	0.102	29,146	0.028	0.060
Maturity	54,806	0.773	0.295	22,314	0.714	0.319
RFC	54,318	0.024	0.103	21,435	0.035	0.127

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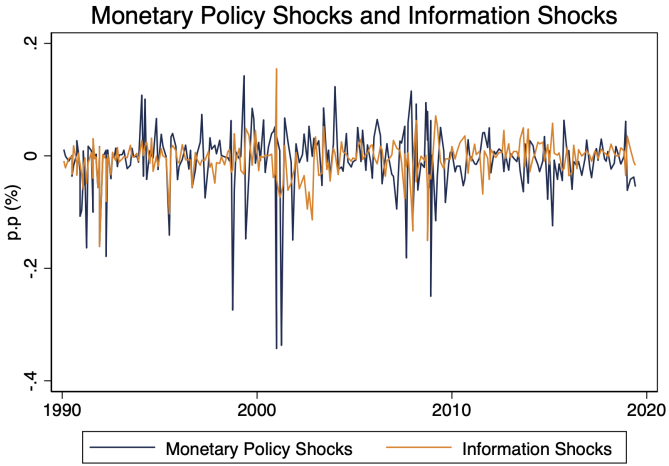
Separate “Pure” Monetary Policy Shocks



Summary Statistics for Shocks

	N	Mean	SD	Min	P25	Median	P75	Max
Monetary Policy Shock	261	-0.01	0.06	-0.34	-0.03	0.00	0.02	0.14
Information Shock	261	-0.01	0.03	-0.16	-0.02	0.00	0.01	0.15

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Average Response: Stock Price

Window:	(0,0)	(+1,+1)	(0,+1)	(0,+2)	(0,+5)
	(1)	(2)	(3)	(4)	(5)
mps	-0.514***	-0.272***	-0.787***	-0.770***	-1.05***
	(0.009)	(0.009)	(0.013)	(0.014)	(0.018)
Controls	Yes	Yes	Yes	Yes	Yes
Fixed-effects					
sic3-year	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	905,306	853,799	905,017	904,738	903,908
R^2	0.019	0.015	0.024	0.023	0.029

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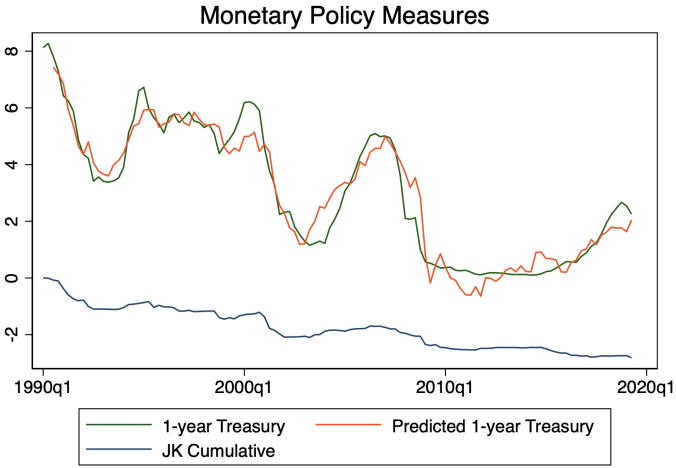
First Stage Results

	$1yt$
JK shock	3.37***
	(0.62)
Log CPI	16.0***
	(3.70)
Log Industrial Production	-9.75***
	(2.77)
Log Employment Ratio	54.5***
	(7.77)
Excess Bond Premium	-0.52***
	(0.18)
GDP Growth	26.5*
	(15.0)
Observations	112
F stat all	162
F stat IV	29.2

Back

Instrumented Treasury Rate



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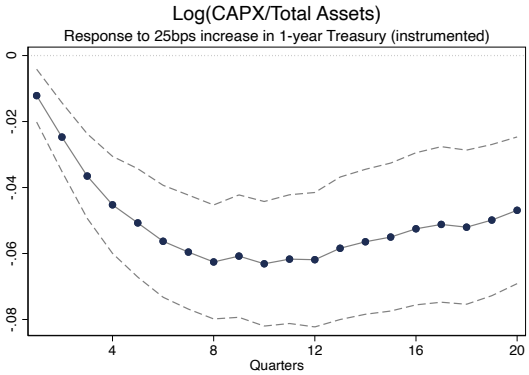
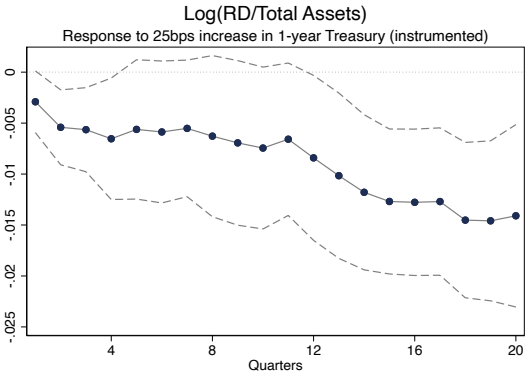
Average Response: CAPX and R&D



CAPX



R&D

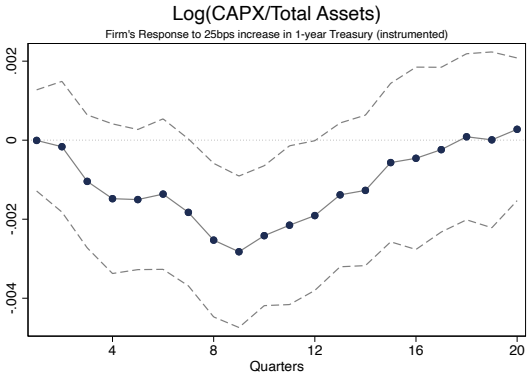
- back

Robustness

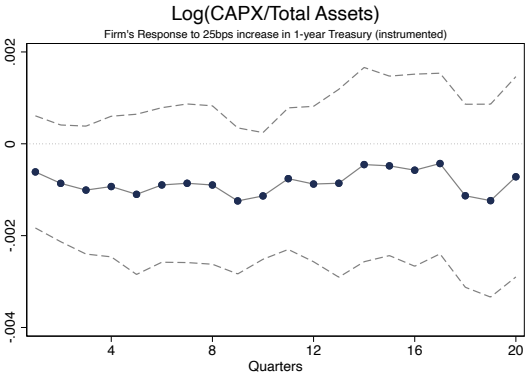
- The equity constraint channel is also robust to controlling for
  - Duration: firms with longer duration of cash flow might be more sensitive to monetary policy shocks ▸ duration
  - Refinancing constraints: refi-constraints might attenuate the equity constraint channel ▸ refinancing
  - Cyclicality: the results could be driven by the business cycle
  - Information effect: *Hsu et. al. 2023* show that information effect also impacts firm investment
  - Alternative monetary policy shocks: *Bauer and Swanson (2023)* ▸ Bauer and Swanson (2023)

▸ back

Robustness: CAPX, Controlling for Duration

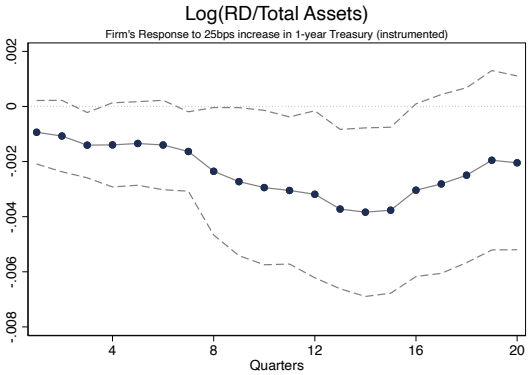


FCE

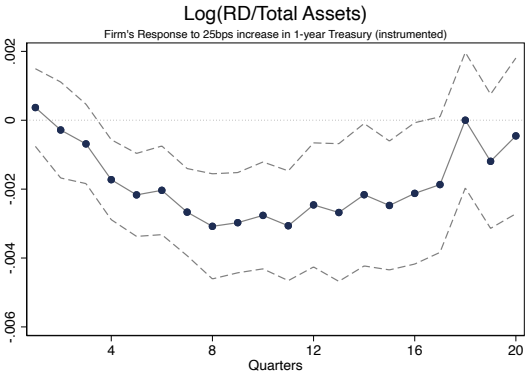


FCD

Robustness: R&D, Controlling for Duration



FCE



FCD

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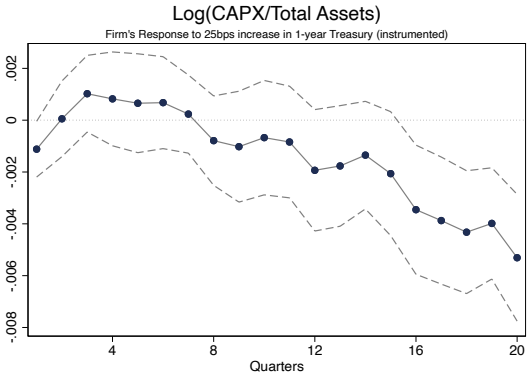
Robustness: CAPX, Controlling for Refinancing Constraints



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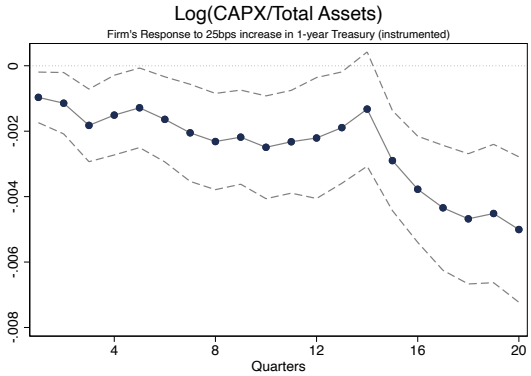
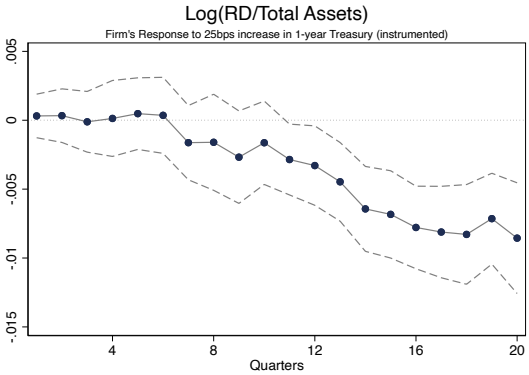


FCD

Robustness: R&D, Controlling for Refinancing Constraints



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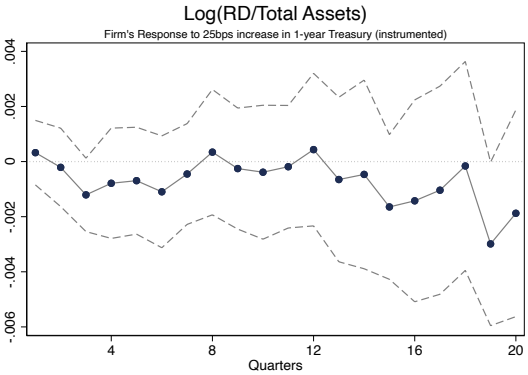

FCD

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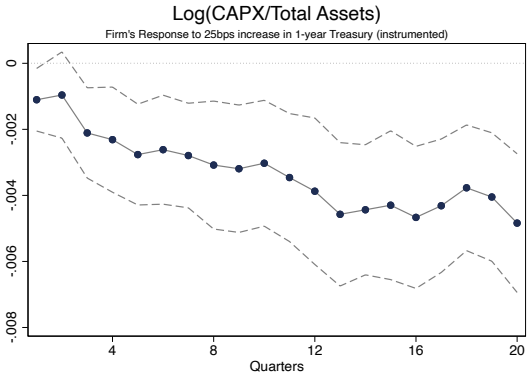
Robustness: Bauer and Swanson (2023) Shocks



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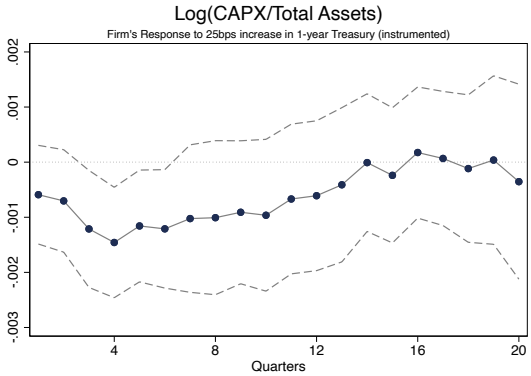

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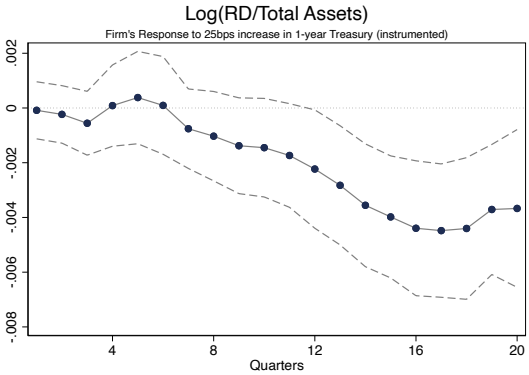
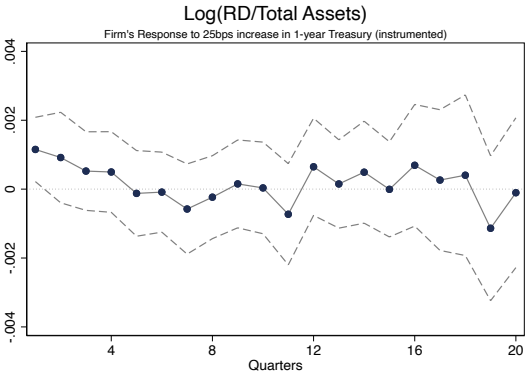


FCE



FCD

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Financing Shock from *Belo et. al. (2024)*

- Using micro moments, *Belo et. al. (2024)* measure the aggregate shocks to firms' equity and debt issuances as the unexpected change in the fractions of firms issuing equity and debt in the cross-section, after accounting for standard observable proxies that influence firm's issuance activity

- They model these fractions as autoregressive processes and include several aggregate variables to control for investment opportunities, and costs of equity and debt financing, thus capturing the expected normal variation in issuance activity

- The Equity Issuance Shocks (EIS) and Debt Issuance Shocks (DIS) are the residuals from these regressions

- That way, there are two financial shocks from the time series variation in the fractions of firms issuing equity and debt in the cross-section of U.S. publicly traded firms

▸ back