# Financial Constraints, Monetary Policy Shocks, and the Cross-Section of Equity Returns

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2024 年 10 月 09 日

# Motivation

- Financial constraints limit firms' investment in positive NPV projects.
  - Credit market imperfections can amplify shocks to macroeconomy and affect the transmission of the monetary policy.
- Understanding monetary policy's impact on asset prices is crucial for understanding its real economy effects.
  - Credit channel is a widely studied channel of monetary policy transmission
- Monetary policy should differently affect financially constrained and unconstrained firms.

# Question

- Q1: whether unexpected monetary policy changes affect stock returns of financially constrained and unconstrained firms differently?
  - Yes, but over the three to four trading days following the FOMC announcement.
  - Lag in return differential may result from lack of liquidity/attention.
- Q2:If yes, what is the economic channel?
  - Increased effective Fed funds rate reduce Invest and NI for constrained firms.
  - Return differential accounted for mostly by cash flow news and not discount rate news.

# Contribution

- Literature on the impact of monetary policy on asset prices
  - Document the impact of unanticipated monetary policy changes in the cross-section of equity returns.
- Literature on monetary policy shocks and cross-sectional equity returns.
  - Bank dependence;Industry;Leverage;Credit rating

    Ippolito et al.(2018);Ehrmann and Fratzscher (2004);Bernanke and Kuttner (2005)
  - Analyze the differential return reactions of constrained and unconstrained firms to unexpected monetary policy shocks.
- Presents evidence that is consistent with credit channel of monetary policy.
  - Showing value implications of monetary policy are larger for constrained firms.

# Data: Firm

- Quarterly data on firm characteristics (Compustat)
  - Financial Constraint (*WW*) (Whited and Wu, 2006)

$$WW_{i,t} = -0.091 \times CF_{i,t} - 0.062 \times DIVPOS_{i,t} + 0.021 \times TLTD_{i,t} - 0.044 \times LNTA_{i,t} + 0.102 \times ISG_{i,t} - 0.035 \times SG_{i,t}$$

    - *CF*: ratio of cash flow to total assets;
    - *DIVPOS*: cash dividend indicator variable;
    - *TLTD*: ratio of long-term debt to total assets;
    - *LNTA*: log of total assets;
    - *ISG*: firm's three-digit industry growth;
    - *SG*: sales growth;
- Daily & monthly stock return data (CRSP)

# Data:FOMC

- FOMC:1994-2007,116 events
- Surprise element of policy actions(*FFShock*)

$$FFShock = \frac{D}{D-d}(f^0_{m,d} - f^0_{m,d-1})$$

  - $f^0_{m,d}$: current-month futures contract price,
  - $D$: number of days in the month
  - $d$: calendar day of the month

- Surprise element of policy actions(*FFExpected*)

$$FFExpected = MPDelta - FFShock \quad (1)$$

# Q1:Design

- Regression:

$$r_{i,t} = \alpha + \beta \times I^{fc}_{i,t} + \gamma \times MPDelta_t + \sigma \times I^{fc}_{i,t} \times MPDelta_t + Controls_{i,t} + FE_{sic,t} + \epsilon_{i,t}$$

$$r_{i,t} = \alpha + \beta \times I^{fc}_{i,t} + \gamma^e \times FFExpected_t + \gamma^s \times FFShock_t + \sigma^e \times I^{fc}_{i,t} \times FFExpected_t + \sigma^s \times I^{fc}_{i,t} \times FFShock_t + Controls_{i,t} + FE_{sic,t} + \epsilon_{i,t}$$

  - $r_{i,t}$: returns of firm $i$ around FOMC event $t$
  - $MPDelta_t$: raw change of announcement for event $t$
  - $FFExpected_t$ & $FFShock_t$: expected and surprise components of announcement
  - $I^{fc}_{i,t}$: financial constraint indicator for firm $i$ at time $t$(dummy)
  - $Controls_{i,t}$ are lagged firm-level controls

# Q1:Result1

| $A$ | (1) (−1,−1) | (2) (0,0) | (3) (+1,+1) | (4) (+1,+2) | (5) (+1,+3) | (6) (+1,+4) |
|---|---|---|---|---|---|---|
| $I^{fc}$ x 100 | 0.0152 | −0.0337 | 0.0106 | 0.0521 | −0.00683 | 0.0379 |
| | (0.36) | (−0.75) | (0.20) | (0.70) | (−0.08) | (0.35) |
| MP delta | 0.911* | 0.164 | 0.611 | 1.308 | 0.478 | 0.252 |
| | (1.89) | (0.25) | (0.91) | (1.24) | (0.37) | (0.17) |
| $I^{fc}$xMP delta | −0.354 | 0.193 | 0.151 | −0.212 | 0.362 | 0.328 |
| | (−1.46) | (0.75) | (0.63) | (−0.55) | (0.68) | (0.48) |
| Adjusted $R^2$ | .013 | .006 | .010 | .011 | .010 | .014 |
| $B$ | (1) (−1,−1) | (2) (0,0) | (3) (+1,+1) | (4) (+1,+2) | (5) (+1,+3) | (6) (+1,+4) |
| $I^{fc}$ x 100 | 0.0209 | −0.0182 | −0.00482 | 0.0330 | −0.0655 | −0.000243 |
| | (0.48) | (−0.39) | (−0.09) | (0.40) | (−0.65) | (−0.20) |
| FFExpected | 1.113** | 1.622** | 0.959 | 2.136 | 1.101 | 1.382 |
| | (2.08) | (2.54) | (1.09) | (1.62) | (0.78) | (0.73) |
| FFShock | 0.0151 | −5.570*** | −0.420 | −1.509 | −0.779 | −2.753 |
| | (0.01) | (−3.48) | (−0.21) | (−0.48) | (−0.22) | (−0.69) |
| $I^{fc}$xFFExpected | −0.417 | 0.146 | 0.430 | 0.184 | 1.335** | 1.423* |
| | (−1.29) | (0.44) | (1.21) | (0.34) | (2.06) | (1.66) |
| $I^{fc}$xFFShock | 0.0716 | 0.517 | −1.732 | −2.891 | −6.223** | −7.073** |
| | (0.08) | (0.46) | (−1.39) | (−1.33) | (−2.42) | (−2.20) |
| Adjusted $R^2$ | .013 | .013 | .010 | .013 | .012 | .017 |

- Unexpected increases in the Fed funds rate negatively impact returns of constrained firms, but realized with a delay.

# Q1:Result2-1

- Constrained-illiquid VS Constrained-liquid

| A | (1) (−1,−1) | (2) (0,0) | (3) (+1,+1) | (4) (+1,+2) | (5) (+1,+3) | (6) (+1,+4) |
|---|---|---|---|---|---|---|
| $I^{fc}_{i,t}$ x 100 | −0.422*** | −0.292*** | −0.136* | −0.168 | −0.306** | −0.316* |
| | (−5.94) | (−4.76) | (−1.69) | (−1.42) | (−2.22) | (−1.96) |
| FFExpected | 1.142** | 1.366** | 1.143 | 2.372* | 1.301 | 1.648 |
| | (2.00) | (2.41) | (1.27) | (1.88) | (0.98) | (0.93) |
| FFShock | 0.367 | −5.287*** | 0.172 | −0.879 | 0.477 | −2.160 |
| | (0.26) | (−3.92) | (0.09) | (−0.30) | (0.14) | (−0.59) |
| $I^{fc}_{i,t}$ xFFExpected | −0.310 | 0.410 | 0.350 | −0.134 | 0.748 | 0.539 |
| | (−0.87) | (1.17) | (0.90) | (−0.24) | (1.04) | (0.56) |
| $I^{fc}_{i,t}$ xFFShock | −0.175 | −1.100 | −1.791 | −3.539 | −8.116*** | −7.370** |
| | (−0.13) | (−0.93) | (−1.13) | (−1.52) | (−2.84) | (−2.33) |
| Adjusted $R^2$ | .018 | .015 | .011 | .013 | .012 | .017 |
| **B** | (1) (−1,−1) | (2) (0,0) | (3) (+1,+1) | (4) (+1,+2) | (5) (+1,+3) | (6) (+1,+4) |
| $I^{fc}_{i,t}$ x 100 | 0.328*** | 0.146** | 0.0373 | 0.0746 | 0.0193 | 0.0954 |
| | (3.93) | (2.29) | (0.53) | (0.79) | (0.17) | (0.69) |
| FFExpected | 1.172** | 1.371** | 1.100 | 2.286* | 1.305 | 1.641 |
| | (2.06) | (2.43) | (1.24) | (1.83) | (0.99) | (0.93) |
| FFShock | 0.343 | −5.222*** | 0.188 | −0.812 | 0.536 | −2.110 |
| | (0.25) | (−3.90) | (0.10) | (−0.27) | (0.16) | (−0.58) |
| $I^{fc}_{i,t}$ xFFExpected | −0.552 | 0.374 | 0.272 | 0.0808 | 1.168** | 1.395* |
| | (−1.27) | (1.11) | (0.94) | (0.17) | (2.09) | (1.88) |
| $I^{fc}_{i,t}$ xFFShock | −2.362* | 1.798 | −2.524** | −4.148* | −8.094*** | −8.146** |
| | (−1.80) | (1.50) | (−2.59) | (−1.94) | (−2.64) | (−2.45) |

- Liquidity drives the timing of return difference.

# Q1:Result2-2

- FC—>$I^{fc}$

| | (1) (−1,−1) | (2) (0,0) | (3) (+1,+1) | (4) (+1,+2) | (5) (+1,+3) | (6) (+1,+4) |
|---|---|---|---|---|---|---|
| FC dummy x 100 | 0.0759 | 0.0239 | −0.0658 | −0.156 | 0.593 | 0.870 |
| | (0.36) | (0.09) | (−0.19) | (−0.39) | (1.02) | (1.41) |
| FFExpected | 0.703 | 2.326*** | 0.0376 | 0.956 | −0.512 | −0.110 |
| | (1.42) | (2.74) | (0.04) | (0.82) | (−0.40) | (−0.07) |
| FFShock | 1.237 | −6.769*** | −0.200 | −0.525 | 0.725 | −0.599 |
| | (1.11) | (−3.19) | (−0.11) | (−0.20) | (0.27) | (−0.17) |
| FCxFFExpected | −1.973 | −0.431 | 5.365* | 6.520** | 6.039** | 4.978 |
| | (−1.22) | (−0.37) | (1.80) | (2.61) | (2.07) | (1.41) |
| FCxFFShock | 10.64** | −7.948 | −11.61 | −16.72** | −16.16 | −17.02 |
| | (1.99) | (−1.07) | (−1.45) | (−2.01) | (−1.43) | (−1.25) |
| Adjusted $R^2$ | .044 | .029 | .031 | .024 | .024 | .029 |

- Investor inattention does affect the delayed return response.

# Q2:Design1

- Real impact of the FOMC shocks on firm fundamentals

$$y_{i,t} = \alpha + \beta \times I^{fc}_{i,t} + \sum_{l=0}^{12} \gamma_l \times \Delta FFR_{t-l} + \sum_{l=0}^{12} \sigma_l \times [I^{fc}_{i,t} \times \Delta FFR_{t-l}] + Controls + FE_{sic} + \epsilon^{y}_{i,t}$$

  - $\Delta FFR$: changes in the contemporaneous and lagged effective Fed funds rate
  - $y_{i,t}$: the ratios of sales, inventory, investment, and net income to total assets

# Q2: Result1

| | (1) $\frac{Sales}{Assets}$ | (2) $\frac{Inventory}{Assets}$ | (3) $\frac{Investment}{Assets}$ | (4) $\frac{NetIncome}{Assets}$ |
|---|---|---|---|---|
| Sum of $\delta_1$ to $\delta_4$ | −0.0149 | −0.00860 | −0.00268* | −0.0113*** |
| $p$-value | .261 | .276 | .0826 | .00394 |
| Sum of $\delta_1$ to $\delta_8$ | −0.0138 | −0.00312 | −0.00482*** | −0.00724* |
| $p$-value | .332 | .704 | .00142 | .0574 |
| Sum of $\delta_1$ to $\delta_{12}$ | −0.0172 | −0.00761 | −0.00550*** | −0.0119*** |
| $p$-value | .278 | .419 | .00177 | .00308 |
| Adjusted $R^2$ | 0.442 | 0.548 | 0.291 | 0.438 |

- Constrained firms exhibit significantly lower investment and net income in the year following the rate increase.

# Q2:Design2

- Who drive the differential monetary policy shocks?

$$\begin{aligned} News^{dr/cf/roe/dg} =& \alpha + \beta \times I^{fc}_{i,t} + \gamma^{e} \times 234Expected_t + \gamma^{s} \times 234Shock_t \\ &+ \sigma^{e} \times [I^{fc}_{i,t} \times 234Expected_t] + \sigma^{s} \times [I^{fc}_{i,t} \times 234Shock_t] \\ &+ FE_{i,t} + \epsilon^{dr/cf/dg/roe}_{i,t} \end{aligned}$$

- $News^{dr/cf/roe/dg}$: DR/CF/ROE/DG news decomposed from stock return
- $234Shock_t$: quarterly policy shock proxy
- $234Expected_t$: expected component of monetary policy change each quarter

# Q2:Result2

| | (1) DR news | (2) CF news | (3) ROE news | (4) DG news |
|---|---|---|---|---|
| $I^{fc}$ | −0.0129*** | 0.0397*** | −0.0346*** | −0.000491 |
| | (−14.15) | (4.41) | (−9.78) | (−0.08) |
| 234Expected | 0.0127 | −0.128 | 0.0427 | 0.243 |
| | (1.21) | (−0.84) | (1.08) | (1.84) |
| 234Shock | 0.0172 | 1.318 | 0.249 | 0.186 |
| | (0.16) | (1.33) | (1.51) | (0.38) |
| $I^{fc}$x234Expected | −0.0133 | 0.316 | −0.0241 | −0.240* |
| | (−0.76) | (1.36) | (−0.35) | (−1.98) |
| $I^{fc}$x234Shock | −0.0248 | −3.829*** | −0.567*** | 0.0604 |
| | (−0.82) | (−7.53) | (−4.60) | (0.40) |
| Adjusted $R^2$ | .142 | .061 | .163 | −.016 |

- CF news dominates DR news in the cross-section of firms due to monetary policy shocks.

# Conclusion

- Unexpected increases in the Fed funds rate negatively impact returns of constrained firms, but realized with a delay.
  - Lag in return differential may result from lack of liquidity/attention.
- Monetary policy shocks have real impact on firm outcomes
  - Increases in the Fed funds rate have a disproportionately negative effect on constrained firms' Invest and NI up to 3 years
- Differential impact of firm fundamentals is reflected in firm returns.
  - CF news dominates DR news in the cross-section of firms due to monetary policy shocks.
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