Flow-Driven Corporate Finance: A Supply-Demand Approach

Hulai Zhang

Tilburg University and ESCP Business School

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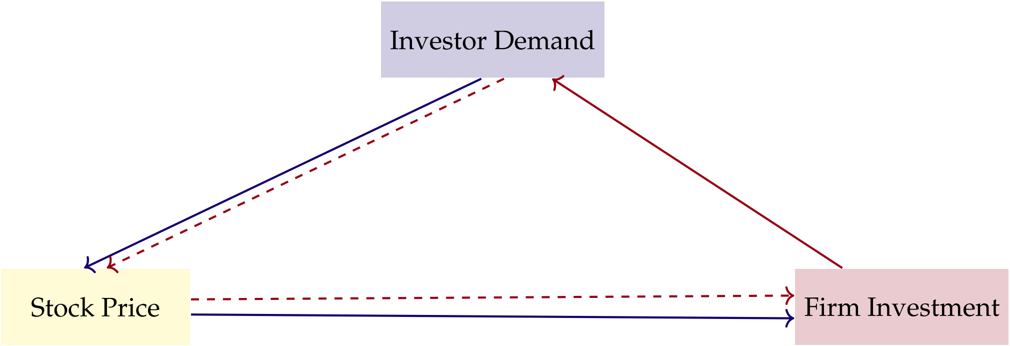
Introduction

- Assume fixed supply side (Firm)
  - Demand System AP: Price impact of flows (Koijen and Yogo, 2019; Gabaix and Koijen, 2023)
- Assume fixed demand side (Investor)
  - Production-Based AP: Price impact of investment (Cochrane, 1996; Zhang, 2005)
  - Q-Theory of Investment: Investment impact of price (Hayashi, 1982; Liu et al., 2009; Bolton et al., 2011)
- This paper develops a supply-demand framework with both sides in the stock market.

Introduction



- I quantify and decompose the impact of investor flows on firm's financing and investment.

Introduction

Challenges to quantify the real effect of investor flows

(1) Feedback effect

- firm's investment $\Rightarrow$ investor flows

(2) Measurement error

- Investor flows via index reconstitution, mutual fund flow, or dividend reinvestment.
  - Hypothetical investor flows
  - Active trades between investors
  - No impact on stock prices and firms (Wardlaw, 2020)

(3) Decomposition is hard!

Theory

Introduction

This paper addresses these challenges!

(1) Derive the equilibrium effect of investor flows via a demand-supply framework
- The equilibrium effects are linear functions of investor flows
- The real effects are identifiable via linear regressions

(2) Construct a granular instrumental variable to estimate the parameters

(3) Conduct counterfactual analysis for decomposition based on estimated parameters

Overview of Results

Using quarterly US data from 1999 to 2023, I find that

- Investor demand is key in determining firm's policies
  - \$1 flow induces \$.24 share issuance and \$.19 increase in firm's investment over two years
  - Investor preferences substantially diminish direct effects
- Two asymmetries
  - Stronger responses to investor inflows than outflows
  - Stronger responses during economic expansions than recessions
- Firms are key in determining stock prices
  - Firm's net issuance and changed fundamentals affect price dynamics

Literature

- This paper integrates both demand and production based models
  - Demand-Based AP: Koijen and Yogo (2019); Gabaix and Koijen (2023); Van der Beck (2024); Haddad et al. (2024)
  - Production-Based AP: Cochrane (1996); Zhang (2005); Belo (2010); Gomes and Schmid (2021)
  - The q theory of investment: Hayashi (1982); Erickson and Whited (2000); Liu et al. (2009); Bolton et al. (2011); Crouzet and Eberly (2023)

- This paper quantifies the real impact of investor demand
  - Mutual fund flows: Edmans et al. (2012); Khan et al. (2012); Hau and Lai (2013); Norli et al. (2015); Bennett et al. (2020); Xu and Kim (2022)
  - Dividend reinvestment: Hartzmark and Solomon (2024); Schmickler and Tremacoldi-Rossi (2023); Van der Beck (2024)
  - Index reconstitution: Chang et al. (2015); Chaudhry (2024); Sammon and Shim (2024); Tamburelli (2024)

Model: Setup

- N firms: $n = 1, ..., N$
  - Total shares issued $Q_t^F(n)$: normalized to 1 at the beginning of each quarter
  - Investment $X_t(n)$
- I investors: $i = 1, ..., I$
  - The investor i's ownership shares of stocks are $\boldsymbol{Q}_{i,t} = \boldsymbol{Q}_{i,t}(\boldsymbol{P}_t, \boldsymbol{X}_t, \boldsymbol{V}_t)$

Model: Investor Side

- Equilibrium conditions
  (1) Stock market clears: $\boldsymbol{Q}_t^F = \sum_{i=1}^{I} \boldsymbol{Q}_{i,t}$
    - Firms don't issue shares: $\boldsymbol{Q}_t^F = \sum_{i=1}^{I} \boldsymbol{Q}_{i,t} = 1$
    - Firms net issue shares: $\boldsymbol{Q}_t^F = \sum_{i=1}^{I} \boldsymbol{Q}_{i,t} > 1$
    - Firms net repurchase shares: $\boldsymbol{Q}_t^F = \sum_{i=1}^{I} \boldsymbol{Q}_{i,t} < 1$

  (2) Investor's budget constraint: $\text{AUM}_{i,t} \geqslant \sum_{n=1}^{N} P_t(n) Q_{i,t}(n)$.

Model: Investor Side

- The aggregate demand elasticity to asset prices is $\boldsymbol{\zeta}_t^P$.

$$\boldsymbol{\zeta}_t^P = \sum_{i=1}^{I} \text{diag}(\boldsymbol{Q}_{i,t})\boldsymbol{\zeta}_{i,t}^P \tag{1}$$

where $\zeta_{i,t}^P(n,n) = -\frac{\partial \ln(Q_{i,t}(n))}{\partial \ln(P_t(n))}$ and $\zeta_{i,t}^P(n,m) = -\frac{\partial \ln(Q_{i,t}(n))}{\partial \ln(P_t(m))}$.

- The aggregate demand elasticity to firm characteristics is $\boldsymbol{\zeta}_t^X$.

$$\boldsymbol{\zeta}_t^X = \sum_{i=1}^{I} \text{diag}(\boldsymbol{Q}_{i,t})\boldsymbol{\zeta}_{i,t}^X \tag{2}$$

where $\zeta_{i,t}^X(n) = \frac{\partial \ln(Q_{i,t}(n))}{\partial \ln(X_t(n))}$ and $\zeta_{i,t}^X(n,m) = \frac{\partial \ln(Q_{i,t}(n))}{\partial \ln(X_t(m))}$.

Model: Investor Side

- Assume an exogenous demand shock $\Delta \boldsymbol{V}_t$
- The impact of the demand shock (1st Order Taylor Approximation)
  - Firm level demand shock: $\Delta \boldsymbol{D}_t \stackrel{\text{def}}{=} \left(\sum_{i=1}^{I} \frac{\partial Q_{i,t}}{\partial V_t}\right) \Delta \boldsymbol{V}_t$
  - Asset price: $\Delta \boldsymbol{P}_t = \frac{\partial P_t}{\partial V_t} \Delta \boldsymbol{V}_t$
  - Share issuance: $\Delta \boldsymbol{Q}_t^F = \frac{\partial Q_t^F}{\partial V_t} \Delta \boldsymbol{V}_t$
  - Firm's real investment: $\Delta \boldsymbol{X}_t = \frac{\partial X_t}{\partial V_t} \Delta \boldsymbol{V}_t$

Model: Investor Side

Lemma 1

The equilibrium effects of investor flows satisfy

$$\Delta \boldsymbol{D}_t = \zeta_t^P \underbrace{\mathrm{diag}(\boldsymbol{P}_t)^{-1} \Delta \boldsymbol{P}_t}_{\text{Price Effect}} + \underbrace{\Delta \boldsymbol{Q}_t^F}_{\text{Financing Effect}} - \zeta_t^X \underbrace{\mathrm{diag}(\boldsymbol{X}_t)^{-1} \Delta \boldsymbol{X}_t}_{\text{Investment Effect}} \tag{3}$$

where ζ_t^P and ζ_t^X are demand elasticities.

- If no financing and investment effects, the price effect $\mathrm{diag}(\boldsymbol{P}_t)^{-1} \Delta \boldsymbol{P}_t = (\zeta_t^P)^{-1} \Delta \boldsymbol{D}_t$.
  - Price effect by estimating ζ_t^P (Gabaix and Koijen, 2023; Van der Beck, 2024; Haddad et al., 2024)
- Evidence shows non-zero financing and investment effects

Model: Firm Side

(1) Q-theory of investment

- Hayashi (1982); Liu et al. (2009); Bolton et al. (2011)
- Assume CRS and quadratic adjustment cost
- Investment is linear in Tobin's q: $\mathrm{diag}(\boldsymbol{X}_t)^{-1}\Delta\boldsymbol{X}_t = \boldsymbol{\Lambda}^X\mathrm{diag}(\boldsymbol{P}_t)^{-1}\Delta\boldsymbol{P}_t$

(2) Information role of stock prices

- Bond et al. (2012); Foucault and Fresard (2014); Dessaint et al. (2019)
- Assume price as a noisy indicator of MPK: $\boldsymbol{P}_t = \boldsymbol{MPK}_t + \boldsymbol{u}_t$
- Investment is linear in stock prices: $\mathrm{diag}(\boldsymbol{X}_t)^{-1}\Delta\boldsymbol{X}_t = \boldsymbol{\Lambda}^X\mathrm{diag}(\boldsymbol{P}_t)^{-1}\Delta\boldsymbol{P}_t$

$\Rightarrow$ Total shares and investment are linear functions of stock prices

- $\Delta\boldsymbol{Q}_t^F = \boldsymbol{\Lambda}^F\mathrm{diag}(\boldsymbol{P}_t)^{-1}\Delta\boldsymbol{P}_t$ and $\mathrm{diag}(\boldsymbol{X}_t)^{-1}\Delta\boldsymbol{X}_t = \boldsymbol{\Lambda}^X\mathrm{diag}(\boldsymbol{P}_t)^{-1}\Delta\boldsymbol{P}_t$

Model: Equilibrium

Proposition 1

The equilibrium effects of investor flows on firm's share issuance and investment are

$$\Delta Q_t^F = \underbrace{\boldsymbol{\Lambda}_t^F(\zeta_t^P + \boldsymbol{\Lambda}_t^F - \zeta_t^X \boldsymbol{\Lambda}_t^X)^{-1}}_{\stackrel{\text{def}}{=} M_t^F} \Delta D_t \tag{4}$$

$$\mathrm{diag}(X_t)^{-1} \Delta X_t = \underbrace{\boldsymbol{\Lambda}_t^X(\zeta_t^P + \boldsymbol{\Lambda}_t^F - \zeta_t^X \boldsymbol{\Lambda}_t^X)^{-1}}_{\stackrel{\text{def}}{=} M_t^X} \Delta D_t \tag{5}$$

Challenges Identification

Model: No Feedback Effects

The direct impact of investor flows ($\zeta_t^X = 0$):

$$\Delta \boldsymbol{Q}_t^F = \boldsymbol{\Lambda}_t^F(\zeta_t^P + \boldsymbol{\Lambda}_t^F)^{-1}\Delta \boldsymbol{D}_t \tag{6}$$

$$\mathrm{diag}(\boldsymbol{X}_t)^{-1}\Delta \boldsymbol{X}_t = \boldsymbol{\Lambda}_t^X(\zeta_t^P + \boldsymbol{\Lambda}_t^F)^{-1}\Delta \boldsymbol{D}_t \tag{7}$$

How much the feedback effect diminishes the direct effect:

$$\Delta^X = \frac{(\zeta_t^P + \boldsymbol{\Lambda}_t^F - \zeta_t^X \boldsymbol{\Lambda}_t^X)^{-1}}{(\zeta_t^P + \boldsymbol{\Lambda}_t^F)^{-1}} - 1. \tag{8}$$

Data and Sample

Data

- Quarterly firm data: Compustat
- Stock data: CRSP
- Quarterly institutional holdings: Factset Ownership v5

Sample

- Industrial firms: exclude financial and utilities firms
- Common stocks listed in NYSE, AMEX, and NASDAQ
- 1999Q1 – 2023Q4

Identification

The identification strategy is based on Gabaix and Koijen (2024).

- The demand-supply system to be estimated:

$$\Delta q_{i,t}(n) = -\zeta^P(n)R_t(n) + \zeta^X(n)\Delta x_t(n) + \gamma_i(n)\eta_t(n) + \varepsilon_{i,t}(n) \quad (9)$$

$$\Delta Q^F_t(n) = \lambda^F(n)R_t(n) + \mu_t(n) \quad (10)$$

$$\Delta x_t(n) = \lambda^X(n)R_t(n) + \nu_t(n) \quad (11)$$

- Assumptions
  1. Exogenous demand shocks: $\varepsilon_{i,t}(n) \perp \eta_t(n), \mu_t(n), \nu_t(n)$
  2. No spillover effects
  3. Homogenous demand elasticity: $\zeta^P_{i,t}(n) = \zeta^P(n)$ and $\zeta^X_{i,t}(n) = \zeta^X(n)$
  4. Homogenous supply elasticity: $\lambda^F_t(n) = \lambda^F(n)$ and $\lambda^X_t(n) = \lambda^X(n)$

Identification

- Define three weights: $S_{i,t}(n) = \frac{Q_{i,t-1}(n)}{\sum_i Q_{i,t-1}(n)}$, $E_i(n)$, and $S_{i,t}(n) - E_i(n)$
- The aggregate demand functions are

$$S_{i,t}(n): \quad \widetilde{\Delta q_t(n)} = -\zeta^P(n)R_t(n) + \zeta^X(n)\Delta x_t(n) + \widetilde{\gamma(n)}\eta_t(n) + \widetilde{\varepsilon_t(n)} \tag{12}$$

$$E_i(n): \quad \overline{\Delta q_t(n)} = -\zeta^P(n)R_t(n) + \zeta^X(n)\Delta x_t(n) + \overline{\gamma(n)}\eta_t(n) + \overline{\varepsilon_t(n)} \tag{13}$$

$$S_{i,t}(n) - E_i(n): \quad \widehat{\Delta q_t(n)} = \widehat{\gamma(n)}\eta_t(n) + \widehat{\varepsilon_t(n)}. \tag{14}$$

- The demand shock is $D_t(n) = \widetilde{\varepsilon_t(n)}$, but unidentifiable.
  - $z_t(n) \stackrel{\text{def}}{=} \widehat{\varepsilon_t(n)}$ is identified!
  - $z_t(n)$ is called the granular instrumental variable (GIV). (Gabaix and Koijen, 2024)

- $\Delta Q_t^F(n) = \widetilde{\Delta q_t(n)}$

Identification

Proposition 2

The equilibrium effects of investor flows are identified from regressions

$$\Delta Q_t^F(n) = M^F(n) z_t(n) + \xi_t(n) \tag{15}$$

$$\Delta x_t(n) = M^X(n) z_t(n) + \upsilon_t(n) \tag{16}$$

where

$$M^F(n) = \lambda^F(n)[\zeta^P(n) + \lambda^F(n) - \zeta^X(n)\lambda^X(n)]^{-1} \tag{17}$$

$$M^X(n) = \lambda^X(n)[\zeta^P(n) + \lambda^F(n) - \zeta^X(n)\lambda^X(n)]^{-1} \tag{18}$$

Theory

Identification

Estimation Procedure

- Aggregate institutional holdings to nine: brokers, hedge funds, long term investors, private banking, small active, large active, small passive, large passive, and households.
- Compute the weights $S_{i,t}(n)$ and $E_i(n)$: $S_{i,t}(n) = \frac{Q_{i,t-1}(n)}{\sum_i Q_{i,t-1}(n)}$ and $E_i(n) = \frac{1/\sigma_i^2(n)}{\sum_i 1/\sigma_i^2(n)}$
- Follow Gabaix and Koijen (2024) to construct $z_t(n)$
  - $\eta_t = (\text{GDP Growth}_t, \eta_{1t}(n), \eta_{2t}(n))$
  - $(\eta_{1t}(n), \eta_{2t}(n))$ by PCA
- Run the two regressions

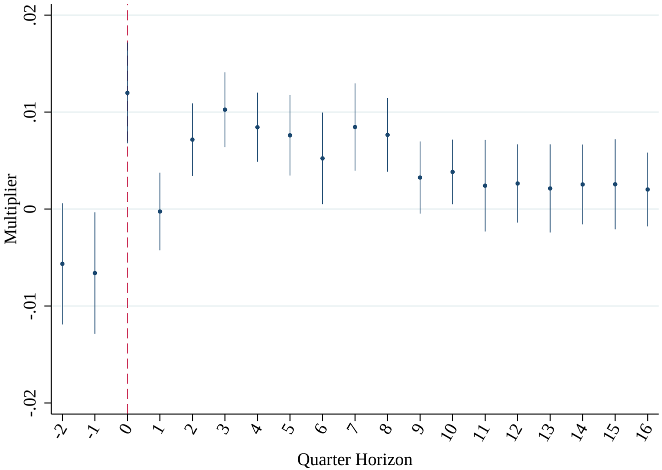
$$\Delta Q_t^F(n) = M^F z_t(n) + \alpha^F(n) + \gamma^F(n)\eta_t(n) + \xi_t(n) \tag{19}$$

$$\Delta x_t(n) = M^X z_t(n) + \alpha^X(n) + \gamma^X(n)\eta_t(n) + \upsilon_t(n) \tag{20}$$

GIV $z_t(n)$ Validity

- Main results are stable for GIVs constructed by different factors
- The GIVs are unrelated to firm characteristics in previous quarters
- The GIVs should capture the *hypothetical* demand shocks.
  (1) Demand shocks from mutual fund flows positively predict $z_t(n)$.
  Method Result
  (2) Demand shocks by dividend reinvestment positively predict $z_t(n)$.
  Method Result
  (3) $z_t(n)$ captures both hypothetical demand shocks at the same time.
  Result

Share Issuance

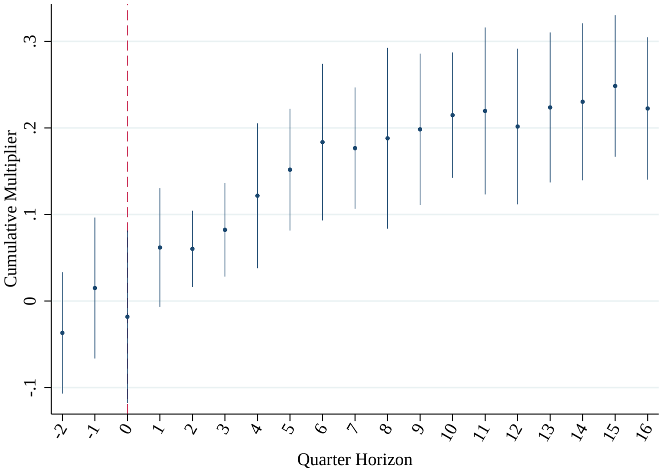


Long-term Issuance

$$\sum_{\tau=0}^{8} \Delta Q^F_{t+\tau}(n) = M^F z_t(n) + \alpha^F(n) + \gamma^F(n)\eta_t(n) + \xi_t(n) \tag{21}$$

	(1)	(2)	(3)	(4)	(5)	(6)
		ΔQ^S_t			ΔNetIssue/TA	
$z_t(n)$	0.235***	0.236***	0.236***	0.021***	0.021***	0.021***
	(0.041)	(0.042)	(0.042)	(0.007)	(0.007)	(0.007)
Obs.	38172	38172	38172	38172	38172	38172
R^2	0.571	0.573	0.573	0.748	0.749	0.749
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm×GDP Growth	Yes	Yes	Yes	Yes	Yes	Yes
Firm×η_1		Yes	Yes		Yes	Yes
Firm×η_2			Yes			Yes

Growth of Real Investment



Long-term Growth of Real Investment

$$\sum_{\tau=0}^{8} \Delta \frac{I_{t+\tau}}{K_{t+\tau-1}}(n) = M^X z_t(n) + \alpha^X(n) + \gamma^X(n)\eta_t(n) + \upsilon_t(n) \tag{22}$$

	(1)	(2)	(3)
$z_t(n)$	0.184***	0.188***	0.188***
	(0.057)	(0.058)	(0.058)
Obs.	38172	38172	38172
R^2	0.461	0.463	0.463
Firm FEs	Yes	Yes	Yes
Firm$\times$GDP Growth	Yes	Yes	Yes
Firm$\times\eta_1$		Yes	Yes
Firm$\times\eta_2$			Yes

Heterogeneity Analysis

- Investor Inflows vs. Outflows
  - Almost zero net buybacks for outflows

    Financing
  - Dis-investment is 50% for outflows of investment for inflows

    Investment

- Economic Expansions vs. Recessions
  - Net issuance is 56% during recessions of that during expansions

    Financing
  - Investment responses are 50% during recessions of that during expansions

    Investment

The Effect of Investor Preferences

How much the feedback effect diminishes the direct effect:

$$\Delta^X = \frac{(\boldsymbol{\zeta}_t^P + \boldsymbol{\Lambda}_t^F - \boldsymbol{\zeta}_t^X \boldsymbol{\Lambda}_t^X)^{-1}}{(\boldsymbol{\zeta}_t^P + \boldsymbol{\Lambda}_t^F)^{-1}} - 1. \tag{23}$$

(1) $(\boldsymbol{\zeta}_t^P + \boldsymbol{\Lambda}_t^F - \boldsymbol{\zeta}_t^X \boldsymbol{\Lambda}_t^X)^{-1}$: identify by $R_t(n)$ on $z_t(n)$

(2) $\boldsymbol{\Lambda}_t^F$: identify by $\mathbb{E}\left[z_t(n)[\Delta Q_t^F(n) - \lambda^F(n) R_t(n)]\right] = 0$

(3) $\boldsymbol{\zeta}_t^P$: identify by instruments in DSAP such as investment mandate of institutions

The Effect of Investor Preferences

The price impact of investor flows is

$$\text{diag}(P_t)^{-1}\Delta P_t = (\zeta_t^P + \mathbf{\Lambda}_t^F - \zeta_t^X \mathbf{\Lambda}_t^X)^{-1}\Delta D_t \tag{24}$$

Dep. Var.: $\sum_{\tau=0}^{8} R_t(n)$	(1)	(2)	(3)
$z_t(n)$	0.266***	0.266***	0.266***
	(0.047)	(0.048)	(0.048)
Obs.	38172	38172	38172
R^2	0.471	0.474	0.474
Firm FEs	Yes	Yes	Yes
Firm$\times$GDP Growth	Yes	Yes	Yes
Firm$\times\eta_1$		Yes	Yes
Firm$\times\eta_2$			Yes

(1) $(\zeta_t^P + \mathbf{\Lambda}_t^F - \zeta_t^X \mathbf{\Lambda}_t^X)^{-1} = 0.266$

(2) $\mathbf{\Lambda}_t^F = 0.236/0.266 = 0.887$

The Effect of Investor Preferences

		(1)	(2)	(3)	(4)
Literature	Methodology	ζ^P	$\frac{\Lambda^F}{(\zeta^P+\Lambda^F)}$	$\frac{\Lambda^X}{(\zeta^P+\Lambda^F)}$	Δ^X
	Benchmark		0.236	0.188	
Koijen and Yogo (2019)	Investment Mandate	0.200	0.816	0.650	-71.1%
Choi et al. (2023)	Simulated Method of Moments	0.339	0.724	0.576	-67.4%
Gabaix and Koijen (2023)	GIV	0.211	0.808	0.643	-70.8%
Lou (2012)	Mutual Fund Flows	0.833	0.516	0.411	-54.2%
Peng and Wang (2021)	Mutual Fund Flows	0.208	0.810	0.645	-70.9%
Li (2022)	Mutual Fund Flows	0.175	0.835	0.665	-71.7%
Van der Beck (2022)	Mutual Fund Flows	0.833	0.516	0.411	-54.2%
Ben-David et al. (2022)	Morningstar Ratings	0.189	0.825	0.657	-71.4%
Schmickler and Tremacoldi-Rossi (2023)	Dividend Reinvestment	1.250	0.415	0.331	-43.2%
Van der Beck (2024)	Dividend Reinvestment	1.730	0.339	0.270	-30.4%
Hartzmark and Solomon (2024)	Dividend Reinvestment	0.526	0.628	0.500	-62.4%
Chang et al. (2015)	Index Reconstitution	0.625	0.587	0.467	-59.8%
Da et al. (2018)	Pension Fund Rebalance	0.455	0.661	0.527	-64.3%
Li et al. (2021)	IPO Restriction	0.220	0.801	0.638	-70.6%

Reverse Question: Firm's Role in the Stock Market

The price impact of investor flows

$$\mathrm{diag}(P_t)^{-1}\Delta P_t = (\boldsymbol{\zeta}_t^P + \boldsymbol{\Lambda}_t^F - \boldsymbol{\zeta}_t^X \boldsymbol{\Lambda}_t^X)^{-1}\Delta D_t \tag{25}$$

The price impact without fundamental responses ($\boldsymbol{\Lambda}_t^X = 0$)

$$\mathrm{diag}(P_t)^{-1}\Delta P_t = (\boldsymbol{\zeta}_t^P + \boldsymbol{\Lambda}_t^F)^{-1}\Delta D_t \tag{26}$$

The price impact without firm responses ($\boldsymbol{\Lambda}_t^F = \boldsymbol{\Lambda}_t^X = 0$)

$$\mathrm{diag}(P_t)^{-1}\Delta P_t = (\boldsymbol{\zeta}_t^P)^{-1}\Delta D_t \tag{27}$$

Reverse Question: Firm's Role in the Stock Market

Benchmark price impact is 0.266.

		(1)	(2)	(3)	(4)	(5)
Literature	Methodology	ζ^P	$\frac{1}{\zeta^P}$	$\frac{1}{(\zeta^P+\Lambda^F)}$	Δ^F	Δ^{X+F}
Koijen and Yogo (2019)	Investment Mandate	0.200	5.000	0.920	-81.6%	-94.7%
Choi et al. (2023)	Simulated Method of Moments	0.339	2.951	0.816	-72.4%	-91.0%
Gabaix and Koijen (2023)	GIV	0.211	4.730	0.910	-80.8%	-94.4%
Lou (2012)	Mutual Fund Flows	0.833	1.200	0.581	-51.6%	-77.8%
Peng and Wang (2021)	Mutual Fund Flows	0.208	4.800	0.913	-81.0%	-94.5%
Li (2022)	Mutual Fund Flows	0.175	5.700	0.941	-83.5%	-95.3%
Van der Beck (2022)	Mutual Fund Flows	0.833	1.200	0.581	-51.6%	-77.8%
Ben-David et al. (2022)	Morningstar Ratings	0.189	5.300	0.929	-82.5%	-95.0%
Schmickler and Tremacoldi-Rossi (2023)	Dividend Reinvestment	1.250	0.800	0.468	-41.5%	-66.8%
Van der Beck (2024)	Dividend Reinvestment	1.730	0.578	0.382	-33.9%	-54.0%
Hartzmark and Solomon (2024)	Dividend Reinvestment	0.526	1.900	0.707	-62.8%	-86.0%
Chang et al. (2015)	Index Reconstitution	0.625	1.600	0.661	-58.7%	-83.4%
Da et al. (2018)	Pension Fund Rebalance	0.455	2.200	0.745	-66.1%	-87.9%
Li et al. (2021)	IPO Restriction	0.220	4.550	0.903	-80.1%	-94.2%

Conclusion

- This paper develops a demand-supply framework to study the multipliers of investor flows
  - The multipliers depend on both demand and supply side elasticities
  - The multipliers can be decomposed as direct and feedback effects

- The multipliers can be identified using GIV
  - 1% investor flow leads to .24% share issuance and 0.19% growth of real investment
  - The effect to outflows and during recessions is half of that inflows and economic expansions
  - The direct effect is mostly diminished by the feedback effect

- The framework also provides a novel tool to evaluate how a firm shapes financial markets
  - Share supply reduces the price impact of investor flows by 80%
  - Firm's investment reduces the price impact by additional 10%

GIV $z_t(n)$ Validity: Mutual Fund Flows

- The *hypothetical* demand shocks are defined as Lou (2012).
  - Keep only $\frac{F_{i,t}}{TNA_{i,t-1}} \geqslant 5\%$ mutual fund flows
  - Firm level demand shock is

$$MFFlow_t(n) = \sum_{i=1}^{I} Q_{i,t-1}(n) \frac{F_{i,t}}{TNA_{i,t-1}} \tag{28}$$

Back

GIV $z_t(n)$ Validity: Mutual Fund Flows

$$z_t(n) = \beta MFFlow_t(n) + FEs + \epsilon_t(n) \tag{29}$$

	(1)	(2)	(3)
MFFlow	0.001**	0.002***	0.002***
	(0.000)	(0.001)	(0.001)
Obs.	360003	360003	360003
R^2	0.000	0.004	0.004
Quarter FEs		Yes	Yes
Quarter Clustering	Yes	Yes	Yes
Firm Clustering			Yes
Obs.	360003	360003	360003
R^2	0.0000	0.0037	0.0037

Back

GIV $z_t(n)$ Validity: Dividend Reinvestment

- The *hypothetical* demand shocks are defined as Schmickler and Tremacoldi-Rossi (2023).
  - Investor flow to n due to dividend reinvestment is $\Delta q_{i,t}(n) = \frac{\sum_{m \neq n} Div_{i,t}(m)}{AUM_{i,t-1}}$
  - Firm level demand shock is

$$DivxFlow_t(n) = \frac{\sum_{i=1}^{I} Q_{i,t-1}(n) \Delta q_{i,t}(n)}{Q^F_{t-1}(n)} \tag{30}$$

Back

GIV $z_t(n)$ Validity: Dividend Reinvestment

$$z_t(n) = \beta DivxFlow_t(n) + FEs + \epsilon_t(n) \tag{31}$$

	(1)	(2)	(3)
DivxFlow	9.007***	16.002***	16.002***
	(1.464)	(1.904)	(2.124)
Obs.	399635	399635	399635
R^2	0.004	0.012	0.012
Quarter FEs		Yes	Yes
Quarter Clustering	Yes	Yes	Yes
Firm Clustering			Yes
Obs.	399635	399635	399635
R^2	0.0041	0.0117	0.0117

Back

GIV $z_t(n)$ Validity: Mutual Fund Flows vs Dividend Reinvestment

$$z_t(n) = \beta_1 MFFlow_t(n) + \beta_2 DivxFlow_t(n) + FEs + \epsilon_t(n) \quad (32)$$

	(1)	(2)	(3)
MFFlow	0.000	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
DivxFlow	10.014***	18.572***	18.572***
	(1.703)	(2.209)	(2.396)
Obs.	359979	359979	359979
R^2	0.006	0.015	0.015
Quarter FEs		Yes	Yes
Quarter Clustering	Yes	Yes	Yes
Firm Clustering			Yes
Obs.	359979	359979	359979
R^2	0.0059	0.0150	0.0150

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Share Issuance: Inflows versus Outflows

	(1)	(2)	(3)
$z_t^+(n)$	0.850***	0.853***	0.853***
	(0.173)	(0.173)	(0.173)
$z_t^-(n)$	0.005	0.005	0.005
	(0.044)	(0.045)	(0.045)
Obs.	38172	38172	38172
R^2	0.573	0.575	0.575
Firm FEs	Yes	Yes	Yes
Firm × GDP Growth	Yes	Yes	Yes
Firm × η_1		Yes	Yes
Firm × η_2			Yes

For 1% investor flows,

- 0.85% net issuance to inflows
- 0.01% net buyback in outflows

$\Rightarrow$ All effects from inflows

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Real Investment: Inflows versus Outflows

	(1)	(2)	(3)
$z_t^+(n)$	0.289***	0.297***	0.297***
	(0.094)	(0.097)	(0.097)
$z_t^-(n)$	-0.143**	-0.145**	-0.145**
	(0.067)	(0.069)	(0.069)
Obs.	38172	38172	38172
R^2	0.461	0.463	0.463
Firm FEs	Yes	Yes	Yes
Firm$\times$GDP Growth	Yes	Yes	Yes
Firm$\times\eta_1$		Yes	Yes
Firm$\times\eta_2$			Yes

For 1% investor flows,

- 0.30% investment growth to inflows
- 0.15% dis-investment growth in outflows

$\Rightarrow$ 50% of the effect

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Share Issuance during Economic Recessions

	(1)	(2)	(3)
$z_t(n)$	0.250***	0.248***	0.248***
	(0.031)	(0.031)	(0.031)
Recession	-0.119***	-0.119***	-0.119***
	(0.030)	(0.030)	(0.030)
$z_t(n) \times$Recession	-0.110	-0.111	-0.111
	(0.079)	(0.081)	(0.081)
Obs.	38172	38172	38172
R^2	0.298	0.300	0.300
Firm FEs	Yes	Yes	Yes
Firm$\times\eta_1$		Yes	Yes
Firm$\times\eta_2$			Yes

For 1% investor flows,

- 0.25% share issuance in expansions
- 0.14% share issuance in recessions

$\Rightarrow$ 56% of the effect in recessions

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Real Investment during Economic Recessions

	(1)	(2)	(3)
$z_t(n)$	0.187***	0.183***	0.183***
	(0.044)	(0.045)	(0.045)
Recession	-0.300***	-0.297***	-0.297***
	(0.096)	(0.095)	(0.095)
$z_t(n) \times$Recession	-0.093*	-0.095*	-0.095*
	(0.047)	(0.050)	(0.050)
Obs.	38172	38172	38172
R^2	0.123	0.131	0.131
Firm FEs	Yes	Yes	Yes
Firm$\times\eta_1$		Yes	Yes
Firm$\times\eta_2$			Yes

For 1% investor flows,

- 0.18% investment growth in expansions
- 0.09% investment growth in recessions

$\Rightarrow$ 50% of the effect in recessions

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References I

Belo, F. (2010). Production-based measures of risk for asset pricing. *Journal of Monetary Economics 57*(2), 146–163.

Ben-David, I., J. Li, A. Rossi, and Y. Song (2022). Ratings-driven demand and systematic price fluctuations. *Review of Financial Studies 35*(6), 2790–2838.

Bennett, B., R. Stulz, and Z. Wang (2020). Does the stock market make firms more productive? *Journal of Financial Economics 136*(2), 281–306.

Bolton, P., H. Chen, and N. Wang (2011). A unified theory of tobin's q, corporate investment, financing, and risk management. *Journal of Finance 66*(5), 1545–1578.

Bond, P., A. Edmans, and I. Goldstein (2012). The real effects of financial markets. *Annual Review of Financial Economics 4*(1), 339–360.

Chang, Y.-C., H. Hong, and I. Liskovich (2015). Regression discontinuity and the price effects of stock market indexing. *Review of Financial Studies 28*(1), 212–246.

References II

Chaudhry, A. (2024). The impact of prices on analyst cash flow expectations: Reconciling subjective beliefs data with rational discount rate variation. *SSRN*.

Choi, J., X. Tian, Y. Wu, and M. Kargar (2023). Investor demand, firm investment, and capital misallocation. *SSRN*.

Cochrane, J. H. (1996). A cross-sectional test of an investment-based asset pricing model. *Journal of Political Economy 104*(3), 572–621.

Crouzet, N. and J. Eberly (2023). Rents and intangible capital: A q+ framework. *Journal of Finance 78*(4), 1873–1916.

Da, Z., B. Larrain, C. Sialm, and J. Tessada (2018). Destabilizing financial advice: Evidence from pension fund reallocations. *Review of Financial Studies 31*(10), 3720–3755.

Dessaint, O., T. Foucault, L. Frésard, and A. Matray (2019). Noisy stock prices and corporate investment. *Review of Financial Studies 32*(7), 2625–2672.

References III

Edmans, A., I. Goldstein, and W. Jiang (2012). The real effects of financial markets: The impact of prices on takeovers. *Journal of Finance 67*(3), 933–971.

Erickson, T. and T. M. Whited (2000). Measurement error and the relationship between investment and q. *Journal of Political Economy 108*(5), 1027–1057.

Foucault, T. and L. Fresard (2014). Learning from peers' stock prices and corporate investment. *Journal of Financial Economics 111*(3), 554–577.

Gabaix, X. and R. S. Koijen (2023). In search of the origins of financial fluctuations: The inelastic markets hypothesis. *SSRN*.

Gabaix, X. and R. S. Koijen (2024). Granular instrumental variables. *Journal of Political Economy 132*(7), 000–000.

Gomes, J. F. and L. Schmid (2021). Equilibrium asset pricing with leverage and default. *Journal of Finance 76*(2), 977–1018.

References IV

Haddad, V., P. Huebner, and E. Loualiche (2024). How competitive is the stock market? theory, evidence from portfolios, and implications for the rise of passive investing. *SSRN*.

Hartzmark, S. M. and D. H. Solomon (2024). Marketwide predictable price pressure. *SSRN*.

Hau, H. and S. Lai (2013). Real effects of stock underpricing. *Journal of Financial Economics 108*(2), 392–408.

Hayashi, F. (1982). Tobin's marginal q and average q: A neoclassical interpretation. *Econometrica*, 213–224.

Khan, M., L. Kogan, and G. Serafeim (2012). Mutual fund trading pressure: Firm-level stock price impact and timing of seos. *Journal of Finance 67*(4), 1371–1395.

Koijen, R. S. and M. Yogo (2019). A demand system approach to asset pricing. *Journal of Political Economy 127*(4), 1475–1515.

Li, J. (2022). What drives the size and value factors? *Review of Asset Pricing Studies 12*(4), 845–885.

References V

Li, J. J., N. D. Pearson, and Q. Zhang (2021). Impact of demand shocks on the stock market: Evidence from chinese ipos. *Neil D. and Zhang, Qi, Impact of Demand Shocks on the Stock Market: Evidence from Chinese IPOs (December 16, 2021)*.

Liu, L. X., T. M. Whited, and L. Zhang (2009). Investment-based expected stock returns. *Journal of Political Economy 117*(6), 1105–1139.

Lou, D. (2012). A flow-based explanation for return predictability. *Review of Financial Studies 25*(12), 3457–3489.

Norli, Ø., C. Ostergaard, and I. Schindele (2015). Liquidity and shareholder activism. *Review of Financial Studies 28*(2), 486–520.

Peng, C. and C. Wang (2021). Factor demand and factor returns. Technical report, London School of Economics and Political Science, LSE Library.

Sammon, M. and J. J. Shim (2024). Who clears the market when passive investors trade? *SSRN*.

References VI

Schmickler, S. and P. Tremacoldi-Rossi (2023). Spillover effects of payouts on asset prices and real investment. *SSRN*.

Tamburelli, T. (2024). Firms issue shares to satisfy inelastic demand. *SSRN*.

Van der Beck, P. (2022). On the estimation of demand-based asset pricing models. *Swiss Finance Institute Research Paper* (22-67).

Van der Beck, P. (2024). Flow-driven esg returns. *SSRN* (21-71).

Wardlaw, M. (2020). Measuring mutual fund flow pressure as shock to stock returns. *Journal of Finance 75*(6), 3221–3243.

Xu, Q. and T. Kim (2022). Financial constraints and corporate environmental policies. *Review of Financial Studies 35*(2), 576–635.

Zhang, L. (2005). The value premium. *Journal of Finance 60*(1), 67–103.