

Speculation with Information Disclosure

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Research Question and Answer

A Puzzle?

- Sophisticated investors often disclose private information *voluntarily*
- Conventional notion of speculation \Rightarrow *withholding information*

Answer: Speculator Short-termism

- *Theoretically*, concern of short-term portfolio value \Rightarrow disclosure
 - Disclosure, in lieu of trading, *pumps* asset prices in the short term
 - Disclosure \Rightarrow adverse selection risk \downarrow \Rightarrow equilibrium market depth \uparrow
- *Empirically*, suggestive support in the mutual fund industry:
 - Stronger short-term incentives \Rightarrow more aggressive disclosure
 - The liquidity of affected stocks improves following such disclosures

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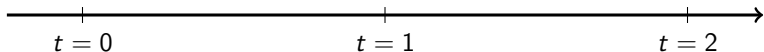
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Baseline Model

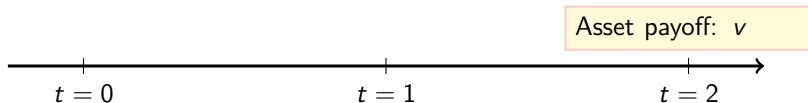


- Three dates: $t = 0, 1, 2$
- One risky asset, with terminal ($t = 2$) payoff:

$$v \sim N(P_0, \sigma_v^2)$$

- All agents risk neutral

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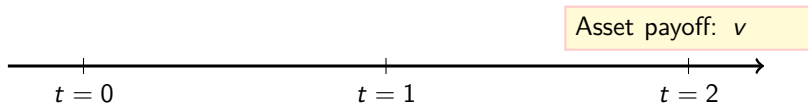


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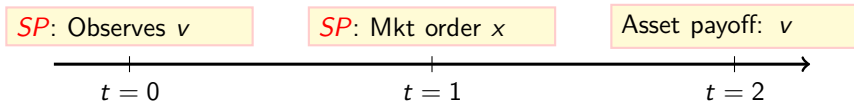


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The Speculator (*SP*)

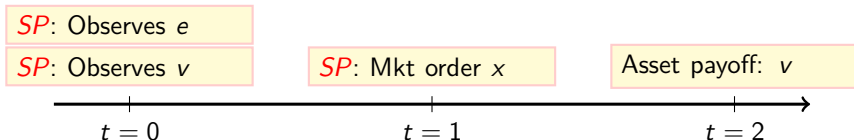
- Privately observes v at $t = 0$ and submits market order x at $t = 1$
- Subject to private endowment shock in the risky asset:

$$e \sim N(\bar{e}, \sigma_e^2) \text{ and } \text{cov}(e, v) = 0$$

- Objective (Pasquariello & Vega 2009; Bhattacharyya & Nanda 2012):

$$W = \underbrace{\gamma}_{\text{Short-termism}} \underbrace{e(P_1 - P_0)}_{\text{Short-term objective}} + (1 - \gamma) \underbrace{x(v - P_1)}_{\text{Long-term profit}}$$

Baseline Model



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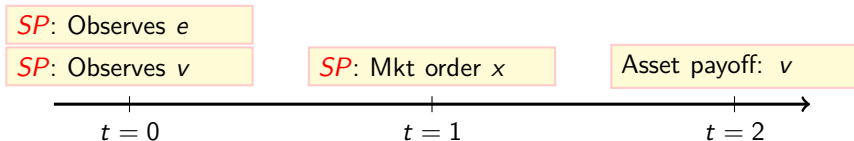
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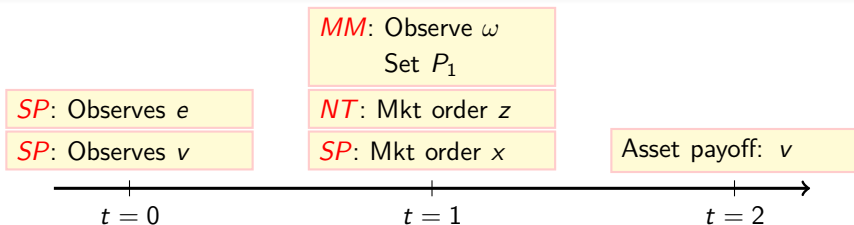
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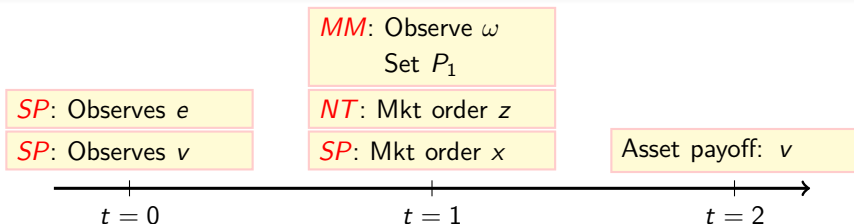
Noise Traders (*NT*)

- Aggregate demand $z \sim N(0, \sigma_z^2)$

Competitive Market-makers (*MM*)

- Observe aggregate order flow $\omega = x + z$
- Set price P_1 to clear the market: $P_1 = \mathbb{E}(v|\omega)$

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Proposition 1: Equilibrium Pumping by Trading (PBT)

- **Baseline linear equilibrium** (Bhattacharyya & Nanda, 2012):
 - Speculator's demand strategy:

$$x^*(v, e) = \frac{v - P_0}{2\lambda^*} + \underbrace{\beta\bar{e} + \frac{\beta}{2}(e - \bar{e})}_{\text{Pumping by Trading (PBT)}} \quad (2)$$

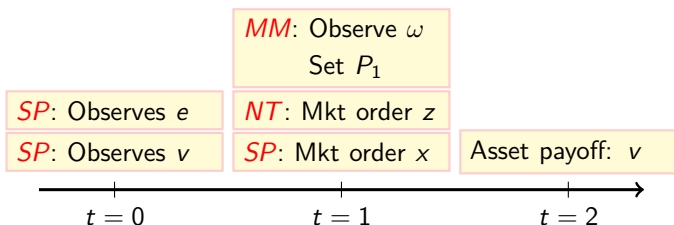
- MMs' pricing strategy:

$$P_1 = P_0 + \lambda^*(\omega - \beta\bar{e}) \quad (3)$$

where $\beta = \frac{\gamma}{1-\gamma}$ and $\lambda^* = \frac{\sigma_v}{2(\beta^2 \frac{\sigma_e^2}{4} + \sigma_z^2)^{\frac{1}{2}}}$

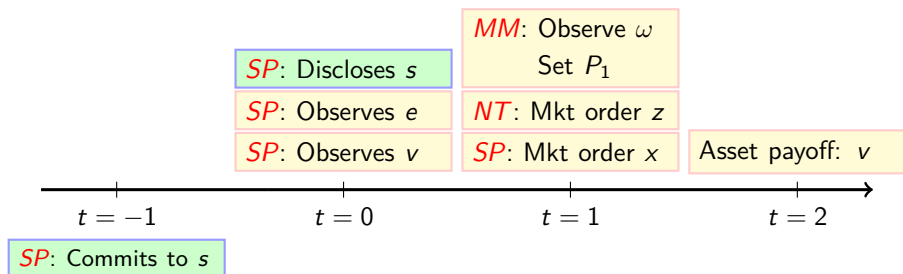
Pumping by Disclosing (PBD)

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Form of Signal

- We assume the signal is linear in asset fundamentals (v) and the speculator's initial endowment (e):

$$s = \delta e + (1 - \delta)v$$

- SP chooses δ **before** observing v and e [Discussion on Commitment Device](#)

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- Intuition
 - In the model, only combinations of v and e can achieve pumping by “misleading” MMs' inference
 - A speculator's endowment may carry information about fundamentals
 - A speculator's talk about fundamentals may suggest her holdings
 - Regulation requires the disclosure of both (Ljunqvist & Qian, 2016)

Propositions 2 & 3: Equilibrium Pumping by Disclosing (PBD)

• Linear equilibrium with PBD

- *SP*'s optimal demand strategy:

$$x^*(v, e) = \beta \bar{e} + \frac{1 - (1 - \delta)\lambda_2}{2\lambda_1}(v - P_0) + \underbrace{\left(\frac{\beta}{2} - \frac{\delta\lambda_2}{2\lambda_1}\right)(e - \bar{e})}_{\text{Substitution b/w PBT \& PBD}} \quad (7)$$

- *MM*'s pricing strategy:

$$P_1 = P_0 + \lambda_1(\omega - \bar{\omega}) + \lambda_2(s - \bar{s}) \quad (8)$$

with $\lambda_1 > 0$ and, if the speculator is better-off disclosing, $\lambda_2 > 0$

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- ***SP* is always better-off by optimally disclosing (δ^*)**

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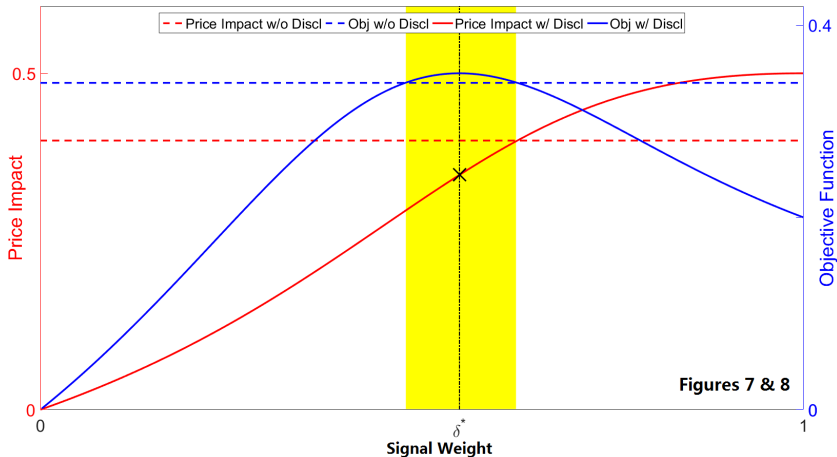
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- **Intuition:** Signal $\Rightarrow \text{corr}(P_1, e) \uparrow \Rightarrow \text{Short-term portfolio value} \uparrow$

Objective Function Graph

Corollary 1: PBD Improves Liquidity ($\lambda_1(\delta^*) < \lambda^*$)



- **Intuition:** PBD + PBT alleviate adverse selection risk more than PBT alone

Price Efficiency

Disclosure with Cost

Optimal Signal Weight

Empirical Analysis

- We test the two main empirical implications of our model:
 - ① *Ceteris paribus*, short-term incentives drive strategic disclosures (PBD)
 - ② *Ceteris paribus*, PBD improves the liquidity of the affected assets
- We test those implications in the mutual fund industry:

	Description	# Total	# Discl. ≥ 1
Firms	S & P 1500, non-financial	1,818	998
Speculators	Mutual Fund Holding Companies	903	350
Disclosures	WSJ, NYT and FT articles, 2005-2014		

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Two Measures of Funds' Incentives to Disclose

① Flow-return sensitivity:

$$\hat{\gamma}_{j,t}^1 = \sum_{h=0}^2 \text{Coef}(\text{Flow}_{j,t}, \text{Ret}_{j,t-h})$$

- **Intuition:** Short-term performance matters more for fund j if its flows depend more strongly on recent returns

② Bets: deviations in holdings from benchmark:

$$\hat{\gamma}_{i,j,t}^2 = \begin{cases} H_{i,j,t}^f / H_{i,t}^m, & \text{if } H_{i,j,t}^f > H_{i,t}^m \\ H_{i,t}^m / H_{i,j,t}^f, & \text{otherwise} \end{cases}$$

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Short-term Incentives and Strategic Disclosure

- Our model implies that funds with stronger **short-term incentives** should disclose more aggressively:

$$\#Discl_{i,j,t} = \beta_0 + \beta_1 \hat{\gamma} + \beta_2 \#Discl_{-i,j,t} + \beta_3 \#Discl_{i,-j,t} + \delta_q + \delta_y + \epsilon_{i,j,t} \quad (29)$$

- The more so for firms more suitable as disclosure targets

$$\begin{aligned} \#Discl_{i,j,t} = & \beta_0 + \beta_1 \hat{\gamma} + \beta_2 \text{Suit}_{i,t} + \beta_3 \hat{\gamma} \times \text{Suit}_{i,t} \\ & + \beta_4 \#Discl_{-i,j,t} + \beta_5 \#Discl_{i,-j,t} + \delta_q + \delta_y + \epsilon_{i,j,t} \end{aligned} \quad (30)$$

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Table 6: Short-term Incentives and Strategic Disclosure

LHS Var.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$\#Discl_{i,j,t}$							
	$\hat{\gamma}^1 = \text{Flow-Return Sensitivity}$				$\hat{\gamma}^2 = \text{Bets}$			
$\hat{\gamma}$	0.015*** (0.004)	0.010** (0.004)	0.015*** (0.004)	0.013*** (0.004)	0.222*** (0.004)	0.205*** (0.004)	0.222*** (0.004)	0.218*** (0.004)
$Suit_{i,t}$		0.118*** (0.006)	0.019*** (0.004)	0.069*** (0.005)		0.041*** (0.004)	0.009*** (0.003)	0.035*** (0.004)
$\hat{\gamma} \times Suit_{i,t}$		0.013* (0.007)	0.005 (0.004)	0.004 (0.005)		0.082*** (0.005)	0.012*** (0.004)	0.042*** (0.005)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	85,240	85,240	85,240	85,240	85,240	85,240	85,240	85,240
R-squared	0.064	0.078	0.065	0.068	0.109	0.122	0.110	0.113
$Suit_{i,t}$		$1/Size_{i,t}$	$Intan_{i,t}$	$Std(Ret)_{i,t}$		$1/Size_{i,t}$	$Intan_{i,t}$	$Std(Ret)_{i,t}$

- All variables are standardized for ease of interpretation

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- Funds with greater short-term incentives are more likely to disclose

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- Stronger effects for stocks more sensitive to pumping

Strategic Disclosure and Liquidity

- The model: PBD may improve the liquidity of affected stocks
- The more so for firms more suitable as disclosure targets

$$\Delta \log(\text{Amihud}_{i,t}) \quad (38)$$

$$\begin{aligned} &= \beta_0 + \beta_1 \hat{\gamma} + \beta_2 \Delta \log(\text{Discl}_{i,t}) + \beta_3 \Delta \log(\text{Discl}_{i,t}) \times \hat{\gamma} \\ &+ \beta_4 \Delta \log(\text{Discl}_{i,t}) \times \text{Suit}_{i,t} + \beta_5 \Delta \log(\text{Discl}_{i,t}) \times \hat{\gamma} \times \text{Suit}_{i,t} \\ &+ \beta_7 \Delta \log(\text{Trading}_{i,t}) + \beta_8 \Delta \log(\text{Trading}_{i,t}) \times \hat{\gamma} + \beta_9 \Delta \log(\text{Trading}_{i,t}) \times \text{Suit}_{i,t} \\ &+ \beta_{10} \Delta \log(\text{Trading}_{i,t}) \times \hat{\gamma} \times \text{Suit}_{i,t} + \beta_{11} \text{Suit}_{i,t} + \beta_{12} \hat{\gamma} \times \text{Suit}_{i,t} \\ &+ \delta' \Delta \log(X_{i,t}) + \delta_y + \delta_q + \epsilon_{i,t} \end{aligned}$$

- Short-termism: $\hat{\gamma}_{i,t}^1 = \text{Avg. } \hat{\gamma}_{j,t}^1$ across funds; robust to $\hat{\gamma}_{j,t}^2$
- Trading intensity: $\text{Trading}_{i,t} = \text{Total \% trading by sample funds}$

Strategic Disclosure and Liquidity

Amihud (2002)

liquidity

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- The more so for firms more suitable as disclosure targets

$$\Delta \log(\text{Amihud}_{i,t}) \quad (38)$$

$$\begin{aligned} &= \beta_0 + \beta_1 \hat{\gamma} + \beta_2 \Delta \log(\text{Discl}_{i,t}) + \beta_3 \Delta \log(\text{Discl}_{i,t}) \times \hat{\gamma} \\ &+ \beta_4 \Delta \log(\text{Discl}_{i,t}) \times \text{Suit}_{i,t} + \beta_5 \Delta \log(\text{Discl}_{i,t}) \times \hat{\gamma} \times \text{Suit}_{i,t} \\ &+ \beta_7 \Delta \log(\text{Trading}_{i,t}) + \beta_8 \Delta \log(\text{Trading}_{i,t}) \times \hat{\gamma} + \beta_9 \Delta \log(\text{Trading}_{i,t}) \times \text{Suit}_{i,t} \\ &+ \beta_{10} \Delta \log(\text{Trading}_{i,t}) \times \hat{\gamma} \times \text{Suit}_{i,t} + \beta_{11} \text{Suit}_{i,t} + \beta_{12} \hat{\gamma} \times \text{Suit}_{i,t} \\ &+ \delta' \Delta \log(X_{i,t}) + \delta_y + \delta_q + \epsilon_{i,t} \end{aligned}$$

- Short-termism: $\hat{\gamma}_{i,t}^1 = \text{Avg. } \hat{\gamma}_{j,t}^1$ across funds; robust to $\hat{\gamma}_{j,t}^2$
- Trading intensity: $\text{Trading}_{i,t} = \text{Total \% trading by sample funds}$

Alternative Measure

Table 7: Strategic Disclosure and Liquidity

VARIABLES	(1)	(2)	(3) $\Delta\log(\text{Amihud})$	(4)	(5)
$\hat{\gamma}$			0.027*** (0.006)	0.024*** (0.005)	0.022*** (0.005)
$\Delta\log(\text{Discl})$	-0.008** (0.003)		-0.010*** (0.003)		-0.009*** (0.003)
$\Delta\log(\text{Discl}) \times \hat{\gamma}$			-0.020*** (0.005)		-0.018*** (0.005)
$\Delta\log(\text{Trading})$		0.023*** (0.005)		0.015*** (0.005)	0.013*** (0.005)
$\Delta\log(\text{Trading}) \times \hat{\gamma}$				0.023*** (0.004)	0.019*** (0.005)
Observations	28,094	28,094	28,094	28,094	28,094
R-Squared	0.514	0.513	0.515	0.514	0.516

- All variables are standardized for ease of interpretation

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- $\beta_3 < 0$: PBD improves market liquidity

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R-Squared	0.514	0.513	0.515	0.514	0.516

substitution b/w
PBT & PBD

- $\beta_8 > 0$: Consistent with model, SEC actions

Table 7 (cont.): Strategic Disclosure and Liquidity

VARIABLES	(12)	(13) $\Delta\log(\text{Amihud})$	(14)
$\hat{\gamma}$	-0.011** (0.005)	0.020*** (0.005)	0.009* (0.005)
$\text{Suit}_{i,t}$	0.345*** (0.018)	-0.006 (0.005)	-0.052*** (0.011)
$\hat{\gamma} \times \text{Suit}_{i,t}$	-0.002 (0.005)	0.006 (0.005)	0.002 (0.006)
$\Delta\log(\text{Discl})$	-0.002 (0.003)	-0.007** (0.003)	-0.005* (0.003)
$\Delta\log(\text{Discl}) \times \hat{\gamma}$	-0.009** (0.004)	-0.017*** (0.004)	-0.012*** (0.004)
$\Delta\log(\text{Discl}) \times \text{Suit}_{i,t}$	-0.002 (0.004)	-0.009** (0.005)	-0.012*** (0.004)
$\Delta\log(\text{Discl}) \times \hat{\gamma} \times \text{Suit}_{i,t}$	-0.016*** (0.004)	-0.027*** (0.006)	-0.028*** (0.005)
...
$\text{Suit}_{i,t}(\Delta\log)$	$1/\text{Size}_{i,t}$	$\text{Intan}_{i,t}$	$\text{Std}(\text{Ret})_{i,t}$

- $\beta_4, \beta_5 < 0$: Liquidity improves more for stocks more suitable to PBD

Table 7 (cont.): Strategic Disclosure and Liquidity

VARIABLES	(12)	(13) $\Delta\log(\text{Amihud})$	(14)
$\hat{\gamma}$	-0.011** (0.005)	0.020*** (0.005)	0.009* (0.005)
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$\text{Suit}_{i,t}(\Delta\log)$	$1/\text{Size}_{i,t}$	$\text{Intan}_{i,t}$	$\text{Std}(\text{Ret})_{i,t}$

- $\beta_4, \beta_5 < 0$: Liquidity improves more for stocks more suitable to PBD

Conclusion

- Novel analysis of strategic speculation with disclosure
- Theory: Private information disclosure can be optimal for a speculator caring about the interim value of her portfolio
 - PBT is costly (and discouraged by SEC)
 - PBD complements (and partially substitutes) PBT
- Empirical analysis: Suggestive support for model's predictions
 - Ljunqvist & Qian (2016): Boutique hedge funds often disclose private information about stocks they hold
 - Mutual funds with greater extent of short-termism disclose more often
 - The liquidity of the affected stocks improves

A1. Commitment Device

- Most models of information acquisition and transmission rely on extent of *ex ante* commitment:
 - e.g., Grossman & Stiglitz (1980), Admati & Plederer (1988), Kamenica & Gentzkow (2015)
- Two forms of commitment devices:
 - **Regulatory requirements**
 - US Investment Advisor Act of 1940: *"...full and fair disclosure of all facts material to the client's engagement of the advisor to its clients, as well as a duty to avoid misleading them"*
 - SEC prohibits any advisor from *"using any advertisement that contains any untrue statement of material fact or is otherwise misleading"*
 - **Reputation concerns**
 - Ljunqvist and Qian (2016): *"...only arbs with a history of making claims that are subsequently confirmed are able to induce to longs to sell..."*

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A2. Price Efficiency

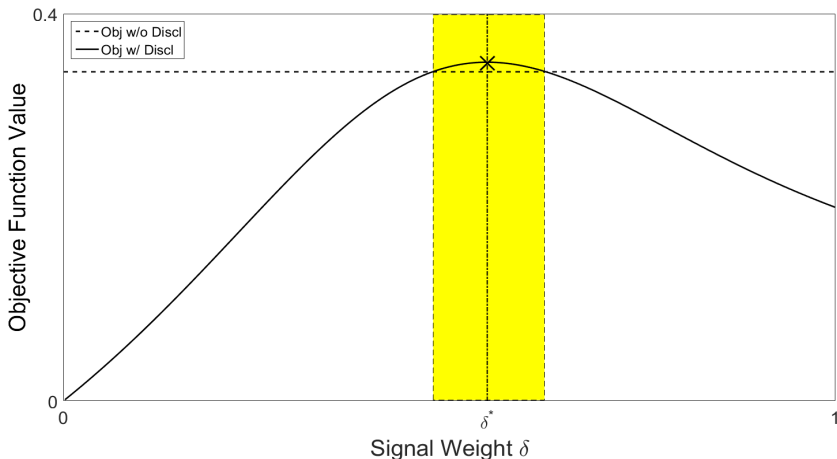
Corollary 2

The following statements about price efficiency hold:

- 1 $\text{var}(v|P_1, \text{not disclose}) = \frac{1}{2}\sigma_v^2$;
- 2 $\text{var}(v|P_1, \text{disclose}, s(\delta))$ increases with δ ;
- 3 $\text{var}(v|P_1, \text{disclose}, s(\delta)) \leq \frac{1}{2}\sigma_v^2$; the inequality is strict if δ is such that disclosure is preferred.
 - PBD makes equilibrium prices more informative (despite more cautious speculation and $\delta < 1$)

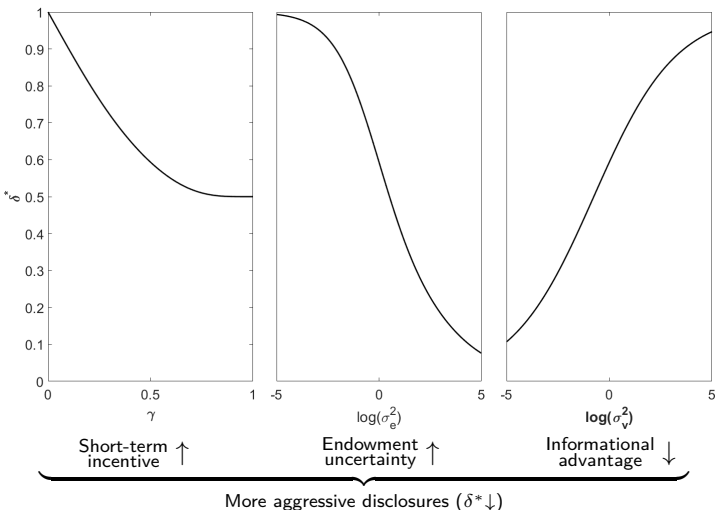
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A3. Optimality of Disclosure: Figure 7



- There exists signal weight δ such that disclosure improves the speculator's objective function [Go Back](#)

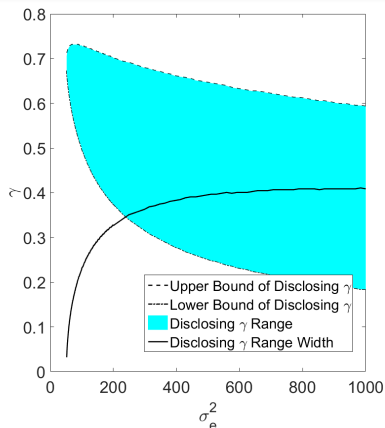
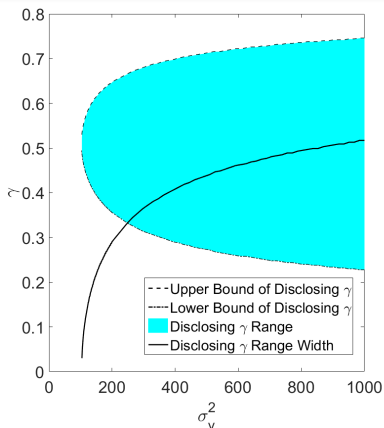
A4. Optimal Signal Weight δ^* : Figures 2 to 4



- Intuition: Disclosure more informative as pumping matters more, costs less

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A5. PBD with Fixed Disclosure Cost: Figures 5 & 6



- Given cost, PBD is not optimal for some γ
- The less so, the greater fundamental or endowment uncertainty, as short-termism and pumping become more important for value function

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A6. Disclosure Example (Ljunqvist and Qian, 2016)

UNIVERSAL TRAVEL GROUP (UTA)

Things gained through unjust fraud are never secure.

- Sophocles

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Company:
Universal Travel
Group (NYSE:
UTA)

Industry: Chinese
Online Travel
Services

Recommendation:
Strong Sell

- UTA is fabricating its publicly filed financial statements. Its actual underlying business is far smaller than its SEC filings indicate.
- UTA's business model is not credible. For example, UTA claims to have earned \$110 million in net revenue in the first three quarters of 2010 on an advertising budget of \$247,449 in the highly competitive leisure travel market. Its competitors spend five to 10 times more on marketing as a percentage of net revenue, casting doubt on the authenticity of UTA's revenue and net income.
- UTA has a deficient and unpopular website, boasts only a minimal brick-and-mortar retail operation and has no kiosks under its control directly sell to consumers. Yet the company's return on assets and asset turnover figures suggest it is the most efficient company in the leisure travel space, consistently trouncing the competition.

A7. Identification of Disclosure: Example

How Often to Trade? It's Tricky for Funds, Too

Norm Alster, NT, 1/8/2012

But even low-turnover funds can be tempted by the bargains created in sharp downturns. "The volatility provides an opportunity to enter stocks that the market may have unduly punished," said Aram Green, one of four portfolio managers of the Legg Mason ClearBridge Mid Cap Growth fund. Though generally slow to turn over its portfolio, the fund managers did some selective nibbling during recent market sell-offs. One buy was F5 Networks, a computer networking company whose stock peaked above \$140 early last year, but by August had dipped below \$70. The fund stepped in, and the stock has since rebounded.

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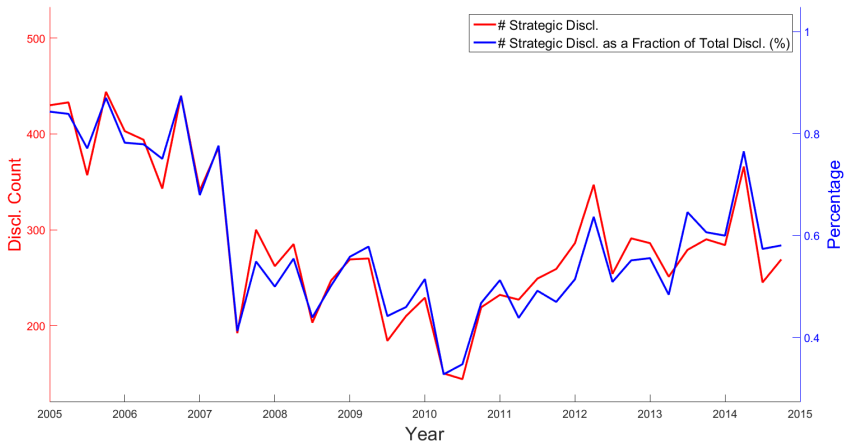
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A8. Time Trend of Disclosures

Number of Strategic Disclosures Over Time

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A9. Two Measures of Funds' Incentives to Disclose

- 1 Based on **flow-return sensitivity**: Estimate a rolling regression for each quarter and each fund k under holding company j

$$\text{Flow}_{k,m} = \alpha_{k,t} + \sum_{h=0}^2 \zeta_{k,t}^h \text{Ret}_{k,m-h} + \epsilon_{m,t}.$$

and define short-termism to be

$$\hat{\zeta}_{k,t} = \hat{\zeta}_{k,t}^0 + \hat{\zeta}_{k,t}^1 + \hat{\zeta}_{k,t}^2.$$

Lastly,

$$\hat{\gamma}_{j,t}^1 = \text{NAV-weighted average of } \hat{\zeta}_{k,t} \text{ within fund family } j.$$

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A9. Two Measures of Funds' Incentives to Disclose

- 2 Based on **deviations in holdings from benchmark (bets)**:

$$H_{i,j,t}^f = \frac{V_t(\text{Firm } i\text{'s Shares Held by Fund } j)}{V_t(\text{All S\&P 1500 Shares Held by Fund } j)}$$

is firm i 's representation in fund j 's portfolio, and

$$H_{i,t}^m = \frac{V_t(\text{Firm } i\text{'s Shares})}{V_t(\text{All S\&P 1500 Shares})}$$

is firm i 's representation in the market portfolio; define

$$\hat{\gamma}_{i,j,t}^2 = \begin{cases} H_{i,j,t}^f / H_{i,t}^m, & \text{if } H_{i,j,t}^f > H_{i,t}^m, \\ H_{i,t}^m / H_{i,j,t}^f, & \text{otherwise} \end{cases}$$

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A10. Alt. Meas. of Short-term Incentives

- The deviation in holdings of firm i 's shares by the mutual fund sector as a whole from the market:

$$H_{i,t}^f = \frac{V_t(\text{Firm } i \text{ Shares Held by All Sample Funds})}{V_t(\text{All S\&P 1500 Shares Held by All Sample Funds})}$$

is firm i 's representation in all sample funds' holdings and

$$H_{i,t}^m = \frac{V_t(\text{Firm } i \text{ Shares})}{V_t(\text{All S\&P 1500 Shares})}$$

is firm i 's representation in the market portfolio; define

$$\hat{\gamma}_{i,t}^2 = \begin{cases} \log\left(\frac{H_{i,t}^f}{H_{i,t}^m}\right), & \text{if } H_{i,t}^f > H_{i,t}^m, \\ \log\left(\frac{H_{i,t}^m}{H_{i,t}^f}\right), & \text{otherwise} \end{cases}$$

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A10. Table 8: Alt. Meas. of Short-term Incentives

VARIABLES	(1)	(2)	(3) $\Delta\log(\text{Amihud})$	(4)	(5)
$\hat{\gamma}$			0.036*** (0.007)	0.028*** (0.006)	0.027*** (0.006)
$\Delta\log(\text{Discl})$	-0.008** (0.003)		-0.011*** (0.004)		-0.010*** (0.004)
$\Delta\log(\text{Discl}) \times \hat{\gamma}$			-0.021*** (0.005)		-0.019*** (0.005)
$\Delta\log(\text{Trading})$		0.023*** (0.005)		0.010** (0.005)	0.008* (0.005)
$\Delta\log(\text{Trading}) \times \hat{\gamma}$				0.035*** (0.004)	0.031*** (0.004)
Observations	28,094	28,094	28,094	28,094	28,094
R-squared	0.514	0.513	0.516	0.515	0.517

- All variables are standardized for ease of interpretation

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R-squared	0.514	0.513	0.516	0.515	0.517

substitution b/w
PBT & PBD

- $\beta_7 > 0$: Substitution between PBT, PBD

A10. Table 8 (cont.): Alt. Meas. of Short-term Incentives

VARIABLES	(12)	(13)	(14)
	$\Delta \log(\text{Amihud})$		
$\hat{\gamma}$	-0.021*** (0.005)	0.025*** (0.006)	0.007 (0.006)
$\text{Suit}_{i,t}$	0.300*** (0.021)	-0.007 (0.004)	-0.076*** (0.011)
$\hat{\gamma} \times \text{Suit}_{i,t}$	0.019*** (0.006)	0.000 (0.005)	0.028*** (0.006)
$\Delta \log(\text{Discl})$	-0.003 (0.003)	-0.007* (0.003)	-0.006* (0.003)
$\Delta \log(\text{Discl}) \times \hat{\gamma}$	-0.012*** (0.004)	-0.017*** (0.004)	-0.013*** (0.004)
$\Delta \log(\text{Discl}) \times \text{Suit}_{i,t}$	-0.001 (0.004)	-0.008* (0.004)	-0.009** (0.004)
$\Delta \log(\text{Discl}) \times \hat{\gamma} \times \text{Suit}_{i,t}$	-0.012*** (0.004)	-0.026*** (0.006)	-0.022*** (0.005)
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- $\beta_4, \beta_5 < 0$: Liquidity improves more for stocks more suitable to PBD

A11. Citron and Valeant

- In October 2015, Citron published a report accusing Valeant Pharmaceuticals of creating fraudulent invoices through a network of pharmacies it controls
- Around the same time, Citron unveiled a short position in Valeant
- Stock price of Valeant plunged by 29% upon publication of the report
- By May 2016, stock price of Valeant had fallen by 90%
- In an interview with *Real Money*, Andrew Left (founder of Citron) reversed his tone
 - “*Wouldn't be surprised if there's a bounce*” in the drugmaker's stock
 - “*I'm long for Valeant, but I also own some out-of-the-money puts*”

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