# Speculation with Information Disclosure*

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**Abstract**

Sophisticated market participants frequently choose to disclose private information to the public—a phenomenon inconsistent with most theories of speculative trading. We propose and test a model to bridge this gap. We show that when a speculator cares about both short-term portfolio value and long-term profit, information disclosure—as a mixture of fundamental information and portfolio holdings—is optimal by inducing competitive dealership to revise prices toward those holdings while alleviating adverse selection. We find that when mutual fund managers have stronger short-term incentives, the frequency of strategic non-anonymous disclosures about stocks in their portfolios—via market-worthy newspaper articles—increases and those stocks' liquidity improves, consistent with our model.

**Keywords:** Liquidity, Market Depth, Trading, Disclosure, Private Information, Mutual Funds.

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# 1 Introduction

Private information is valuable. Much research in financial economics over the last three decades illustrates both its benefits to speculators and its impact on financial market quality through their trading activity. For instance, Kyle (1985) shows that speculators trade cautiously (and anonymously) with private information to minimize its disclosure to less informed market participants. Importantly, in this model and many others, since speculators' trading profits monotonically depend on their informational advantage, protecting information leakage ensures maximal extraction of the rent of being informed.

Yet in reality, we also observe speculators strategically and publicly giving away their supposedly valuable information. These disclosures may take a variety of forms. Portfolio managers share perspectives on their covered firms through media interviews or public commentaries; activist investors have their opinions posted through Twitter feeds or blogs; etc. In a recent paper, Ljungqvist and Qian (2016) document an interesting phenomenon whereby some boutique hedge fund managers reveal evidence of questionable business activities by possibly overvalued firm—which they have gone through considerable trouble (and incurred great costs) to discover. Barring irrationality, this suggests that (cautious) non-anonymous disclosure of private information may indeed be optimal. For instance, Ljungqvist and Qian (2016) suggest that these hedge funds' voluntary disclosures may minimize the noise trader risk they face when taking short positions in those troubled firms (e.g., De Long et al. 1990; Kovbasyuk and Pagano 2020). Intuitively, for fear that market prices may further deviate from (poor) fundamentals, therefore forcing them to liquidate prematurely, fund managers disclose some private information to expedite convergence of prices to fundamentals.[1]

The goal of this paper is to shed further light on the strategic disclosure of information in financial markets. Using a model of speculative trading based on Kyle (1985), we show that if an informed speculator's objective function includes not only long-term profit but also the short-

[1]Consistently, Crawford et al. (2017) find that some small hedge fund managers with limited access to capital *privately* share and discuss their trades on a members-only Web platform to induce other investors to invest similarly and so accelerate the price-discovery process.

term value of her portfolio, public (i.e., non-anonymous) disclosure of private information may naturally arise. This short-term objective (Pasquariello and Vega 2009; Bhattacharyya and Nanda 2013) captures parsimoniously a variety of forms of short-termism among sophisticated market participants: a hedge fund manager with a short position may be concerned about forced liquidation because of a sharp drop in portfolio value (as in Ljungqvist and Qian 2016); a mutual fund manager may care about her fund's net asset value (NAV), upon which her compensation is often contingent; financial derivatives holders have their gains or losses hinge on the price movements of the underlying asset before the expiration date; liquidity constraint or risk-aversion in general can also lead to concerns over short-term asset values. A recent literature on "portfolio pumping" examines the impact of similar incentives for speculators on their trading activity and resulting market outcomes. For instance, Bhattacharyya and Nanda (2013) argue that fund managers may "pump" the short-term value of their portfolios by trading "excessively" in the direction of their initial holdings—i.e., away from what is warranted by long-term profit maximization. Consequently, equilibrium prices are distorted in the short term, the more so the larger weight the fund manager places on her short-term NAV or when she has a larger initial position. We refer to this pumping strategy—long popular with investors and scrutinized by regulators (e.g., Hu et al. 2014; Duong and Meschke 2020)—as "pumping by trading" (PBT).

In our model, we show that strategic public disclosure of private information (in the spirit of Admati and Pfleiderer 1988; Kamenica and Gentzkow 2011) is an additional tool to achieve portfolio pumping. A sophisticated speculator may optimally reveal private information about her holdings and asset fundamentals at the same time, but in a mixed fashion. Unable to distinguish between the two, uninformed market participants (market-makers) may revise their priors about asset fundamentals in response to such disclosures when clearing the market. Accordingly, short-term equilibrium prices are pumped in the direction of the speculator's holdings. We refer to this pumping strategy as "pumping by disclosing" (PBD).

PBT hurts the speculator's long-term profit as she deviates from her long-term profit-maximizing strategy. When available, PBD reduces the adverse effects of PBT by limiting the equilibrium extent of "excessive" trading. Disclosure, however, is also costly, as it compromises the speculator's informational advantage, which in turn deteriorates the speculator's long-term profits. Nonetheless, we show that, in equilibrium, the benefits from alleviating PBT and boosting the speculator's short-term value always outweigh the costs of compromising her informational advantage. Strategic disclosure, therefore, optimally arises in our model.

PBD has important, original implications for our understanding of the determinants of financial market quality. Disclosure has two opposite effects on market liquidity. On the one hand, as more private information is revealed, market-makers face less adverse selection risk and so lower the price impact of order flow, increasing market depth. On the other hand, as speculators refrain from PBT, a larger fraction of the aggregate order flow is driven by information-based trading, decreasing market depth. We show that when disclosure is optimal, the former effect dominates the latter such that PBD improves market liquidity.

Our empirical analysis provides support for the model's implications. Our model suggests that strategic disclosure may be commonplace: Given a reasonably low cost, any partly-short-term-oriented speculator should find it optimal to disclose. Anecdotal evidence broadly supports this implication. For instance, portfolio managers "talk their book", i.e., discuss their positions in order to create or reduce interest and therefore promote buyers or sellers of the securities.[2] Yet, with the noteworthy exception of Ljungqvist and Qian (2016), empirical evidence on this issue remains scarce. To that end, we focus on strategic non-anonymous disclosures made by mutual fund families through three major newspapers: the Wall Street Journal, the Financial Times, and the New York Times between 2005 and 2014. We first establish that these disclosures are accompanied by non-trivial stock price fluctuations within days of their first print publication, consistent with the notion that market participants are paying attention to their release. We then show that three novel composite indices of stronger short-term incentives of U.S. equity mutual fund managers

[2]This phenomenon has received ample coverage in the media. See, for instance, *"Everybody Talks Their Book, Everybody"* on Abnormal Returns, available at http://abnormalreturns.com/2010/02/18/everybody-talks-their-book-everybody/, or *"New Investing Strategy: Talk Your Book"* on BloombergView, available at https://www.bloomberg.com/view/articles/2014-03-07/new-investing-strategy-talk-your-book.

(based on several extant such proxies in the literature) are associated with an increased occurrence of strategic disclosures and greater stock market liquidity for the disclosure targets, especially when those targets are firms more suitable to such strategic disclosures by virtue of their greater fundamental uncertainty, consistent with our model.

Overall, our novel insights on the determinants and non-trivial externalities of strategic disclosure contribute to a recent theoretical literature on the disclosure activity of sophisticated market participants. Kovbasyuk and Pagano (2020) argue that when uninformed investors have limited attention, *price-taking* arbitrageurs in several undervalued assets may optimally choose to overweight and advertise their private payoff information about only one such asset to expedite convergence to fundamentals. When studying bilateral transactions with imperfect competition, Glode et al. (2018) also show that a privately informed agent facing a counterparty endowed with market power may find it optimal to voluntarily disclose his *ex post* verifiable information in order to mitigate the counterparty's inefficient screening, leading to socially efficient trade. However, Han and Yang (2013) postulate that social communication may hinder information production and worsen market efficiency by enabling traders to free-ride on better informed friends or prices, while Liu (2017) finds that optimal disclosure of private long-lived information by a reputable short-horizon investor to uninformed long-horizon followers may lower prior informed trading intensity and equilibrium price informativeness. Relatedly, in a model of "cheap talk" (Crawford and Sobel 1982; Van Bommel 2003), Schmidt (2020) argues that *anonymous price-taking* "rumormongers" may find truthful information sharing attractive when short-term oriented, while choosing to lie when long-term oriented—an insight which may explain the veracity of takeover rumors about U.S.-listed target companies. Others investigate the notion that firm managers have discretion to disclose information that investors do not observe (e.g., Shin 2003; Goto et al. 2009; Hertzberg 2017) or whether they should be required to do so when selling risky assets (e.g., Kurlat and Veldkamp 2015).

Relative to these studies, the main contribution of our theory is in its novel investigation of the natural *interaction* between speculators' *strategic* trading and strategic *public* disclosure of private information about asset payoffs and endowments in pursuit of short-term price manipulation within one of the most popular and well-understood models of informed speculation in the literature (Kyle 1985), an effort that yields novel implications for the process of price formation in the affected markets. Our accompanying empirical evidence is both suggestively supportive of these implications and (to our knowledge) novel to the literature on mutual fund management (e.g., surveyed in Elton and Gruber 2013).

The rest of the paper proceeds as follows. Section 2 introduces our model and derives its implications. Section 3 describes our data sources, while Section 4 presents the empirical results. We conclude in Section 5.

# 2 The Theory

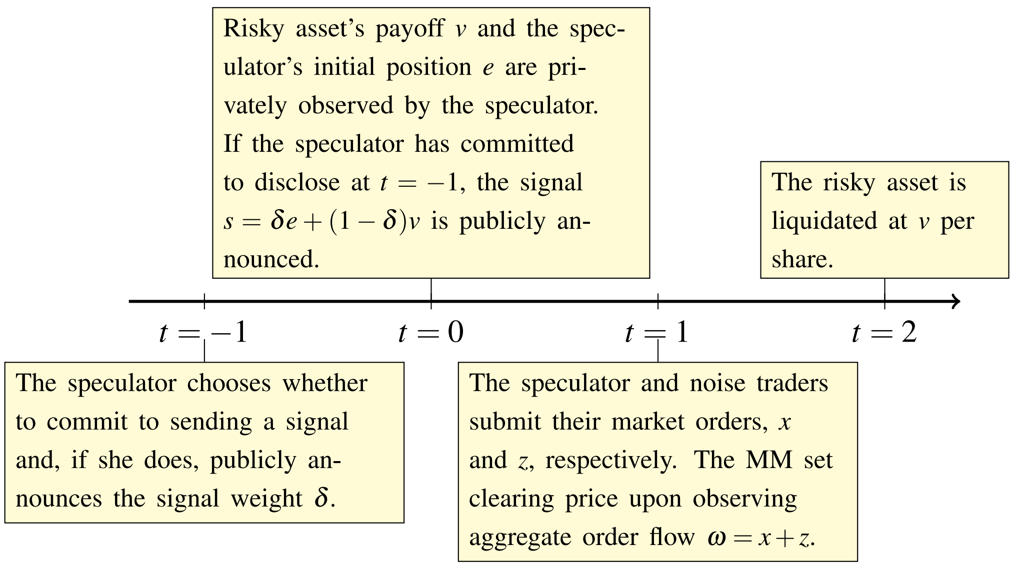
In this section, we show how strategic disclosure may naturally arise in a standard Kyle (1985) setting, in contrast with the conventional wisdom in market microstructure that information leakage hurts speculation. As we show, the key ingredient leading up to this result is that speculators face a trade-off between maximization of long-term profit and short-term portfolio value. As we discuss next, this stylized trade-off captures parsimoniously a variety of real-life conflicting incentives for sophisticated financial market participants.

We begin by describing a baseline model of speculative trading based on Kyle (1985) and Bhattacharyya and Nanda (2013), which gives rise to PBT. Next, we enrich this model by allowing for informative disclosure and derive novel implications of PBD for the equilibrium quality of the affected market. All proofs are in the Appendix.

## 2.1 The Baseline Model

Our basic setting is a batched-order market as in Kyle (1985), with three dates, $t = 0, 1$ and 2, and one risky asset. At date $t = 2$, the payoff of the risky asset—a normally distributed random variable $v$ with mean $P_0$ and variance $\sigma_v^2$—is realized. Three types of risk neutral market participants populate the economy: An informed trader (the speculator or "speculative sector"), competitive market makers (or "market making sector", MM), and liquidity traders. The structure of the economy and the decision processes leading up to order flow and prices are common knowledge among all market participants.

**Figure 1: Time Line**




This figure depicts the time line of the baseline model (starting from date $t=0$) and the signaling model (starting from date $t=-1$).

At date $t=0$, the speculator privately observes the liquidation value of the risky asset ($v$), as well as privately receives an initial endowment ($e$) of the risky asset. Throughout this paper, we use the terms "initial position", "initial endowment" and "initial holding" interchangeably, all referring to the speculator's position in the risky asset before the model's single round of trading.[3] Individual allocations are endogenous in a number of models (see, e.g., Back and Zender 1993, among others). This paper takes as given the level of information asymmetry (regarding both endowments and fundamentals) to study the speculator's strategic behavior thereafter. Hence, as in Bhattacharyya

[3]Assuming *private* endowment information (i.e., endowment uncertainty) is plausible and realistic since, as we further discuss in Sections 2.2 and 2.5, extant regulations imply that market participants may learn about only some (but not all) positions of only some (but not all) speculators, and if so only with delay; see also the discussion in Bhattacharyya and Nanda (2013).

and Nanda (2013), we parsimoniously assume that $e$ is normally distributed with $\mathrm{E}[e] = \bar{e}$ and $\mathrm{Var}\left(e\right) = \sigma_e^2$, as well as independent of $v$ ($\mathrm{Cov}\left(v,e\right) = 0$). Relaxing these assumptions such that the speculator's private fundamental information is noisy and/or correlated with her endowment ($\mathrm{Cov}\left(v,e\right) \neq 0$, e.g., as for the information-based initial short positions of the boutique hedge funds in Ljungqvist and Qian 2016) would complicate the analysis without affecting its main insights (see also Pasquariello 2003, Chapter 1; Pasquariello and Vega 2009).

At date $t = 1$, both the speculator and liquidity traders submit market orders, $x$ and $z$, respectively, to the MM, where $z \sim N(0, \sigma_z^2)$ is independent of all other random variables. The MM observe the aggregate order flow $\omega = x + z$ and set the equilibrium price $P_1 = P_1(\omega)$ that clears the market (see also Figure 1).

The departure we take from Kyle (1985) lies in the speculator's objective function. In Kyle (1985) as well as many other theoretical studies of price formation, long-term profit maximization is the sole objective of the speculator. In reality, however, many sophisticated market participants are found to be short-term oriented, or at least partly so. For instance, mutual fund managers are compensated on the basis of the funds' current net asset value (NAV; see, e.g., Warner and Wu 2011). A fund's recent performance is crucial to its competition for fund flows (e.g., see Ippolito 1992; Brown et al. 1996; Sirri and Tufano 1998) as well as the success of its fund managers in the job market (see, e.g., Chevalier and Ellison 1999). Short-term performance also concerns activist investors as many of them choose to exit from their block holdings after carrying out interventions in a firm; the firm's valuation at the time of the exit would therefore largely affect the return to the activist investors.[4] More broadly, any speculator plagued by liquidity constraints (e.g., see Ljungqvist and Qian 2016; Crawford et al. 2017; and references therein), professional money manager facing relatively short expected tenure due to mobility and turnover (as in Dow and Gorton 1994; Goldman and Slezak 2003), or investor preferring early resolution of uncertainty (e.g., under Epstein and Zin 1989 preferences or when trading in short-lived derivative securities,

[4]For instance, Becht et al. (2017) find activist hedge funds' holding period spans an average of 1.7 years, while Brav et al. (2008) estimate the median holding period to be just above 1 year. Accordingly, Greenwood and Schor (2009) associate abnormal returns surrounding hedge funds' announcements of activist intentions about a target to their ability to induce a takeover for that target.

as in Bernhardt et al. 2006) may wish all or part of her investment to pay off early. Lastly, the short-term performance of an asset may be relevant to investors holding both the asset and options on it. Following Pasquariello and Vega (2009) and Bhattacharyya and Nanda (2013), we capture these short-term incentives parsimoniously by assuming that the speculator's value function is separable in her short-term (i.e., date $t = 1$) value $W_1 = e(P_1 - P_0)$, and long-term (i.e., date $t = 2$) profit $W_2 = x(v - P_1)$, such that:

$$W = \gamma W_1 + (1-\gamma)W_2, \tag{1}$$

where $\gamma \in [0,1)$ captures the relative importance the speculator attaches to her short-term objective $(W_1)$.[5] Finally, at date $t = 2$, the risky asset is liquidated at price $v$.

Consistent with Kyle (1985), we define a Bayesian Nash Equilibrium of this economy as a trading strategy $x(v,e)$ and a pricing rule $P_1(\omega)$, such that the following conditions are satisfied:

1. Utility Maximization: $x(v,e) = \arg\max \mathrm{E}\left[W|v,e\right]$;

2. Semi-strong form market efficiency: $P_1 = \mathrm{E}\left[v|\omega\right]$.

The following proposition characterizes the unique linear equilibrium of this economy.

**Proposition 1 (Baseline, Bhattacharyya and Nanda 2013)** *The unique equilibrium in linear strategies of this economy is characterized by the speculator's demand strategy*

$$x^*(v,e) = \beta\bar{e} + \frac{v - P_0}{2\lambda^*} + \frac{\beta}{2}(e - \bar{e}), \tag{2}$$

*and the MM's pricing rule*

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

[5] Specifically, Pasquariello and Vega (2009) and Bhattacharyya and Nanda (2013) assume the speculator's objective function to be separable in her portfolio's short-term ($t = 1$) and long-term ($t = 2$) NAV (or wealth), i.e., $U = \gamma \times \mathrm{NAV}_1 + (1-\gamma) \times \mathrm{NAV}_2$, where $\mathrm{NAV}_1 = \mathrm{NAV}_0 + e(P_1 - P_0)$, $\mathrm{NAV}_2 = \mathrm{NAV}_0 + e(v - P_0) + x(v - P_1)$, and $\mathrm{NAV}_0 = eP_0$ is her initial ($t = 0$) NAV. The reduced-form objective function of Eq. (1) is then derived by removing from $U$ those terms in $\mathrm{NAV}_1$ and $\mathrm{NAV}_2$ that are not affected by (hence do not affect) the speculator's decision process, i.e., $W = U - \mathrm{NAV}_0 - (1-\gamma)e(v - P_0)$. This simplification is only for economy of notation and has no bearing on our analysis in that replacing $W$ with $U$ in Eq. (1) straightforwardly yields identical results. Similarly, we rule out the trivial case in which $\gamma = 1$ in Eq. (1) yielding unbounded speculation in the risky asset to maximize $W_1$.

*where*

$$\lambda^* = \frac{\sigma_v}{2(\beta^2\frac{\sigma_e^2}{4} + \sigma_z^2)^{\frac{1}{2}}}, \tag{4}$$

*and*

$$\beta = \frac{\gamma}{1-\gamma}. \tag{5}$$

In this model, $\beta$ can be interpreted as the speculator's marginal rate of substitution between short- and long-term objectives. When $\beta = 0$, the speculator reduces to a long-term profit maximizer and the ensuing equilibrium to the one in Kyle (1985): $x^k = \frac{v-P_0}{2\lambda^k}$ and $\lambda^k = \frac{\sigma_v}{2\sigma_z}$. As $\beta$ increases, the speculator's trading strategy deviates from information-based, long-term profit maximization ($x^* \neq x^k$) to successfully pump up/down the equilibrium price in the direction of her initial position in the risky asset ($\mathrm{Cov}\left(P_1, e\right) = \frac{1}{2}\lambda^*\beta\sigma_e^2 > 0$ although $\mathrm{Cov}(v, e) = 0$) by exploiting the MM's uncertainty about her endowment ($\sigma_e^2 > 0$) and ensuing PBT intensity in the aggregate order flow ($\omega = x^*(v, e) + z$). Accordingly, PBT improves market liquidity ($\lambda^* < \lambda^k$) by alleviating the MM's adverse selection risk. Further insights on PBT can be found in Pasquariello and Vega (2009) and Bhattacharyya and Nanda (2013).[6]

## 2.2 Equilibrium with Disclosure

We now extend the baseline model of Section 2.1 by allowing the speculator to publicly disclose information before market clearing.

Sophisticated market participants often make public announcements about asset fundamentals in a variety of forms. For instance, Ljungqvist and Qian (2016) document that some small hedge funds, after spending considerable resources to discover that a target firm is overpriced, not only take short positions in that firm but also publicly disclose that information in detailed reports (e.g.

[6]Pasquariello and Vega (2009) and Bhattacharyya and Nanda (2013) also find these insights to be unaffected by allowing for a discrete number of either heterogeneously informed (hence, less aggressively competing) or homogeneously informed (hence, more aggressively competing) speculators, respectively, yet at the cost of greater analytical complexity relative to the baseline model. Accordingly, in this study we concentrate on the trading and disclosure activity of a single speculator (or speculative sector, as in our accompanying empirical analysis of the mutual fund industry), and leave the investigation of competition (or potential collaboration, as suggested by Crawford et al. 2017) in disclosure for future research.

accusing the target firm of fabricating accounting figures or inflating productive capacity). Other disclosures are less aggressive. For instance, portfolio managers and financial analysts often make media appearances (on such outlets as CNBC, WSJ, etc.) discussing recent corporate events or market outlook. These talks may allow the involved speculator to reveal her private knowledge of asset fundamentals.

Importantly, however, these disclosures may reveal information not only about asset fundamentals, but also the speculator's own stake in that asset. To begin with, U.S. law mandates that the speculator be explicit about the conflict of interest in her disclosures such that the reader or audience should realize that the speculator stands to gain once her suggestions are followed.[7]

Even without conflict of interest, investors may rationally perceive public disclosures by speculators as tainted. After all, a speculator may be inclined, if she holds a long (short) position in an asset, to use her disclosures about that asset to induce investors to buy (sell) it. Current regulations, albeit stringent, may leave the information provider sufficient wiggling room for tuning her message. The speculator may, for instance, disclose evidence with selective emphasis, but without crossing the line between truthful revealing and misrepresentation. Consequently, upon seeing a strongly negatively-toned disclosure about an asset by a speculator, a reader has every reason to suspect that the speculator is intentionally tilting her tone and that she is likely to hold a short position in that asset.[8]

Lastly, information on asset fundamentals and speculative holdings are likely indistinguishable

[7]The Securities Exchange Commission (SEC) imposes fiduciary duty on financial advisors, which is made enforceable by Section 206 of the U.S Investment Advisers Act of 1940. Under the Act, an adviser has an affirmative obligation of utmost good faith and full and fair disclosure of all facts material to the client's engagement of the adviser to its clients. This is particularly pertinent whenever the adviser is faced with a conflict—or potential conflict—of interest with a client. The SEC has stated that the adviser must disclose all material facts regarding the conflict such that the client can make an informed decision whether to enter into or continue an advisory relationship with the adviser. Additionally, the Act also applies to prospective clients. The SEC has adopted rule 206(4)–1, prohibiting any registered adviser from using any advertisement (that includes notice through radio or television) that contains any untrue statement of material facts or is otherwise misleading. Accordingly, Ljungqvist and Qian (2016, p. 1989) note that each of the stock reports prepared by boutique hedge funds in their sample "prominently discloses that the arb[itrageur] has a short position in the target stock."

[8]Relatedly, Banerjee et al. (2018) show that in an investment game in which two players endowed with noisy private fundamental information have an incentive to coordinate, both the sender and the receiver may prefer strategic communication—in the form of only partially informative cheap-talk—to the sender's commitment to perfect disclosure.

to an uninformed investor. On the one hand, any bias in a speculator's disclosure about asset fundamentals will likely depend on the speculator's stake in that asset. On the other hand, speculators are often not entirely transparent about their holdings. Many studies find that institutional investors attempt to disguise their portfolio holdings, e.g., by window dressing, to reduce the leakage of potentially valuable proprietary information (e.g., Lakonishok et al. 1991; Musto 1999; Agarwal et al. 2013; Shi 2017).[9] How much the speculators hide their positions may in turn depend on the fundamental information they want to keep private.

In short, speculators' disclosures are likely to reflect both their private fundamental information and their unobservable holdings; accordingly, uninformed market participants are likely to view any public disclosure by speculators as a function of both their private fundamental information and their unobservable holdings. We capture parsimoniously this observation in the model by assuming that the speculator has the option to publicly disclose a signal $s$ that is a convex combination of $e$ and $v$:

$$s(v,e) = \delta e + (1-\delta)v, \tag{6}$$

where the publicly known coefficient $\delta \in [0,1]$ represents the extent to which the signal is informative about the speculator's holdings ($e$) versus asset fundamentals ($v$). The speculator may freely choose which $\delta$ to use, but she must commit to disclosing the resulting signal ($s$) at the chosen $\delta$ *before* observing $e$ and $v$.[10] Eq. (6) is a parsimonious characterization of the speculator's non-anonymous disclosure strategy.[11] More detailed discussions about the plausibility of this assumption are in Section 2.5, as well as in Section 2 of the Internet Appendix.

Specifically, we model the strategic disclosure of the signal $s$ of Eq. (6) in our setting by

[9]For instance, Shi (2017) shows that the mandatory disclosure of hedge funds' positions via Form 13F filings may reveal valuable private information by leading both to a subsequent drop in their performance and to an increase in its correlation with their competitors.

[10]Accordingly, rational MM with *ex ante* knowledge of the speculator's preferences could compute her *ex ante* optimal $\delta$ even if it was not otherwise publicly known. We discuss how such a $\delta$ is derived in Proposition 3 next after solving for the equilibrium of the economy for any publicly known $\delta$ in Proposition 2.

[11]Non-anonymity in signal disclosure makes it plausible that all other market participants (i.e., the MM) use their *ex ante* knowledge of the speculator's disclosure policy to make inference about $v$ and $e$ from the observed signal $s$ of Eq. (6). Such inference would be both severely impeded and *prima facie* implausible if such a signal was observed alongside other equally noisy, unverified, anonymous rumors. See Schmidt (2020) for an investigation of such rumormongering in the stock market.

introducing a date $t=-1$, in which the speculator can choose either (1) to do nothing and proceed to date $t=0$ (yielding the baseline equilibrium of Proposition 1), or (2) to commit to the following reporting strategy (i.e., to PBD): She first chooses and commits to a particular $\delta$ at $t=-1$; then, at $t=0$ (or at any subsequent time *before* the market clearing price $P_1$ is set), after observing $v$ and $e$, she discloses the resulting signal $s(v,e)$ to the public (see also Figure 1). Each reporting strategy thus corresponds to a choice of the weight $\delta$. When the speculator commits to disclose, the ensuing model has a unique equilibrium in linear strategies, in which the price schedule is a linear function of the signal and the order flow and the speculator's trading strategy is linear in the asset's liquidation value, initial position, and the signal.

**Proposition 2 (Equilibrium with Disclosure)** *If the speculator chooses to send a signal $s$ of Eq.* (6) *with publicly known weight $\delta$ (PBD), the ensuing linear equilibrium of the economy is characterized by the speculator's demand strategy*

$$x^*(v,e)=\frac{\beta}{2}(e+\bar{e})+\frac{v-P_0}{2\lambda_1}-\frac{\lambda_2}{2\lambda_1}(s-\bar{s})=\beta\bar{e}+\frac{\beta\lambda_1-\delta\lambda_2}{2\lambda_1}(e-\bar{e})+\frac{1-(1-\delta)\lambda_2}{2\lambda_1}(v-P_0), \quad (7)$$

*and the MM's pricing rule*

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

*where*

$$\lambda_1=\frac{1}{\sqrt{\alpha^2\beta^2+4\frac{\sigma_z^2}{\sigma_v^2}+4\alpha^2\frac{\sigma_z^2}{\sigma_e^2}}}>0, \quad (9)$$

$$\lambda_2=-\frac{\lambda_1}{\delta}\left(\beta-\frac{4\lambda_1\sigma_z^2}{(\frac{1}{\alpha}-\beta\lambda_1)\sigma_e^2}\right), \quad (10)$$

*and*

$$\alpha=\frac{1-\delta}{\delta}. \quad (11)$$

The coefficients $\lambda_1$ and $\lambda_2$ represent the equilibrium price impact of the order flow and public signal, respectively. In particular, it can be shown that for any $\delta$ such that disclosure is *ex ante* optimal (as discussed next), $\lambda_2 > 0$.[12] Accordingly, relative to the baseline equilibrium of Eq. (2) and for any given level of market liquidity $\lambda'$, the speculator trades "less" in Eq. (7) both on private fundamental information ($\frac{1-(1-\delta)\lambda_2}{2\lambda'} < \frac{1}{2\lambda'}$) and her endowment ($\frac{\beta\lambda'-\delta\lambda_2}{2\lambda'} < \frac{\beta}{2}$). Intuitively, because the signal partly resolves fundamental uncertainty, information-based trading is less profitable; this captures the "cost" of PBD. However, PBD both alleviates the need for PBT and makes it less effective (by improving market depth, i.e., lowering $\lambda_1$).[13] As we show shortly, the former effect of PBD translates into a reduction in long-term profit, whereas the latter yields an increase in long-term profit because of the reduced scale of PBT.

The MM incorporate the signal's information content about fundamentals in the market clearing price of Eq. (8). However, since the MM are unable to disentangle the signal's fundamental-related component and endowment-related component, both components have a positive impact on the equilibrium price. The fact that the signal moves prices in the direction of the endowment is especially desirable to a speculator who is at least partly short-term-oriented, i.e., at least partly interested in increasing the market value of her initial holdings of the risky asset (e.g., as for the boutique hedge funds in Ljungqvist and Qian 2016). The equilibrium price is high (or low) exactly when a high (or low) price is desirable—i.e., when her initial holdings of the asset are large ($e > \bar{e}$) (or small ($e < \bar{e}$)).

As we noted earlier, the equilibrium in Proposition 2 is conditional on the speculator committing to disclose a signal $s$. We now discuss when such a commitment is optimal. As we show in the following proposition, there always exist suitable choices of signal weight $\delta$, at which committing to disclosure is *ex ante* optimal.

**Proposition 3 (Optimality of Disclosure)** *Let $D$ be the indicator variable for disclosure: $D = 1$ if the speculator commits to sending a signal $s$ of Eq.* (6) *and $D = 0$ otherwise. The following*

[12] *Ceteris paribus* for other model parameters, there exist some *ex ante* suboptimally "high" $\delta$ coefficients such that $\lambda_2 < 0$, as in those circumstances the MM use the resulting disclosed signal $s$ of Eq. (6) to learn mostly about $e$ and so offset any effect of PBT on $P_1$ via the aggregate order flow.

[13] Note that $\lambda_1$ of Eq. (9) is increasing, while $\lambda^*$ of Eq. (4) is decreasing, in endowment uncertainty $\sigma_e^2$. Intuitively, when $\delta$ is exogenous, an increase in $\sigma_e^2$ makes both the signal $s$ of Eq. (6) less informative about $v$ and PBT more effective (as in Bhattacharyya and Nanda 2013), but the former effect dominates upon the latter in Proposition 2. However, it can be shown that when $\delta$ is endogenously selected, as we discuss in Proposition 3 next, it is decreasing in $\sigma_e^2$ (see, e.g., Figure 4) such that so is, once again, the ensuing equilibrium price impact.

*results hold:*

1. *The ex ante ($t = -1$) expected value function to the speculator of committing to sending a signal with weight $\delta$ is given by*

$$\mathrm{E}\left[W \middle| D = 1, \delta\right] = (1-\gamma)\lambda_1\sigma_z^2\frac{1+\alpha\beta\lambda_1}{1-\alpha\beta\lambda_1}, \tag{12}$$

*where $\lambda_1$ is defined in Eq.* (9).

2. *The ex ante ($t = -1$) expected value function to the speculator of not disclosing a signal is given by*

$$\mathrm{E}\left[W \middle| D = 0\right] = \frac{1-\gamma}{4\lambda^*}(\sigma_v^2 + \beta^2\lambda^{*2}\sigma_e^2), \tag{13}$$

*where $\lambda^*$ is defined in Eq.* (4).

3. *Disclosing is incentive compatible. Let $\delta^*$ be the optimal signal weight with disclosure:*

$$\delta^* = \arg\max_{\delta} \mathrm{E}\left[W \middle| D = 1, \delta\right], \tag{14}$$

*then $\delta^* \in (0,1)$ and*

$$\mathrm{E}\left[W \middle| D = 1, \delta^*\right] > \mathrm{E}\left[W \middle| D = 0\right], \;\; \forall \sigma_v^2 > 0, \sigma_e^2 > 0, \sigma_z^2 > 0, \gamma \in (0,1). \tag{15}$$

The intuition for this result is that even with disclosure, the speculator can still replicate the equilibrium outcome in the baseline model by carefully choosing the signal weight $\delta$. If the speculator sends a signal with no information content above and beyond that of the aggregate order flow, then such a signal is redundant and the equilibrium reduces to the baseline equilibrium. It can be shown that such a redundant signal is one with the weight $\hat{\delta} = \frac{1}{1+\lambda^*\beta\frac{\sigma_e^2}{\sigma_v^2}} \in (0,1)$ for any $\beta > 0$, where $\lambda^*$ is given by Eq. (4).[14] Thus the action set of the speculator in the signaling equilibrium

[14] Specifically, under $\hat{\delta}$, the MM's two sources of information are: (a) The order flow $\omega - \bar{\omega} = \frac{1}{2\lambda^*}(v - P_0) + \varepsilon_\omega$,

of Proposition 2 is $\delta \in [0,1]$ versus $\delta \in \{\hat{\delta}\}$, which is effectively her action set in the baseline equilibrium of Proposition 1. With a strictly larger action set, optimality of disclosure follows.

It might be counterintuitive that it is suboptimal for the speculator not to disclose. It is an established notion that (more) private information yields (more) trading profit. For instance, in Kyle (1985), the greater her informational advantage, the more profit the speculator could reap from trading. Releasing a signal of her private information is thus tantamount to (at least partly) giving away expected trading profits. Accordingly, most existing models in the microstructure literature do not leave room for voluntary disclosure. In our model, however, the speculator is not a pure long-term profit maximizer. The loss of long-term profit caused by information revelation from PBD is compensated by gains in the short-term value of her portfolio, as implied by what can be shown as a greater $\mathrm{Cov}(P_1, e) = \frac{\beta\lambda_1 + \delta\lambda_2}{2}\sigma_e^2 > 0$ in equilibrium than in absence of PBD (see also Section 2.1); and these gains outweigh those losses—as shown in Proposition 3. By incorporating short-termism in the speculator's objective function, our model has the potential to explain the frequently observed voluntary disclosures in financial markets.

The following example may shed further light on the intuition behind Proposition 3. Assume that a speculator has the intention to "pump" price by disclosing a signal. In order for that signal to have any price impact, it must contain at least some fundamental information. Intuitively, any signal containing only information about the endowment $e$ and possibly some noise $\varepsilon$ would not affect the MM's fundamental priors while also reducing *ex post* uncertainty about $e$ and so making any PBT by the speculator less effective (see also Bhattacharyya and Nanda 2013). Thus, in general, the signal should be a function of $v$ and possibly some noise $\varepsilon$. If the speculator follows a "naïve" strategy by setting $\varepsilon$ to be purely random noise, such a disclosure would move prices in the

where $\varepsilon_\omega = \frac{\beta}{2}(e - \bar{e}) + z$, is the noise about fundamentals; and (b) the (scaled) signal $\frac{s - \bar{s}}{2\hat{\delta}\lambda^{*2}\beta\frac{\sigma_e^2}{\sigma_v^2}} = \frac{1}{2\lambda^*}(v - P_0) + \varepsilon_s$, where $\varepsilon_s = \varepsilon_\omega + \eta$ with $\eta = \frac{2\sigma_z^2}{\beta\sigma_e^2}(e - \bar{e}) - z$. Since $\varepsilon_\omega$, $\eta$ and $v - P_0$ are mutually independent, the signal is just the order flow plus uninformative noise. This implies that $v \perp s|\omega$, i.e., that given the order flow, a signal with weight $\hat{\delta}$ is redundant in learning about asset fundamentals. Thus, $\lambda_1 = \lambda^*$, $\lambda_2 = 0$, and the equilibrium reduces to the baseline equilibrium of Proposition 1. Accordingly, when $\gamma = \beta = 0$, the above economy reduces to Kyle (1985) such that the long-term profit maximizing speculator is indifferent to her endowment shock $e$ and both the optimal and redundant signals fully reveal it to the MM ($\delta^* = \hat{\delta} = 1$).

desired direction only when the speculator's endowment shock happens to be in the same direction as the fundamental shock; otherwise the signal may backfire. The net effect of such a signal is that the speculator obtains no short-term gain on average but only lowers her long-term profits due to a compromised informational advantage.[15]

Consider now a disclosure strategy that sets $\varepsilon \propto e$. Since from a Bayesian perspective, how the noise is constructed is irrelevant to the inference of $v$, a signal with $\varepsilon \propto e$ has the same impact on the MM's fundamental priors as a signal with purely random noise (given the same noise variance). But now the signal has an added benefit of leading the MM to interpret, e.g., a "large" endowment shock as a "large" fundamental shock, potentially leading to a "large" price change. Note that when $\varepsilon = \frac{1}{\alpha}e$, this is effectively the signal in Eq. (6). Hence, pumping by disclosing is most effective exactly when the speculator cares most about it—when her endowment is "large."

## 2.3 Pumping by Trading and Pumping by Disclosing

In order to achieve her short-term objective, the speculator may trade "excessively" in the direction of her initial endowment (PBT) and/or disclose a mixed signal (PBD). Our earlier discussion suggests that the speculator optimally uses both tools in equilibrium. In this section, we isolate the two tools and examine separately their effect on the speculator's short-term and long-term objectives ($W_1$ and $W_2$, respectively).

To that end, it is useful to take a closer look at the process by which information is used by the MM and the speculator. In the signaling equilibrium of Proposition 2, the MM receive the signal and the order flow simultaneously (Eq. (8)). Alternatively, one could think of the MM as separately absorbing the information in two steps. First, the MM observe the signal and update their priors about $v$ and $e$. Second, the MM observe the order flow and, together with their updated priors, set the price. One could also think of the speculator as acting in two steps. First, she observes $v$ and $e$, discloses the signal according to Eq. (6), and forms belief about the MM's updated priors.

[15] Accordingly, the disclosure of two *separate* such signals for $e$ and $v$, respectively, would cost the speculator both short-term gains and long-term profits. A formal proof of these arguments in our setting for the class of linear signals $s = e + \varepsilon$ and/or $s = v + \varepsilon$ is available in Section 1 of the Internet Appendix.

Second, she trades in the updated information environment. While both approaches yield the same equilibrium outcomes, the two-step approach allows for a more intuitive interpretation: The first step involves no trading and the second step represents a baseline equilibrium without disclosure. This helps isolate the effects of PBT and PBD.

### 2.3.1 A Two-step Formulation of the Signaling Equilibrium

We begin by formally describing an alternative approach to construct the signaling equilibrium of Proposition 2. Consider a two-stage game. In the first stage, the speculator privately observes $v$ and $e$ and then announces her signal $s$ of Eq. (6) at a predetermined weight $\delta$. In the second stage, trading takes place at the realized market clearing price $P_1$ (as the baseline equilibrium).

We consider the Perfect Bayesian Equilibrium of this two-stage game. Note that with the *ex ante* commitment to disclose and a predetermined signal weight, no optional action occurs in the first step: Nature draws $v$ and $e$, publicly reports $s$, the speculator observes $v$ and $e$ directly and the MM update their priors about $v$ and $e$ according to $s$. Thus we only need to study the equilibrium in the second step. We start with the information environment in the continuation game after Nature's draw—the common prior in the second step. Since the speculator is fully informed, the updated common prior is the MM's perceived distribution of $(v,e)$ conditional on $s$:

$$\begin{pmatrix} v \\ e \end{pmatrix} | s \sim N\left[\begin{pmatrix} \tilde{v} \\ \tilde{e} \end{pmatrix}, \begin{pmatrix} \tilde{\sigma}_v^2 & -\tilde{\sigma}_v\tilde{\sigma}_e \\ -\tilde{\sigma}_v\tilde{\sigma}_e & \tilde{\sigma}_e^2 \end{pmatrix}\right] \tag{16}$$

where

$$\tilde{v}(v,e) = P_0 + \frac{(1-\delta)\sigma_v^2}{\delta^2\sigma_e^2 + (1-\delta)^2\sigma_v^2}(s-\bar{s}) \tag{17}$$

$$\tilde{e}(v,e) = \bar{e} + \frac{\delta\sigma_e^2}{\delta^2\sigma_e^2 + (1-\delta)^2\sigma_v^2}(s-\bar{s}) \tag{18}$$

$$\tilde{\sigma}_v^2(v,e) = \frac{\delta^2\sigma_v^2\sigma_e^2}{\delta^2\sigma_e^2 + (1-\delta)^2\sigma_v^2} \tag{19}$$

and

$$\tilde{\sigma}_e^2(v,e) = \frac{(1-\delta)^2\sigma_v^2\sigma_e^2}{\delta^2\sigma_e^2 + (1-\delta)^2\sigma_v^2} \tag{20}$$

Proposition 1 can be applied to fully characterize the second stage equilibrium by replacing the prior distribution with the updated posteriors of Eqs. (16) to (20). The entire game is therefore a set of baseline equilibriums, one for each realization of $(v, e)$. Our next result shows that this two-stage approach yields the same equilibrium outcome as the single-stage signaling equilibrium.

**Proposition 4 (Equivalence)** *The Perfect Bayesian Equilibrium of the two-step game is identical to the single-step signaling equilibrium: For any realization of v, e, and z, the speculator submits the same market order, and the MM set the same price.*

This two-step approach emphasizes the role of disclosure as reshaping the information environment before market clearing. Effectively, price is formed in two steps: First, information in the disclosed signal is incorporated in the form of the MM's updated posteriors about $v$ and $e$; second, information in the order flow is incorporated when the market clears. This is a convenient result as it allows to separate the effects of PBT and PBD on the equilibrium.

### 2.3.2 Decomposing the Effects of PBD

Following the two-step approach, we decompose the speculator's *ex ante* expected value function in equilibrium as:

$$\mathrm{E}\left[W|D=1,\delta\right] = \underbrace{\mathrm{E}\left[\overbrace{\gamma e(\tilde{v}-P_0)}^{\text{Short-term}}|D=1,\delta\right]}_{\text{Signaling (first stage)}} + \underbrace{\mathrm{E}\left[\overbrace{\gamma e(P_1-\tilde{v})}^{\text{Short-term}} + \overbrace{(1-\gamma)x(v-P_1)}^{\text{Long-term}}\Big|s,D=1,\delta\right]}_{\text{Trading (second stage)}} \quad (21)$$

(see also Eq. (A.11)).[16] Only trading can generate long-term profit, whereas both disclosure and trading serve to the speculator's short-term objective. The signal firstly shifts the price via updating

[16] In particular, the speculator's *ex ante* expectation of $W$, i.e., given her date $t=-1$ information set, is given by

$$\begin{aligned}
&\mathrm{E}\left[W|D=1,\delta\right]\\
=&\mathrm{E}\left\{\mathrm{E}\left[W|s,D=1,\delta\right]|D=1,\delta\right\}\\
=&\mathrm{E}\left\{\mathrm{E}\left[\gamma e(\tilde{v}-P_0)|s,D=1,\delta\right]|D=1,\delta\right\}+\mathrm{E}\left\{\mathrm{E}\left[\gamma e(P_1-\tilde{v})+(1-\gamma)x(v-P_1)\big|s,D=1,\delta\right]\big|D=1,\delta\right\},
\end{aligned}$$

where, in the last line, the inner expectation in the first term drops because of the law of iterated expectations while the outer expectation in the second term drops because the expected value function conditional on the information set $(s, D=1, \delta)$ is independent of $s$.

the MM's inference of $v$; then this inference (and the market clearing price) is further affected by the speculator's trading in the aggregate order flow. The effect of the signal persists through the trading stage, as it shifts the prior mean of the MM's valuation. By construction, the signal positively depends on both $v$ and $e$. The first dependence means that the MM adjust their inference ($\tilde{v}$) of $v$ upward upon seeing a positive signal, whereas the second dependence means that a positive endowment shock $e$ leads to a positive signal. This feature serves to the speculator's short-term objective as it implies a positive correlation between $e$ and $\tilde{v}$ ($\mathrm{Cov}\left(\tilde{v}, e\right) = \frac{(1-\delta)\delta\sigma_v^2\sigma_e^2}{\delta^2\sigma_e^2+(1-\delta)^2\sigma_v^2}$).

**Table 1: Decomposition of Speculator's *Ex Ante* Expected Value Function**

| | Actions | Short-term Objective | | Long-term Objective | |
|---|---|---|---|---|---|
| | | D=0 | D=1 | D=0 | D=1 |
| **Stage 1** | PBD | 0 | $\frac{1}{2}\gamma\tilde{\sigma}_v\tilde{\sigma}_e$ | 0 | 0 |
| **Stage 2** | PBT | $\frac{\gamma\beta}{2}\lambda^*\sigma_e^2$ | $\frac{\gamma\beta}{2}\lambda_1\tilde{\sigma}_e{}^2$ | $(1-\gamma)\lambda^*\sigma_z^2$ | $(1-\gamma)\lambda_1\sigma_z^2$ |

Table 1 decomposes the speculator's *ex ante* expected value function by PBT and PBD and their contributions to her long-term and short-term objectives. Comparing each component of the value function under disclosure ($D=1$) versus no disclosure ($D=0$) reveals that: (1) The direct effect (first step) of PBD is a boost to the speculator's short-term objective ($\frac{1}{2}\gamma\tilde{\sigma}_v\tilde{\sigma}_e$) but there is no direct effect on the long-term objective; (2) PBD allows the speculator to optimally cut back on her PBT such that the effect of PBT on her short-term objective is reduced ($\frac{\gamma\beta}{2}\lambda^*\sigma_e^2 > \frac{\gamma\beta}{2}\lambda_1\tilde{\sigma}_e{}^2$), as we later show that in equilibrium $\lambda_1 < \lambda^*$; (3) PBD has two opposing effects on the speculator's long-term objective: First, her signal gives away part of the speculator's private information about $v$; second, less PBT means less information leakage about $v$ by the order flow; the net effect is a loss in long-term profit, as reflected by the aforementioned reduction in equilibrium price impact ($(1-\gamma)\lambda_1\sigma_z^2 < (1-\gamma)\lambda^*\sigma_z^2$).[17]

[17] Propositions 1 and 2 imply that since the equilibrium price set by competitive dealership is semi-strong form efficient, the speculator's expected long-term profit consists entirely of noise traders' loss, and therefore depends solely on equilibrium price impact $\lambda$ per given noise trading intensity (as in Kyle 1985; see also the discussion in Bhattacharyya and Nanda 2013). Using Eqs. (16) to (20), the expression for equilibrium price impact with disclosure ($\lambda_1$ in Eq. (9)) can be rewritten as:

$$\lambda_1 = \frac{\tilde{\sigma}_v}{2\sqrt{(\frac{\beta}{2})^2\tilde{\sigma}_e^2 + \sigma_z^2}}.$$

Proposition 3 shows that, after aggregating these effects, the speculator's value function is improved by PBD.

## 2.4 Equilibrium Properties and Comparative Statics

*A. Comparative Statics*

The optimal signal weight ($\delta^*$) depends on the model's primitives. There is, unfortunately, no analytically tractable solution for $\delta^*$. Therefore, we derive its comparative statics (and some of the properties of the ensuing equilibrium) numerically; alternative parameterizations only affect the scale of the economy. We begin with Figure 2, where we plot $\delta^*$ as a function of $\gamma$—the relative importance of the speculator's short-term objective—for different combinations of such primitives as $\sigma_v^2$ and $\sigma_e^2$. For all combinations, optimal signal weight decreases monotonically in $\gamma$. Intuitively, when $\delta$ is smaller, the signal becomes more informative about $v$, leading to a larger loss of the speculator's informational advantage and long-term profit. Of course, if the speculator only cared about the long run ($\gamma = 0$), she would choose never to disclose valuable private information (i.e., $\delta = 1$). On the other hand, when the speculator values the short run ($\gamma > 0$), she wants the signal to have a large price impact; thus she needs the signal to be informative about both $v$ and $e$. It can be shown that a $\delta = \frac{\sigma_v}{\sigma_e+\sigma_v}$ induces the largest price impact of the signal in the direction of the speculator's endowment; in other words, this is the signal weight the speculator would choose if she cared only about the short-run.[18] Correspondingly, as $\gamma$ increases, the optimal choice of $\delta$ decreases from 1 to $\frac{\sigma_v}{\sigma_e+\sigma_v}$.

Figures 3 and 4 plot $\delta^*$ with respect to $\sigma_v^2$ and $\sigma_e^2$, for different choices of $\gamma$ while holding

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Intuitively, the numerators and denominators of both the above expression and the one for price impact without disclosure ($\lambda^*$ of Eq. (4)) reflect the amount of information and non-information-based trading, respectively. With PBD, there is less information-based trading as the signal compromises the speculator's informational advantage, improving the price impact and reducing the speculator's profit. However, with PBD, non-information-based trading (PBT) is also reduced; this leads to the opposite effects on price impact and long-term profit. The net effect is that the speculator loses long-term profit.

[18] In particular, if the speculator cared only about the short-run, order flow would have zero price impact as the speculator's trades would have no information content. Thus, only the signal could move the price and her short-run value would be given by $\mathrm{E}\left[\gamma e(\tilde{v} - P_0)\right] = \gamma \mathrm{Cov}\left(\tilde{v}, e\right)$, which is maximized at $\delta = \frac{\sigma_v}{\sigma_v+\sigma_e}$ since so is $\mathrm{Cov}\left(\tilde{v}, e\right) = \frac{\delta(1-\delta)\sigma_v^2\sigma_e^2}{\delta^2\sigma_e^2+(1-\delta)^2\sigma_v^2}$.

all other parameters fixed. These plots show that the optimal choice of $\delta$ increases in $\sigma_v^2$ but decreases in $\sigma_e^2$. There are two forces driving this result. First, as noted earlier, the direct effect of PBD is maximized at $\delta = \frac{\sigma_v}{\sigma_e+\sigma_v}$, which is increasing in $\sigma_v^2$ and decreasing in $\sigma_e^2$, since in those circumstances so is the *ex ante* effectiveness of PBD at updating the MM's priors about $v$ toward $e$. For example, as $\sigma_e^2$ decreases, so do the MM's *ex ante* uncertainty about the speculator's endowment and its comovement with their fundamental posteriors ($\mathrm{Cov}\left(\tilde{v}, e\right)$); hence, the speculator has to disclose more of $e$ in the signal $s$ to sway those posteriors in the direction of her short-term objective (see, e.g., Eq. (21) and Table 1). Second, since the indirect effect of disclosure involves reduction in long-term profit, a larger $\delta$ means a smaller weight on $v$, and therefore a smaller information loss. Thus the speculator optimally increases $\delta$ when the cost of information loss is larger, i.e., when $\sigma_v^2$ is large.

**Conclusion 1** *The optimal signal weight $\delta^*$ increases in $\sigma_v^2$, decreases in $\sigma_e^2$, and decreases in $\gamma$.*

We turn next to the size of disclosure gains. In particular, we examine how large a cost to disclosure would a speculator be willing to bear while still preferring PBD. Such a cost can be thought of as the opportunity cost to the manager of spending time in a TV studio, of giving an interview to the press, of composing and publishing a report, or the monetary cost of making an advertisement. For simplicity, we assume this cost to be a fixed amount $c$ paid by the speculator if she commits to send a signal at $t = -1$. Proposition 3 suggests that disclosure is always optimal when it is costless. Given a fixed cost $c$ to disclose, we ask the following questions: For what range of $\gamma$ would the speculator still find it optimal to disclose? How does this range depend on the information environment ($\sigma_v^2$ and $\sigma_e^2$)?

To answer these questions, let

$$I^{\gamma}(c, \sigma_v^2, \sigma_e^2, \sigma_z^2) = \{\gamma \in [0,1) | \max_{\delta} \mathrm{E}\left[W|D=1,\delta\right] - c > \mathrm{E}\left[W|D=0\right]\}.$$

Intuitively, $I^{\gamma}$ is the set of $\gamma$ such that the speculator prefers costly disclosure to no disclosure *ex ante*. Figures 5 and 6 then plot the relation between $I^{\gamma}$ and $\sigma_v^2$ and $\sigma_e^2$, respectively. The two dashed lines represent upper and lower bounds of $I^\gamma$, while the solid line represents the width of the interval $[\inf I^\gamma, \sup I^\gamma]$. Note that the direct effect of PBD is to boost the short-term objective by $\gamma \mathrm{Cov}(\tilde{v}, e) = \gamma \frac{\delta^*(1-\delta^*)\sigma_v^2\sigma_e^2}{\delta^{*2}\sigma_e^2+(1-\delta^*)^2\sigma_v^2}$, which suggests that the direct gains to disclosure may be increasing in both $\sigma_v^2$ and $\sigma_e^2$.[19] This is generally consistent with Figures 5 and 6. Intuitively, both larger $\sigma_v^2$ and larger $\sigma_e^2$ increase the scope of the speculator's value function (i.e., short-termism and pumping become more important for it), and therefore can support a wider range of $\gamma$ for a given fixed disclosure cost $c$. The sole (unreported) exception arises at implausibly large values of $\sigma_e^2$, where $(\sup I^\gamma - \inf I^\gamma)$ may decline in $\sigma_e^2$ since the resulting disclosed signal $s$ of Eq. (6) becomes so noisy as to make PBD less valuable to a short-term-oriented speculator relative to PBT alone.

**Conclusion 2** $(\sup I^\gamma - \inf I^\gamma)$ *is decreasing in c, increasing in* $\sigma_v^2$ *and generally increasing in* $\sigma_e^2$.

*B. Disclosure and Market Liquidity*

We now turn to the effect of PBD on market liquidity. As a benchmark, consider first the effect of a public signal of $v$ on the equilibrium depth of an economy where the speculator maximizes exclusively her long-term profit ($\gamma = 0$). Intuitively, any signal of $v$ would reduce the uncertainty about the asset's payoff, hence lowering adverse selection risk and equilibrium price impact (e.g., Pasquariello and Vega 2007; Kahraman 2020)—the more so the greater is the initial uncertainty about $v$. Next, consider the effect of PBT alone on market liquidity. PBT also lowers equilibrium price impact since it induces the speculator to deviate from long-term profit maximization to increase the short-term value of her portfolio—the more so the greater is endowment uncertainty (Bhattacharyya and Nanda 2013).[20] The release of a signal may not only alleviate information asymmetry about $v$ but also reduce uncertainty about $e$ (and PBT), leading to opposite effects on liquidity. Accordingly, we show that disclosing can either increase or decrease the price impact depending on the signal weight $\delta$; yet, price impact is always smaller if PBD is *ex ante* optimal.

[19]Specifically, $\frac{\partial \mathrm{Cov}(\tilde{v},e)}{\partial \sigma_v^2} = \frac{\delta^{*3}(1-\delta^*)\sigma_e^4}{(\delta^{*2}\sigma_e^2+(1-\delta^*)^2\sigma_v^2)^2} > 0$ and $\frac{\partial \mathrm{Cov}(\tilde{v},e)}{\partial \sigma_e^2} = \frac{\delta^*(1-\delta^*)^3\sigma_v^4}{(\delta^{*2}\sigma_e^2+(1-\delta^*)^2\sigma_v^2)^2} > 0$.

[20]Accordingly, the speculator becomes *de facto* in part a noise trader.

Equivalently, the effect of $s$ on fundamental uncertainty prevails upon its effect on endowment uncertainty.

**Corollary 1** *(1) $\lambda_1$ increases with $\delta$; (2) $\lambda_1 < \lambda^*$ if and only if $\delta < \hat{\delta}$, where $\hat{\delta}$ is given by Eq.* (A.16) *as the signal weight at which the speculator is indifferent between disclosing and not disclosing; (3) In particular, if $\delta$ is such that* $\mathrm{E}\left[W|D=1,\delta\right] > \mathrm{E}\left[W|D=0\right]$, *then $\lambda_1 < \lambda^*$.*

Figure 7 plots equilibrium price impact in the baseline ($\lambda^*$, dashed line, left axis) and signaling economies ($\lambda_1$, dotted line, left axis), as well as their positive difference ($\lambda^* - \lambda_1$ solid line, right axis) for the optimal signal weight $\delta^*$, with respect to *ex ante* fundamental uncertainty $\sigma_v^2$, in correspondence with different combinations of $\gamma$ and $\sigma_e^2$. In all graphs and in both economies, equilibrium price impact is increasing in fundamental uncertainty (as in Kyle 1985), since so is the accompanying adverse selection risk faced by the dealership sector when clearing the market. Accordingly, in those circumstances, strategic disclosure yields an increasing improvement in equilibrium market depth, (i.e., a greater $\lambda^* - \lambda_1 > 0$), since it mitigates such risk more than the decreasing weight of the speculator's increasingly valuable private fundamental information in her signal (i.e., greater $\delta^*$ in $s$ of Eq. (6); see Figure 3) worsens it. We summarize these observations as follows.[21]

**Conclusion 3** *The liquidity improvement from optimal disclosure (i.e., $\lambda^* - \lambda_1 > 0$) is increasing in the asset's fundamental uncertainty $\sigma_v^2$.*

## 2.5 Discussion of Model Assumptions

In delivering our theoretical results on the implications of strategic disclosure for equilibrium price formation, we made two important assumptions: (1) The speculator commits not to deviate, upon observing her private information, from her disclosing strategy (which is determined *ex ante*) and (2) the speculator's signal is a convex combination of endowment ($e$) and fundamentals ($v$).

[21] We further show in Section 3 of the Internet Appendix that with optimal disclosure, equilibrium prices are more informative (and at the same time more volatile) in the sense that they reflect a larger proportion of speculators' private information, even though speculators trade more cautiously with their private information and aggregate order flow carries less fundamental information.

In our model, it is crucial that the speculator commits both to disclose and to a predetermined form of disclosure. Were the speculator not bound to disclose exactly $s = \delta e + (1 - \delta)v$ *ex post*, she would have a strong incentive to deviate—given the significant gains from signal manipulation when the MM take the signal at its face value. We discuss in detail the plausibility of our assumptions in Section 2 of the Internet Appendix. There, we argue that these assumptions are consistent both with the extant theoretical literature on information acquisition and transmission (e.g., see Grossman and Stiglitz 1980; Admati and Pfleiderer 1988; Kamenica and Gentzkow 2011), as well as with extant large reputation costs and regulatory constraints—especially in U.S. financial markets (e.g., see the Investment Advisory Act of 1940)—deterring any deviation from the speculator's pre-committed disclosure strategy (e.g., see Benabou and Laroque 1992; Van Bommel 2003; Agarwal et al. 2013; Ljungqvist and Qian 2016). With this discussion in mind, we test our model's main implications within the U.S. stock market next.

# 3 Data and Sample Selection

Our model argues that a speculator who cares about the short-term value of her holdings may voluntarily disclose some of her private information. Consistent with our model, Ljungqvist and Qian (2016) show that small hedge fund managers make public their findings about problematic firms after taking large short positions in those companies. Anecdotally, activist investors such as Carl Icahn or Bill Ackman frequently communicate their perspectives to the public through media interviews, Twitter feed, or blogs.[22] Our theory suggests that the use of strategic public disclosure may be even more widespread than what currently reported in the literature, especially among (at least partly) short-term oriented sophisticated financial market participants.

Accordingly, we set to test our model by studying the effect of all voluntary non-anonymous disclosures by mutual funds in the Wall Street Journal (WSJ), the Financial Times (FT), and the New York Times (NYT) on the U.S. stock market. Four observations motivate our choice. First,

[22]See, for instance, *"Carl Icahn Takes 'Large' Apple Stake"* on CNN Money, available at http://money.cnn.com/2013/08/13/technology/mobile/carl-icahn-apple/.

mutual funds arguably are among the most sophisticated financial market participants (e.g., Wermers 2000; Kacperczyk et al. 2008; Huang et al. 2011). Second, as noted earlier, many studies show that mutual fund managers are subject to short-term concerns. For instance, numerous papers find that mutual fund flows are sensitive to past performance (e.g., Ippolito 1992; Sirri and Tufano 1998; Del Guercio and Tkac 2002). Additionally, mutual fund managers exhibit tournament-like behavior (e.g., Brown et al. 1996; Chevalier and Ellison 1999; Chen et al. 2018), consistent with short-term objectives. Third, the large reader base of those three newspapers and their broad coverage of the financial sector grants speculators broad access to investors at large, consistent with our model's notion of the disclosed signal being common knowledge. Fourth, newspaper disclosures leave traceable records, and mutual funds are required by law to regularly report their portfolio compositions; both ensure adequate availability of data to test our theory.[23]

## 3.1 Data and Identification Criteria

*A. Mutual Fund Holding Data*

Our sample spans a decade from 2005 to 2014. Mutual fund holdings are an important input to our study. We obtain holdings data from the CRSP mutual fund database. The database provides portfolio compositions, including both long and short positions, of all open-end mutual funds in the United States. While holdings data is available at the monthly frequency, non-quarter-end month data is missing for most funds as reporting of portfolio composition is only mandatory quarterly. Hence, our sample is constructed—and the accompanying empirical analysis of our model's predictions is conducted—at the quarterly (i.e., calendar quarter-end month) frequency.[24] Our theory focuses on strategic disclosures by an active, privately informed speculative sector

[23]Investigating strategic disclosure and trading by hedge funds is significantly more challenging in light of severe data limitations on their managers' identity and portfolio holdings. Accordingly, the unreported analysis of a much smaller sample of hedge funds with viable such data yields qualitatively similar, yet noisier inference.

[24]A small fraction (5.4%) of the fund portfolios in our sample report fiscal (rather than calendar) quarter-end holdings. In those circumstances, we convert these holdings at the calendar quarter-end level by assigning them to the closest calendar quarter to their as-of dates. Schwarz and Potter (2016) document that the CRSP mutual fund database contains some inaccurate holdings prior to 2008. However, restricting the analysis that follows to the subsample 2008–2014 does not affect our findings.

about assets with non-trivial fundamental uncertainty. Accordingly, we exclude from our sample all index funds, ETFs (given their overwhelmingly passive management style and distinct regulatory framework over our sample period; see, e.g., Lettau and Madhavan 2018; SEC 2019), and fixed income funds. CRSP provides holdings data at the portfolio level. For our tests, however, we consolidate all data to the fund holding company level for two reasons. First, our empirical study involves linking a speculator's disclosure behavior to her incentives to disclose and (as we observe next) most disclosures are only identifiable at the fund holding company level. Second, it is plausible that funds within the same family may coordinate their disclosing strategy to serve the same or similar family-level objectives. The fund holding family, therefore, fits more closely with our notion of a sophisticated speculator in the model. We also collect from CRSP the names of all portfolio managers who have worked at each of the fund holding families during our sample period.[25]

For each quarter, we consider as potential disclosure targets all firms that are in the S&P 1500 universe. Those firms are the largest in the U.S. stock market, hence presumably the most likely subject of financial media coverage. We exclude all financial companies, as most of them are often also classified as speculators in our mutual fund sample. We obtain firm-level balance sheet information from Compustat.

*B. Mutual Fund Disclosure Data*

Our disclosure data comes from two sources. We obtain WSJ articles from ABI/INFORM and FT and NYT articles from LexisNexis.[26] For each newspaper, we obtain all articles published between 2005 and 2014. We then drop articles that are published in a non-business-related section, letters from readers, or corrections. We parse the news by paragraph to filter out strategic disclosures. Specifically, a paragraph is defined as a (potentially) strategic public disclosure by

[25]CRSP reports fund manager names with varying levels of precision. For the majority of fund managers, CRSP reports their first and last names; sometimes all first, middle and last names are available; sometimes CRSP either only reports the last name or states that the fund is "team-managed."

[26]ABI/INFORM and LexisNexis give us access to the U.S. edition of the WSJ and NYT, respectively; most issues of the FT on LexisNexis are instead from the U.K. edition (with the remaining ones from the U.S. edition).

fund holding company $j$ about target firm $i$ if either one of the following criteria is met:

1. Both (exact) names of the target company $i$ and the fund management company $j$ are found. News articles rarely refer to individual funds within a family.[27] Investment banks are frequently covered in the media together with other firms for reasons unrelated to strategic information disclosure (equity or bond underwriting, market making, mergers, acquisitions, rating assignments, etc.). To avoid confounding our analysis, we exclude investment banks (e.g., Goldman Sachs, Merrill Lynch, Wells Fargo, etc.) from fund management companies, unless one of the following is true:

    - Key words such as "analyst", "portfolio manager", or "strategist" (listed in Table 2) appear in the same sentence as the mention of the fund holding company;
    - Key words such as "securities", "holdings" or "asset management" (also listed in Table 2)—which indicate that the disclosure may come from a non-investment banking branch of financial institution $j$—closely follow the mention of the fund management company (i.e., with no more than one word in between);
    - The name (first name followed by last name) of a portfolio manager associated with fund holding company $j$ is also found in the same paragraph.

2. The (exact) name of the target company $i$ is found and either one of the following is true:

    - All first, middle, and last names of any portfolio manager at fund holding company $j$ are found;
    - The first and last names of any portfolio manager at fund holding company $j$ are found, and, in the same sentence, there are such key words as "analyst", "portfolio manager", or "strategist".

Importantly, in applying these screenings, we do not separately search for information disclosures about fundamentals ($v$) versus the speculator's endowment ($e$), since, as noted earlier, the two

[27]For example, it is much more likely for a news article to report a quote from "a portfolio manager with T. Rowe Price" rather than a quote from "a portfolio manager at T. Rowe Price Blue Chip Growth Fund."

are likely indistinguishable. Plausibly, speculators may provide information to the media with selective emphasis. Upon seeing a disclosure about fundamentals, a reader may rationally infer that the information provider has such a position that she stands to gain if her disclosure is impounded into the price. Second, as sophisticated investors choose their positions endogenously, information about those positions is also likely to be suggestive about fundamentals.

Table 2 reports, for each newspaper, the number of articles so identified as disclosures, as well as the number of articles that are in the business-related and business-unrelated sections; plots of the total and relative number of these disclosures over our sample period are in Figure 8. Out of the 675,452 articles published in the business-related sections of WSJ, FT, and NYT, 11,550 are identified as potentially strategic non-anonymous disclosures between 2005 and 2014, amounting to a plausible and relatively stable 1.7% of their total business coverage.[28] Visual inspection of the identified articles shows that they capture the notion of "strategic disclosure" with reasonable accuracy. Table 3 reports five such paragraphs as examples.

To further validate this approach, we plot in Figure 9 OLS estimates of daily absolute abnormal returns (AARs, solid line, in percentage, defined as the absolute difference between individual stock returns and non-financial S&P 1500 index returns; see Section 3.1.A) for the stocks mentioned in those articles over a 40-day window around their first U.S. *print* publication date as available to us (day 0; U.S. edition for NYT and WSJ, U.K. edition for FT), as well as their 95% confidence interval (dashed lines, based on standard errors clustered at the event-date level). We focus on unsigned price changes to avoid any subjective or mechanical interpretation of the articles' information content; print publication is usually preceded (by at least a day; day -1) by online access and newspapers print multiple editions at different time zones around the world. Consistent with the model's premise, the event study in Figure 9 suggests that market participants are aware of and non-trivially react to the potentially strategic disclosures in our sample: Estimated AARs increase sharply around their earliest (online, day -1) release (e.g., from

[28]Some of these news articles may also be reprinted or discussed in blogs and other business news outlets (e.g., Bloomberg, Reuters, CNBC, or FBN), further increasing their potential audience. A number of these articles (3,685 out of 11,550) mention more than one firm and/or fund management company in our sample, hence are treated as potential strategic disclosures for more than one firm $i$ and/or fund $j$ in the empirical analysis that follows.

-0.02 on day -2 to 0.64 on day -1, 0.23 on day 0, and 0.03 on day 1) and do not fully revert to pre-event levels until several days afterwards.

*C. Liquidity*

We use stock price and trading data to compute a measure of illiquidity that is both commonly used in the literature and broadly consistent with the notion of Kyle's (1985) lambda in the model, while also providing ample sample coverage: Amihud's (2002) price impact. For each stock $i$ and quarter $t$, it is computed as a quarterly average of daily price impact (i.e., absolute percentage price change per dollar traded):

$$\text{Amihud}_{i,t} = \frac{1}{N_t} \sum_{d=1}^{N_t} \frac{|r_{i,d}|}{\text{Dvol}_{i,d}}, \tag{22}$$

where $r_{i,d}$ and $\text{Dvol}_{i,d}$ denote, respectively, daily return and dollar trading volume for firm $i$ shares on trading day $d$, and $N_t$ is the number of trading days $d$ over quarter $t$.[29]

*D. Sample Construction and Summary Statistics*

As discussed previously, we identify mutual fund disclosures at the fund holding company level. Correspondingly, all our empirical tests use only information at this level. Hence, for simplicity, we use the term "fund" to refer to a fund holding company or fund family throughout the remainder of this paper. To avoid confusion, we henceforth label the subsidiary funds managed by those holding companies as "portfolios"; in Section 3.2 we then consolidate portfolio-level information of interest at the fund holding company-level. We use the subscripts $i$, $j$, $k$, and $t$ to index for firms (disclosure targets), funds, portfolios, and quarter (i.e., quarter year), respectively.

Next, we use this consolidated data to form two samples, one at firm-fund-quarter level and the other at firm-quarter level. We use the former to investigate the determinants of the aforementioned potentially strategic disclosures, and use the latter to understand their effects on the stock liquidity of the target firms. Our firm-fund-quarter level sample is composed of all triples $(i, j, t)$ where

[29] In unreported analysis, qualitatively similar (yet noisier) inference ensues from employing the (Amivest) liquidity ratio of Cooper et al. (1985) and Amihud et al. (1997), a popular alternative measure of firm-level market depth computed (like in Eq. (22)) as a quarterly average of the daily ratio between $\text{Dvol}_{i,d}$ and $|r_{i,d}|$.

in quarter $t$ between 2005 and 2014, (i) firm $i$ belongs to the (non-financial) S&P 1500 universe and appears in at least one disclosure article, and (ii) fund $j$ makes at least one disclosure and its holding data is available. This sample restriction is motivated by the preponderance of zero disclosures in the otherwise much larger raw sample (e.g., because of unobserved high disclosure costs relative to its expected benefits, as suggested by the model extension of Section 2.4.A; see also Proposition 3 and Figures 5 and 6) in light of our focus on the determinants and implications of observed firm-fund-quarter level disclosure activity (rather than of any sample-wide absence thereof).[30] The resulting sample consists of 146,181 observations from 993 firms disclosed about at least once and 335 funds disclosing at least once over the sample period.

Our firm-quarter level sample includes all pairs $(i,t)$ where in quarter $t$ between 2005 and 2014, firm $i$ belongs to the (non-financial) S&P 1500 universe, yielding a total of 47,819 observations from 1,845 firms. Summary statistics for all variables of interest listed and defined in Table 4 in each of the two samples are in Table 5. All variables are winsorized at the 2% and 98% levels to further remove extreme realizations. Mean and median for each variable are computed for the full sample, as well as for each of the four increasingly smaller subsamples where we restrict the number of disclosures to be equal to zero or at least 1, 5, or 10. As noted earlier, disclosures are infrequent but not uncommon over our sample period (e.g., a median of zero but a mean of 0.29 per quarter at the firm level), as well as evenly distributed among disclosed firms and disclosing funds over time (e.g., less than 2% occurring more than four times in a quarter at the firm-fund level). We further discuss those summary statistics as we introduce our main variables of interest and accompanying empirical analysis next.

## 3.2 Measuring Short-Term Incentives

The model of Section 2 suggests that the strategic disclosure activity of such sophisticated market participants as mutual funds may be related to their short-term incentives. Measuring those incen-

[30] In addition, as we discuss next, our inference from the restricted sample is robust to the inclusion of firm or fund fixed effects; accordingly, the unreported analysis of the raw sample with those fixed effects (absorbing all sample-wide zero firm or fund observations) yields qualitatively similar inference.

tives is challenging, as fund managers' objective functions are typically not directly observable. The delegated portfolio management literature has proposed numerous explanation for a fund's short-termism (discussed in Section 2.1), as well as developed a number of empirical proxies for a fund's investment horizon that are based on such observable fund characteristics as its asset composition or trading behavior (e.g., Gaspar et al. 2005; Cremers and Pareek 2014). We use this guidance to construct several such proxies. However, as noted earlier, speculative short-termism is also multi-faceted in nature such that each individual proxy may only partially capture its intensity. These proxies are also likely plagued by measurement noise. Thus, we capture their information commonality parsimoniously while mitigating their idiosyncratic shocks by combining them into three composite indices of firm-fund, fund, and firm level short-termism.

Specifically, we consider five such proxies: flow-performance sensitivity, position "pivotalness", churn rate, turnover rate, and inverse holding duration. We first construct each of these five proxies at the firm-fund-quarter $(i, j, t)$ level, to measure a fund $j$'s short-termism as stemming from its position in a firm $i$ in a quarter $t$. We then aggregate each of them at the firm-quarter $(i, t)$ and the fund-quarter $(j, t)$ levels, to capture either the short-termism of all sample funds holding firm $i$ or the short-termism of fund $j$ as stemming from its holdings of all sample firms, respectively. Finally, we scale and average the resulting firm-fund, fund, and firm level proxies separately into their corresponding short-termism indices. In the remainder of this section, we motivate and briefly discuss how we compute each proxy and form these indices. Further details are in Table 4, while summary statistics are in Table 5.

*A. Flow-performance sensitivity*

Fund flows are crucial not only to fund managers' compensation (Brown et al. 1996; Carhart et al. 2002) but also to their ability to exploit future arbitrage opportunities (Shleifer and Vishny 1997). It is well established that fund flows chase recent performance (Ippolito 1992; Chevalier and Ellison 1997; Sirri and Tufano 1998). Therefore, the strength of this relationship is likely to affect those incentives and fund managers' decision-making, in that funds with greater flow-return sensitivity may be more responsive to their short-term valuation.

We compute flow-return sensitivity in two steps. First, for each portfolio managed by our sample funds, we estimate a rolling regression of its flows on its contemporaneous and past performance.[31] We sum up the regression coefficients to obtain a flow-performance sensitivity measure at the portfolio-quarter level. Second, we aggregate this measure at the firm-quarter (*Flow-Perf Sensitivity*$_{i,t}$), fund-quarter (*Flow-Perf Sensitivity*$_{j,t}$) or firm-fund-quarter level (*Flow-Perf Sensitivity*$_{i,j,t}$). Intuitively, *Flow-Perf Sensitivity*$_{i,j,t}$ and *Flow-Perf Sensitivity*$_{i,t}$ capture the percentage change in flows to either a particular fund or all sample funds holding firm $i$, respectively, in response to a one percent increase in that firm's stock performance *ceteris paribus* for the performance of all other stocks, while *Flow-Perf Sensitivity*$_{j,t}$ measures a fund's percentage change in flows in correspondence with a one percent increase in its overall performance.

*B. Position "pivotalness"*

Our second measure of a fund's short-termism exploits the deviation of its portfolio composition from the market portfolio. Practitioners typically evaluate fund managers by comparing their performance to that of various benchmarks, most commonly the market portfolio. Portfolio managers attempt to "beat" these benchmarks by making "bets", i.e., with stock holdings that differ from the benchmark's. The largest such bets are also the most "pivotal", i.e., have the largest impact on relative short-term fund performance, hence not only on its flow-return sensitivity but also on its exposure to limits to arbitrage, noise trader risk, or illiquidity in the short-term. As noted in Section 2.1, other market participants typically learn about a fund's bets only with delay. Within our model, these bets correspond to the *unsigned* difference between the speculator's private initial holdings in the risky asset ($e$) and their unconditional expectation ($\bar{e}$; as a function of its variance $\sigma_e^2$). Thus, *ceteris paribus*, the greater this difference, the greater is the speculator's incentive to deviate from long-term profit maximization in pursuit of short-term portfolio gains (via strategic disclosure).

[31] Each regression is estimated over 12 rolling months of data, ending in the last month of the quarter of interest. We measure fund performance using its monthly CAPM-adjusted returns. Our inference is robust to using such alternative performance measures as raw returns and Fama-French three factor-adjusted returns, to estimating the regression over longer rolling windows of past monthly data, as well as to replacing each estimated slope coefficient with its absolute value or corresponding t-statistics.

Accordingly, we argue that a fund's short-termism and its incentives to disclose are likely to be greater the larger are its bets relative to the market, and especially so for the largest of these bets. This idea underlies the construction of our second proxy, position "pivotalness". At the firm-fund-quarter level, this proxy captures the unsigned deviation of a fund's holdings in a stock from the market, consistent with our model. Specifically, for a firm $i$, fund $j$, and quarter $t$, we define

$$\text{Pivotal}_{i,j,t} = \max\left\{\frac{\text{PctHol}^{\text{F}}_{i,j,t}}{\text{PctHol}^{\text{M}}_{i,t}}, \frac{\text{PctHol}^{\text{M}}_{i,t}}{\text{PctHol}^{\text{F}}_{i,j,t}}\right\}, \tag{23}$$

where $\text{PctHol}^{\text{F}}_{i,j,t}$ is the market value of fund $j$'s holdings of firm $i$ shares as a fraction of the fund's holdings of all S&P 1500 firm shares at the end of quarter $t$, and $\text{PctHol}^{\text{M}}_{i,t}$ is firm $i$'s value share in the S&P 1500 universe.[32] We then compute position "pivotalness" at the firm-quarter level, $\text{Pivotal}_{i,t}$, by replacing $\text{PctHol}^{\text{F}}_{i,j,t}$ in Eq. (23) with firm $i$'s percentage share of the combined portfolio of all sample funds. Finally, we average $\text{Pivotal}_{i,j,t}$ across all sample firms to arrive at our fund-quarter level measure, $\text{Pivotal}_{j,t}$.

*C. Churn rate*

Our next short-termism measure is the churn rate. Extant literature argues that institutional investors with shorter investment horizons may revise their portfolios more often (e.g., Wermers 2000; Gaspar et al. 2005; Cremers and Pareek 2014; Schmidt 2020). Similarly, in the baseline model of Section 2.1, short-termism leads the speculator to trade excessively in order to "rebalance" her otherwise long-term profit-maximizing asset holdings (see, e.g., $x^*(v,e)$ of Eq. (2) as well as the accompanying discussion in Bhattacharyya and Nanda 2013).

[32] In particular, Eq. (23) treats upward and downward pivotalness symmetrically (e.g., such that holding either 50% or twice of the market's position yields the same $\text{Pivotal}_{i,j,t}$) since, as mentioned above, the *ex ante* effectiveness of (hence the short-term incentive to engage in) PBT and PBD in our model (see, e.g., the expressions for $\text{Cov}(P_1,e)$ in Sections 2.1 and 2.3) does not depend on signed relative holdings but only on their absolute magnitude (i.e., on $\sigma_e^2$). In unreported tests, when separating $\text{Pivotal}_{i,j,t}$ in its upward and downward components (i.e., $\frac{\text{PctHol}^{\text{F}}}{\text{PctHol}^{\text{M}}}\mathbb{1}\{\text{PctHol}^{\text{F}} \geq \text{PctHol}^{\text{M}}\}$ and $\frac{\text{PctHol}^{\text{M}}}{\text{PctHol}^{\text{F}}}\mathbb{1}\{\text{PctHol}^{\text{F}} \leq \text{PctHol}^{\text{M}}\}$, respectively), we find that the latter plays a greater role in our inference for it occurs more frequently in our sample (as active fund holdings are typically much more concentrated relative to the market portfolio).

Accordingly, following Gaspar et al. (2005) and Schmidt (2020), we first define

$$\mathrm{CR}_{i,j,t} = \frac{\sum_{k \in K_{j,t}} |\mathrm{Shr}_{i,k,t} - \mathrm{Shr}_{i,k,t-1}| \times \mathrm{Prc}_{i,t}}{\sum_{k \in K_{j,t}} \frac{1}{2}\left(\mathrm{Shr}_{i,k,t} \times \mathrm{Prc}_{i,t} + \mathrm{Shr}_{i,k,t-1} \times \mathrm{Prc}_{i,t-1}\right)},$$

$$\mathrm{CR}_{i,t} = \frac{\sum_j \sum_{k \in K_{j,t}} |\mathrm{Shr}_{i,k,t} - \mathrm{Shr}_{i,k,t-1}| \times \mathrm{Prc}_{i,t}}{\sum_j \sum_{k \in K_{j,t}} \frac{1}{2}\left(\mathrm{Shr}_{i,k,t} \times \mathrm{Prc}_{i,t} + \mathrm{Shr}_{i,k,t-1} \times \mathrm{Prc}_{i,t-1}\right)},$$

and

$$\mathrm{CR}_{j,t} = \frac{\sum_i \sum_{k \in K_{j,t}} |\mathrm{Shr}_{i,k,t} - \mathrm{Shr}_{i,k,t-1}| \times \mathrm{Prc}_{i,t}}{\sum_i \sum_{k \in K_{j,t}} \frac{1}{2}\left(\mathrm{Shr}_{i,k,t} \times \mathrm{Prc}_{i,t} + \mathrm{Shr}_{i,k,t-1} \times \mathrm{Prc}_{i,t-1}\right)},$$

where $K_{j,t}$ is the set of portfolios managed by fund $j$ in quarter $t$. $\mathrm{CR}_{i,j,t}$, $\mathrm{CR}_{i,t}$, and $\mathrm{CR}_{j,t}$ capture the speed at which either fund $j$ rotates its position in firm $i$, all sample funds rotate their positions in firm $i$ on average, or fund $j$ rotates its overall positions, respectively. Next, we take a rolling average of these values over eight quarters to obtain our final churn rate measures, which we conjecture to be larger the greater is firm-fund-quarter, firm-quarter, or fund-quarter level intensity of speculative short-termism, respectively.

*D. Turnover rate*

Turnover rates are alternative proxies for the intensity of speculative portfolio rebalancing due to short-termism. In particular, as in Wermers (2000), we compute turnover rates in two steps as follows. First, we define $\mathrm{TR}_{i,j,t}$ as the minimum of the absolute values of purchases and sales of firm $i$'s shares by fund manager $j$ in quarter $t$, scaled by the value of firm $i$'s shares owned by that fund in that quarter. Second, we calculate our turnover measure at the firm-fund-quarter level as a rolling average of $\mathrm{TR}_{i,j,t}$ over eight quarters. To compute turnover rate at the firm-quarter level, we amend the first step by using purchases and sales of firm $i$'s shares by all sample funds (instead of just fund $j$) as well as the value of all shares of firm $i$ held by all sample funds (instead of just fund $j$). Similarly, we compute fund-quarter level turnover rates by using a fund's purchases and sales of shares in all sample firms (instead of just in firm $i$) as well as the value of all shares held by that fund (instead of just firm $i$'s shares). Accordingly, a high turnover rate may indicate a fund's (or all funds') more intense trading activity (in either firm $i$ or all sample firms) in pursuit of short-term objectives.

*E. Inverse holding duration*

Our last proxy for the intensity of speculative short-termism is based on the measure of stock holding duration proposed by Cremers and Pareek (2014). As for position pivotalness, we amend their measure so that it accounts for long and short holdings symmetrically, as follows. Specifically, let

$$a^{+}_{i,k,t} = (H-1) \times \max\{\mathrm{Shr}_{i,k,t-H+1}, 0\} + \sum_{h=0}^{H-2} (\max\{\mathrm{Shr}_{i,k,t-h}, 0\} - \max\{\mathrm{Shr}_{i,k,t-h-1}, 0\}) \times h \quad (24)$$

be the holding period-weighted long position in firm $i$ taken by a portfolio $k$ over the past $H$ quarters. We then define the holding period-weighted (absolute) short position as

$$a^{-}_{i,k,t} = (H-1) \times \max\{-\mathrm{Shr}_{i,k,t-H+1}, 0\} + \sum_{h=0}^{H-2} (\max\{-\mathrm{Shr}_{i,k,t-h}, 0\} - \max\{-\mathrm{Shr}_{i,k,t-h-1}, 0\}) \times h. \quad (25)$$

Let $b^{+}_{i,k,t}$ and $b^{-}_{i,k,t}$ be the maximum long and short positions during the past $H$ quarters. With these notations, we define the average duration that firm $i$ is in portfolio $k$ at quarter $t$ as

$$\text{Holding Period}_{i,k,t} = \frac{a^{+}_{i,k,t} + a^{-}_{i,k,t}}{b^{+}_{i,k,t} + b^{-}_{i,k,t}}. \quad (26)$$

Next, we calculate the firm-fund-quarter, firm-quarter, and fund-quarter level duration measures as the corresponding holdings-weighted averages of Holding Period$_{i,k,t}$, which we interpret as either the average number of quarters fund $j$ holds on to firm $i$, all sample funds hold on to firm $i$, or fund $j$ holds on to all sample firms, respectively. Finally, our short-termism proxy is the inverse of the average holding period.

*F. Short-termism indices*

By construction, each of the five aforementioned proxies is increasing in firm, fund, or firm-fund level short-termism. Yet, as noted earlier, these proxies may also reflect different features of speculative short-term concerns. Accordingly, their sample-wide pairwise correlations in Table 6 are nearly always positive but mostly small. Furthermore, these proxies are in a different scale and may be plagued by noise and idiosyncratic shocks. Thus, their normalization and aggregation may allow us to parsimoniously isolate the portion of their commonality driven by speculative short-termism while reducing their idiosyncratic variance (e.g., as in Chordia et al. 2000; Korajczyk and Sadka 2008; Bharath et al. 2009; Pasquariello 2020, among others).

In this paper, we propose three composite indices of firm, fund, and firm-fund level short-termism in a quarter, $\hat{\gamma}_{i,t}$, $\hat{\gamma}_{j,t}$, and $\hat{\gamma}_{i,j,t}$, as the equal-weighted averages of the standardized values of all available firm, fund, and firm-fund level short-termism proxies in that quarter, respectively.[33] Hence, by definition, $\hat{\gamma}_{i,t}$, $\hat{\gamma}_{j,t}$, and $\hat{\gamma}_{i,j,t}$ are increasing in speculative short-termism. Consistent with the model, sample averages of all three indices (in Table 5) and of their components are also mostly increasing—while stock illiquidity is instead decreasing—across disclosure intensity subsamples. We assess this relationship formally in the empirical analysis next.

# 4 Empirical Analysis

## 4.1 Strategic Disclosure and Incentives To Disclose

Our theory postulates that the strategic disclosure of some private fundamental information (PBD) may be optimal for at least partially short-term oriented speculators. Empirically, we argue that, *ceteris paribus*, funds with stronger short-term incentives disclose more often. The reason is two-fold. First, relative to the extreme case of purely long-term profit maximizers ($\gamma = 0$), who find any form of disclosure suboptimal, speculators with short-term incentives ($\gamma > 0$) clearly disclose more often. Second, even when $\gamma > 0$, some of those speculators may not find PBD optimal if its perceived gains are lower than its stated cost (pecuniary or otherwise; see, e.g., Conclusion 2). In those circumstances, PBD should occur more often as $\gamma$ increases and short-termism becomes

[33] Alternative aggregation of those proxies via principal component analysis (PCA, despite the ensuing look-ahead bias and absence of dominating eigenvalues—and only one of them non-trivially greater than one—from the correlation matrices of Table 6; e.g., Baker and Wurgler 2006; Korajczyk and Sadka 2008; Bharath et al. 2009) or the separate analysis of each of them yield broadly similar inference; see Tables IA-1 and IA-7, or Tables IA-2 to IA-6 and IA-8 to IA-12 of the Internet Appendix, respectively.

more important for strategic speculators (see, e.g., Figures 5 and 6).[34]

To test this implication of our model, we start by estimating the following OLS model:

$$\#\text{Discl}_{i,j,t} = \beta_0 + \beta_1 \hat{\gamma} + \beta_2 \#\text{Discl}_{-i,j,t} + \beta_3 \#\text{Discl}_{i,-j,t} + \delta_y + \delta_q + \varepsilon_{i,j,t}, \tag{27}$$

where $\#\text{Discl}_{i,j,t}$ is the number of articles in WSJ, FT and NYT identified as strategic disclosures about firm $i$ by fund $j$ during quarter $t$, and $\hat{\gamma} = \hat{\gamma}_{j,t}$ or $\hat{\gamma} = \hat{\gamma}_{i,j,t}$. All variables in our empirical analysis are standardized to adjust for differences in scale within and across variables and to facilitate the interpretation of the corresponding coefficients of interest; our inference is unaffected by this normalization. Our model predicts that $\beta_1 > 0$, i.e., that funds with stronger short-term incentives should disclose more often both in general (i.e., for higher $\hat{\gamma} = \hat{\gamma}_{j,t}$) as well as in firms more critical for achieving their short-term goals (i.e., for higher $\hat{\gamma} = \hat{\gamma}_{i,j,t}$). Some fund managers may make more frequent media appearances for reasons unrelated to short-termism (e.g., stronger media connections). We control for this possibility in Eq. (27) by including $\#\text{Discl}_{-i,j,t}$, the number of disclosures made by fund $j$ about all firms except firm $i$ during quarter $t$. Similarly, some firms may become media's targets for reasons unrelated to PBD, e.g., if going through such important, newsworthy corporate events as CEO turnover or merger talks. Accordingly, we also include $\#\text{Discl}_{i,-j,t}$, the number of disclosures made about firm $i$ by all funds except fund $j$ during quarter $t$.[35] We further include year fixed effects ($\delta_y$) and quarter fixed effects ($\delta_q$) to control for macroeconomic trends as well as seasonality in disclosure patterns (e.g., year-end earnings releases).[36]

[34]Note however that in our model, the gains from PBD are not monotonic in $\gamma$. In particular, Figures 5 and 6 suggest that *ex ante* disclosure gains first increase but then decrease as $\gamma$ increases. Intuitively, as the speculator places less weight on her long-term profit (when $\gamma$ grows larger), she is less concerned about the cost of PBT; thus she can achieve her short-term objective efficiently enough by PBT alone. As a result, PBD is less valuable to the speculator when $\gamma$ is sufficiently large. Nonetheless, for our empirical tests, however, we ignore the decreasing portion of the gains from PBD (as a function of $\gamma$) because a so-behaving speculator would have to trade aggressively to take advantage of PBT. Such overt PBT is, however, unfeasible over our sample period (2005–2014) due to the sharp increase in investor attention about, and SEC enforcement against portfolio pumping since 2001 (e.g., Gallagher et al. 2009; SEC 2014; Duong and Meschke 2020). With PBT constrained by regulation, it is plausible that speculators would turn to PBD as a substitute, and the more so the greater is their short-termism. Consequently, it is plausible that the gains from PBD are increasing for the entire feasible range of $\gamma$.

[35]While $\#\text{Discl}_{-i,j,t}$ and $\#\text{Discl}_{i,-j,t}$ are not group-level quarterly averages of $\#\text{Discl}_{i,j,t}$, either replacing them with or including two-way firm-time (i.e., quarter year) and fund-time fixed effects in all specifications of Eq. (27) to control for unobserved heterogeneity (Gormley and Matsa 2014) does not affect the analysis that follows.

[36]When reporting about a firm, journalists often contact such relevant financial practitioners as some of its largest

We report estimates of Eq. (27) for $\hat{\gamma} = \hat{\gamma}_{i,j,t}$ and $\hat{\gamma} = \hat{\gamma}_{j,t}$ in Columns (1) and (5) of Table 7, respectively.[37] Consistent with our model, in both cases the estimate for $\beta_1$ is positive, strongly statistically significant, and economically meaningful. For instance, Column (1) implies that a one standard deviation increase in firm $i$'s contribution to fund $j$'s short-termism in quarter $t$ ($\hat{\gamma}_{i,j,t}$) is accompanied by nearly half (0.425) of a standard deviation increase in the number of disclosures made by fund $j$ about firm $i$ in that quarter; this estimate translates into 0.12 additional firm-fund level disclosures per quarter ($0.425 \times 0.28$), a significant change given its corresponding sample mean of 0.11 in Table 5. Estimated $\beta_1$ is smaller for fund-quarter level short-termism ($\hat{\gamma}_{j,t}$) in Column (5), perhaps because its effect on disclosure intensity may be subsumed by the fund-level control variable $\#\text{Discl}_{-i,j,t}$; yet, this effect remains non-trivial, e.g., amounting to 11% (0.106) standard deviation increase in firm-fund-quarter disclosures, i.e., to roughly 27% ($0.106 \times 0.28/0.11$) of its sample mean.

Next, we investigate whether the effect of short-termism on disclosure is more pronounced for firms about which speculators may have a greater information advantage, hence for which PBD may be more effective. For instance, our model implies that, *ceteris paribus*, (costly) strategic disclosure about a firm's fundamentals may become optimal for a greater number of funds (e.g., for a wider range of $\gamma$ in Conclusion 2 and Figure 5; see also the discussion in Section 2.4.A) if those fundamentals are more volatile (higher $\sigma_v^2$) such that private information about them is more valuable and the revision in MM's priors in correspondence with the release of a public signal is larger (e.g., see Eq. (17)).

To assess this possibility, we first consider three popular measures of firm-level fundamental uncertainty in a quarter: inverse firm size ($1/\text{Size}_{i,t}$), analyst forecast inaccuracy ($\text{Inaccu}_{i,t}$, defined

shareholders for comments. Although not strategic in nature, such media-initiated reporting may involve both a speculator and the target firm; therefore, it may be labeled as potential PBD by our identification algorithm in Section 3.1.B. However, unreported analysis indicates that controlling for the potentially confounding effects of these disclosures by either excluding, for each firm in each quarter, the funds with the largest long and short positions in that firm or by including one-way firm and/or fund, or two-way firm-fund fixed effects in all specifications of Eq. (27) does not qualitatively affect our inference.

[37] In these regressions, we use two-way cluster-robust standard errors at the firm and fund levels to account for heteroscedasticity and within firm-fund serial correlation (e.g., Petersen 2009). The usual Huber-White standard errors or robust standard errors clustered at either the firm or the fund level, or three-way clustered by firm, fund, and year do not materially affect our inference.

as the percentage absolute difference between actual earnings-per-share (EPS) and mean analyst EPS forecasts), and stock return volatility ($\text{Stdev(Ret)}_{i,t}$). Arguably, firms with larger such proxies are likely more opaque in nature, hence potentially more suitable to information discovery and strategic disclosure by sophisticated investors.[38] We then assess the effect of fundamental uncertainty on disclosure intensity by separately allowing such firm-level characteristics (labeled $\text{Suit}_{i,t}$) to affect $\#\text{Discl}_{i,j,t}$ in Eq. (27) both directly as well as in interaction with $\hat{\gamma}$, as follows:

$$\begin{aligned} \#\text{Discl}_{i,j,t} = {} & \beta_0 + \beta_1 \hat{\gamma} + \beta_2 \text{Suit}_{i,t} + \beta_3 \hat{\gamma} \times \text{Suit}_{i,t} \\ & + \beta_4 \#\text{Discl}_{-i,j,t} + \beta_5 \#\text{Discl}_{i,-j,t} + \delta_y + \delta_q + \varepsilon_{i,j,t}. \end{aligned} \tag{28}$$

By construction, larger $\text{Suit}_{i,t}$ proxies for greater firm-level opacity and suitability to strategic disclosure. Hence, our model predicts that the cross-product coefficient $\beta_3 > 0$, i.e., that funds with stronger short-term incentives should disclose more often about more suitable firms. We report estimates of Eq. (28) for $\hat{\gamma} = \hat{\gamma}_{i,j,t}$ and $\hat{\gamma} = \hat{\gamma}_{j,t}$ in Columns (2)–(4) and (6)–(8) of Table 7, respectively. As conjectured by our theory, $\beta_3$ is positive and statistically strongly significant in all specifications.[39] The economic significance of these estimates is also non-trivial, although it varies depending on the choice of $\text{Suit}_{i,t}$ and $\hat{\gamma}$. For instance, Columns (6) to (8) show that the average effect of a fund's short-termism on its disclosure intensity about a firm is between 21% (0.023/0.107) and 50% (0.054/0.109) stronger if that firm's suitability to PBD is one standard deviation larger than its mean.

[38]Accordingly, Table 5 suggests that on average, disclosure targets (firms), while unconditionally larger in size (which presumably attracts greater media attention, as noted in Section 3.1.A), display marginally more volatile stock returns and less accurate EPS forecasts.

[39]However, estimates for $\beta_2$, while always statistically significant, are positive and economically large (as implied by the above discussion of firm-level suitability to PBD) only for $\hat{\gamma} = \hat{\gamma}_{j,t}$, suggesting that more (so-defined) suitable firms are disclosed more often only after accounting for broader (i.e., fund level) short-termism. Even in those circumstances, the total effect of a one standard deviation shock to $\text{Suit}_{i,t}$ on $\#\text{Discl}_{i,j,t}$ when short-termism is one standard deviation above its mean (i.e., $\beta_2 + \beta_3$ in Eq. (28)) is always positive (except for $\text{Suit}_{i,t} = \text{Stdev(Ret)}_{i,t}$).

## 4.2 Strategic Disclosure and Liquidity

### 4.2.1 Baseline Regression: Direct Liquidity Effect of Disclosure

Our model postulates that in correspondence with optimal PBD ($\delta = \delta^*$), equilibrium market liquidity of the target asset improves (e.g., relative to the baseline economy with PBT alone: $\lambda_1 < \lambda^*$ in Corollary 1) as fundamental information (i.e., about $v$) in the disclosed signal $s$ of Eq. (6) at least partially alleviates MM's perceived adverse selection risk more than endowment information (i.e., about $e$) in $s$ worsens it by weakening PBT's effectiveness (see Section 2.4.B and Figure 7). Accordingly, in the remainder of the paper we test for the effect of funds' potentially strategic disclosures in our sample on the liquidity of the disclosed stocks.

To that end, we start with the following baseline regression:

$$\Delta\text{Amihud}_{i,t} = \beta_0 + \beta_1 \Delta\#\text{Discl}_{i,t} + \delta' \Delta\text{X}_{i,t} + \delta_y + \delta_q + \varepsilon_{i,t}, \tag{29}$$

where $\text{Amihud}_{i,t}$ is Amihud's (2002) measure of firm $i$'s stock price impact (i.e, stock market illiquidity) in quarter $t$ (see Eq. (22)), $\#\text{Discl}_{i,t}$ is the number of disclosures made by all funds in the sample about firm $i$ in quarter $t$, $\text{X}_{i,t}$ is a vector made of three aforementioned firm-level controls also commonly associated with stock illiquidity (inverse firm size, analyst forecast inaccuracy, and stock return volatility, defined in Table 4; e.g., Hasbrouck 2009, Foucault et al. 2013), and $\delta_y$ and $\delta_q$ are year and quarter fixed effects (to control for long-term trends and seasonality in illiquidity). The operator $\Delta$ denotes first difference (from the previous quarter's value). First-difference regressions alleviate potential non-stationarity biases due to persistence in firms' level illiquidity (e.g., an average AR(1) coefficient of 0.75 across the funds in our sample; Hamilton 1994), while accounting for any time-invariant (omitted) factor that may affect both levels of disclosure intensity and illiquidity.[40]

[40] In unreported tests, we nonetheless find our inference to be robust to setting all variables in levels (but including firm fixed effects), to taking log differences, or to taking first differences of all variables (including state variables, defined next). Data limitations preclude a comprehensive higher-frequency investigation of the liquidity externalities of mutual funds' PBD; however, replicating our empirical analysis via an event-study methodology at the daily frequency yields qualitatively similar inference; see Table IA-13 of the Internet Appendix (as well as Figure 7a in Ljungqvist and

In light of Corollary 1, our model predicts that $\beta_1 < 0$ in Eq. (29): *ceteris paribus*, an increase in the number of potentially strategic public disclosures should be associated with an improvement in the liquidity of the disclosure target's shares. We report estimates of Eq. (29) in Column (1) of Table 8. As in Table 7, all variables are standardized to ease the interpretation of the corresponding slope coefficients.[41] Consistent with our model, estimated $\beta_1$ is negative and statistically significant. The economic magnitude of this effect is, however, small—e.g., a one standard deviation increase in disclosure changes only improves liquidity by less than one percent of its standard deviation (-0.006 in Column (1)). The lack of economic significance may be due to several reasons. First, strategic disclosure is only one of the many factors influencing stock liquidity (e.g., shocks to ownership structure, equity issuance, changes in credit rating, earnings announcements, institutional trading, changes in trading platforms and specialist companies, etc.), all of which may cause variation in liquidity that mute the effect of PBD. Second, extant literature suggests that the positive effect of any public news on financial market quality in general, and liquidity in particular, is both conceptually ambiguous (e.g., Kyle 1985 versus Kim and Verrecchia 1994, 1997) and usually difficult to capture in the data (see, e.g., Green 2004; Pasquariello and Vega 2007).[42] Third, our sample is made of firms in the S&P 1500 universe, all of which are well-established, highly liquid companies, and thus may be less suitable targets for PBD. The evidence in Ljungqvist and Qian (2016) suggests that more intense PBD may take place—with more pronounced effects—in smaller, more opaque and possibly private firms, for which liquidity is significantly lower and market depth and fund holding data are not readily available. Lastly, as noted earlier, strategic disclosures via newspaper articles are relatively infrequent in our sample, and newspapers are only

Qian 2016 for boutique hedge fund disclosures).

[41] Standard errors in Table 8 are heteroscedasticity-robust and clustered by firm. Employing either the usual Huber-White sandwich estimator or two-way clustering by firm and year (to account for any cross-sectional commonality in liquidity within time; e.g., Chordia et al. 2000) has no effect on our inference.

[42] For instance, the availability of public fundamental information in a Kyle (1985) setting would improve equilibrium market depth by lowering market makers' perceived uncertainty about asset payoff (e.g., $\lambda_1$ is increasing in $\sigma_v^2$ in Eq. (9); see also Pasquariello and Vega 2007). However, Kim and Verrecchia (1994, 1997) argue that the release of public information may instead increase adverse selection risk and worsen liquidity if it leads to greater information heterogeneity among sophisticated market participants. Relatedly, Goldstein and Yang (2019) highlight the potentially negative unintended consequences of the exogenous public disclosure of different types of fundamental information for price informativeness and real efficiency.

one of the venues through which a fund manager may disclose information. Thus, our measure of disclosure may not fully capture the true intensity of PBD, subjecting Eq. (29) to attenuation bias.

#### 4.2.2 Liquidity Effect of Disclosure and Speculative Short-Termism

The above discussion motivates us to amend Eq. (29) to distinguish the specific effect of PBD on price formation due to speculative short-termism from that of any fundamental information disclosure, as follows:

$$\begin{aligned}\Delta\text{Amihud}_{i,t} &= \beta_0 + \beta_1 \hat{\gamma}_{i,t} \qquad (30)\\ &+ \beta_2 \Delta\#\text{Discl}_{i,t} + \beta_3 \Delta\#\text{Discl}_{i,t} \times \hat{\gamma}_{i,t} + \beta_4 \Delta\#\text{Discl}_{i,t} \times \text{Suit}_{i,t} + \beta_5 \Delta\#\text{Discl}_{i,t} \times \hat{\gamma}_{i,t} \times \text{Suit}_{i,t}\\ &+ \beta_6 \Delta\text{PctTrd}_{i,t} + \beta_7 \Delta\text{PctTrd}_{i,t} \times \hat{\gamma}_{i,t} + \beta_8 \Delta\text{PctTrd}_{i,t} \times \text{Suit}_{i,t} + \beta_9 \Delta\text{PctTrd}_{i,t} \times \hat{\gamma}_{i,t} \times \text{Suit}_{i,t}\\ &+ \beta_{10} \text{Suit}_{i,t} + \beta_{11} \hat{\gamma}_{i,t} \times \text{Suit}_{i,t} + \delta' \Delta \text{X}_{i,t} + \delta_y + \delta_q + \varepsilon_{i,t},\end{aligned}$$

where $\hat{\gamma}_{i,t}$ is our firm-quarter level composite index of speculative short-termism (See Section 3.2.F), while $\text{Suit}_{i,t}$ is any of the three quarterly proxies for firm-level fundamental uncertainty—hence, suitability to disclosure—described in Section 4.1 (inverse firm size, analyst forecast inaccuracy, and stock return volatility). Proposition 2, Corollary 1, and Conclusion 3 imply that the liquidity effect of the potentially strategic disclosures in our sample should be more pronounced (i.e., greater $\lambda^* - \lambda_1$) when so is speculative short-termism (larger $\gamma$), especially when firms' fundamental uncertainty is high (and PBD may be more valuable); thus, we expect the interaction coefficients between changes in disclosure intensity and firm-level speculative short-termism ($\beta_3$), suitability to disclosure ($\beta_4$), and their cross-product ($\beta_5$) in Eq. (30) to be negative.[43]

[43] Specifically, in the model with PBT and PBD of Section 2.2, the improvement in liquidity from PBD ($\lambda^* - \lambda_1$) is always increasing in fundamental uncertainty ($\sigma_v^2$), but is only increasing in speculative short-termism ($\gamma$) when endowment uncertainty ($\sigma_e^2$) is small and especially so when MM's adverse selection risk is more severe (higher $\sigma_v^2$); see, e.g., Figure 7. Intuitively, a higher $\gamma$ has two opposite effects on $\lambda^* - \lambda_1$. On the one hand, the speculator becomes more willing to disclose private fundamental information in her signal in order to pump the equilibrium price in the direction of her endowment $e$ (e.g., lower $\delta^*$ in Figure 2), alleviating MM's adverse selection risk more relative to the baseline economy with PBT of Section 2.1 (greater $\lambda^* - \lambda_1$), and particularly so when such risk is perceived to be high (i.e., at higher $\sigma_v^2$). On the other hand, the speculator also trades more on her endowment (i.e., engages in more PBT) to pursue her more important short-term objective, reducing the fundamental information content of the aggregate order flow and improving equilibrium market depth (lower $\lambda^*$ and $\lambda_1$; see also Bhattacharyya and Nanda

Lastly, Eq. (30) also accounts for any correlation between stock-level illiquidity and a measure of intensity of speculative trading, $\text{PctTrd}_{i,t}$, defined as the percentage trading volume of all sample funds in firm $i$ (relative to its shares outstanding) during quarter $t$, either directly or in interaction with speculative short-termism, suitability to PBD, or both. (More) informed speculation in Kyle (1985) makes the market for the traded asset (more) illiquid in equilibrium, especially when liquidity provision is hampered by greater fundamental uncertainty—suggesting that both $\beta_6 > 0$ and $\beta_8 > 0$ in Eq. (30). However, empirically, it is challenging to separate informed trading and short-term-driven (hence uninformative) PBT in any such aggregate proxy for sophisticated trading intensity (i.e., firm-level fund portfolio rebalancing activity) as $\text{PctTrd}_{i,t}$. Accordingly, (more) PBT may instead improve asset liquidity by mitigating adverse selection risk (Bhattacharyya and Nanda 2013), especially when speculative short-termism, fundamental uncertainty, or both are greater, unless if at least partly substituted by PBD (as in Proposition 2)—thus making both the proportion of PBT in the $\text{PctTrd}_{i,t}$ and the sign of its effect on illiquidity via speculative short-termism ($\beta_7$ and $\beta_9$ in Eq. (30)) ambiguous.

We report estimates of various specifications of Eq. (30) in Columns (2) to (14) of Table 8. This evidence provides further support for our theory. First, estimated $\beta_2$, $\beta_3$, and $\beta_4$ are nearly always both negative and statistically significant (except when $\text{Suit}_{i,t} = \text{Inaccu}_{i,t}$, which is noisiest in correspondence with non-trivial disclosure intensity; see, e.g., Table 5). Intuitively, these coefficients imply that the first-order negative relationship between illiquidity and firm-level strategic disclosures in Column (1) is stronger when funds (are measured to) display greater short-term concerns, especially when firm-level fundamental uncertainty is greater (making firms more suitable to disclosure by funds), consistent with the aforementioned predictions in Corollary 1 and Conclusion 3. For instance, according to Column (3), the liquidity improvement accompanying those disclosures is, on average, 50% larger ($\beta_3$ versus $\beta_2$: $-0.012/-0.008$) when short-termism

2013), but more so when PBD is not otherwise available (lower $\lambda^* - \lambda_1$). Figure 7 suggests that the former effect generally prevails on the latter—yielding our conjecture that $\beta_3, \beta_4, \beta_5 < 0$ in Eq. (30)—unless $\sigma_e^2$ is high. High endowment uncertainty is however less plausible in our sample since (as noted earlier) U.S. equity market participants learn about fund holdings, albeit with some delay, and those holdings tend not to vary greatly over our sample period (e.g., an average AR(1) coefficient of 0.45 across all firm-fund pairs); in addition, as we discuss next, we explicitly control for funds' trading activity (which may include PBT) in Eq. (30).

($\hat{\gamma}_{i,t}$) is one standard deviation above its mean, amounting to a total of 2% of sample-wide firm-quarter illiquidity variation ($\beta_2 + \beta_3 = -0.008 - 0.012$). Columns (6) to (8) further show that these effects are between over 40% ($\beta_4 + \beta_5$ versus $\beta_2 + \beta_3$: $(-0.002 - 0.006)/(-0.008 - 0.011)$) and more than 200% stronger ($(-0.038 - 0.045)/(-0.021 - 0.020)$) when firms are one standard deviation more suitable to disclosure than the mean.

Second, accounting for speculative trading intensity (measured by firm-level fund portfolio rebalancing, $\text{PctTrd}_{i,t}$) does not affect but rather strengthens our inference: Estimated $\beta_2$, $\beta_3$, $\beta_4$, and $\beta_5$ are both larger and more often statistically significant in Columns (5) and (12) to (14)—e.g., amounting to a total decrease in firm-level illiquidity of as much as 13% of its sample-wide variation in correspondence with one standard deviation greater disclosure intensity ($\beta_2 + \beta_3 + \beta_4 + \beta_5 = -0.023 - 0.020 - 0.040 - 0.044$ in Column (12)).

Lastly, the relationship between such fund-level trading activity in a firm and its stock illiquidity is also consistent with our model. In particular, estimates of $\beta_6$ and $\beta_8$ are positive and statistically significant in most specifications, while estimates of $\beta_7$ and $\beta_9$ are mostly small and statistically insignificant. For instance, Columns (2) and (9) to (14) suggest that (a one standard deviation) greater firm-level fund trading intensity is accompanied by (up to nearly 2% (0.017) standard deviation) worse firm-level liquidity, especially (by as much as almost 4% (0.037)) when firm-level fundamental uncertainty is large—i.e., when MM's perceived adverse selection risk from liquidity provision is presumably higher—consistent with our model. However, any PBT in fund portfolio rebalancing activity and its potential substitution with PBD may offset this effect, especially in light of the aforementioned increasingly strict SEC enforcement of regulation prohibiting pumping by trading over our sample period (see Section 4.1); accordingly, we find $\hat{\gamma}_{i,t}$ to have an insignificant net impact on the relationship between illiquidity and trading in Columns (4) and (9) to (14).

In short, the analysis in Tables 7 and 8 indicates that the potentially strategic disclosure activity of equity mutual funds about U.S. stocks is both positively related to those funds' estimated short-termism as well as negatively related to the those stocks' price impact of trading. These findings are consistent with the notion that such disclosure activity may reflect speculators' attempts at short-term price manipulation and so have non-trivial effects on the quality of price formation in financial markets, as postulated by our model.

# 5 Conclusions

In this paper, we model and provide evidence of sophisticated speculators' strategic public disclosure of private information. First we develop a model of strategic speculation based on Kyle (1985) and show that when a speculator is (at least partially) short-term oriented, voluntary disclosure of private information is optimal. We model disclosure as a signal that depends positively on two pieces of a speculator's private information—asset fundamentals and her initial endowment in that asset. Intuitively, a positive (negative) endowment shock leads to a more positive (negative) signal realization, which, in turn, may be interpreted by uninformed market participants—the market makers—as a positive (negative) fundamental shock, resulting in equilibrium price changes in the same direction as the endowment shock. Thus, strategic disclosure yields a positive correlation between a speculator's initial endowment in an asset and its short-term price, boosting her portfolio value and her overall value function. Additionally, we show that strategic disclosure has important implications for the quality of the affected market. In particular, relative to the non-disclosure case, market depth increases, as the adverse selection risk faced by the dealership sector is mitigated (and prices are more efficient) in the presence of such an (at least partially) informative disclosure in equilibrium.

We provide supportive empirical evidence in the context of the U.S. equity mutual fund industry between 2005 and 2014. We first show that stock market participants are cognizant of (i.e., stock returns are sensitive to) those funds' potentially strategic non-anonymous disclosures (measured by their relevant interviews in the main business press). We then find that funds' stronger short-term incentives (measured by three novel composite indices) are associated with more frequent such disclosures—a pattern that is most pronounced for target firm-level characteristics (namely small size, inaccurate analyst EPS forecasts, and high stock return volatility) that plausibly make strategic disclosure more effective. We also find that (1) these disclosures in target firms are accompanied by liquidity improvements of their stocks and (2) this effect is stronger if speculative short-termism is more severe, and especially so if those disclosures are expected to have a greater impact on market beliefs and stock prices—such as when firm-level fundamental uncertainty is greater—consistent with our model.

Overall, our novel analysis contributes to an emerging literature bridging the gap between the conventional wisdom that information is valuable only if kept private and the not uncommon observation that sophisticated financial market participants voluntarily, non-anonymously, and possibly strategically disclose information to the public. These insights are important both for academics' and practitioners' understanding of the process of price formation in financial markets in the presence of information asymmetry as well as for policy-makers' efforts at regulating the availability of information in those markets.

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# A Proofs

**Proof of Proposition 2.**
Conjecture that the MM's pricing strategy takes the following form:

$$P_1 = P_0 + \lambda_1(\omega - \bar{\omega}) + \lambda_2(s - \bar{s}). \tag{A.1}$$

After observing $v$ and $e$, the speculator's expected date $t = 1$ price is

$$\mathrm{E}\left[P_1|v,e,D=1,\delta\right] = P_0 + \lambda_1(x - \bar{x}) + \lambda_2(s - \bar{s}). \tag{A.2}$$

Plug this into her objective function:

$$\mathrm{E}\left[W|v,e,D=1,\delta\right] = \gamma e[\lambda_1(x-\bar{x}) + \lambda_2(s-\bar{s})] + (1-\gamma)[x(v - P_0 - \lambda_1(x-\bar{x}) - \lambda_2(s-\bar{s}))]. \tag{A.3}$$

This leads to the first order condition:

$$\frac{\partial}{\partial x}\mathrm{E}\left[W|v,e,D=1,\delta\right] = \gamma e\lambda_1 + (1-\gamma)[v - P_0 + \lambda_1\bar{x} - \lambda_2(s-\bar{s}) - 2\lambda_1 x] = 0. \tag{A.4}$$

Thus, defining $\beta = \frac{\gamma}{1-\gamma}$, there is

$$x^*(v,e) = \beta\bar{e} + \frac{\beta\lambda_1 - \delta\lambda_2}{2\lambda_1}(e - \bar{e}) + \frac{1-(1-\delta)\lambda_2}{2\lambda_1}(v - P_0). \tag{A.5}$$

The equilibrium is a fixed point: If the speculator optimizes with respect to the conjectured pricing rule (A.1) and the MM make inferences (according to the Bayesian rule) based on the speculator's optimization, then the MM's expected liquidation value must be consistent with the conjectured pricing rule, i.e.,

$$P_1 = \mathrm{E}\left[v|s,\omega,D=1,\delta\right]. \tag{A.6}$$

With normality, the conditional expectation can be expressed as

$$\mathrm{E}\left[v|s,\omega,D=1,\delta\right] = P_0 + \sigma_v^2\begin{bmatrix} 1-\delta \\ 1-(1-\delta)\lambda_2 \end{bmatrix}' \times A^{-1} \times \begin{bmatrix} s-\bar{s} \\ 2\lambda_1(\omega-\bar{\omega}) \end{bmatrix}, \tag{A.7}$$

where $A =$

$$\begin{bmatrix} \delta^2\sigma_e^2 + (1-\delta)^2\sigma_v^2 & \delta(\beta\lambda_1 - \delta\lambda_2)\sigma_e^2 + (1-\delta)(1-(1-\delta)\lambda_2)\sigma_v^2 \\ \delta(\beta\lambda_1 - \delta\lambda_2)\sigma_e^2 + (1-\delta)(1-(1-\delta)\lambda_2)\sigma_v^2 & (\beta\lambda_1 - \delta\lambda_2)^2\sigma_e^2 + (1-(1-\delta)\lambda_2)^2\sigma_v^2 + 4\lambda_1^2\sigma_z^2 \end{bmatrix}. \tag{A.8}$$

Jointly solving Eq. (A.1) and Eq. (A.7) leads to

$$\lambda_1 = \frac{1}{\sqrt{\alpha^2\beta^2 + 4\frac{\sigma_z^2}{\sigma_v^2} + 4\alpha^2\frac{\sigma_z^2}{\sigma_e^2}}}, \tag{A.9}$$

and

$$\lambda_2 = -\frac{\lambda_1}{\delta}\left(\beta - \frac{4\lambda_1\sigma_z^2}{(\frac{1}{\alpha} - \beta\lambda_1)\sigma_e^2}\right). \tag{A.10}$$

■

**Proof of Proposition 3.**

**Proof of Part 1** In an equilibrium with disclosure, the speculator's *ex ante* expected value function is (e.g., Grossman and Stiglitz 1980; Vives 2008, Chapter 4)

$$\begin{aligned} &\mathrm{E}\left\{\mathrm{E}\left[W|v,e,D=1,\delta\right]\right\}=\mathrm{E}\left[W|D=1,\delta\right] \\ =&\gamma\mathrm{E}\left[(P_1-P_0)e|D=1,\delta\right]+(1-\gamma)\mathrm{E}\left[x^*(v-P_1)|D=1,\delta\right], \end{aligned} \tag{A.11}$$

by the law of iterated expectations. Substituting $x^*$ and $P_1$ of Eqs. (7) and (8) into Eq. (A.11) and simplifying leads to

$$\mathrm{E}\left[W\middle|D=1,\delta\right]=(1-\gamma)\lambda_1\sigma_z^2\frac{1+\alpha\beta\lambda_1}{1-\alpha\beta\lambda_1}, \tag{A.12}$$

where $\lambda_1$ is given by Eq. (9).

**Proof of Part 2** In a baseline equilibrium, the speculator's *ex ante* expected value function is

$$\begin{aligned} &\mathrm{E}\left\{\mathrm{E}\left[W|v,e,D=0\right]\right\}=\mathrm{E}\left[W|D=0\right] \\ =&\gamma\mathrm{E}\left[(P_1-P_0)e|D=0\right]+(1-\gamma)\mathrm{E}\left[x^*(v-P_1)|D=0\right], \end{aligned} \tag{A.13}$$

by the law of iterated expectations. Substituting $x^*$ and $P_1$ of Eqs. (2) and (3) into Eq. (A.13) and simplifying leads to

$$\mathrm{E}\left[W|D=0\right]=\frac{1-\gamma}{4\lambda^*}\left(\sigma_v^2+\beta^2\lambda^{*2}\sigma_e^2\right), \tag{A.14}$$

where $\lambda^*$ is given by Eq. (4).

**Proof of Part 3** To establish weak inequality, it suffices to show that there exist a signal weight $\hat{\delta}$ such that

$$\mathrm{E}\left[W|D=1,\hat{\delta}\right]=\mathrm{E}\left[W|D=0\right]. \tag{A.15}$$

Consider the following candidate:

$$\hat{\delta}=\frac{1}{1+\hat{\alpha}}, \tag{A.16}$$

where

$$\hat{\alpha}=\lambda^*\beta\frac{\sigma_e^2}{\sigma_v^2}=\beta\sqrt{\frac{\sigma_v^2}{\beta^2\sigma_e^2+4\sigma_z^2}}\frac{\sigma_e^2}{\sigma_v^2}. \tag{A.17}$$

Substituting the expression for $\hat{\alpha}$ into Eq. (12) and (13) establishes equality between the speculator's *ex ante* expected value function in the baseline and signaling equilibria.

To establish strict inequality, differentiate the speculator's *ex ante* expected value function in a signaling equilibrium with respect to the signal weight and evaluate the resulting derivative at $\hat{\delta}$. This gives

$$\frac{\partial\,\mathrm{E}\left[W|D=1,\delta\right]}{\partial\delta}\bigg|_{\delta=\hat{\delta}}=-(1-\gamma)\sigma_z^2\frac{\hat{\alpha}}{\hat{\delta}^2}\lambda_1^3\frac{1+\alpha\beta\lambda_1}{1-\alpha\beta\lambda_1}(\beta^2+4\frac{\sigma_z^2}{\sigma_e^2})\frac{2\sigma_z^2}{2\sigma_z^2+\beta^2\sigma_e^2}<0. \tag{A.18}$$

Since the derivative is strictly less than zero, setting the signal weight to be slightly below the value $\hat{\delta}$ increases the speculator's *ex ante* expected value function to be strictly above that in the baseline equilibrium.
■

**Proof of Proposition 4.**

For some realization $(v,e,z)$, denote by $x^*(v,e,z)$ and $x^{**}(v,e,z)$ the speculator's trading strategies in the signaling equilibrium of the one-step game (SE) and the Perfect Bayesian Equilibrium of the two-step game (PBE), respectively. Additionally, denote by $P_1^*(v,e,z)$ and $P_1^{**}(v,e,z)$ the MM's corresponding pricing rules. The two equilibria are equivalent if and only if (1) $x^*(v,e,z) = x^{**}(v,e,z)$ and (2) $P_1^*(v,e,z) = P_1^{**}(v,e,z)$.

**Proof of (1)** By construction, the speculator's trading strategy in PBE is the baseline trading strategy with the MM's information set updated to reflect the information content of the signal. Thus Eq. (2) implies

$$x^{**} = \frac{\beta}{2}(e+\tilde{e}) + \frac{v-\tilde{v}}{2\tilde{\lambda}}, \tag{A.19}$$

where $\tilde{\lambda} = \sqrt{\frac{\tilde{\sigma}_v^2}{\beta^2\tilde{\sigma}_e^2+4\sigma_z^2}}$ is the price impact derived from Eq. (4). By substituting Eq. (19) and (20) for $\tilde{\sigma}_v^2$ and $\tilde{\sigma}_e^2$ in Eq. (A.19), we get

$$\tilde{\lambda} = \lambda_1. \tag{A.20}$$

Intuitively, for SE and PBE to be equivalent, they must induce the same price impact.

Finally, in Eq. (A.19), replace $\tilde{v}$ and $\tilde{e}$ by the right hand sides of Eq. (17) and (18), respectively, and use the fact that $\tilde{\lambda} = \lambda_1$. There is

$$x^{**}(v,e,z) = \frac{v-P_0}{2\lambda_1} + \frac{\beta}{2}(e+\bar{e}) + \frac{1}{2\delta}[\beta - \frac{4\lambda_1}{\frac{1}{\alpha}-\lambda_1\beta}\frac{\sigma_z^2}{\sigma_e^2}](s-\bar{s}) = x^*(v,e,z). \tag{A.21}$$

The last equality follows from Eq. (2) and the fact that $\frac{1}{2\delta}[\beta - \frac{4\lambda_1}{\frac{1}{\alpha}-\lambda_1\beta}\frac{\sigma_z^2}{\sigma_e^2}] = -\frac{\lambda_2}{2\lambda_1}$, as implied by Eq. (10).

**Proof of (2)** The equilibrium pricing rule in PBE is the baseline pricing rule, where the MM's information set is updated to reflect the information content of the signal. By Eq. (3), there is

$$P_1^{**}(v,e,z) = \tilde{v} + \tilde{\lambda}(\omega - \tilde{\omega}), \tag{A.22}$$

where $\tilde{\omega} = \tilde{x} = \beta\tilde{e}$. Substituting Eq. (17) and (18) for $\tilde{v}$ and $\tilde{e}$, respectively, and using the fact that $\lambda_1 = \tilde{\lambda}$, there is

$$P_1^{**}(v,e,z) = P_0 + \lambda_1(\omega - \bar{\omega}) - \frac{\lambda_1}{\delta}[\beta - \frac{4\lambda_1}{\frac{1}{\alpha}-\lambda_1\beta}\frac{\sigma_z^2}{\sigma_e^2}](s-\bar{s}). \tag{A.23}$$

Lastly, substituting in Eq. (10) yields $P_1^{**}(v,e,z) = P_1^*(v,e,z)$. ■

**Proof of Corollary 1.**

**Proof of Part 1** Note that $\lambda_1 = \tilde{\lambda} = \frac{\tilde{\sigma}_v}{2\sqrt{\beta^2\tilde{\sigma}_e^2+\sigma_z^2}}$. Thus, Eqs. (19) and (20), along with the facts that $\tilde{\sigma}_v^2$ increases with $\delta$ and that $\tilde{\sigma}_e^2$ decreases with $\delta$, imply that $\lambda_1$ is increasing in $\delta$.

**Proof of Part 2** If the speculator commits to the signal weight $\delta = \hat{\delta}$ (Eq. (A.16)), it is straightforward to show that the price impact in the signaling equilibrium equates the price impact in the baseline equilibrium—$\lambda_1 = \lambda^*$. It then follows immediately from Part 1 of Corollary (1) that Part 2 holds.

**Proof of Part 3** We first consider a necessary condition for $\delta$ such that the speculator is better-off by committing to disclose a signal. Differentiating the speculator's *ex ante* expected value function $\mathrm{E}\left[W|D=1,\delta\right]$ with respect to $\delta$, there is

$$\frac{\partial\,\mathrm{E}\left[W|D=1,\delta\right]}{\partial\delta} = (1-\gamma)\sigma_z^2\frac{2\alpha}{\delta^2}\lambda_1^3\frac{1+\alpha\beta\lambda_1}{1-\alpha\beta\lambda_1}\left[-\frac{4\beta}{\alpha}\frac{\sigma_z^2}{\sigma_v^2}\frac{\lambda_1}{1-\alpha^2\beta^2\lambda_1^2}+\frac{1}{2}(\beta^2+4\frac{\sigma_z^2}{\sigma_e^2})\right], \tag{A.24}$$

where $\alpha = \frac{1-\delta}{\delta}$ is given by Eq. (11). Since $(1-\gamma)\sigma_z^2\frac{2\alpha}{\delta^2}\lambda_1^3\frac{1+\alpha\beta\lambda_1}{1-\alpha\beta\lambda_1} > 0$, the sign of $\frac{\partial\,\mathrm{E}\left[W|D=1,\delta\right]}{\partial\delta}$ depends on the sign of the terms in the brackets on the right hand side of Eq. (A.24). These terms can be rewritten as

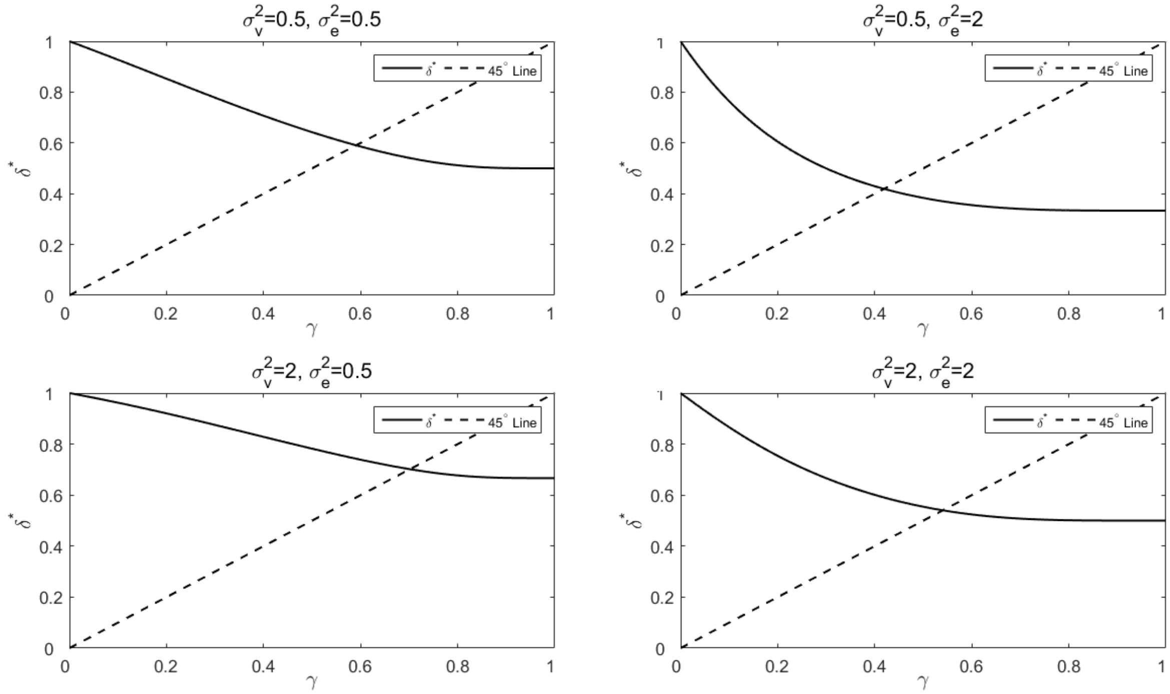
$$-\frac{4\beta}{\alpha}\frac{\sigma_z^2}{\sigma_v^2}\frac{\lambda_1}{1-\alpha^2\beta^2\lambda_1^2}+\frac{1}{2}(\beta^2+4\frac{\sigma_z^2}{\sigma_e^2}) = -4\beta\frac{\sigma_z^2}{\sigma_v^2}\frac{1}{\alpha\lambda_1[4\frac{\sigma_z^2}{\sigma_v^2}+4\alpha^2\frac{\sigma_z^2}{\sigma_e^2}]}+\frac{1}{2}(\beta^2+4\frac{\sigma_z^2}{\sigma_e^2}). \tag{A.25}$$

It is straightforward to see that the expression in Eq. (A.25) increases in $\alpha$ (both $\alpha\lambda_1$ and $4\frac{\sigma_u^2}{\sigma_v^2}+4\alpha^2\frac{\sigma_u^2}{\sigma_z^2}$ increase in $\alpha$) and thus decreases in $\delta$. It then follows that the speculator's *ex ante* expected value function $\mathrm{E}\left[W|D=1,\delta\right]$ is either monotonic or first increasing and then decreasing in $\delta$.

Note that, from the proof of Proposition 3, there is $\left.\frac{\partial\,\mathrm{E}\left[W|D=1,\delta\right]}{\partial\delta}\right|_{\delta=\hat{\delta}} < 0$. Additionally, letting $\check{\delta} = \frac{\sigma_v}{\sigma_v+\sigma_e} < \hat{\delta}$, it can be shown that, $\left.\frac{\partial\,\mathrm{E}\left[W|D=1,\delta\right]}{\partial\delta}\right|_{\delta=\check{\delta}} \geq 0$. It then follows that $\mathrm{E}\left[W|D=1,\delta\right]$ is first increasing and then decreasing in $\delta$. Furthermore, because $\mathrm{E}\left[W|D=1,\hat{\delta}\right] = \mathrm{E}\left[W|D=0\right]$, a necessary condition for the speculator to be better-off with disclosure is that the signal weight satisfy $\delta \leq \hat{\delta}$. Because $\lambda_1 = \lambda^*$ when the speculator commits to disclose with signal weight $\delta = \hat{\delta}$, $\lambda_1 < \lambda^*$ if and only if $\delta < \hat{\delta}$. Therefore, $\lambda_1 < \lambda^*$ whenever the signal weight $\delta$ is such that the speculator is better-off by disclosing a signal. ■

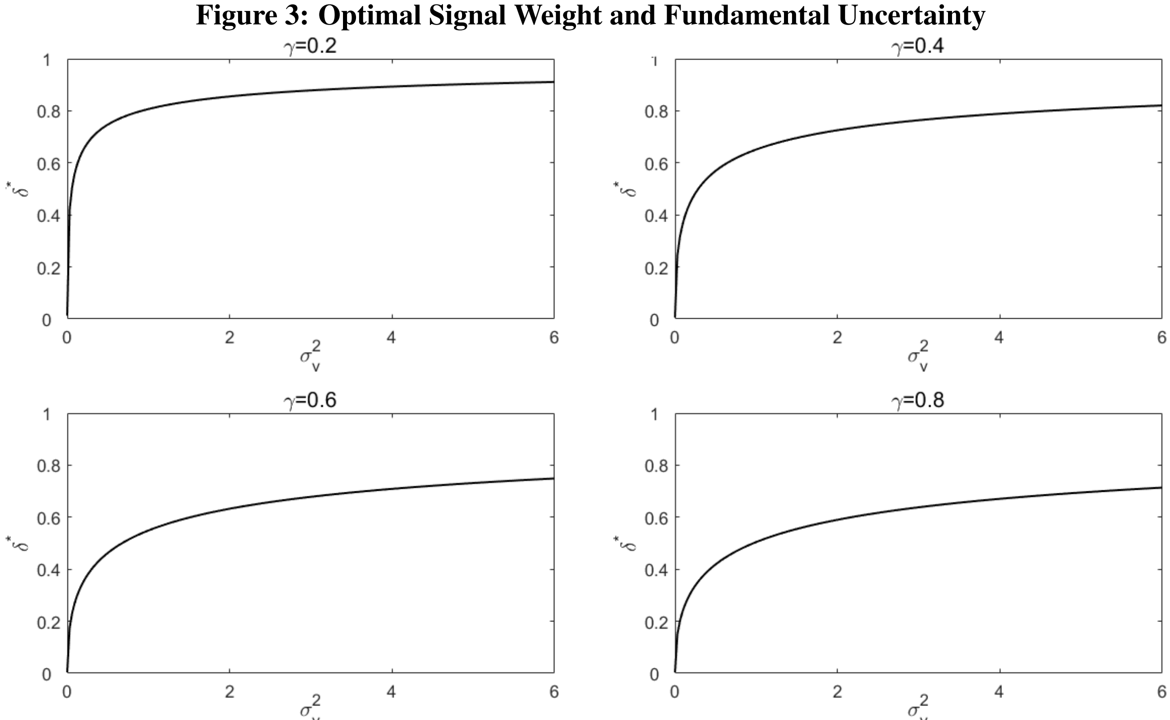
# B Figures and Tables

**Figure 2: Optimal Signal Weight and Short-termism**



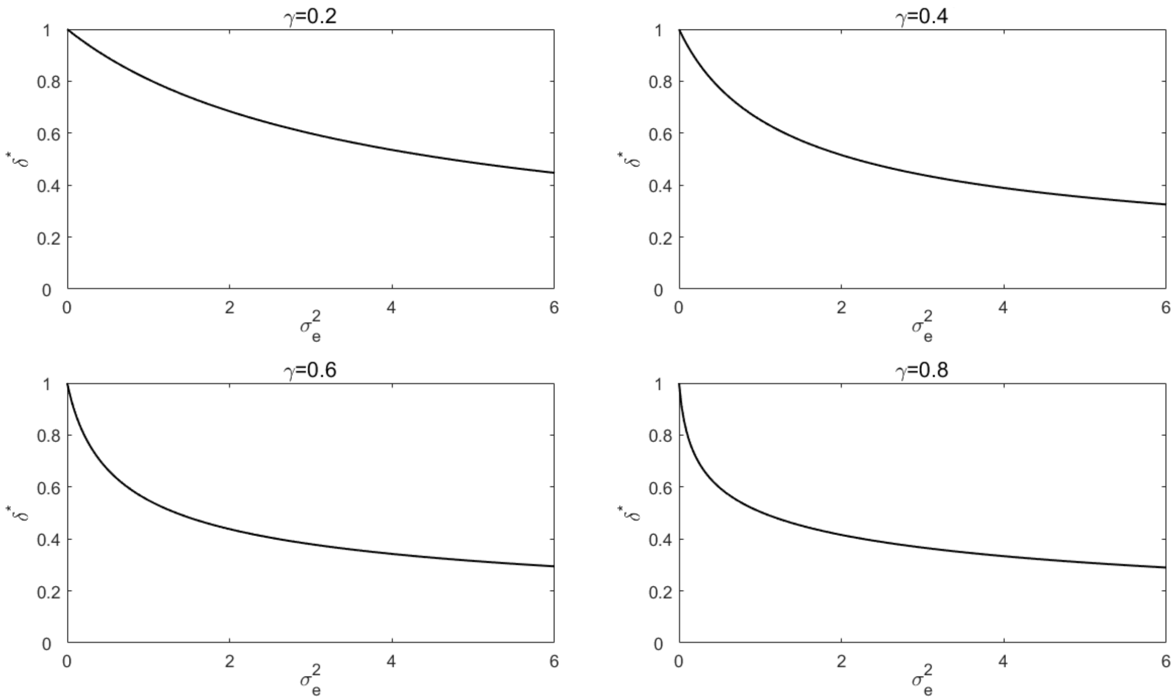

This figure plots, for four different combinations of $\sigma_v^2$ and $\sigma_e^2$, the optimal signal weight $\delta^*$ as a function of $\gamma$, the weight of short-term gain in the speculator's objective function. In all graphs, we set $\sigma_z^2 = 1$. The solid lines are $\delta^*(\gamma)$ and the dashed lines are the 45° lines.

**Figure 3: Optimal Signal Weight and Fundamental Uncertainty**



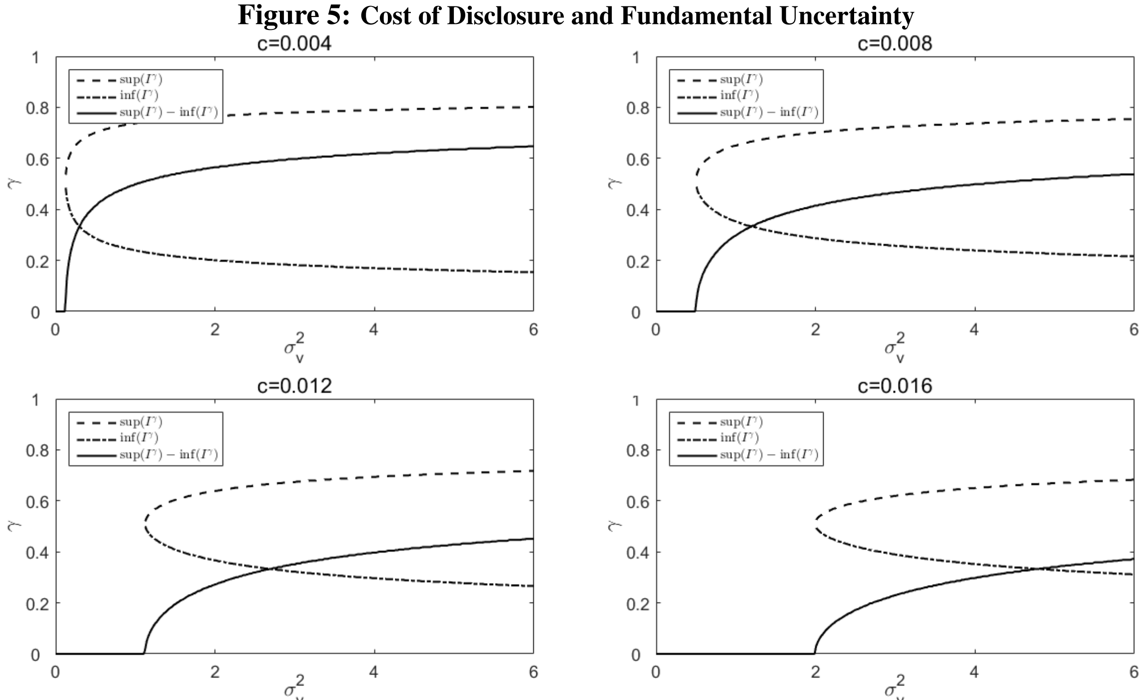

This figure plots, for four different $\gamma$'s, the optimal signal weight $\delta^*$ as a function of $\sigma_v^2$, the asset's fundamental uncertainty. In all graphs, we set $\sigma_e^2 = \sigma_z^2 = 1$.

**Figure 4: Optimal Signal Weight and Endowment Uncertainty**



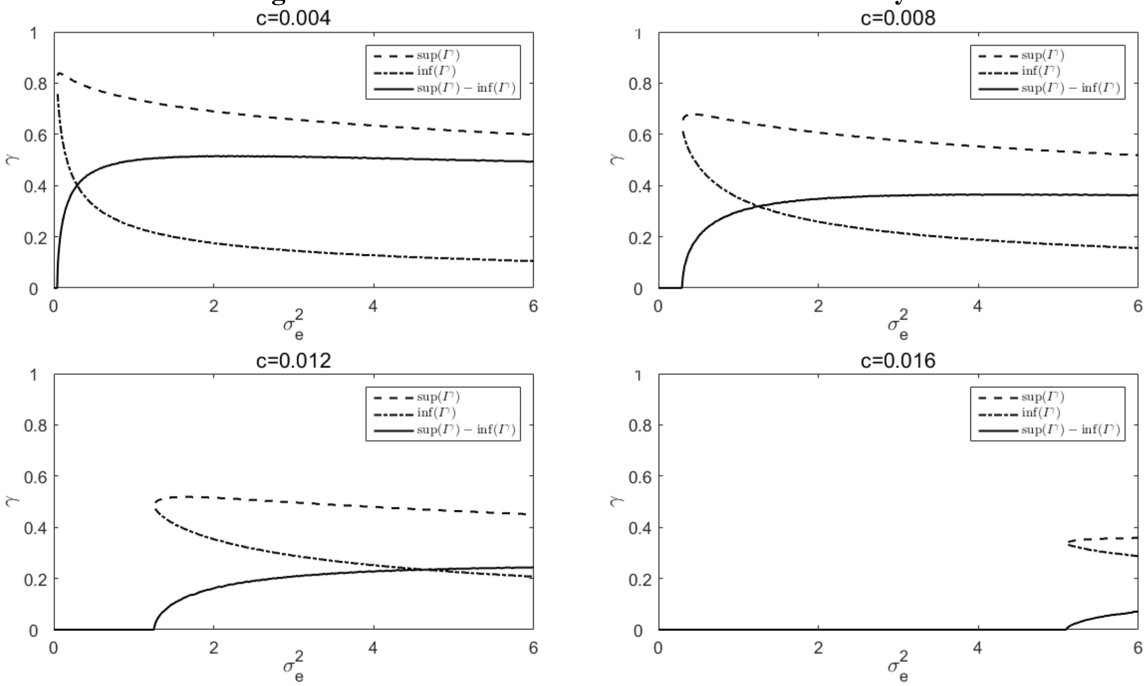

This figure plots, for four different $\gamma$'s, the optimal signal weight $\delta^*$ as a function of $\sigma_e^2$, the uncertainty about the speculator's endowment. In all graphs, we set $\sigma_v^2 = \sigma_z^2 = 1$.

**Figure 5: Cost of Disclosure and Fundamental Uncertainty**



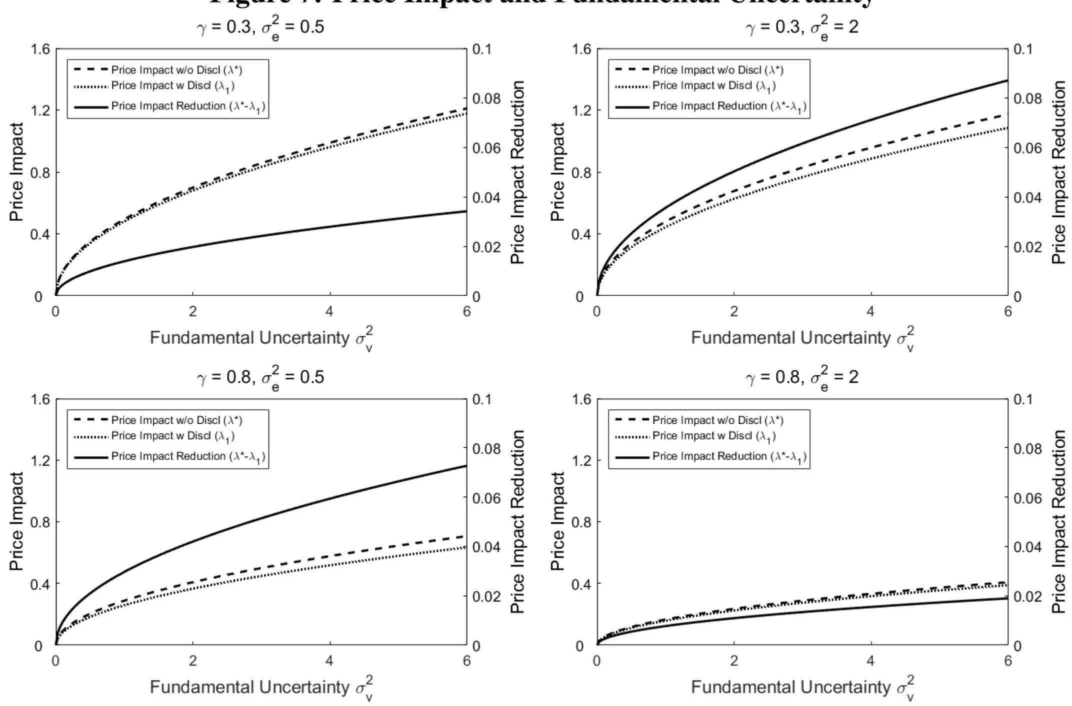

This figure plots, for four different values of the fixed disclosure cost $c$, $I^\gamma$ as a function of $\sigma_v^2$, the asset's fundamental uncertainty. $I^\gamma$ is the set of $\gamma$ such that the speculator prefers disclosure (with an optimally chosen signal weight) to no disclosure. The two dashed lines are upper and lower bounds of $I^\gamma$ and the solid line is the width of the interval $[\inf I^\gamma, \sup I^\gamma]$. In all graphs, we set $\sigma_e^2 = \sigma_z^2 = 1$.

**Figure 6: Cost of Disclosure and Endowment Uncertainty**



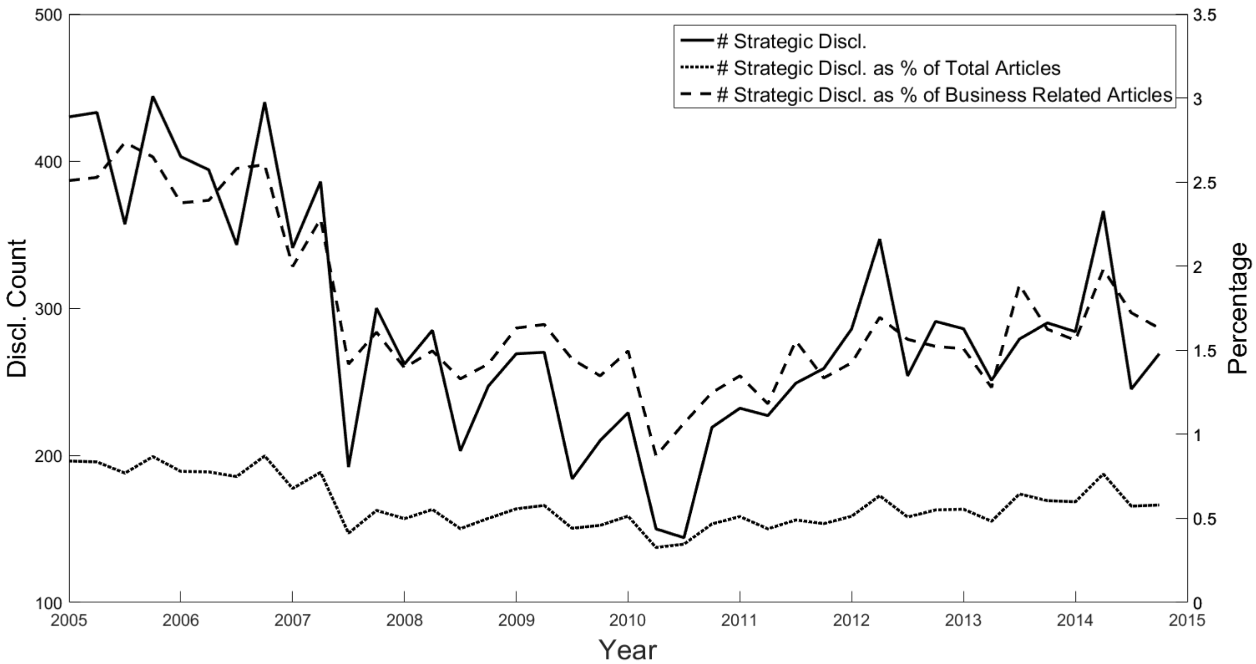

This figure plots, for four different values of the fixed disclosure cost $c$, $I^\gamma$ as a function of $\sigma_e^2$, the uncertainty about the speculator's endowment. $I^\gamma$ is the set of $\gamma$ such that the speculator prefers disclosure (with an optimally chosen signal weight) to no disclosure. The two dashed lines are upper and lower bounds of $I^\gamma$ and the solid line is the width of the interval $[\inf I^\gamma, \sup I^\gamma]$. In all graphs, we set $\sigma_v^2 = \sigma_z^2 = 1$.

**Figure 7: Price Impact and Fundamental Uncertainty**



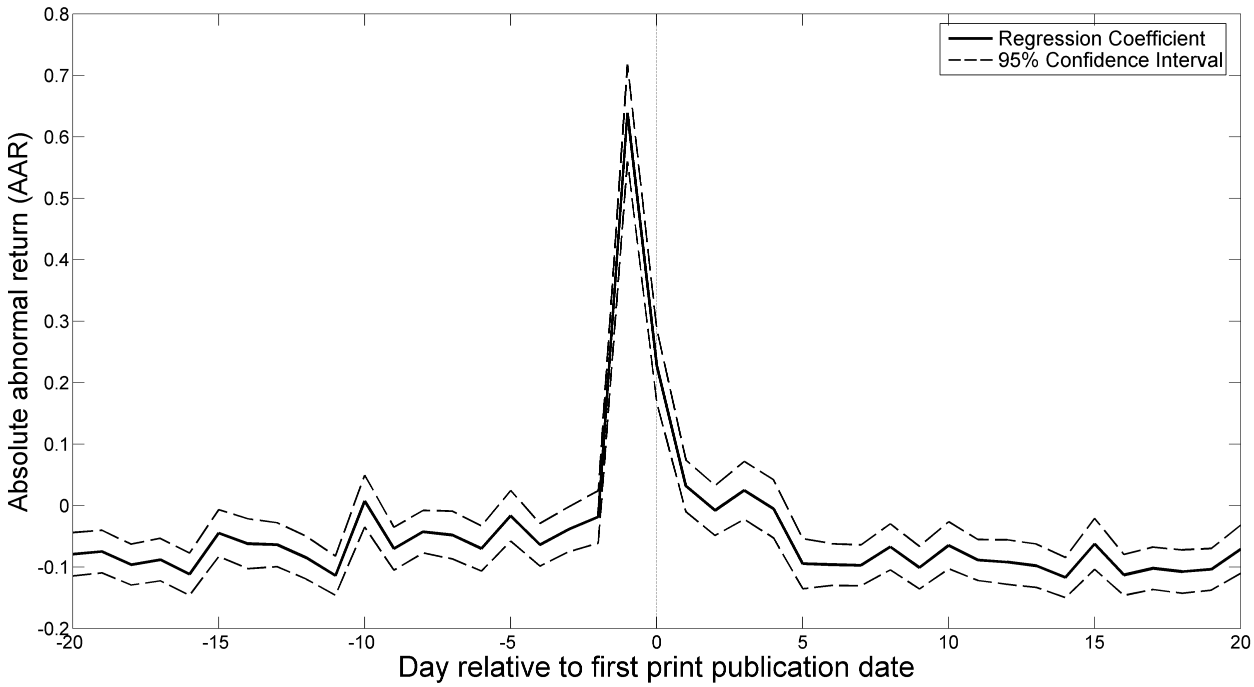

This figure plots, for different combinations of $\gamma$ and $\sigma_e^2$, the relation between equilibrium price impact and the asset's fundamental uncertainty $\sigma_v^2$. The dashed and dotted lines, which are plotted against the left axis, are the price impact in the baseline equilibrium ($\lambda^*$) and the signaling equilibrium ($\lambda_1$, in correspondence with the optimal signal weight $\delta^*$), respectively. The solid line, plotted against the right axis, is the reduction in price impact from the baseline equilibrium to the signaling equilibrium ($\lambda^* - \lambda_1$).

**Figure 8: Number of Potentially Strategic Disclosures Over Time**




This figure plots the total number of potentially strategic disclosures (as defined in Section 3.1.B) about S&P 1500 non-financial firms (left axis, solid line), and as a fraction of the total number of business-related articles (right axis, dashed line) or all articles (right axis, dotted line) printed in WSJ, FT, and NYT, over each quarter of the sample period 2005–2014.

**Figure 9: Abnormal Absolute Returns Around Disclosure Dates**




This figure plots OLS estimates of daily absolute abnormal returns (AARs, solid line, in percentage, net of value-weighted non-financial S&P 1500 index returns) for the stocks mentioned in the potentially strategic disclosures in our sample (in the form of WSJ, FT, and NYT articles, as defined in 3.1.B) within 40 trading days around the U.S. date of first print publication (day 0; U.S. edition for NYT and WSJ, U.K. edition for FT) over the sample period 2005–2014, as well as the corresponding 95% confidence interval based on standard errors clustered at the event-date level (dashed lines).

## Table 2: Summary Statistics of WSJ/NYT/FT Data

This table summarizes our disclosure data. Our sample spans a decade from 2005 to 2014 and covers all articles published in the Wall Street Journal, the Financial Times and the New York Times. To identify a strategic disclosure, we apply the following criteria: An article is defined to be a disclosure made by fund holding company $j$ about target firm $i$, if there exists a paragraph in it such that either one of the following is satisfied (see also Section 3.1.B).

1. Both names of the target company $i$ and the fund management company $j$ are found. Because investment banks are frequently covered in the media together with other firms for reasons unrelated to strategic information disclosure (equity or bond underwriting, grading assignments, etc.), to avoid confounding our analysis, we exclude investment banks (e.g. Goldman Sachs, Merrill Lynch, Wells Fargo, etc.) from fund management companies, unless (i) key words such as "analyst", "portfolio manager" or "strategist" appear in the same sentence as the mention of the fund holding company; (ii) key words such as "securities", "holdings" or "asset management", which indicates the disclosure comes from a non-investment banking branch of $j$, closely follow the mention of the fund management company (with no more than one word in between); or (iii) the name (first name followed by last name) of a portfolio manager associated with fund holding company $j$ is also found in the same paragraph.
2. The name of the target company $i$ is found and either (i) all first, middle, and last names of any portfolio manager at fund holding company $j$ is found, or (ii) the first and last names of any portfolio manager at fund holding company $j$ is found, and, in the same sentence, there is key word such as "analyst", "portfolio manager", or "strategist".[a]

For each of the three newspapers, we count separately the number of articles which we identify as disclosures, which we do not identify as disclosures but are published in a business-related section, and which are published in a business-unrelated section (such as leisure, art or food).

| | # Articles | | | |
|---|---|---|---|---|
| | FT | NYT | WSJ | All |
| **Disclosures** | 3,531 | 2,886 | 5,133 | 11,550 |
| **Business-Related** | 189,472 | 133,191 | 352,789 | 675,452 |
| **Business-Unrelated** | 405,769 | 872,169 | 4,678 | 1,282,616 |
| **All** | 595,275 | 1,005,363 | 357,476 | 1,958,114 |

[a] The complete list of key words is: analyst, fund manager, portfolio manager, strategist, director of research, research director, financial expert, investment advisor, financial advisor, portfolio advisor, fund advisor, research professional, asset manager, client advisor, private wealth advisor, head of, investment officer, the plural form of the above phrases, as well as their alternative spellings ("advisor" spelled as "adviser").

## Table 3: Examples of Identified Disclosures

This table lists sample paragraphs—one for each newspaper in our sample—with which a journal article is identified as a strategic disclosure using the screening technique described in Section 3.1.B.

Time Warner's Cable Plan Is Attracting Bargain Hunters
Julia Angwin
The Wall Street Journal, Mar. 3rd, 2005

*Time Warner plans to pay for Adelphia partly by issuing stock in the new Time Warner cable company. "I'm not the biggest cable bull in the world, but I'm positive on the speculated deal terms," said Henry Ellenbogen, an analyst with T. Rowe Price, which owned a 1.2% stake in Time Warner as of Dec. 31, according to FactSet Research. Mr. Ellenbogen believes the new cable stock likely would trade at a higher multiple than Time Warner shares do currently, indicating that it would be fast-growing. It would "showcase the growth and quality of cable operation and show that Time Warner's high-quality, albeit moderate-growth, media assets trade at a significant discount to their peers," he said.*

The Energy Conundrum: To Own or Ignore?
Ian McDonald
The Wall Street Journal, Oct. 7th, 2005

*Energy bulls believe that the dearth of major oil and natural-gas discoveries in recent years should keep oil prices and energy-company profits high. And, despite the recent drop in crude-oil prices, cuts in refining capacity because of the Gulf Coast hurricanes add to the bulls' optimism for sustained high prices. "The cash flows from these companies should be pretty staggering for some time," says David Dreman, chairman and chief investment officer at Dreman Value Management in Jersey City, N.J. His firm didn't own energy stocks during the 1990s, but built up big positions late last year in stocks like Devon Energy, ConocoPhillips and Occidental Petroleum, which are all up more than 35% so far this year but off over the past week.*

Starbucks Investors May Get Jitters
Ian McDonald and Janet Adamy
The Wall Street Journal, May 9th, 2006

*Starbucks bulls argue that those who steer clear of the shares today match Oscar Wilde's definition of a cynic: someone who knows the price of everything and the value of nothing. "It's expensive. It will probably always be expensive," says Bill McVail, a portfolio manager with Turner Investment Partners of Berwyn, Pa., which has $21.2 billion under management. The firm has owned Starbucks in client portfolios for more than three years. "A company with this kind of franchise won't sell at a market multiple."*

EBay Merchants Seek Management Change
Mylene Mangalindan
The Wall Street Journal, Aug. 21st, 2006

*Kevin Landis, chief investment officer of Firsthand Capital Management, which owns eBay shares, says much of the hand-wringing by merchants is overblown. EBay "isn't exactly a turnaround situation," he says. "You still have a very healthy, growing profitable company." He notes eBay's price/earnings ratio of 36 is comparable with those of Amazon.com Inc. and Yahoo Inc., which have multiples of 39 and 33, respectively. But eBay's forward P/E multiple of 20, which incorporates earnings estimates for next year, looks like a steal, he says. In contrast, Amazon's richer forward P/E multiple is 40, and Yahoo has a forward P/E of 42. "Unless these guys are done growing, that's cheap," says Mr. Landis, who believes eBay will keep growing.*

Reed Krakoff Seals $50M Buyout
Elizabeth Paton
The Financial Times, Sept. 3rd, 2013

*Henry Ellenbogen, portfolio manager at T Rowe Price, a mutual fund that has invested in US luxury retail companies such as Tory Burch and Michael Kors, said: "We have an extremely strong record in the sector and see this business as a future force to be reckoned with on a global scale."*

## Table 4: Variable Definitions

This table provides construction details of variables used in our empirical analysis. Throughout this table we use the subscripts $i$, $j$, $k$, and $t$ to index for firm, fund holding company (fund, for short), individual portfolio managed by a fund holding company, and quarter, respectively. $K_{j,t}$ is the set of portfolios $k$ managed by fund $j$ in quarter $t$.

***#Disclosures*** At firm-fund-quarter level, we define $\mathrm{Discl}_{i,j,t}$ as the number of disclosures made by fund $j$ about firm $i$ during quarter $t$, $\mathrm{Discl}_{-i,j,t}$ as the number of disclosures made by fund $j$ about all firms except firm $i$, and $\mathrm{Discl}_{i,-j,t}$ as the number of disclosures made by all funds except fund $j$ about firm $i$. At firm-quarter level, we define $\mathrm{Discl}_{i,t}$ as the number of disclosures made by all sample funds about firm $i$ in quarter $t$.

***Flow-Perf Sensitivity*** First, for each portfolio $k$ managed by holding company $j$ and each quarter $t$, we estimate the following regressions: $\mathrm{Flow}_{k,m} = \alpha_{k,t} + \sum_{h=0}^{2} \zeta_{k,t}^{h} \mathrm{Perf}_{k,m-h} + \varepsilon_{k,m}$, where $m$ indexes for month, and $\mathrm{Flow}_{k,m}$ and $\mathrm{Perf}_{k,m}$ are monthly percentage fund flows and performance, respectively. We estimate the regression over 12 rolling months ending in the last month of quarter $t$. We measure fund performance with its CAPM alpha. We define the portfolio-quarter level sensitivity as $\zeta_{k,t} = \zeta_{k,t}^{0} + \zeta_{k,t}^{1} + \zeta_{k,t}^{2}$. Next, we define the firm-fund-quarter level flow-performance sensitivity as

$$\text{Flow-Perf Sensitivity}_{i,j,t} = \sum_{k \in K_{j,t}} \mathrm{ValHol}_{i,k,t} \times \zeta_{k,t} \Big/ \sum_{k \in K_{j,t}} \mathrm{TNA}_{k,t},$$

where $\mathrm{ValHol}_{i,k,t}$ is the market value of firm $i$'s shares held in portfolio $k$ and $\mathrm{TNA}_{k,t}$ is portfolio $k$'s total net assets. Finally, we define the firm-quarter and fund-quarter level sensitivity as

$$\text{Flow-Perf Sensitivity}_{i,t} = \sum_{j} \sum_{k \in K_{j,t}} \mathrm{ValHol}_{i,k,t} \times \zeta_{k,t} \Big/ \sum_{j} \sum_{k \in K_{j,t}} \mathrm{TNA}_{k,t},$$

and

$$\text{Flow-Perf Sensitivity}_{j,t} = \sum_{k \in K_{j,t}} \mathrm{TNA}_{k,t} \times \zeta_{k,t} \Big/ \sum_{k \in K_{j,t}} \mathrm{TNA}_{k,t},$$

respectively. Intuitively, $\text{Flow-Perf Sensitivity}_{i,j,t}$ ($\text{Flow-Perf Sensitivity}_{i,t}$) is the change in fund flows to fund $j$ (all sample funds) holding firm $i$ as a percentage of fund $j$'s (those funds' combined) total net assets in response to a one percent increase in firm $i$'s stock return, and $\text{Flow-Perf Sensitivity}_{j,t}$ captures the additional percentage fund flows in response to a one percent performance improvement in all the portfolios managed by the fund.

***Pivotal*** At firm-fund-quarter level, we define $\mathrm{Pivotal}_{i,j,t} = \max\left\{\frac{\mathrm{PctHol}_{i,j,t}^{\mathrm{F}}}{\mathrm{PctHol}_{i,t}^{\mathrm{M}}}, \frac{\mathrm{PctHol}_{i,t}^{\mathrm{M}}}{\mathrm{PctHol}_{i,j,t}^{\mathrm{F}}}\right\}$, where $\mathrm{PctHol}_{i,j,t}^{\mathrm{F}}$ is the market value of fund $j$'s holdings of firm $i$ shares as a fraction of the market value of its holdings of all S&P 1500 firm shares at the end of quarter $t$, and $\mathrm{PctHol}_{i,t}^{\mathrm{M}}$ is firm $i$'s market capitalization as a fraction of the market capitalization of the S&P 1500 universe at the end of quarter $t$. At firm-quarter level, we define $\mathrm{Pivotal}_{i,t} = \max\left\{\frac{\mathrm{PctHol}_{i,t}^{\mathrm{F}}}{\mathrm{PctHol}_{i,t}^{\mathrm{M}}}, \frac{\mathrm{PctHol}_{i,t}^{\mathrm{M}}}{\mathrm{PctHol}_{i,t}^{\mathrm{F}}}\right\}$, where $\mathrm{PctHol}_{i,t}^{\mathrm{F}}$ is the market value of sample funds' combined holdings of firm $i$ shares scaled by the market value of their combined holdings of all S&P 1500 firm shares at the end of quarter $t$. Finally, at fund-quarter level, $\mathrm{Pivotal}_{j,t}$ is defined as the average of $\mathrm{Pivotal}_{i,j,t}$ across sample firms. In constructing $\mathrm{Pivotal}_{i,j,t}$ and $\mathrm{Pivotal}_{i,t}$, we first exclude observations with non-positive holdings (for which the variables are not well-defined). We then censor the resulting variables at their 98% levels (but not at their 2% levels because, by construction, the variables are bounded from below by 1). Lastly, we replace observations with non-positive holdings by the 98th percentile value.

***Churn Rate*** We measure churn rate based on Gaspar et al. (2005). First, let

$$\mathrm{CR}_{i,j,t} = \sum_{k \in K_{j,t}} |\mathrm{Shr}_{i,k,t} - \mathrm{Shr}_{i,k,t-1}| \times \mathrm{Prc}_{i,t} \Big/ \sum_{k \in K_{j,t}} \frac{1}{2}\big(\mathrm{Shr}_{i,k,t} \times \mathrm{Prc}_{i,t} + \mathrm{Shr}_{i,k,t-1} \times \mathrm{Prc}_{i,t-1}\big),$$

$$\mathrm{CR}_{i,t} = \sum_{j} \sum_{k \in K_{j,t}} |\mathrm{Shr}_{i,k,t} - \mathrm{Shr}_{i,k,t-1}| \times \mathrm{Prc}_{i,t} \Big/ \sum_{j} \sum_{k \in K_{j,t}} \frac{1}{2}\big(\mathrm{Shr}_{i,k,t} \times \mathrm{Prc}_{i,t} + \mathrm{Shr}_{i,k,t-1} \times \mathrm{Prc}_{i,t-1}\big),$$

and

$$\mathrm{CR}_{j,t} = \sum_{i} \sum_{k \in K_{j,t}} |\mathrm{Shr}_{i,k,t} - \mathrm{Shr}_{i,k,t-1}| \times \mathrm{Prc}_{i,t} \Big/ \sum_{i} \sum_{k \in K_{j,t}} \frac{1}{2}\big(\mathrm{Shr}_{i,k,t} \times \mathrm{Prc}_{i,t} + \mathrm{Shr}_{i,k,t-1} \times \mathrm{Prc}_{i,t-1}\big),$$

where $\mathrm{Shr}_{i,k,t}$ is the number of firm $i$ shares held in portfolio $k$, and $\mathrm{Prc}_{i,t}$ is the share price. We then define the firm-fund-quarter-, firm-quarter-, and fund-quarter-level churn rate as the corresponding eight-quarter rolling averages $\overline{\mathrm{CR}}_{i,j,t} = \frac{1}{8}\sum_{h=0}^{7} \mathrm{CR}_{i,j,t-h}$, $\overline{\mathrm{CR}}_{i,t} = \frac{1}{8}\sum_{h=0}^{7} \mathrm{CR}_{i,t-h}$, and $\overline{\mathrm{CR}}_{j,t} = \frac{1}{8}\sum_{h=0}^{7} \mathrm{CR}_{j,t-h}$, respectively.

# Table 4 Continued

***Turnover Rate*** For each firm $i$, quarter $t$, and portfolio $k$ managed by some sample fund, let $\text{Buy}_{i,k,t} = \max\{\text{Shr}_{i,k,t} - \text{Shr}_{i,k,t-1}, 0\} \times \text{Prc}_{i,t}$ and $\text{Sell}_{i,k,t} = \max\{\text{Shr}_{i,k,t-1} - \text{Shr}_{i,k,t}, 0\} \times \text{Prc}_{i,t}$, where $\text{Shr}_{i,k,t}$ is the number of firm $i$ shares held in portfolio $k$, and $\text{Prc}_{i,t}$ is the share price. Let

$$\text{TR}_{i,j,t} = \min\Big\{\sum_{k \in K_{j,t}} \text{Buy}_{i,k,t}, \sum_{k \in K_{j,t}} \text{Sell}_{i,k,t}\Big\} \Big/ \sum_{k \in K_{j,t}} \text{Shr}_{i,k,t} \times \text{Prc}_{i,t},$$

$$\text{TR}_{i,t} = \min\Big\{\sum_j \sum_{k \in K_{j,t}} \text{Buy}_{i,k,t}, \sum_j \sum_{k \in K_{j,t}} \text{Sell}_{i,k,t}\Big\} \Big/ \sum_j \sum_{k \in K_{j,t}} \text{Shr}_{i,k,t} \times \text{Prc}_{i,t},$$

and

$$\text{TR}_{j,t} = \min\Big\{\sum_i \sum_{k \in K_{j,t}} \text{Buy}_{i,k,t}, \sum_i \sum_{k \in K_{j,t}} \text{Sell}_{i,k,t}\Big\} \Big/ \sum_i \sum_{k \in K_{j,t}} \text{Shr}_{i,k,t} \times \text{Prc}_{i,t}.$$

We then define the firm-fund-quarter-, firm-quarter-, and fund-quarter-level turnover rate as the corresponding eight-quarter rolling averages $\overline{\text{TR}}_{i,j,t} = \frac{1}{8}\sum_{h=0}^{7} \text{TR}_{i,j,t-h}$, $\overline{\text{TR}}_{i,t} = \frac{1}{8}\sum_{h=0}^{7} \text{TR}_{i,t-h}$, and $\overline{\text{TR}}_{j,t} = \frac{1}{8}\sum_{h=0}^{7} \text{TR}_{j,t-h}$, respectively.

***Inverse Holding Period (#Qtr)*** *Holding Period* measures the average number of quarters a fund has (a set of funds have) kept a firm's (a set of firms') shares in the portfolio. In constructing the variable, we treat long and short positions symmetrically. Specifically, let $a^+_{i,k,t} = 7 \times \max\{\text{Shr}_{i,k,t-7}, 0\} + \sum_{h=0}^{6}(\max\{\text{Shr}_{i,k,t-h}, 0\} - \max\{\text{Shr}_{i,k,t-h-1}, 0\}) \times h$ and let $a^-_{i,k,t} = 7 \times \max\{-\text{Shr}_{i,k,t-7}, 0\} + \sum_{h=0}^{6}(\max\{-\text{Shr}_{i,k,t-h}, 0\} - \max\{-\text{Shr}_{i,k,t-h-1}, 0\})$. Then $a^+_{i,k,t}$ and $a^-_{i,k,t}$ are the holding quarters weighted long and short positions taken by a fund, respectively. Note that we cap the maximum number of holding quarters at seven. Similarly, let $b^+_{i,k,t} = \max_{h=0,1,\ldots,7} \max\{\text{Shr}_{i,k,t-h}, 0\}$ and $b^-_{i,k,t} = \max_{h=0,1,\ldots,7} \max\{-\text{Shr}_{i,k,t-h}, 0\}$ be the maximum long and short positions taken by the fund over the current and the past seven quarters, respectively. We then define the average holding period at firm-fund quarter level as

$$\text{Holding Period}_{i,j,t} = \sum_{k \in K_{j,t}} a^+_{i,k,t} + a^-_{i,k,t} \Big/ \sum_{k \in K_{j,t}} b^+_{i,k,t} + b^-_{i,k,t},$$

$$\text{Holding Period}_{i,t} = \sum_j \sum_{k \in K_{j,t}} a^+_{i,k,t} + a^-_{i,k,t} \Big/ \sum_j \sum_{k \in K_{j,t}} b^+_{i,k,t} + b^-_{i,k,t},$$

and

$$\text{Holding Period}_{j,t} = \sum_i \sum_{k \in K_{j,t}} a^+_{i,k,t} + a^-_{i,k,t} \Big/ \sum_i \sum_{k \in K_{j,t}} b^+_{i,k,t} + b^-_{i,k,t},$$

respectively. Finally, we define the firm-fund-quarter-, firm-quarter-, and fund-quarter-level inverse holding period as $\text{IHP}_{i,j,t} = 1/\text{Holding Period}_{i,j,t}$, $\text{IHP}_{i,t} = 1/\text{Holding Period}_{i,t}$, and $\text{IHP}_{j,t} = 1/\text{Holding Period}_{j,t}$.

***Amihud's (2002) Illiquidity*** Following Amihud (2002), for each firm $i$ and quarter $t$, we compute $\text{Amihud}_{i,t}$ as $\frac{1}{N_t}\sum_{d=1}^{N_t} \frac{|r_{i,d}|}{\text{Dvol}_{i,d}}$, where $r_{i,d}$ and $\text{Dvol}_{i,d}$ denote, respectively, daily return and dollar trading volume for firm $i$ shares on day $d$. The sum is taken over all trading days $d$ in quarter $t$, with a total of $N_t$ days.

***Firm Market Cap*** We define $\text{Size}_{i,t}$ as the market capitalization of firm $i$ at the end of quarter $t$.

***Analyst Forecast Inaccuracy*** Let $\mu^{\text{EPS}}_{i,t,h}$ be the mean of analyst forecasts of firm $i$'s quarterly earnings per share (EPS) in month $h$ of quarter $t$, and let $\text{EPS}_{i,t}$ be the firm $i$'s realized EPS. We define *Analyst Forecast Inaccuracy* as

$$\text{Inaccu}_{i,t} = \Big|\Big(\frac{1}{\text{Num of months with forecast data}} \sum_{\text{month } h \text{ in quarter } t} \mu_{i,t,h}\Big) - \text{EPS}_{i,t}\Big| / \text{EPS}_{i,t}.$$

This variable captures the deviation of (outside) investors' perceived firm performance from the actual performance.

***Stock Return Std Dev (%)*** We define $Stdev(Ret)_{i,t}$ as the annualized standard deviation of firm $i$'s daily stock return in quarter $t$.

***Trading Intensity (%)*** We define trading intensity as the percentage of a firm's shares outstanding traded by all sample funds during a quarter, i.e., $\text{PctTrd}_{i,t} = \frac{|\sum_j \text{Shr}_{i,j,t} - \sum_j \text{Shr}_{i,j,t-1}|}{\text{ShrOut}_{i,t-1}} \times 100$, where $\text{Shr}_{i,j,t}$ is the total number of firm $i$ shares held by fund $j$ at the end of quarter $t$ and $\text{ShrOut}_{i,t}$ is the firm's shares outstanding.

## Table 5: Sample Summary Statistics

This table contains summary statistics for all variables of interest in the paper. We consolidate the data to two samples, the first at firm-fund-quarter level and the second at firm-quarter level. The former consists of firm-fund-quarter triples $(i, j, t)$ where in quarter $t$ between 2005 and 2014, (i) firm $i$ belongs to the (non-financial) S&P 1500 universe and appears in at least one disclosure article, and (ii) fund $j$ makes at least one disclosure and its holdings data is available. Our firm-quarter level sample includes all pairs $(i, t)$ where in quarter $t$ between 2005 and 2014, firm $i$ belongs to the (non-financial) S&P 1500 universe. Variable definition and construction details can be found in Table 4. All variables are winsorized at the 2% and 98% levels. Several variables are constructed at multiple, different levels, which we report in the Var Lv column. For each of the variables, we report its mean and median in the full sample, and in each of the five subsamples characterized by an increasing number of strategic disclosures. We also report each variable's sample-wide standard deviation.

| | Var Lv | **Mean** | | | | | **Median** | | | | | **Std Dev** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full | #Discl | | | | Full | #Discl | | | | Full |
| | | Sample | $=0$ | $\geq 1$ | $\geq 5$ | $\geq 10$ | Sample | $=0$ | $\geq 1$ | $\geq 5$ | $\geq 10$ | Sample |
| **Panel (A) Firm-Fund-Quarter Level Sample** | | | | | | | | | | | | |
| # Disclosures | $(i,j,t)$ | 0.11 | 0.00 | 1.34 | 7.00 | 13.72 | 0.00 | 0.00 | 1.00 | 6.00 | 12.00 | 0.28 |
| *Flow-Perf Sensitivity* ($\times 10^3$) | $(i,j,t)$ | 1.54 | 1.55 | 1.32 | 2.85 | 1.78 | 0.16 | 0.16 | 0.12 | 0.31 | 0.47 | 20.23 |
| | $(j,t)$ | 15.23 | 15.65 | 10.53 | 15.25 | 54.46 | 4.52 | 5.07 | 0.00 | 0.00 | 9.49 | 173.07 |
| *Pivotal* | $(i,j,t)$ | 23.55 | 18.49 | 86.82 | 73.70 | 66.96 | 3.09 | 2.96 | 14.11 | 6.84 | 4.73 | 53.40 |
| | $(j,t)$ | 109.74 | 108.71 | 122.36 | 121.21 | 122.12 | 109.59 | 109.26 | 125.14 | 128.01 | 120.40 | 46.29 |
| *Churn Rate (%)* | $(i,j,t)$ | 71.03 | 70.61 | 78.02 | 69.99 | 32.05 | 64.61 | 64.34 | 68.83 | 58.66 | 26.21 | 47.47 |
| | $(j,t)$ | 51.77 | 51.09 | 59.74 | 63.65 | 43.95 | 48.25 | 47.34 | 57.16 | 61.75 | 40.94 | 30.79 |
| *Turnover Rate (%)* | $(i,j,t)$ | 0.02 | 0.02 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.77 |
| | $(j,t)$ | 8.98 | 8.95 | 9.43 | 9.39 | 7.53 | 7.94 | 7.86 | 8.69 | 9.10 | 6.98 | 5.21 |
| *Holding Period (#Qtr)* | $(i,j,t)$ | 3.12 | 3.11 | 3.27 | 3.47 | 4.43 | 3.09 | 3.08 | 3.30 | 3.61 | 4.80 | 1.78 |
| | $(j,t)$ | 3.57 | 3.58 | 3.39 | 3.38 | 3.82 | 3.70 | 3.72 | 3.58 | 3.52 | 4.23 | 1.15 |
| *Short-termism Index* $\hat{\gamma}$ | $(i,j,t)$ | 0.07 | 0.00 | 0.91 | 0.72 | 0.65 | -0.07 | -0.08 | 0.15 | 0.07 | -0.14 | 0.54 |
| | $(j,t)$ | 0.00 | -0.01 | 0.13 | 0.18 | -0.02 | -0.06 | -0.07 | 0.06 | 0.15 | 0.06 | 0.44 |
| *Firm Market Cap ($B)* | $(i,t)$ | 48.91 | 48.33 | 55.45 | 71.48 | 75.97 | 21.43 | 21.43 | 21.07 | 23.28 | 24.18 | 62.44 |
| *Analyst Forecast Inaccuracy* | $(i,t)$ | 0.17 | 0.17 | 0.19 | 0.23 | 0.10 | 0.07 | 0.07 | 0.07 | 0.09 | 0.05 | 0.31 |
| *Stock Return Std Dev (%)* | $(i,t)$ | 19.77 | 19.72 | 20.29 | 22.42 | 19.55 | 16.77 | 16.71 | 17.04 | 17.60 | 19.71 | 11.01 |
| Observations | | 146,181 | 133,894 | 12,287 | 202 | 29 | 146,181 | 133,894 | 12,287 | 202 | 29 | |
| **Panel (B) Firm-Quarter Level Sample** | | | | | | | | | | | | |
| # Disclosures | $(i,t)$ | 0.29 | 0.00 | 2.43 | 8.64 | 15.50 | 0.00 | 0.00 | 1.00 | 7.00 | 12.00 | 0.73 |
| *Flow-Perf Sensitivity* ($\times 10^3$) | $(i,t)$ | 0.60 | 0.60 | 0.62 | 0.52 | 0.52 | 0.37 | 0.36 | 0.49 | 0.40 | 0.32 | 1.45 |
| *Pivotal* | $(i,t)$ | 3.09 | 3.14 | 2.68 | 2.77 | 3.07 | 1.58 | 1.60 | 1.50 | 1.51 | 1.46 | 6.02 |
| *Churn Rate (%)* | $(i,t)$ | 0.47 | 0.47 | 0.44 | 0.39 | 0.34 | 0.43 | 0.44 | 0.41 | 0.34 | 0.29 | 0.25 |
| *Turnover Rate (%)* | $(i,t)$ | 9.35 | 9.35 | 9.27 | 8.09 | 7.63 | 8.22 | 8.23 | 8.19 | 7.42 | 7.33 | 5.48 |
| *Holding Period (#Qtr)* | $(i,t)$ | 3.70 | 3.68 | 3.84 | 4.07 | 4.10 | 3.78 | 3.75 | 3.93 | 4.23 | 4.32 | 1.14 |
| *Short-termism Index* $\hat{\gamma}$ | $(i,t)$ | 0.02 | 0.02 | -0.03 | -0.10 | -0.13 | -0.08 | -0.08 | -0.11 | -0.19 | -0.20 | 0.47 |
| *Amihud's (2002) Illiquidity* | $(i,t)$ | 3.24 | 3.57 | 0.79 | 0.55 | 0.26 | 0.69 | 0.84 | 0.10 | 0.03 | 0.02 | 7.18 |
| *Firm Market Cap ($B)* | $(i,t)$ | 7.65 | 5.33 | 24.71 | 46.65 | 58.61 | 2.14 | 1.82 | 11.92 | 54.53 | 80.02 | 14.90 |
| *Analyst Forecast Inaccuracy* | $(i,t)$ | 0.29 | 0.29 | 0.24 | 0.21 | 0.14 | 0.10 | 0.11 | 0.08 | 0.07 | 0.06 | 0.52 |
| *Stock Return Std Dev (%)* | $(i,t)$ | 24.44 | 24.79 | 21.81 | 19.51 | 18.97 | 21.04 | 21.44 | 18.23 | 15.75 | 15.70 | 13.23 |
| *Trading Intensity (%)* | $(i,t)$ | 0.10 | 0.10 | 0.10 | 0.09 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.52 |
| Observations | | 47,819 | 42,071 | 5,748 | 683 | 173 | 47,819 | 42,071 | 5,748 | 683 | 173 | |

## Table 6: Short-termism Proxy Correlations

This table reports sample-wide pairwise correlations among our short-termism proxies at firm-quarter, fund-quarter, and firm-fund-quarter levels.

| | *Flow-perf Sensitivity* | *Pivotal* | *Churn Rate* | *Turnover Rate* | *Inverse Holding Period* |
|---|---|---|---|---|---|
| | | | Firm-Quarter Level | | |
| *Flow-perf Sensitivity* | 1.000*** | | | | |
| *Pivotal* | -0.009* | 1.000*** | | | |
| *Churn Rate* | 0.001 | 0.308*** | 1.000*** | | |
| *Turnover Rate* | 0.016*** | 0.133*** | 0.517*** | 1.000*** | |
| *Inverse Holding Period* | -0.000 | 0.004 | 0.034*** | -0.000 | 1.000*** |
| | | | Fund-Quarter Level | | |
| *Flow-perf Sensitivity* | 1.000*** | | | | |
| *Pivotal* | 0.009 | 1.000*** | | | |
| *Churn Rate* | -0.022 | 0.321*** | 1.000*** | | |
| *Turnover Rate* | 0.001 | 0.042** | 0.196*** | 1.000*** | |
| *Inverse Holding Period* | -0.008 | 0.088*** | 0.247*** | 0.028 | 1.000*** |
| | | | Firm-Fund-Quarter Level | | |
| *Flow-perf Sensitivity* | 1.000*** | | | | |
| *Pivotal* | -0.002 | 1.000*** | | | |
| *Churn Rate* | -0.003 | 0.060*** | 1.000*** | | |
| *Turnover Rate* | -0.000 | -0.013*** | 0.023*** | 1.000*** | |
| *Inverse Holding Period* | -0.000 | -0.001 | 0.006** | -0.000 | 1.000*** |

## Table 7: Strategic Disclosure and Short-termism

This table reports test results on the effect of short-termism on mutual fund disclosures. In particular, we estimate various specifications of the following regression model:

$$\begin{aligned}\#\text{Discl}_{i,j,t} = &\beta_0 + \beta_1\hat{\gamma} + \beta_2\text{Suit}_{i,t} + \beta_3\hat{\gamma}\times\text{Suit}_{i,t} + \beta_4\#\text{Discl}_{-i,j,t} \\ &+ \beta_5\#\text{Discl}_{i,-j,t} + \delta_q + \delta_y + \varepsilon_{i,j,t}.\end{aligned}$$

where $\#\text{Discl}_{i,j,t}$ is the number of disclosures made by fund $j$ about firm $i$ during quarter $t$ (as defined in Section 3.1); $\hat{\gamma}$ is an index of either fund or firm-fund level short-termism in a quarter, $\hat{\gamma}_{j,t}$ and $\hat{\gamma}_{i,j,t}$, defined as the equal-weighted averages of the standardized values of five fund and firm-fund level short-termism proxies in that quarter (flow-performance sensitivity, position pivotalness, churn rate, turnover rate, and the inverse of holding duration), respectively, when available; $\text{Suit}_{i,t}$ is defined as either the inverse of firm size (market capitalization, $\text{Size}_{i,t}$), analyst forecast inaccuracy about the firm (deviation of analyst EPS forecasts from the realized EPS, $\text{Inaccu}_{i,t}$), or the firm's stock return volatility ($\text{Stdev(Ret)}_{i,t}$); $\#\text{Discl}_{-i,j,t}$ is the number of disclosures made by fund $j$ about all S&P 1500 firms except firm $i$ during quarter $t$; $\#\text{Discl}_{i,-j,t}$ is the number of disclosures about firm $i$ made by all sample funds except fund $j$. Details on the construction of all variables are in Table 4. In all specifications, we include year fixed effects ($\delta_y$) and quarter fixed effects ($\delta_q$). All variables are winsorized at the 2% and 98% levels and standardized. Standard errors in parentheses are heteroscedasticity-robust and two-way clustered by firm-fund.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| LHS Var. | $\#\text{Discl}_{i,j,t}$ | | | | | | | |
| | *$\hat{\gamma}$ at firm-fund-quarter level ($\hat{\gamma}_{i,j,t}$)* | | | | *$\hat{\gamma}$ at fund-quarter level ($\hat{\gamma}_{j,t}$)* | | | |
| $\hat{\gamma}$ | 0.425*** | 0.409*** | 0.417*** | 0.424*** | 0.106*** | 0.109*** | 0.105*** | 0.107*** |
| | (0.004) | (0.005) | (0.005) | (0.005) | (0.004) | (0.004) | (0.004) | (0.004) |
| $\text{Suit}_{i,t}$ | | -0.037*** | -0.018*** | -0.029*** | | 0.054*** | 0.027*** | 0.024*** |
| | | (0.003) | (0.003) | (0.003) | | (0.006) | (0.004) | (0.004) |
| $\hat{\gamma}\times\text{Suit}_{i,t}$ | | 0.052*** | 0.023*** | 0.027*** | | 0.054*** | 0.027*** | 0.023*** |
| | | (0.002) | (0.003) | (0.003) | | (0.006) | (0.004) | (0.004) |
| $\#\text{Discl}_{-i,j,t}$ | 0.163*** | 0.164*** | 0.166*** | 0.164*** | 0.193*** | 0.189*** | 0.190*** | 0.190*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| $\#\text{Discl}_{i,-j,t}$ | 0.055*** | 0.051*** | 0.059*** | 0.053*** | 0.047*** | 0.041*** | 0.038*** | 0.034*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) |
| Observations | 144,794 | 144,410 | 130,832 | 144,384 | 145,609 | 144,962 | 131,355 | 144,936 |
| R-squared | 0.232 | 0.238 | 0.222 | 0.234 | 0.048 | 0.051 | 0.047 | 0.047 |
| $\text{Suit}_{i,t} =$ | | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

## Table 8: PBT, PBD and Market Liquidity

This table reports test results on the effect of PBT and PBD on market liquidity. In particular, we estimate various specifications of the following regression model:

$$
\begin{aligned}
\Delta\text{Amihud}_{i,t} &= \beta_0 + \beta_1\hat{\gamma}_{i,t} \\
&+ \beta_2\Delta\#\text{Discl}_{i,t} + \beta_3\Delta\#\text{Discl}_{i,t}\times\hat{\gamma}_{i,t} + \beta_4\Delta\#\text{Discl}_{i,t}\times\text{Suit}_{i,t} + \beta_5\Delta\#\text{Discl}_{i,t}\times\hat{\gamma}_{i,t}\times\text{Suit}_{i,t} \\
&+ \beta_6\Delta\text{PctTrd}_{i,t} + \beta_7\Delta\text{PctTrd}_{i,t}\times\hat{\gamma}_{i,t} + \beta_8\Delta\text{PctTrd}_{i,t}\times\text{Suit}_{i,t} + \beta_9\Delta\text{PctTrd}_{i,t}\times\hat{\gamma}_{i,t}\times\text{Suit}_{i,t} \\
&+ \beta_{10}\text{Suit}_{i,t} + \beta_{11}\hat{\gamma}_{i,t}\times\text{Suit}_{i,t} + \delta'\Delta\text{X}_{i,t} + \delta_y + \delta_q + \varepsilon_{i,t},
\end{aligned}
$$

where $\Delta$ is the first difference operator; $\text{Amihud}_{i,t}$ is the quarterly average of daily price impact (i.e., absolute percentage price change per dollar traded); $\#\text{Discl}_{i,t}$ is the number of disclosures made about firm $i$ by all sample funds in quarter $t$; $\hat{\gamma}_{i,t}$ is defined as the equal-weighted average of the standardized values of five firm-level short-termism proxies in that quarter (flow-performance sensitivity, position pivotalness, churn rate, turnover rate, and the inverse of holding duration), when available; $\text{Suit}_{i,t}$ is defined as either the inverse of firm size (market capitalization, $\text{Size}_{i,t}$), analyst forecast inaccuracy about the firm (deviation of analyst EPS forecasts from the realized EPS, $\text{Inaccu}_{i,t}$), or the firm's stock return volatility ($\text{Stdev(Ret)}_{i,t}$); $\text{PctTrd}_{i,t}$ is the trading intensity of sample funds, defined as the percentage of firm $i$'s shares traded by all sample funds (relative to its shares outstanding) during quarter $t$. Details on the construction of all variables are in Table 4. In all specifications, we include in the control vector, $\Delta\text{X}_{i,t}$, the following variables: the first difference in inverse firm size, analyst forecast inaccuracy, and the firm's stock return volatility. We also include year fixed effects ($\delta_y$) and quarter fixed effects ($\delta_q$). All variables are winsorized at the 2% and 98% levels and standardized. Standard errors in parentheses are heteroscedasticity-robust and clustered by firm.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LHS Var. | | | ΔAmihud | | |
| $\hat{\gamma}$ | | | 0.011** | 0.010* | 0.010* |
| | | | (0.005) | (0.005) | (0.005) |
| Δ#Discl | -0.006** | | -0.008*** | | -0.008*** |
| | (0.002) | | (0.003) | | (0.003) |
| Δ#Discl × $\hat{\gamma}$ | | | -0.012** | | -0.012** |
| | | | (0.006) | | (0.006) |
| ΔTrading | | 0.017*** | | 0.016*** | 0.016*** |
| | | (0.004) | | (0.005) | (0.004) |
| ΔTrading × $\hat{\gamma}$ | | | | 0.011 | 0.011 |
| | | | | (0.007) | (0.007) |
| Observations | 41,901 | 41,901 | 40,095 | 40,095 | 40,095 |
| R-squared | 0.226 | 0.227 | 0.224 | 0.224 | 0.225 |

| | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|
| LHS Var. | | | | | ΔAmihud | | | | |
| $\hat{\gamma}$ | -0.011*** | 0.006 | 0.006 | -0.011*** | 0.006 | 0.005 | -0.011*** | 0.006 | 0.006 |
| | (0.004) | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) |
| Suit | 0.102*** | 0.027*** | 0.033*** | 0.102*** | 0.027*** | 0.032*** | 0.101*** | 0.027*** | 0.033*** |
| | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.006) |
| $\hat{\gamma}$ × Suit | 0.021*** | 0.009 | 0.004 | 0.021*** | 0.010 | 0.002 | 0.020*** | 0.009 | 0.003 |
| | (0.007) | (0.007) | (0.008) | (0.007) | (0.007) | (0.008) | (0.007) | (0.007) | (0.008) |
| Δ#Discl | -0.021 | -0.008*** | -0.007** | | | | -0.023 | -0.008*** | -0.007** |
| | (0.014) | (0.003) | (0.003) | | | | (0.014) | (0.003) | (0.003) |
| Δ#Discl×$\hat{\gamma}$ | -0.020** | -0.011** | -0.013** | | | | -0.020** | -0.011** | -0.013** |
| | (0.008) | (0.005) | (0.007) | | | | (0.008) | (0.005) | (0.007) |
| Δ#Discl×Suit | -0.038 | -0.002 | -0.005 | | | | -0.040* | -0.002 | -0.005 |
| | (0.024) | (0.003) | (0.004) | | | | (0.024) | (0.003) | (0.004) |
| Δ#Discl×$\hat{\gamma}$× Suit | -0.045*** | -0.006 | -0.016** | | | | -0.044*** | -0.006 | -0.015** |
| | (0.014) | (0.006) | (0.007) | | | | (0.014) | (0.006) | (0.007) |
| ΔTrading | | | | 0.015*** | 0.016*** | 0.012*** | 0.015*** | 0.016*** | 0.013*** |
| | | | | (0.005) | (0.004) | (0.004) | (0.005) | (0.004) | (0.004) |
| ΔTrading × $\hat{\gamma}$ | | | | 0.006 | 0.011 | 0.007 | 0.006 | 0.011 | 0.007 |
| | | | | (0.005) | (0.007) | (0.006) | (0.005) | (0.007) | (0.006) |
| ΔTrading × Suit | | | | 0.037** | 0.008 | 0.015** | 0.037** | 0.008 | 0.015** |
| | | | | (0.015) | (0.006) | (0.006) | (0.014) | (0.006) | (0.006) |
| ΔTrading × $\hat{\gamma}$× Suit | | | | 0.003 | 0.000 | 0.016* | 0.002 | -0.000 | 0.016* |
| | | | | (0.015) | (0.010) | (0.009) | (0.015) | (0.010) | (0.009) |
| Observations | 40,095 | 40,095 | 40,095 | 40,095 | 40,095 | 40,095 | 40,095 | 40,095 | 40,095 |
| R-squared | 0.238 | 0.225 | 0.225 | 0.237 | 0.225 | 0.226 | 0.239 | 0.225 | 0.226 |
| $\text{Suit}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

# Internet Appendix to Speculation with Information Disclosure

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# 1 Disclosure with Noisy Linear Signals about Asset Endowment $e$ and/or Asset Payoff $v$

We show that, in linear equilibria, the speculator is always worse-off by committing to disclosing a signal of the form $s = v + \varepsilon$, $s = e + \varepsilon$, or $s = (v + \varepsilon_v, e + \varepsilon_e)$, where $\varepsilon_v \perp \varepsilon_e$.

First, let *SE* be the set of linear equilibria defined by (1) the speculator's risky asset demand:

$$x = k_0 + k_v v + k_e e + k_s \cdot s, \tag{IA-1}$$

and (2) the MM's pricing rule:

$$P_1 = l_0 + l_\omega (x + z) + l_s \cdot s, \tag{IA-2}$$

such that given the common prior and conditioning on observing the information contained in the signal (s) and the aggregate order flow $(x+z)$, the MM make zero profit in expectation, and the speculator—knowing the MM's pricing rule—chooses her market order $x$ to maximize the objective function:

$$\mathrm{E}(W|D=1) = \mathrm{E}\Big[\gamma e(P_1 - P_0) + (1-\gamma)(v - P_1)\Big]. \tag{IA-3}$$

In Eq. (IA-1) and (IA-2), the operator "$\cdot$" represents scalar multiplication when $s$ is one-dimensional and inner product when $s$ is a vector. $k_0$, $k_v$, $k_e$, $l_0$, $l_w$, and $l_s$ are undetermined coefficients ($k_s$ and $l_s$ are vectors when $s$ is a vector).

Second, let *PBE* be the set of equilibria that are linear in $v$ and $e$ conditioning on each realization of $s$, i.e., the set of Benchmark Equilibrium with the common prior given by the conditional distribution of $v$ and $e$ (given $s$). Specifically, each equilibrium is defined by (1) The speculator's (conditional) risky asset demand:

$$x(s) = k_0(s) + k_v(s) v + k_e(s) e, \tag{IA-4}$$

and (2) the MM's (conditional) pricing rule:

$$P_1(s) = l_0(s) + l_w(s)(x + z), \tag{IA-5}$$

such that the MM make zero expected profit and the speculator optimizes with respect to her objective function:

$$\mathrm{E}\left(W(s)|s\right) = \mathrm{E}\Big[\gamma e(P_1 - \mathrm{E}(v|s)) + (1-\gamma)x(v - P_1)|s\Big]. \tag{IA-6}$$

Clearly, $SE \subset PBE$. Furthermore, $SE = PBE$ are singletons. This equality can be shown by observing that (1) the equilibrium defined by *PBE* is unique (see Bhattacharyya and Nanda 2013), and (2) this equilibrium also belongs to *SE*. Therefore, we can restrict attention to the unique equilibrium in *PBE* without loss of generality, which is characterized by (see Proposition 1 or Bhattacharyya and Nanda 2013)

$$x^* = \beta\tilde{e} + \frac{v-\tilde{v}}{2\tilde{\lambda}} + \frac{\beta}{2}(e-\tilde{e}), \tag{IA-7}$$

$$P_1 = \tilde{v} + \tilde{\lambda}(x^* + z - \beta\tilde{e}), \tag{IA-8}$$

and

$$\tilde{\lambda} = \frac{\tilde{\sigma}_v}{2\left(\beta^2\frac{\tilde{\sigma}_e^2}{4} + \sigma_z^2\right)^{\frac{1}{2}}}, \tag{IA-9}$$

where

$$\tilde{v} = \mathrm{E}(v|s),\ \tilde{e} = \mathrm{E}(e|s),\ \tilde{\sigma}_v^2 = \mathrm{Var}(v|s),\ \tilde{\sigma}_e^2 = \mathrm{Var}(e|s). \tag{IA-10}$$

In particular, the speculator's expected objective function value is (see Proposition 3)

$$\begin{aligned}\mathrm{E}\left(W(s)|s\right) &= \mathrm{E}\left[\gamma e(P_1-\tilde{v}) + (1-\gamma)x(v-P_1)|s\right] \\ &= \frac{1-\gamma}{4\tilde{\lambda}}(\tilde{\sigma}_v^2 + \beta^2\tilde{\lambda}^2\tilde{\sigma}_e^2).\end{aligned} \tag{IA-11}$$

This further implies that the speculator's *ex ante* expected objective function value in the equilibrium defined by SE is given by

$$\begin{aligned}\mathrm{E}(W|D=1) &= \mathrm{E}\left[\gamma e(P_1-P_0) + (1-\gamma)(v-P_1)\right] \\ &= \mathrm{E}\left[\gamma e(\tilde{v}-P_0)\right] + \mathrm{E}\left[\mathrm{E}\left(\gamma e(P_1-\tilde{v}) + (1-\gamma)x(v-P_1)|s\right)\right] \\ &= \mathrm{E}\left[\gamma e(\tilde{v}-P_0)\right] + \frac{1-\gamma}{4\tilde{\lambda}}(\tilde{\sigma}_v^2 + \beta^2\tilde{\lambda}^2\tilde{\sigma}_e^2) \\ &= \frac{1-\gamma}{4\tilde{\lambda}}(\tilde{\sigma}_v^2 + \beta^2\tilde{\lambda}^2\tilde{\sigma}_e^2),\end{aligned} \tag{IA-12}$$

where the second equality follows from the law of iterated expectations and the third equality follows from the fact that if $s = v+\varepsilon$, $s = e+\varepsilon$ or $s = (e+\varepsilon_e, v+\varepsilon_v)$ with $\varepsilon_e \perp \varepsilon_v$, then $e$ and $\tilde{v}-P_0$ are independent.[1] On the other hand, the speculator's objective function value in the absence of disclosure is given by

$$\mathrm{E}(W|D=0) = \frac{1-\gamma}{4\lambda}(\sigma_v^2 + \beta^2\lambda^2\sigma_e^2), \tag{IA-13}$$

[1] If $s = v+\varepsilon$, then $\tilde{v}-P_0 = \frac{\sigma_v^2}{\sigma_v^2+\sigma_e\varepsilon^2}(s-P_0) = \frac{\sigma_v^2}{\sigma_v^2+\sigma_e\varepsilon^2}(v+\varepsilon-P_0) \perp e$. On the other hand, if $s = e+\varepsilon$ or $s = (e+\varepsilon_e, v+\varepsilon_v)$ with $\varepsilon_e \perp \varepsilon_v$, then $\tilde{v}-P_0 = 0 \perp e$.

where $\lambda$ is given by Eq. (4).

Substituting $\lambda$ and $\tilde{\lambda}$ by model primitives, one can rewrite the objective functions as

$$\mathrm{E}(W|D=0)=\frac{1-\gamma}{4}\sigma_v\left[2\left(\beta^2\sigma_e^2+4\sigma_z^2\right)^{\frac{1}{2}}-\frac{4\sigma_z^2}{\left(\beta^2\sigma_e^2+4\sigma_z^2\right)^{\frac{1}{2}}}\right], \tag{IA-14}$$

and

$$\mathrm{E}(W|D=1)=\frac{1-\gamma}{4}\tilde{\sigma}_v\left[2\left(\beta^2\tilde{\sigma}_e^2+4\sigma_z^2\right)^{\frac{1}{2}}-\frac{4\sigma_z^2}{\left(\beta^2\tilde{\sigma}_e^2+4\sigma_z^2\right)^{\frac{1}{2}}}\right]. \tag{IA-15}$$

By observing that $\tilde{\sigma}_v^2<\sigma_v^2$ and $\tilde{\sigma}_e^2<\sigma_e^2$, it follows immediately that $\mathrm{E}(W|D=1)<\mathrm{E}(W|D=0)$. In conclusion, the speculator is hurt by committing to disclosure in the form of $v+\varepsilon$, $e+\varepsilon$, or $(e+\varepsilon_e, v+\varepsilon_v)$ with $\varepsilon_e\perp\varepsilon_v$.

# 2 Further Discussion of Model Assumptions

As noted in Section 2.5 of Pasquariello and Wang (2020), the PBD equilibrium of Proposition 2 is derived under two crucial assumptions: (1) the speculator is committed to her optimal disclosure strategy $\delta^*$, as devised at $t=-1$, regardless of the realizations of $v$ and $e$ at $t=0$; and (2) given the optimal set at $t=-1$, the disclosed signal is always the ensuing convex combination of $v$ and $e$ of Eq. (6), i.e., $s=\delta^*e+(1-\delta^*)v$.

On the theoretical side, most existing models in the information transmission literature rely on some public commitment by the sender. For instance, Grossman and Stiglitz (1980) and Verrecchia (1982), when modeling economies in which market participants endogenously become informed by acquiring a signal, abstract from the information producer's problem in that each of them not only takes as a given that such a signal is the true fundamental up to an independent noise term but also does not observe it until after making the decision to acquire it, while all market participants know the extent of equilibrium information production in the economy. Admati and Pfleiderer (1988) study how an informed party may openly sell information to the rest of the market if risk averse, in a model in which the seller can choose signal precision but not signal form and is bounded away from manipulation; Van Bommel (2003) allows a risk-neutral speculator to anonymously disclose discrete but imprecise signals to an audience of followers in order to induce price overshooting and so enhance the profits of her camouflaged multi-period trading. Our model resembles those settings in that a risk neutral informed agent not only transfers her private information—albeit non-anonymously—if displaying short-termism but also trades on her own account. Our paper is also related to Kamenica and Gentzkow (2011), in which an information sender is granted the ability to commit to both the form of the signal and truthful revelation of the signal. Kamenica and Gentzkow (2011) derive in their setting the optimal signal that would induce the receiver to take the most favorable actions to the sender. Our model adds to their setting an additional level of complication in that the speculator (the sender) can not only communicate information (disclose a signal) but also take action herself (trade directly on information).

On the empirical side, we note that, in financial markets, *ex post* deviation often entails large penalties. As we argue, either one of the following costs may serve as a commitment device to deter deviation. The first one is reputation cost. Although our model is a static one, a real-world speculator—be it a fund manager, venture capitalist, or specialist company—is most likely a repeated player. As reputation is generally believed to be of vital importance for any type of financial institution, the gains from "deviation" must be traded-off against the cost of reputation damage when the speculator decides what signal to provide (e.g., see Benabou and Laroque 1992; Van Bommel 2003). Therefore, insofar as those gains are not unbounded, reputation concerns arguably constrain the extent to which the speculator may deviate from the committed (agreed-upon) signal disclosure process.[2] Accordingly, Ljungqvist and Qian (2016) find that disclosures by hedge funds with better reputation (e.g., as acquired via prior such disclosures) have a greater impact on the prices of the disclosed stocks.

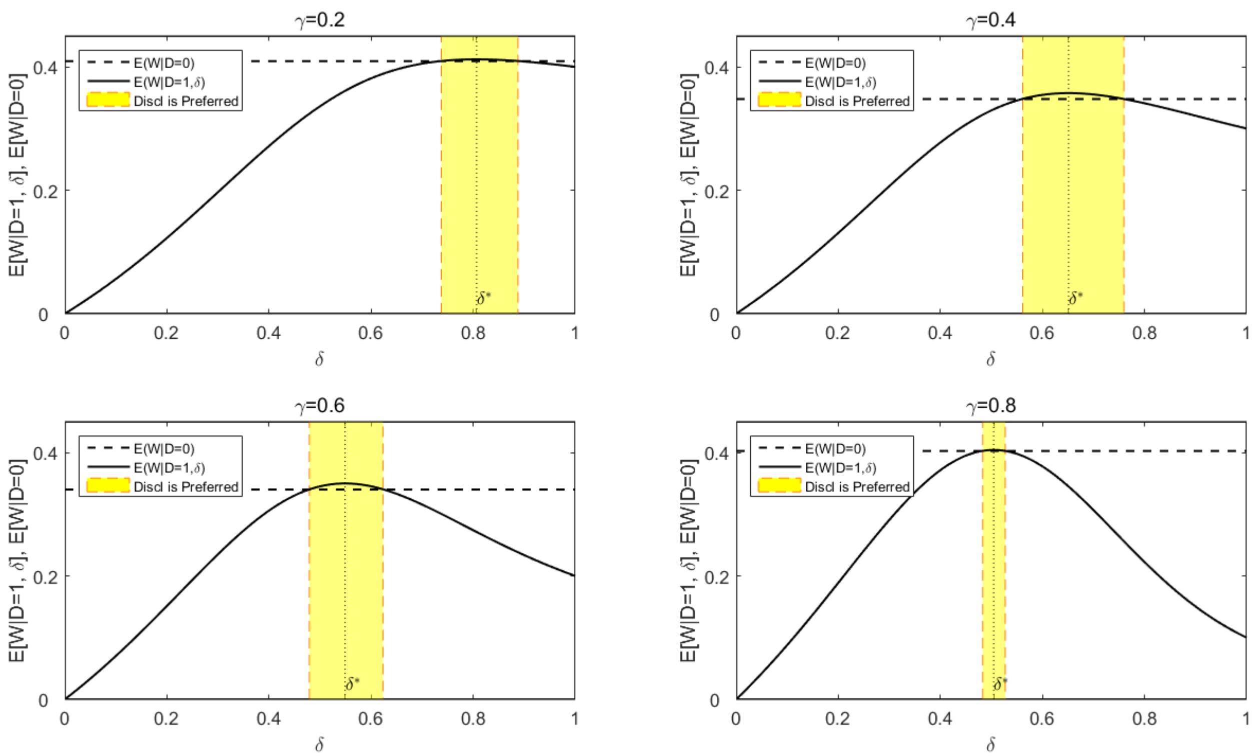
A second commitment device is financial regulation. Regulators often impose and enforce stringent rules regarding disclosure made by fund managers and other key market participants. For instance, in regulating disclosure of financial asset fundamentals, the U.S. Investment Advisor Act of 1940 requires that an advisor has an obligation of "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." In addition, the SEC prohibits any advisor from "using any advertisement that contains any untrue statement of material fact or is otherwise misleading" (Rule 206(4)-1(a)(5) under the Investment Advisers Act of 1940). Similarly, in regulating any disclosure about a speculator's holdings, the SEC mandates that investment advisors with discretion over \$100 million must file a Form 13(F) on a quarterly basis containing her positions in detail. Although the SEC gives hedge funds the option of delaying reporting on the basis of confidentiality, this confidential treatment is neither trivial nor guaranteed (Agarwal et al. 2013).

Since violating these regulations may entail significant punishment (ranging from steep fines to imprisonment) possibly exceeding any short-term gain from *ex-post* deviation, regulations leave

[2]For instance, one could apply the Folk Theorem to a repeated version of our model where (1) on the equilibrium path, the signaling equilibrium is reached in every stage and (2) once mis-reporting is detected at any time, the players switch to the baseline equilibrium in all subsequent stages. There is only one caveat: In our model, the one-shot gain from deviating could be arbitrarily large. Therefore, one must modify the stage equilibrium to fit in the Folk Theorem framework. One possible modification is as follows. Let $\underline{s}$ and $\bar{s}$ be two threshold values of the signal. If the signal is realized such that $\underline{s} \leq s \leq \bar{s}$ the same equilibrium is reached in the ensuing subgame as before. On the other hand, if $s$ is realized such that $s < \underline{s}$ or $s > \bar{s}$, then the MM will suspect that manipulation is in play and refuse to update his beliefs. Therefore, the ensuing continuation game proceeds with the same common prior as the original one.

the fund manager with little flexibility in her choice of disclosure. In the context of our model, this means the signal weight $\delta$ is effectively imposed (or restricted) by the regulators. If the speculator optimally chooses to disclose, she is constrained by regulation to stick to pre-specified signal weights. Interestingly, this also implies that under some regulatorily imposed signal weights, a speculator may not find it optimal to disclose. Regulation in effect puts the speculators through a screening process; only those who happen to have the right $\sigma_v^2$ and $\sigma_e^2$ choose to be vocal. To illustrate this observation, Figure IA-1 plots the speculator's value function in the signaling (solid line) and baseline (dashed line) equilibria as functions of signal weight $\delta$. Figure IA-1 shows that, although for the optimal $\delta$ releasing a signal is always better than staying silent, there is only a narrow range of $\delta$ for which the speculator prefers the signaling equilibrium to the baseline equilibrium. For some speculators, the regulatorily imposed $\delta$ may be out of that range.

**Figure IA-1: Gains from PBT and PBD**




This figure plots, for four different values of $\gamma$, the speculator's *ex ante* expected value function as a function of the speculator's signal weight $\delta$, when $\sigma_v^2 = 1$, $\sigma_e^2 = 1$, and $\sigma_z^2 = 1$. In each graph, the solid line and the horizontal dashed line represent the speculator's *ex ante* expected value function in the signaling equilibrium ($\mathrm{E}\left[W|D=1,\delta\right]$) and baseline equilibrium ($\mathrm{E}\left[W|D=0\right]$), respectively. The vertical dotted line marks the optimal signal weight $\delta^*$, and the shaded area marks the range where disclosure is preferred to no disclosure.

# 3 Price Informativeness

We show that the equilibrium price is more informative in the presence of PBD than in the baseline economy of Section 2.1 of Pasquariello and Wang (2020), i.e., that $P_1$ of Proposition 2 (with both PBT and PBD; Eq. (8)) is more informative than $P_1$ of Proposition 1 (with PBT alone; Eq. (3)). Intuitively, to the extent that the signal conveys information regarding asset fundamentals, one would expect that a greater proportion of the speculator's private information will be incorporated into prices; this is indeed the case when a signal is optimally disclosed, as summarized in the following corollary.

**Corollary IA-1** *Denote by* $\mathrm{Var}\left(v|P_1, D=0\right)$ *the portion of the speculator's private information that is not incorporated into prices in the baseline PBT equilibrium of Proposition 1, and by* $\mathrm{Var}\left(v|P_1, D=1, s(\delta)\right)$ *the portion of unincorporated information when the speculator sends a signal with weight* $\delta$. *(1)* $\mathrm{Var}\left(v|P_1, D=0\right) = \frac{1}{2}\sigma_v^2$. *(2) In the second step, less than half of the speculator's remaining private fundamental information is impounded into the price:* $\mathrm{Var}\left(v|P_1, D=1, s(\delta)\right) > \frac{1}{2}\tilde{\sigma}_v^2$. *(3) If* $\delta$ *is such that the speculator ex ante prefers disclosure to no disclosure, then* $\mathrm{Var}\left(v|P_1, D=1, s(\delta)\right)$ *increases with* $\delta$. *(4)* $\mathrm{Var}\left(v|P_1, D=1, s(\delta)\right) \leq (<) \frac{1}{2}\sigma_v^2$ *if* $\delta$ *is such that the speculator ex ante (strictly) prefers disclosure to no disclosure, or equivalently, if* $\mathrm{E}\left[W|D=1,\delta\right] \geq (>) \mathrm{E}\left[W|D=0\right]$.

**Proof of Corollary IA-1.**

Define $\phi$ as the fraction of the speculator's private information that gets impounded into the price:

$$\mathrm{Var}\left(v|P_1\right) = (1-\phi^2)\sigma_v^2. \tag{IA-16}$$

Relax the assumption that $v$ and $e$ are independent and let $\rho$ be their correlation coefficient—$\rho = \mathrm{Corr}\left(v,e\right)$. In a baseline equilibrium, there is

$$\mathrm{Var}\left(v|P_1\right) = \frac{\left(\frac{1}{2\lambda}\sigma_v + \frac{\beta}{2}\rho\sigma_e\right)^2}{\frac{1}{4\lambda^2}\sigma_v^2 + \frac{\beta^2}{4}\sigma_e^2 + \frac{\beta}{2\lambda}\rho\sigma_v\sigma_e + \sigma_z^2}. \tag{IA-17}$$

**Proof of Part 1** In a baseline game with $\rho = 0$, there is

$$\phi^2 = \frac{\frac{1}{4\lambda^2}\sigma_v^2}{\frac{1}{4\lambda^2}\sigma_v^2 + \frac{\beta^2}{4}\sigma_e^2 + \sigma_z^2} = \frac{1}{2}. \tag{IA-18}$$

The second equality follows from Eq. (4).

**Proof of Part 2** After the revelation of a signal, define $\tilde{\rho}$ as the fraction of the speculator's remaining private fundamental information that gets impounded into the price, i.e.,

$$\operatorname{Var}\left(v|P_1,s\right) = (1-\tilde{\phi}^2)\tilde{\sigma}_v^2. \tag{IA-19}$$

An expression of $\tilde{\phi}$ can be obtained by replacing $\sigma_v^2$ and $\sigma_e^2$ by $\tilde{\sigma}_v^2$ and $\tilde{\sigma}_e^2$, respectively, in Eq. (IA-18) and setting $\rho = -1$ (conditional on observing $s = \delta e + (1-\delta)v$, the MM can back out either $e$ or $v$ from knowing the other, implying a perfect correlation between the two). Some simplification leads to

$$1-\tilde{\phi}^2 = \frac{1}{\left(\sqrt{\frac{\beta^2}{4}\frac{\tilde{\sigma}_e^2}{\sigma_z^2}+1}-\frac{\beta}{2}\frac{\tilde{\sigma}_e}{\sigma_z}\right)^2+1}. \tag{IA-20}$$

Since

$$\sqrt{\frac{\beta^2}{4}\frac{\tilde{\sigma}_e^2}{\sigma_z^2}+1}-\frac{\beta}{2}\frac{\tilde{\sigma}_e}{\sigma_z} = \frac{1}{\sqrt{\frac{\beta^2}{4}\frac{\tilde{\sigma}_e^2}{\sigma_z^2}+1}+\frac{\beta}{2}\frac{\tilde{\sigma}_e}{\sigma_z}} < 1,$$

there is $1-\tilde{\phi}^2 > \frac{1}{2}$—the equilibrium price only incorporates less than half of the speculator's remaining private fundamental information.

**Proof of Part 3** From Eq. (IA-19) and (IA-20), there is

$$\operatorname{Var}\left(v|P_1,s\right) = \frac{\tilde{\sigma}_v^2}{\left(\sqrt{\frac{\beta^2}{4}\frac{\tilde{\sigma}_e^2}{\sigma_z^2}+1}-\frac{\beta}{2}\frac{\tilde{\sigma}_e}{\sigma_z}\right)^2+1}. \tag{IA-21}$$

Taking derivative and noting that $\tilde{\sigma}_v^2 = \sigma_v^2(1-\frac{\tilde{\sigma}_e^2}{\sigma_e^2})$, there is

$$\frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})} = 2\sigma_v^2 \frac{\frac{\beta\sigma_e}{2\sigma_z}+\frac{\beta\sigma_e}{2\sigma_z}(1+\frac{2\beta^2\sigma_e^2}{4\sigma_z^2})\frac{\tilde{\sigma}_e^2}{\sigma_e^2}-2\frac{\tilde{\sigma}_e}{\sigma_e}\sqrt{1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}}(1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2})}{\sqrt{1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}}\left[\left(\sqrt{\frac{\beta^2}{4}\frac{\tilde{\sigma}_e^2}{\sigma_z^2}+1}-\frac{\beta}{2}\frac{\tilde{\sigma}_e}{\sigma_z}\right)^2+1\right]^2}. \tag{IA-22}$$

Note that since the denominator in the right hand side of the above expression is always positive, the numerator determines the sign of $\frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})}$. Let $N = \frac{\beta\sigma_e}{2\sigma_z}+\frac{\beta\sigma_e}{2\sigma_z}(1+\frac{2\beta^2\sigma_e^2}{4\sigma_z^2})\frac{\tilde{\sigma}_e^2}{\sigma_e^2}-$

$2\frac{\tilde{\sigma}_e}{\sigma_e}\sqrt{1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}}(1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2})$. Taking derivative again, there is

$$\begin{aligned}
\frac{\partial \mathrm{N}}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})} &= 2\frac{\beta\sigma_e}{2\sigma_z}(1+\frac{2\beta^2\sigma_e^2}{4\sigma_z^2})\frac{\tilde{\sigma}_e}{\sigma_e} - 2(1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2})\frac{1+\frac{2\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}}{\sqrt{1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}}} \\
&< 2(1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2})\Big[2\frac{\beta\sigma_e}{2\sigma_z}\frac{\tilde{\sigma}_e}{\sigma_e} - \frac{1+\frac{2\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}}{\sqrt{1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}}}\Big] \\
&= -\frac{2(1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2})}{\sqrt{1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}}}\Big(\sqrt{1+\frac{\beta^2\sigma_e^2}{4\sigma_z^2}\frac{\tilde{\sigma}_e^2}{\sigma_e^2}} - 2\frac{\beta\sigma_e}{2\sigma_z}\frac{\tilde{\sigma}_e}{\sigma_e}\Big)^2 \le 0
\end{aligned}$$

Hence $\frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})}$ is always decreasing in $\frac{\tilde{\sigma}_e}{\sigma_e}$. Consider next the sign of $\frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})}$ at $\delta = \hat{\delta}$, where $\hat{\delta}$ is defined in Eq. (A.16). It suffices to consider the sign of $N$ at $\delta = \hat{\delta}$, which takes the following expression:

$$N|_{\delta=\hat{\delta}} = -\frac{\beta\sigma_e}{2\sigma_z}\frac{1}{(2\beta^2\sigma_e^2+4\sigma_z^2)4\sigma_z^2}\left[4\sigma_z^2(\beta^2\sigma_e^2+4\sigma_z^2)\right] \le 0.$$

As shown in the proof of Corollary 1, a necessary condition for the speculator to benefit from a signal disclosure is that $\delta \le \hat{\delta}$. Since, $\frac{\tilde{\sigma}_e}{\sigma_e}$ monotonically decreases in $\delta$, $\delta \le \hat{\delta}$ implies $\frac{\tilde{\sigma}_e}{\sigma_e} \ge \frac{\tilde{\sigma}_e}{\sigma_e}|_{\delta=\hat{\delta}}$. Furthermore, as $\frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})}$ decreases in $\frac{\tilde{\sigma}_e}{\sigma_e}$, there is $\frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})} \le \frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})}|_{\delta=\hat{\delta}} \le 0$. It then follows immediately that $\frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial\delta} = \frac{\partial \operatorname{Var}\left(v|P_1,s\right)}{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})} \times \frac{\partial(\frac{\tilde{\sigma}_e}{\sigma_e})}{\partial\delta} \ge 0$, provided that $\delta \le \hat{\delta}$.

**Proof of Part 4** Evaluating Eq. (IA-21) at $\delta = \hat{\delta}$ (as defined in Eq. (A.16)) leads to

$$\operatorname{Var}\left(v|P_1,s\right)|_{\delta=\hat{\delta}} = \frac{1}{2}\sigma_v^2. \tag{IA-23}$$

From the proof of Corollary 1, for the speculator to be better-off from disclosure, it must be that $\delta < \hat{\delta}$. Under the same condition, $\operatorname{Var}\left(v|P_1,s\right)$ also increases in $\delta$, as shown in Part 3 above. This implies $\operatorname{Var}\left(v|P_1,s\right) < \frac{1}{2}\sigma_v^2$ when the signal is voluntarily disclosed. ■

Corollary IA-1 implies that, in the presence of PBD, the equilibrium price incorporates more of the speculator's private information, despite her more cautious trading activity (and less informative order flow). In Kyle (1985), there is an equivalence between the volatility of price and the amount of private information being impounded.[3] This equivalence is preserved under both the PBT and PBD equilibriums:.

$$\text{Var}\left(P_1|D\right) = \sigma_v^2 - \text{Var}\left(v|P_1, D\right), \tag{IA-24}$$

where $\sigma_v^2 - \text{Var}\left(v|P_1, D\right)$ measures the amount of information incorporated into the price. Therefore optimal PBD implies both greater price informativeness and greater price volatility.

[3]To see this, note that $\sigma_v^2 = \text{Var}\left(\text{E}\left[v|P_1, D\right]\right) + \text{E}\left[\text{Var}\left(v|P_1, D\right)\right]$, where we can drop the outer expectation because $\text{Var}\left(v|P_1, D\right)$ is constant across all realization of $P_1$ and $s$, and $\text{E}\left[v|P_1, D\right] = P_1$ because the equilibrium price is semi-strong form efficient.

# 4 Additional Empirical Results

**Table IA-1: Strategic Disclosure and Short-termism (First Principal Component)**

We report Table 7 with $\hat{\gamma}$ measured as the first principal component of individual short-termismism proxies.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| LHS Var. | $\#\text{Discl}_{i,j,t}$ | | | | | | | |
| | *$\hat{\gamma}$ at firm-fund-quarter level* | | | | *$\hat{\gamma}$ at fund-quarter level* | | | |
| $\hat{\gamma}$ | -0.004 | -0.002 | -0.006* | -0.003 | 0.078*** | 0.079*** | 0.077*** | 0.077*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.004) | (0.004) | (0.004) | (0.004) |
| $\text{Suit}_{i,t}$ | | -0.026*** | -0.006** | -0.012*** | | 0.037*** | 0.021*** | 0.017*** |
| | | (0.003) | (0.003) | (0.003) | | (0.005) | (0.004) | (0.004) |
| $\hat{\gamma} \times \text{Suit}_{i,t}$ | | 0.007*** | 0.003 | 0.005* | | 0.034*** | 0.020*** | 0.017*** |
| | | (0.003) | (0.002) | (0.003) | | (0.004) | (0.003) | (0.003) |
| $\#\text{Discl}_{-i,j,t}$ | 0.146*** | 0.147*** | 0.150*** | 0.146*** | 0.189*** | 0.185*** | 0.186*** | 0.185*** |
| | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| $\#\text{Discl}_{i,-j,t}$ | 0.052*** | 0.049*** | 0.056*** | 0.051*** | 0.048*** | 0.040*** | 0.040*** | 0.035*** |
| | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.005) | (0.006) | (0.005) |
| Observations | 109,705 | 109,705 | 99,444 | 109,705 | 133,398 | 132,802 | 120,328 | 132,777 |
| R-squared | 0.040 | 0.041 | 0.042 | 0.040 | 0.046 | 0.047 | 0.046 | 0.045 |
| $\text{Suit}_{i,t}$ | | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

**Table IA-2: Strategic Disclosure and Short-termism (Flow-Performance Sensitivity)**

We report Table 7 with $\hat{\gamma}$ measured as flow-performance sensitivity.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| LHS Var. | #Discl$_{i,j,t}$ | | | | | | | |
| | *$\hat{\gamma}$ at firm-fund-quarter level* | | | | *$\hat{\gamma}$ at fund-quarter level* | | | |
| $\hat{\gamma}$ | 0.002 | 0.004* | 0.004 | 0.003 | 0.368*** | 0.346*** | 0.364*** | 0.366*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.006) | (0.006) | (0.006) | (0.006) |
| Suit$_{i,t}$ | | -0.023*** | -0.006** | -0.012*** | | -0.037*** | -0.018*** | -0.029*** |
| | | (0.003) | (0.003) | (0.003) | | (0.003) | (0.003) | (0.003) |
| $\hat{\gamma} \times$ Suit$_{i,t}$ | | 0.006 | 0.003 | 0.001 | | 0.084*** | 0.033*** | 0.037*** |
| | | (0.004) | (0.003) | (0.003) | | (0.003) | (0.004) | (0.004) |
| #Discl$_{-i,j,t}$ | 0.146*** | 0.146*** | 0.149*** | 0.146*** | 0.170*** | 0.169*** | 0.173*** | 0.170*** |
| | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| #Discl$_{i,-j,t}$ | 0.054*** | 0.050*** | 0.057*** | 0.053*** | 0.054*** | 0.050*** | 0.058*** | 0.051*** |
| | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| Observations | 116,706 | 116,373 | 105,634 | 116,349 | 137,718 | 137,358 | 124,621 | 137,333 |
| R-squared | 0.040 | 0.041 | 0.042 | 0.040 | 0.180 | 0.193 | 0.179 | 0.182 |
| Suit$_{i,t}$ | | $1/$Size$_{i,t}$ | Inaccu$_{i,t}$ | Stdev(Ret)$_{i,t}$ | | $1/$Size$_{i,t}$ | Inaccu$_{i,t}$ | Stdev(Ret)$_{i,t}$ |

**Table IA-3: Strategic Disclosure and Short-termism (Position Pivotalness)**

We report Table 7 with $\hat{\gamma}$ measured as position pivotalness.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| LHS Var. | #Discl$_{i,j,t}$ | | | | | | | |
| | *$\hat{\gamma}$ at firm-fund-quarter level* | | | | *$\hat{\gamma}$ at fund-quarter level* | | | |
| $\hat{\gamma}$ | 0.308*** | 0.293*** | 0.296*** | 0.305*** | 0.106*** | 0.113*** | 0.105*** | 0.107*** |
| | (0.006) | (0.006) | (0.007) | (0.006) | (0.004) | (0.004) | (0.004) | (0.004) |
| Suit$_{i,t}$ | | -0.014*** | -0.006** | -0.008*** | | 0.069*** | 0.030*** | 0.029*** |
| | | (0.003) | (0.003) | (0.003) | | (0.006) | (0.004) | (0.004) |
| $\hat{\gamma} \times$ Suit$_{i,t}$ | | 0.084*** | 0.012*** | 0.029*** | | 0.073*** | 0.030*** | 0.030*** |
| | | (0.005) | (0.004) | (0.005) | | (0.005) | (0.004) | (0.003) |
| #Discl$_{-i,j,t}$ | 0.158*** | 0.158*** | 0.160*** | 0.158*** | 0.200*** | 0.196*** | 0.197*** | 0.197*** |
| | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| #Discl$_{i,-j,t}$ | 0.042*** | 0.042*** | 0.046*** | 0.041*** | 0.042*** | 0.039*** | 0.034*** | 0.030*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) |
| Observations | 144,185 | 144,185 | 130,247 | 144,159 | 144,808 | 144,185 | 130,661 | 144,159 |
| R-squared | 0.142 | 0.153 | 0.136 | 0.143 | 0.050 | 0.056 | 0.050 | 0.050 |
| Suit$_{i,t}$ | | $1/\text{Size}_{i,t}$ | Inaccu$_{i,t}$ | Stdev(Ret)$_{i,t}$ | | $1/\text{Size}_{i,t}$ | Inaccu$_{i,t}$ | Stdev(Ret)$_{i,t}$ |

**Table IA-4: Strategic Disclosure and Short-termism (Churn Rate)**

We report Table 7 with $\hat{\gamma}$ measured as portfolio churn rate.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| LHS Var. | $\#Discl_{i,j,t}$ | | | | | | | |
| | $\hat{\gamma}$ *at firm-fund-quarter level* | | | | $\hat{\gamma}$ *at fund-quarter level* | | | |
| $\hat{\gamma}$ | 0.038*** | 0.039*** | 0.036*** | 0.039*** | 0.094*** | 0.094*** | 0.092*** | 0.093*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.005) | (0.004) | (0.005) | (0.004) |
| $Suit_{i,t}$ | | -0.017*** | -0.002 | -0.009*** | | 0.040*** | 0.020*** | 0.018*** |
| | | (0.003) | (0.003) | (0.003) | | (0.006) | (0.003) | (0.004) |
| $\hat{\gamma} \times Suit_{i,t}$ | | 0.008*** | 0.006** | 0.002 | | 0.027*** | 0.015*** | 0.011*** |
| | | (0.003) | (0.003) | (0.003) | | (0.005) | (0.004) | (0.004) |
| $\#Discl_{-i,j,t}$ | 0.169*** | 0.169*** | 0.172*** | 0.169*** | 0.190*** | 0.186*** | 0.187*** | 0.186*** |
| | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| $\#Discl_{i,-j,t}$ | 0.048*** | 0.046*** | 0.053*** | 0.047*** | 0.049*** | 0.041*** | 0.040*** | 0.036*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) |
| Observations | 139,562 | 139,460 | 126,251 | 139,434 | 145,435 | 144,793 | 131,199 | 144,767 |
| R-squared | 0.043 | 0.044 | 0.044 | 0.043 | 0.046 | 0.046 | 0.045 | 0.044 |
| $Suit_{i,t}$ | | $1/Size_{i,t}$ | $Inaccu_{i,t}$ | $Stdev(Ret)_{i,t}$ | | $1/Size_{i,t}$ | $Inaccu_{i,t}$ | $Stdev(Ret)_{i,t}$ |

**Table IA-5: Strategic Disclosure and Short-termism (Turnover Rate)**

We report Table 7 with $\hat{\gamma}$ measured as portfolio turnover rate.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| LHS Var. | $\#\text{Discl}_{i,j,t}$ | | | | | | | |
| | *$\hat{\gamma}$ at firm-fund-quarter level* | | | | *$\hat{\gamma}$ at fund-quarter level* | | | |
| $\hat{\gamma}$ | 0.000 | 0.000 | -0.028 | 0.001 | 0.005 | 0.005 | 0.006 | 0.004 |
| | (0.000) | (0.002) | (0.038) | (0.001) | (0.004) | (0.004) | (0.004) | (0.004) |
| $\text{Suit}_{i,t}$ | | -0.013*** | 0.001 | -0.004 | | 0.039*** | 0.018*** | 0.016*** |
| | | (0.003) | (0.003) | (0.003) | | (0.006) | (0.003) | (0.004) |
| $\hat{\gamma} \times \text{Suit}_{i,t}$ | | -0.000 | 0.006 | 0.001 | | -0.003 | 0.006* | -0.000 |
| | | (0.004) | (0.008) | (0.001) | | (0.004) | (0.004) | (0.003) |
| $\#\text{Discl}_{-i,j,t}$ | 0.168*** | 0.168*** | 0.171*** | 0.168*** | 0.189*** | 0.185*** | 0.186*** | 0.186*** |
| | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| $\#\text{Discl}_{i,-j,t}$ | 0.046*** | 0.044*** | 0.051*** | 0.046*** | 0.051*** | 0.042*** | 0.042*** | 0.037*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) |
| Observations | 139,468 | 139,366 | 126,169 | 139,341 | 145,435 | 144,793 | 131,199 | 144,767 |
| R-squared | 0.041 | 0.042 | 0.043 | 0.041 | 0.039 | 0.039 | 0.038 | 0.038 |
| $\text{Suit}_{i,t}$ | | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

**Table IA-6: Strategic Disclosure and Short-termism (Inverse Holding Period)**

We report Table 7 with $\hat{\gamma}$ measured as inverse stock holding period.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| LHS Var. | $\#\text{Discl}_{i,j,t}$ | | | | | | | |
| | $\hat{\gamma}$ *at firm-fund-quarter level* | | | | $\hat{\gamma}$ *at fund-quarter level* | | | |
| $\hat{\gamma}$ | -0.012*** | -0.011*** | -0.013*** | -0.012*** | 0.035*** | 0.035*** | 0.033*** | 0.035*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.004) | (0.003) |
| $\text{Suit}_{i,t}$ | | -0.021*** | -0.003 | -0.009*** | | 0.033*** | 0.018*** | 0.016*** |
| | | (0.003) | (0.003) | (0.003) | | (0.005) | (0.003) | (0.004) |
| $\hat{\gamma} \times \text{Suit}_{i,t}$ | | 0.000 | 0.002 | 0.001 | | 0.017*** | 0.010*** | 0.011*** |
| | | (0.002) | (0.002) | (0.002) | | (0.004) | (0.003) | (0.003) |
| $\#\text{Discl}_{-i,j,t}$ | 0.153*** | 0.154*** | 0.157*** | 0.154*** | 0.184*** | 0.180*** | 0.181*** | 0.180*** |
| | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| $\#\text{Discl}_{i,-j,t}$ | 0.050*** | 0.047*** | 0.054*** | 0.049*** | 0.051*** | 0.042*** | 0.042*** | 0.038*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) |
| Observations | 133,996 | 133,641 | 121,462 | 133,641 | 144,156 | 143,529 | 130,070 | 143,503 |
| R-squared | 0.040 | 0.040 | 0.041 | 0.040 | 0.040 | 0.039 | 0.039 | 0.038 |
| $\text{Suit}_{i,t}$ | | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

### Table IA-7: PBT, PBD and Market Liquidity (First Principal Component)

We report Table 8 with $\hat{\gamma}$ measured as the first principal component of individual short-termism proxies.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LHS Var. | | | ΔAmihud | | |
| $\hat{\gamma}$ | | | 0.007 | 0.007 | 0.007 |
| | | | (0.006) | (0.006) | (0.006) |
| Δ#Discl | -0.006** | | -0.006*** | | -0.006*** |
| | (0.002) | | (0.002) | | (0.002) |
| Δ#Discl × $\hat{\gamma}$ | | | -0.003 | | -0.003 |
| | | | (0.003) | | (0.003) |
| ΔTrading | | 0.017*** | | -0.008 | -0.008 |
| | | (0.004) | | (0.005) | (0.005) |
| ΔTrading × $\hat{\gamma}$ | | | | -0.002 | -0.002 |
| | | | | (0.006) | (0.006) |
| Observations | 41,901 | 41,901 | 35,232 | 35,232 | 35,232 |
| R-squared | 0.226 | 0.227 | 0.248 | 0.248 | 0.248 |

| | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|
| LHS Var. | | | | | ΔAmihud | | | | |
| $\hat{\gamma}$ | -0.015*** | 0.004 | 0.003 | -0.015*** | 0.004 | 0.003 | -0.015*** | 0.004 | 0.003 |
| | (0.004) | (0.006) | (0.006) | (0.004) | (0.006) | (0.006) | (0.004) | (0.006) | (0.006) |
| Suit | 0.095*** | 0.022*** | 0.029*** | 0.096*** | 0.022*** | 0.028*** | 0.096*** | 0.022*** | 0.028*** |
| | (0.011) | (0.007) | (0.007) | (0.011) | (0.007) | (0.007) | (0.011) | (0.007) | (0.007) |
| $\hat{\gamma}$ × Suit | 0.014 | 0.008 | -0.004 | 0.014 | 0.008 | -0.005 | 0.014 | 0.008 | -0.004 |
| | (0.009) | (0.007) | (0.008) | (0.009) | (0.007) | (0.008) | (0.009) | (0.007) | (0.008) |
| Δ#Discl | -0.019 | -0.006** | -0.005* | | | | -0.019 | -0.006** | -0.005* |
| | (0.013) | (0.002) | (0.003) | | | | (0.013) | (0.002) | (0.003) |
| Δ#Discl×$\hat{\gamma}$ | -0.000 | -0.003 | -0.004 | | | | -0.000 | -0.003 | -0.004 |
| | (0.009) | (0.003) | (0.004) | | | | (0.009) | (0.003) | (0.004) |
| Δ#Discl×Suit | -0.029 | -0.001 | -0.003 | | | | -0.028 | -0.001 | -0.002 |
| | (0.023) | (0.003) | (0.004) | | | | (0.022) | (0.003) | (0.004) |
| Δ#Discl×$\hat{\gamma}$× Suit | -0.003 | -0.002 | -0.009 | | | | -0.003 | -0.003 | -0.009 |
| | (0.016) | (0.004) | (0.006) | | | | (0.016) | (0.004) | (0.006) |
| ΔTrading | | | | -0.009 | -0.008 | -0.009** | -0.009 | -0.008 | -0.009* |
| | | | | (0.006) | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) |
| ΔTrading × $\hat{\gamma}$ | | | | -0.001 | -0.003 | -0.003 | -0.001 | -0.003 | -0.003 |
| | | | | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| ΔTrading × Suit | | | | -0.007 | 0.006 | 0.007 | -0.006 | 0.006 | 0.007 |
| | | | | (0.018) | (0.007) | (0.007) | (0.018) | (0.007) | (0.007) |
| ΔTrading × $\hat{\gamma}$ × Suit | | | | -0.001 | -0.000 | 0.003 | -0.001 | -0.000 | 0.003 |
| | | | | (0.014) | (0.009) | (0.008) | (0.014) | (0.009) | (0.008) |
| Observations | 35,232 | 35,232 | 35,232 | 35,232 | 35,232 | 35,232 | 35,232 | 35,232 | 35,232 |
| R-squared | 0.257 | 0.248 | 0.249 | 0.257 | 0.248 | 0.249 | 0.257 | 0.249 | 0.249 |
| $\text{Suit}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

## Table IA-8: PBT, PBD and Market Liquidity (Flow-Performance Sensitivity)

We report Table 8 with $\hat{\gamma}$ measured as flow-performance sensitivity.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LHS Var. | | | ΔAmihud | | |
| $\hat{\gamma}$ | | | -0.008*** | -0.008*** | -0.008*** |
| | | | (0.003) | (0.003) | (0.003) |
| Δ#Discl | -0.006** | | -0.007*** | | -0.007*** |
| | (0.002) | | (0.002) | | (0.002) |
| Δ#Discl × $\hat{\gamma}$ | | | 0.002** | | 0.002** |
| | | | (0.001) | | (0.001) |
| ΔTrading | | 0.017*** | | -0.008 | -0.008 |
| | | (0.004) | | (0.005) | (0.005) |
| ΔTrading × $\hat{\gamma}$ | | | | -0.001 | -0.001 |
| | | | | (0.003) | (0.003) |
| Observations | 41,901 | 41,901 | 35,924 | 35,924 | 35,924 |
| R-squared | 0.226 | 0.227 | 0.246 | 0.246 | 0.246 |

| | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|
| LHS Var. | | | | | ΔAmihud | | | | |
| $\hat{\gamma}$ | -0.001 | -0.007** | -0.013*** | -0.001 | -0.007** | -0.013*** | -0.000 | -0.007** | -0.013*** |
| | (0.007) | (0.003) | (0.004) | (0.007) | (0.003) | (0.004) | (0.007) | (0.003) | (0.004) |
| Suit | 0.101*** | 0.026*** | 0.029*** | 0.102*** | 0.026*** | 0.029*** | 0.101*** | 0.026*** | 0.029*** |
| | (0.010) | (0.007) | (0.007) | (0.010) | (0.007) | (0.007) | (0.010) | (0.007) | (0.007) |
| $\hat{\gamma}$ × Suit | 0.006 | 0.002 | -0.016** | 0.006 | 0.002 | -0.016** | 0.007 | 0.002 | -0.016** |
| | (0.015) | (0.006) | (0.006) | (0.015) | (0.006) | (0.006) | (0.015) | (0.006) | (0.007) |
| Δ#Discl | -0.031** | -0.008*** | -0.009*** | | | | -0.030** | -0.008*** | -0.009*** |
| | (0.014) | (0.003) | (0.003) | | | | (0.014) | (0.003) | (0.003) |
| Δ#Discl×$\hat{\gamma}$ | 0.020* | 0.002* | 0.005** | | | | 0.020* | 0.002* | 0.005** |
| | (0.011) | (0.001) | (0.002) | | | | (0.011) | (0.001) | (0.002) |
| Δ#Discl×Suit | -0.049** | -0.004 | -0.006 | | | | -0.048** | -0.004 | -0.005 |
| | (0.024) | (0.004) | (0.004) | | | | (0.024) | (0.004) | (0.004) |
| Δ#Discl×$\hat{\gamma}$× Suit | 0.030* | 0.001 | 0.005** | | | | 0.030* | 0.001 | 0.005** |
| | (0.017) | (0.002) | (0.003) | | | | (0.017) | (0.002) | (0.003) |
| ΔTrading | | | | -0.010** | -0.008* | -0.009** | -0.010* | -0.008* | -0.009** |
| | | | | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) |
| ΔTrading × $\hat{\gamma}$ | | | | -0.003 | -0.001 | -0.002 | -0.003 | -0.001 | -0.002 |
| | | | | (0.008) | (0.004) | (0.004) | (0.008) | (0.004) | (0.004) |
| ΔTrading × Suit | | | | -0.009 | 0.005 | 0.007 | -0.008 | 0.005 | 0.007 |
| | | | | (0.015) | (0.007) | (0.006) | (0.015) | (0.007) | (0.006) |
| ΔTrading × $\hat{\gamma}$ × Suit | | | | -0.003 | 0.002 | -0.003 | -0.003 | 0.003 | -0.003 |
| | | | | (0.020) | (0.007) | (0.006) | (0.020) | (0.007) | (0.006) |
| Observations | 35,924 | 35,924 | 35,924 | 35,924 | 35,924 | 35,924 | 35,924 | 35,924 | 35,924 |
| R-squared | 0.257 | 0.247 | 0.247 | 0.256 | 0.247 | 0.247 | 0.257 | 0.247 | 0.247 |
| $Suit_{i,t}$ | $1/Size_{i,t}$ | $Inaccu_{i,t}$ | $Stdev(Ret)_{i,t}$ | $1/Size_{i,t}$ | $Inaccu_{i,t}$ | $Stdev(Ret)_{i,t}$ | $1/Size_{i,t}$ | $Inaccu_{i,t}$ | $Stdev(Ret)_{i,t}$ |

**Table IA-9: PBT, PBD and Market Liquidity (Position Pivotalness)**

We report Table 8 with $\hat{\gamma}$ measured as position pivotalness.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LHS Var. | | | ΔAmihud | | |
| $\hat{\gamma}$ | | | 0.021*** | 0.021*** | 0.021*** |
| | | | (0.007) | (0.007) | (0.007) |
| Δ#Discl | -0.006** | | -0.008*** | | -0.008*** |
| | (0.002) | | (0.003) | | (0.003) |
| Δ#Discl × $\hat{\gamma}$ | | | -0.016* | | -0.016* |
| | | | (0.009) | | (0.009) |
| ΔTrading | | 0.017*** | | 0.019*** | 0.019*** |
| | | (0.004) | | (0.006) | (0.006) |
| ΔTrading × $\hat{\gamma}$ | | | | 0.018 | 0.018 |
| | | | | (0.017) | (0.017) |
| Observations | 41,901 | 41,901 | 39,996 | 39,996 | 39,996 |
| R-squared | 0.226 | 0.227 | 0.225 | 0.225 | 0.225 |

| | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|
| LHS Var. | | | | | ΔAmihud | | | | |
| $\hat{\gamma}$ | -0.006 | 0.016** | 0.014** | -0.006 | 0.016** | 0.014** | -0.006 | 0.016** | 0.014** |
| | (0.004) | (0.006) | (0.006) | (0.004) | (0.006) | (0.006) | (0.004) | (0.006) | (0.006) |
| Suit | 0.096*** | 0.026*** | 0.030*** | 0.096*** | 0.026*** | 0.029*** | 0.095*** | 0.026*** | 0.029*** |
| | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.006) |
| $\hat{\gamma}$ × Suit | 0.020*** | 0.009 | 0.025*** | 0.020*** | 0.009 | 0.022*** | 0.021*** | 0.009 | 0.023*** |
| | (0.007) | (0.007) | (0.008) | (0.007) | (0.007) | (0.008) | (0.007) | (0.007) | (0.008) |
| Δ#Discl | -0.021 | -0.008*** | -0.009*** | | | | -0.022 | -0.008*** | -0.009*** |
| | (0.014) | (0.003) | (0.003) | | | | (0.014) | (0.003) | (0.003) |
| Δ#Discl×$\hat{\gamma}$ | -0.018*** | -0.015* | -0.017** | | | | -0.018*** | -0.015* | -0.018** |
| | (0.005) | (0.008) | (0.009) | | | | (0.006) | (0.008) | (0.009) |
| Δ#Discl×Suit | -0.034 | -0.002 | -0.006 | | | | -0.036 | -0.002 | -0.006 |
| | (0.023) | (0.003) | (0.004) | | | | (0.024) | (0.003) | (0.004) |
| Δ#Discl×$\hat{\gamma}$× Suit | -0.038*** | -0.005 | -0.016** | | | | -0.038*** | -0.005 | -0.017** |
| | (0.009) | (0.005) | (0.008) | | | | (0.009) | (0.005) | (0.008) |
| ΔTrading | | | | 0.020*** | 0.020*** | 0.013*** | 0.020*** | 0.020*** | 0.013*** |
| | | | | (0.005) | (0.006) | (0.005) | (0.005) | (0.006) | (0.005) |
| ΔTrading × $\hat{\gamma}$ | | | | 0.021* | 0.019 | 0.001 | 0.021* | 0.019 | 0.001 |
| | | | | (0.012) | (0.017) | (0.014) | (0.012) | (0.017) | (0.014) |
| ΔTrading × Suit | | | | 0.037*** | 0.007 | 0.022*** | 0.037*** | 0.007 | 0.023*** |
| | | | | (0.014) | (0.007) | (0.007) | (0.014) | (0.007) | (0.007) |
| ΔTrading × $\hat{\gamma}$ × Suit | | | | -0.011 | -0.003 | 0.039* | -0.011 | -0.003 | 0.041** |
| | | | | (0.015) | (0.019) | (0.021) | (0.015) | (0.019) | (0.020) |
| Observations | 39,996 | 39,996 | 39,996 | 39,996 | 39,996 | 39,996 | 39,996 | 39,996 | 39,996 |
| R-squared | 0.238 | 0.226 | 0.227 | 0.238 | 0.226 | 0.227 | 0.240 | 0.226 | 0.228 |
| $\text{Suit}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

## Table IA-10: PBT, PBD and Market Liquidity (Churn Rate)

We report Table 8 with $\hat{\gamma}$ measured as portfolio churn rate.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LHS Var. | | | ΔAmihud | | |
| $\hat{\gamma}$ | | | 0.010* | 0.009 | 0.009* |
| | | | (0.006) | (0.006) | (0.006) |
| Δ#Discl | -0.006** | | -0.006** | | -0.006** |
| | (0.002) | | (0.002) | | (0.002) |
| Δ#Discl × $\hat{\gamma}$ | | | -0.005 | | -0.005 |
| | | | (0.003) | | (0.003) |
| ΔTrading | | 0.017*** | | 0.011** | 0.011** |
| | | (0.004) | | (0.005) | (0.005) |
| ΔTrading × $\hat{\gamma}$ | | | | 0.014*** | 0.014*** |
| | | | | (0.005) | (0.005) |
| Observations | 41,901 | 41,901 | 39,363 | 39,363 | 39,363 |
| R-squared | 0.226 | 0.227 | 0.225 | 0.225 | 0.225 |

| | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|
| LHS Var. | | | | | ΔAmihud | | | | |
| $\hat{\gamma}$ | -0.021*** | 0.005 | 0.003 | -0.021*** | 0.004 | 0.002 | -0.021*** | 0.004 | 0.002 |
| | (0.005) | (0.006) | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.006) | (0.005) |
| Suit | 0.100*** | 0.025*** | 0.031*** | 0.100*** | 0.025*** | 0.030*** | 0.099*** | 0.025*** | 0.031*** |
| | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.006) |
| $\hat{\gamma}$ × Suit | 0.024*** | 0.012* | -0.002 | 0.024*** | 0.012* | -0.003 | 0.024*** | 0.012* | -0.002 |
| | (0.009) | (0.007) | (0.007) | (0.009) | (0.007) | (0.007) | (0.009) | (0.007) | (0.007) |
| Δ#Discl | -0.019 | -0.006** | -0.005 | | | | -0.020 | -0.006** | -0.005 |
| | (0.013) | (0.002) | (0.003) | | | | (0.013) | (0.002) | (0.003) |
| Δ#Discl×$\hat{\gamma}$ | -0.004 | -0.004 | -0.006* | | | | -0.005 | -0.005 | -0.006 |
| | (0.011) | (0.003) | (0.004) | | | | (0.011) | (0.003) | (0.004) |
| Δ#Discl×Suit | -0.031 | -0.002 | -0.004 | | | | -0.032 | -0.001 | -0.004 |
| | (0.023) | (0.003) | (0.004) | | | | (0.023) | (0.003) | (0.004) |
| Δ#Discl×$\hat{\gamma}$× Suit | -0.010 | -0.001 | -0.014** | | | | -0.011 | -0.002 | -0.013** |
| | (0.020) | (0.005) | (0.006) | | | | (0.020) | (0.005) | (0.005) |
| ΔTrading | | | | 0.012* | 0.011** | 0.009** | 0.012* | 0.011** | 0.009** |
| | | | | (0.006) | (0.005) | (0.004) | (0.006) | (0.005) | (0.004) |
| ΔTrading × $\hat{\gamma}$ | | | | 0.007 | 0.014*** | 0.011** | 0.007 | 0.014*** | 0.011** |
| | | | | (0.004) | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) |
| ΔTrading × Suit | | | | 0.030* | 0.009 | 0.013** | 0.030* | 0.009 | 0.013** |
| | | | | (0.017) | (0.006) | (0.007) | (0.017) | (0.006) | (0.007) |
| ΔTrading × $\hat{\gamma}$ × Suit | | | | 0.013 | -0.004 | 0.009 | 0.013 | -0.004 | 0.009 |
| | | | | (0.014) | (0.008) | (0.007) | (0.014) | (0.008) | (0.007) |
| Observations | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 |
| R-squared | 0.236 | 0.225 | 0.225 | 0.237 | 0.226 | 0.226 | 0.238 | 0.226 | 0.226 |
| $\text{Suit}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

## Table IA-11: PBT, PBD and Market Liquidity (Turnover Rate)

We report Table 8 with $\hat{\gamma}$ measured as portfolio turnover rate.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LHS Var. | | | ΔAmihud | | |
| $\hat{\gamma}$ | | | -0.007 | -0.007 | -0.007 |
| | | | (0.005) | (0.005) | (0.005) |
| Δ#Discl | -0.006** | | -0.005** | | -0.005** |
| | (0.002) | | (0.002) | | (0.002) |
| Δ#Discl × $\hat{\gamma}$ | | | -0.002 | | -0.002 |
| | | | (0.003) | | (0.003) |
| ΔTrading | | 0.017*** | | 0.017*** | 0.017*** |
| | | (0.004) | | (0.005) | (0.005) |
| ΔTrading × $\hat{\gamma}$ | | | | -0.005 | -0.005 |
| | | | | (0.005) | (0.005) |
| Observations | 41,901 | 41,901 | 39,363 | 39,363 | 39,363 |
| R-squared | 0.226 | 0.227 | 0.225 | 0.225 | 0.225 |

| | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|
| LHS Var. | | | | | ΔAmihud | | | | |
| $\hat{\gamma}$ | -0.005 | -0.007* | -0.005 | -0.005* | -0.008* | -0.006 | -0.005* | -0.008* | -0.006 |
| | (0.003) | (0.004) | (0.004) | (0.003) | (0.004) | (0.004) | (0.003) | (0.004) | (0.004) |
| Suit | 0.102*** | 0.027*** | 0.034*** | 0.101*** | 0.027*** | 0.034*** | 0.101*** | 0.027*** | 0.034*** |
| | (0.008) | (0.007) | (0.006) | (0.008) | (0.007) | (0.006) | (0.008) | (0.007) | (0.006) |
| $\hat{\gamma}$ × Suit | -0.007 | -0.002 | -0.027*** | -0.007 | -0.002 | -0.028*** | -0.007 | -0.002 | -0.028*** |
| | (0.009) | (0.007) | (0.007) | (0.009) | (0.007) | (0.007) | (0.009) | (0.007) | (0.007) |
| Δ#Discl | -0.021 | -0.005** | -0.006* | | | | -0.023* | -0.005** | -0.006* |
| | (0.013) | (0.002) | (0.003) | | | | (0.013) | (0.002) | (0.003) |
| Δ#Discl×$\hat{\gamma}$ | -0.002 | -0.002 | -0.001 | | | | -0.002 | -0.002 | -0.001 |
| | (0.009) | (0.003) | (0.004) | | | | (0.009) | (0.003) | (0.004) |
| Δ#Discl×Suit | -0.033 | -0.002 | -0.004 | | | | -0.036 | -0.001 | -0.004 |
| | (0.022) | (0.003) | (0.004) | | | | (0.023) | (0.003) | (0.004) |
| Δ#Discl×$\hat{\gamma}$ × Suit | -0.008 | -0.001 | -0.003 | | | | -0.007 | -0.001 | -0.002 |
| | (0.018) | (0.004) | (0.006) | | | | (0.018) | (0.004) | (0.006) |
| ΔTrading | | | | 0.016*** | 0.017*** | 0.015*** | 0.016*** | 0.017*** | 0.015*** |
| | | | | (0.004) | (0.005) | (0.004) | (0.004) | (0.005) | (0.004) |
| ΔTrading × $\hat{\gamma}$ | | | | -0.004 | -0.006 | -0.007 | -0.004 | -0.006 | -0.007 |
| | | | | (0.004) | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) |
| ΔTrading × Suit | | | | 0.037*** | 0.008 | 0.018*** | 0.037*** | 0.008 | 0.018*** |
| | | | | (0.013) | (0.007) | (0.006) | (0.013) | (0.007) | (0.006) |
| ΔTrading × $\hat{\gamma}$ × Suit | | | | -0.008 | 0.004 | 0.002 | -0.008 | 0.004 | 0.002 |
| | | | | (0.012) | (0.006) | (0.007) | (0.012) | (0.006) | (0.007) |
| Observations | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 | 39,363 |
| R-squared | 0.235 | 0.225 | 0.226 | 0.236 | 0.226 | 0.227 | 0.237 | 0.226 | 0.227 |
| $\text{Suit}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

**Table IA-12: PBT, PBD and Market Liquidity (Inverse Holding Period)**

We report Table 8 with $\hat{\gamma}$ measured as inverse stock holding period.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LHS Var. | | | $\Delta$Amihud | | |
| $\hat{\gamma}$ | | | 0.006 | 0.005 | 0.005 |
| | | | (0.006) | (0.006) | (0.006) |
| $\Delta$#Discl | -0.006** | | -0.007*** | | -0.007*** |
| | (0.002) | | (0.003) | | (0.003) |
| $\Delta$#Discl $\times\, \hat{\gamma}$ | | | -0.003 | | -0.003 |
| | | | (0.003) | | (0.003) |
| $\Delta$Trading | | 0.017*** | | 0.020*** | 0.020*** |
| | | (0.004) | | (0.005) | (0.005) |
| $\Delta$Trading $\times\, \hat{\gamma}$ | | | | -0.012*** | -0.012*** |
| | | | | (0.004) | (0.004) |
| Observations | 41,901 | 41,901 | 39,915 | 39,915 | 39,915 |
| R-squared | 0.226 | 0.227 | 0.225 | 0.225 | 0.225 |

| | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|
| LHS Var. | | | | | $\Delta$Amihud | | | | |
| $\hat{\gamma}$ | -0.011*** | 0.004 | 0.003 | -0.012*** | 0.003 | 0.002 | -0.012*** | 0.003 | 0.002 |
| | (0.004) | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) |
| Suit | 0.105*** | 0.028*** | 0.033*** | 0.106*** | 0.028*** | 0.033*** | 0.105*** | 0.028*** | 0.033*** |
| | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.006) | (0.009) | (0.007) | (0.006) |
| $\hat{\gamma} \times$ Suit | 0.009 | 0.002 | -0.009 | 0.009 | 0.002 | -0.011 | 0.009 | 0.002 | -0.010 |
| | (0.010) | (0.007) | (0.008) | (0.010) | (0.007) | (0.008) | (0.010) | (0.007) | (0.008) |
| $\Delta$#Discl | -0.035** | -0.007** | -0.008** | | | | -0.036** | -0.007*** | -0.008** |
| | (0.014) | (0.003) | (0.003) | | | | (0.014) | (0.003) | (0.003) |
| $\Delta$#Discl$\times\hat{\gamma}$ | 0.003 | -0.002 | -0.003 | | | | 0.003 | -0.002 | -0.003 |
| | (0.009) | (0.003) | (0.003) | | | | (0.009) | (0.003) | (0.004) |
| $\Delta$#Discl$\times$Suit | -0.059** | -0.004 | -0.007* | | | | -0.061** | -0.003 | -0.006 |
| | (0.025) | (0.004) | (0.004) | | | | (0.025) | (0.004) | (0.004) |
| $\Delta$#Discl$\times\hat{\gamma}\times$ Suit | -0.004 | -0.004 | -0.011** | | | | -0.003 | -0.004 | -0.010** |
| | (0.019) | (0.004) | (0.005) | | | | (0.019) | (0.004) | (0.005) |
| $\Delta$Trading | | | | 0.021*** | 0.020*** | 0.017*** | 0.021*** | 0.020*** | 0.017*** |
| | | | | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) |
| $\Delta$Trading $\times\, \hat{\gamma}$ | | | | -0.014*** | -0.012*** | -0.012*** | -0.014*** | -0.012*** | -0.012*** |
| | | | | (0.003) | (0.004) | (0.004) | (0.003) | (0.004) | (0.004) |
| $\Delta$Trading $\times$ Suit | | | | 0.043*** | 0.009 | 0.018*** | 0.044*** | 0.009 | 0.018*** |
| | | | | (0.014) | (0.006) | (0.006) | (0.014) | (0.006) | (0.006) |
| $\Delta$Trading $\times\, \hat{\gamma} \times$ Suit | | | | -0.010 | -0.003 | 0.001 | -0.011 | -0.002 | 0.001 |
| | | | | (0.009) | (0.005) | (0.005) | (0.009) | (0.005) | (0.005) |
| Observations | 39,915 | 39,915 | 39,915 | 39,915 | 39,915 | 39,915 | 39,915 | 39,915 | 39,915 |
| R-squared | 0.237 | 0.226 | 0.226 | 0.238 | 0.226 | 0.227 | 0.239 | 0.226 | 0.227 |
| $\text{Suit}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ | $1/\text{Size}_{i,t}$ | $\text{Inaccu}_{i,t}$ | $\text{Stdev(Ret)}_{i,t}$ |

**Table IA-13: PBT, PBD and Market Liquidity at Daily Frequency**

This table reports tests on the effect of PBT and PBD on market liquidity at daily frequency. We test various specifications of the following regression model (see also Ljungqvist and Qian 2016):

$$\begin{aligned}\text{Amihud}_{i,d,t} =&\beta_0+\beta_1\hat{\gamma}_{i,t}+\beta_2\text{Suit}_{i,t}+\beta_3\hat{\gamma}_{i,t}\times\text{Suit}_{i,t}+\sum_{\Delta d=-1}^{1}\beta_{5+\Delta d}\#\text{Discl}_{i,d+\Delta d,t}\\&+\sum_{\Delta d=-1}^{1}\beta_{8+\Delta d}\#\text{Discl}_{i,d+\Delta d,t}\times\hat{\gamma}_{i,t}+\sum_{\Delta d=-1}^{1}\beta_{11+\Delta d}\#\text{Discl}_{i,d+\Delta d,t}\times\hat{\gamma}_{i,t}\times\text{Suit}_{i,t}\\&+\beta_{13}\text{PctTrd}_{i,t}+\beta_{14}\text{PctTrd}_{i,t}\times\hat{\gamma}_{i,t}+\beta_{15}\text{PctTrd}_{i,t}\times\text{Suit}_{i,t}\\&+\beta_{14}\text{PctTrd}_{i,t}\times\hat{\gamma}_{i,t}\times\text{Suit}_{i,t}+\delta'\text{X}_{i,t}+\delta_y+\delta_q+\delta_i+\varepsilon_{i,d,t}.\end{aligned}$$

where $i$, $t$, and $d$ index for firm, quarter, and day of quarter, respectively; $\text{Amihud}_{i,d,t}$ is the daily price impact (i.e., absolute percentage price change per dollar traded); $\#\text{Discl}_{i,d,t}$ is the number of disclosures made about firm $i$ by all sample funds on day $d$ of quarter $t$; $\hat{\gamma}_{i,t}$ is defined as the equal-weighted average of the standardized values of five firm-level short-termism proxies in that quarter (flow-performance sensitivity, position pivotalness, churn rate, turnover rate, and the inverse of holding duration), when available; $\text{Suit}_{i,t}$ is defined as either the inverse of firm size (market capitalization, $\text{Size}_{i,t}$), analyst forecast inaccuracy about the firm (deviation of analyst EPS forecasts from the realized EPS, $\text{Inaccu}_{i,t}$), or the firm's stock return volatility ($\text{Stdev(Ret)}_{i,t}$); $\text{PctTrd}_{i,t}$ is the trading intensity of sample funds, defined as the percentage of firm $i$'s shares traded by all sample funds (relative to its shares outstanding) during quarter $t$. In all specifications, we include in the control vector, $\Delta\text{X}_{i,t}$, the following variables: inverse firm size, analyst forecast inaccuracy, and the firm's stock return volatility. We also include year, quarter, and firm fixed effects ($\delta_y$, $\delta_q$, and $\delta_i$, respectively). All variables are winsorized at the 2% and 98% levels (except the number of disclosures, to ensure sufficient in-sample variation since more than 98% of its daily realizations are zero) and standardized. Standard errors in parentheses are heteroscedasticity-robust and clustered by firm.

**Table IA-13 Continued**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LHS Var. | | | Amihud | | |
| $\hat{\gamma}$ | | | -0.025*** | -0.025*** | -0.025*** |
| | | | (0.007) | (0.007) | (0.007) |
| #Discl$^{-}$ | -0.003 | | -0.004 | | -0.004 |
| | (0.003) | | (0.003) | | (0.003) |
| #Discl$^{0}$ | -0.009*** | | -0.010*** | | -0.010*** |
| | (0.003) | | (0.003) | | (0.003) |
| #Discl$^{+}$ | 0.005 | | 0.003 | | 0.003 |
| | (0.003) | | (0.004) | | (0.004) |
| #Discl$^{-} \times \hat{\gamma}$ | | | -0.003 | | -0.003 |
| | | | (0.006) | | (0.006) |
| #Discl$^{0} \times \hat{\gamma}$ | | | -0.006 | | -0.006 |
| | | | (0.008) | | (0.008) |
| #Discl$^{+} \times \hat{\gamma}$ | | | -0.005 | | -0.005 |
| | | | (0.008) | | (0.008) |
| Trading | | 0.004*** | | 0.004*** | 0.004*** |
| | | (0.001) | | (0.002) | (0.002) |
| Trading $\times \hat{\gamma}$ | | | | 0.002 | 0.002 |
| | | | | (0.002) | (0.002) |
| Observations | 1,639,654 | 1,639,654 | 1,594,065 | 1,594,065 | 1,594,065 |
| R-squared | 0.676 | 0.676 | 0.671 | 0.671 | 0.671 |

**Table IA-13 Continued**

| | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---|---|---|---|---|---|---|---|---|---|
| LHS Var. | | | | | Amihud | | | | |
| $\hat{\gamma}$ | -0.017*** | -0.024*** | -0.023*** | -0.018*** | -0.024*** | -0.023*** | -0.018*** | -0.024*** | -0.023*** |
| | (0.005) | (0.006) | (0.006) | (0.005) | (0.006) | (0.006) | (0.005) | (0.006) | (0.006) |
| Suit | 0.760*** | -0.004 | 0.025*** | 0.762*** | -0.004 | 0.025*** | 0.762*** | -0.004 | 0.025*** |
| | (0.024) | (0.004) | (0.005) | (0.024) | (0.004) | (0.005) | (0.024) | (0.004) | (0.005) |
| $\hat{\gamma} \times$ Suit | -0.021** | -0.004 | -0.011** | -0.022** | -0.003 | -0.011** | -0.022** | -0.003 | -0.011** |
| | (0.009) | (0.003) | (0.005) | (0.009) | (0.003) | (0.005) | (0.009) | (0.003) | (0.005) |
| #Discl$^{-}$ | -0.013 | -0.004 | -0.005 | | | | -0.013 | -0.004 | -0.005 |
| | (0.018) | (0.004) | (0.004) | | | | (0.018) | (0.004) | (0.004) |
| #Discl$^{0}$ | -0.030** | -0.010*** | -0.012*** | | | | -0.030** | -0.010*** | -0.012*** |
| | (0.012) | (0.003) | (0.003) | | | | (0.012) | (0.003) | (0.003) |
| #Discl$^{+}$ | 0.006 | 0.004 | 0.003 | | | | 0.006 | 0.004 | 0.003 |
| | (0.012) | (0.004) | (0.004) | | | | (0.012) | (0.004) | (0.004) |
| #Discl$^{-} \times \hat{\gamma}$ | -0.012 | -0.002 | -0.004 | | | | -0.011 | -0.002 | -0.004 |
| | (0.011) | (0.006) | (0.006) | | | | (0.011) | (0.006) | (0.006) |
| #Discl$^{0} \times \hat{\gamma}$ | -0.015 | -0.004 | -0.004 | | | | -0.015 | -0.004 | -0.004 |
| | (0.011) | (0.007) | (0.008) | | | | (0.011) | (0.007) | (0.008) |
| #Discl$^{+} \times \hat{\gamma}$ | -0.019** | -0.004 | -0.006 | | | | -0.019** | -0.004 | -0.006 |
| | (0.009) | (0.007) | (0.008) | | | | (0.009) | (0.007) | (0.008) |
| #Discl$^{-} \times$ Suit | -0.024 | -0.006 | -0.011 | | | | -0.025 | -0.006 | -0.011 |
| | (0.034) | (0.011) | (0.008) | | | | (0.034) | (0.011) | (0.008) |
| #Discl$^{0} \times$ Suit | -0.055** | -0.012* | -0.019*** | | | | -0.055** | -0.012* | -0.019*** |
| | (0.022) | (0.007) | (0.006) | | | | (0.022) | (0.007) | (0.006) |
| #Discl$^{+} \times$ Suit | -0.003 | -0.003 | -0.000 | | | | -0.003 | -0.003 | -0.001 |
| | (0.023) | (0.005) | (0.006) | | | | (0.023) | (0.005) | (0.006) |
| #Discl$^{-} \times \hat{\gamma} \times$ Suit | -0.022 | -0.001 | -0.009 | | | | -0.021 | -0.001 | -0.009 |
| | (0.020) | (0.008) | (0.008) | | | | (0.020) | (0.008) | (0.008) |
| #Discl$^{0} \times \hat{\gamma} \times$ Suit | -0.039* | -0.001 | -0.005 | | | | -0.038* | -0.001 | -0.005 |
| | (0.021) | (0.009) | (0.008) | | | | (0.021) | (0.009) | (0.008) |
| #Discl$^{+} \times \hat{\gamma} \times$ Suit | -0.042** | -0.004 | -0.003 | | | | -0.041** | -0.004 | -0.003 |
| | (0.017) | (0.009) | (0.009) | | | | (0.017) | (0.009) | (0.009) |
| Trading | | | | 0.004*** | 0.004*** | 0.004*** | 0.004*** | 0.004*** | 0.004*** |
| | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Trading $\times \hat{\gamma}$ | | | | -0.000 | 0.001 | 0.001 | -0.000 | 0.001 | 0.001 |
| | | | | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Trading $\times$ Suit | | | | 0.007 | -0.002 | 0.001 | 0.007 | -0.002 | 0.001 |
| | | | | (0.005) | (0.002) | (0.003) | (0.005) | (0.002) | (0.003) |
| Trading $\times \hat{\gamma} \times$ Suit | | | | -0.005 | 0.003 | 0.001 | -0.005 | 0.003 | 0.001 |
| | | | | (0.005) | (0.003) | (0.004) | (0.005) | (0.003) | (0.004) |
| Observations | 1,594,065 | 1,594,065 | 1,594,065 | 1,594,065 | 1,594,065 | 1,594,065 | 1,594,065 | 1,594,065 | 1,594,065 |
| R-squared | 0.672 | 0.671 | 0.672 | 0.672 | 0.672 | 0.672 | 0.672 | 0.672 | 0.672 |
| Suit$_{i,t}$ | $1/\text{Size}_{i,t}$ | Inaccu$_{i,t}$ | Stdev(Ret)$_{i,t}$ | $1/\text{Size}_{i,t}$ | Inaccu$_{i,t}$ | Stdev(Ret)$_{i,t}$ | $1/\text{Size}_{i,t}$ | Inaccu$_{i,t}$ | Stdev(Ret)$_{i,t}$ |

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