**Mandatory reporting frequency, informed trading, and corporate myopia**

Hwa Young Kim

hwa.young.kim.phd@anderson.ucla.edu

Anderson School of Management

University of California, Los Angeles

## Abstract

This paper examines the relationship between mandatory reporting frequency and corporate myopia in the presence of informed trading. While previous studies attribute myopia to frequent reporting, the empirical evidence of this claim is inconsistent. The results herein show that corporate myopia can be sustained under both frequent and infrequent reporting regimes. I also demonstrate that the level of myopia can even increase as mandatory reporting frequency decreases when reporting noise is sufficiently high since less frequent reporting induces more informed trading. The results offer potential explanations for the mixed empirical findings regarding the relationship between mandatory reporting frequency and corporate myopia. They are robust to extensions, including dynamic trading or different information structures. Overall, this study highlights that increasing mandatory reporting frequency does not always exacerbate corporate short-termism when additional information sources are taken into account.

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# 1 Introduction

Frequent mandatory reporting is often criticized for encouraging corporate short-termism. Anecdotal evidence indicates that firms blame quarterly reporting for adding short-term performance pressure. For instance, Porsche refused to comply with quarterly reporting requirements, asserting that they induce myopic corporate decision-making.[1]

Regulators in different countries have also expressed concerns regarding frequent reporting. In 2004, the European Union (EU) considered mandating quarterly reporting but instead resorted to interim management statements (IMS), which require narrative disclosures and not financial statements.[2] The EU later eliminated this requirement in 2013, citing possible costs related to short-termism and disclosure preparation (EU, 2013). Various stakeholders, such as firms, investors, and politicians argue that the United States should also decrease reporting frequency to reduce short-term pressure. The Securities and Exchange Commission (SEC) requested public comments on mandatory reporting frequency in 2019 to gather opinions on the potential costs and benefits of decreasing reporting frequency (SEC, 2019).

A closely related study by Gigler et al. (2014) analyzes the costs and benefits of increasing mandatory reporting frequency and documents that the frequent disclosure requirement encourages myopic investments.[3] However, empirical studies find mixed results regarding the relationship between the frequency of mandatory reporting and corporate short-termism (Ernstberger et al., 2017; Fu et al., 2020; Kajüter et al., 2019; Kraft et al., 2017; Nallareddy et al., 2017). While the mixed results could be attributed to differences in research designs, it remains unclear which factor

[1] Porsche was eventually expelled from the M-DAX index in 2001 over its refusal to adhere to the requirement (Edmans et al., 2016).

[2] "IMS should contain an explanation of material events and transactions that have taken place during the relevant period and their impact on the financial position of the issuer and its controlled undertakings, and a general description of the financial position and performance of the issuer and its controlled undertakings during the relevant period." (EU, 2004)

[3] In a related work, Edmans et al. (2016) show that when a portion of the long-term firm value cannot be credibly communicated (i.e., is soft), more precise disclosure of hard information increases financial efficiency at the expense of real efficiency.

drives the inconsistency in findings.

To reconcile the mixed empirical findings and address this gap, this paper takes into account a mechanism that has largely been neglected in the literature: informed trading as an alternative information channel. First, I analyze short-term price informativeness with mandatory disclosure and informed trading and compare corporate myopia under frequent and infrequent mandatory disclosure regimes. I further examine how a firm's disclosure policy affects investors' information acquisition incentives and, therefore, corporate short-termism.

Previous studies that examine how firm disclosure affects investors' information acquisition behavior show that disclosure can either increase or decrease investors' information acquisition incentives depending on the information structure (Goldstein and Yang, 2017; Kim and Verrecchia, 1994) or investor horizon (McNichols and Trueman, 1994). These findings suggest that financial reporting frequency can interact with the investor's information acquisition incentive and change the overall information environment.

Therefore, examining mandatory disclosure apart from other information channels can lead to an incomplete understanding of the overall information environment. Using a model that incorporates informed trading, I study how informed trading interacts with firm disclosure and how this interaction affects corporate short-termism. In the model, a firm is run by a manager who cares about short- and long-run stock prices, with the firm adhering to the mandatory disclosure regulation. The manager decides how much capital to invest in short- and long-term projects while investors choose to acquire costly private signals about firm value and trade based on the acquired information. In this setting, myopia arises via a capital-constrained manager overinvesting in the short-term project relative to the first-best investment level due to short-run price concerns. I examine how investors' information acquisition incentives and trading behaviors change with reporting frequency and compare the firm's myopic investment level under the infrequent and frequent mandatory reporting regimes.

When a non-zero portion of investors is informed about short-term firm performance, I find that the myopia problem persists even under the infrequent mandatory reporting regime. This can be attributed to the information about short-term firm performance getting reflected in the interim stock price via informed trading even in the absence of mandatory disclosure. Comparative statics show how a firm's reporting noise, informed trading characteristics, and capital constraints affect corporate myopia. Next, I endogenize investors' information acquisition decisions. In this setting, I find that decreasing mandatory reporting frequency can aggravate the myopia problem, since investors have higher information acquisition incentives under the infrequent regime. Finally, I show that the results can be generalized to various extensions: a dynamic trading model, one with short- and long-run private signals, as well as a model featuring alternative market microstructure.

The primary contribution of this study is to provide a better understanding of the effects of changing reporting frequency on corporate myopia by considering alternative information channels. Although informed trading is a crucial information channel, previous literature has not considered this when examining the relationship between reporting frequency and corporate short-termism. By incorporating trading by informed investors and analyzing its interaction with firm disclosure, this paper provides a more holistic view of the effect of reporting frequency on corporate myopia.

Moreover, this study provides a potential explanation for the mixed empirical findings by showing that reducing the mandatory reporting frequency may not always mitigate the myopia problem. With endogenous information acquisition, reducing the reporting frequency can increase corporate short-termism, particularly when the reporting quality is low. In addition, this paper documents conditions on reporting quality and capital under which changing reporting frequency has a stronger effect on short-sighted investment decisions. These results offer empirical implications by identifying conditions under which reducing the reporting frequency effectively mitigates corporate myopia.

Finally, this paper addresses regulators' interest in setting the optimal reporting frequency. In 2019, the SEC requested that the public comments on quarterly reporting and earnings releases to gauge the costs and benefits of quarterly reporting (SEC, 2019). Other countries have discussed the potential costs and benefits of changing the reporting frequency, which indicates that the effect of varying reporting frequency is of global interest. I look into one of the main costs of increasing the reporting frequency and provide insights to the standard-setting agencies.

## 2 Prior Literature

Prior studies explore the benefits of increasing reporting frequency. Using the U.S. setting, prior studies show that increasing the mandatory reporting frequency leads to higher earnings timeliness for voluntary adopters (Butler et al., 2007) and lower information asymmetry (Fu et al., 2012). Hillegeist et al. (2020) document a positive feedback effect where managers learn more from the price under the frequent than under the infrequent regime.

Another stream of literature examines the potential costs of increasing reporting frequency. Gigler et al. (2014) show that, while mandating firms to report more frequently disciplines overinvestment, it also comes with a cost of corporate myopia. Empirical papers test the prediction on corporate myopia using regulatory changes in several countries. Using the EU's adoption of mandated interim quarterly narrative reports, Ernstberger et al. (2017) find that real activities management becomes more pronounced as reporting frequency increases. Kraft et al. (2017) show that U.S. firms decrease capital expenditure upon switching from semiannual to quarterly reporting. Fu et al. (2020) find a negative relationship between reporting frequency and innovation, measured by patents. However, Nallareddy et al. (2017) find no evidence that the initiation of mandatory quarterly reporting changed firms' capital expenditure and R&D in the U.K. Additionally, Kajüter et al. (2019) find no evidence of stronger investment myopia for firms that were required to switch from semiannual to quarterly reporting in Singapore. The mixed results may arise from cross-country differences in capital markets or quarterly reporting requirements. For instance, unlike the U.S., which requires quarterly financial statements, Europe's interim statements only mandated qualitative discussion; quantitative financial reports were optional.

Another line of literature examines the relationship between short-term voluntary forecast (e.g., quarterly earnings guidance) and corporate myopia. The issuance of quarterly guidance induces additional short-term price pressure and can motivate managers to meet or beat their self-created targets by sacrificing long-term value.[4] This claim has motivated researchers to examine whether firms that provide quarterly guidance are more likely to engage in myopic behaviors. While Cheng et al. (2005) find that short-term guidance is associated with myopia, other papers document either no difference in myopia between guiding and non-guiding firms (Call et al., 2014; Houston et al., 2010), or a negative relationship between short-termism and guidance issuance (Chen et al., 2015). Although I do not explicitly model voluntary disclosure of future forecasts, the prior empirical evidence points to the possibility that more voluntary disclosure does not necessarily lead to higher short-termism.[5]

Building on the previous literature, I examine how incorporating additional information channel changes the relationship between financial reporting frequency and corporate myopia.

# 3 Model

There are two types of players: a manager and investors. The manager maximizes the weighted average of short- and long-term stock prices $P_1$ and $P_2$. Specifically, the manager's objective function

[4]Some firms ceased issuing quarterly guidance claiming that short-term guidance undermines their long-term focus. For instance, Google declined to provide quarterly guidance in 2004, saying that it would promote short-term thinking.

[5]In the extension, I explore the impact of voluntary disclosure by allowing a manager to voluntarily release a short-term performance report, which has the same information content as interim mandatory disclosure.

is $\alpha P_1 + (1 - \alpha)P_2$, where $\alpha \in (0, 1)$ reflects the level of managerial myopia.[6] There is a continuum of investors with negative exponential utility, $U_i = -e^{-\gamma W_i}$, where $W_i$ is investor $i$'s terminal wealth and $\gamma > 0$ is the degree of risk-aversion. The total mass of investors is 1.

I provide a sketch of the model and elaborate on the details in later sections. At the beginning of the game, the manager makes an investment decision by allocating capital to short- and long-term projects. Investment myopia arises when the manager inefficiently overinvests in the short-term project to boost near-term performance. In the interim period, the short-term investment outcome is disclosed to the market via mandatory disclosure under the frequent reporting regime; no report is released under the infrequent regime. The cumulative performance report becomes available in the long run.

Investors can choose to become informed by acquiring information about short-term firm performance at a fixed cost $c > 0$. After informed traders observe the private signals and the firm's short-term performance is disclosed in the interim period, trading takes place, which determines $P_1$. There is no discounting.

I compare the manager's investment choice under two regimes to derive results on the effect of reporting frequency on investment myopia. Under the frequent mandatory reporting regime, firm performance is reported mandatorily at both times 1 and 2. However, under the infrequent regime, the mandatory report is released only at time 2.

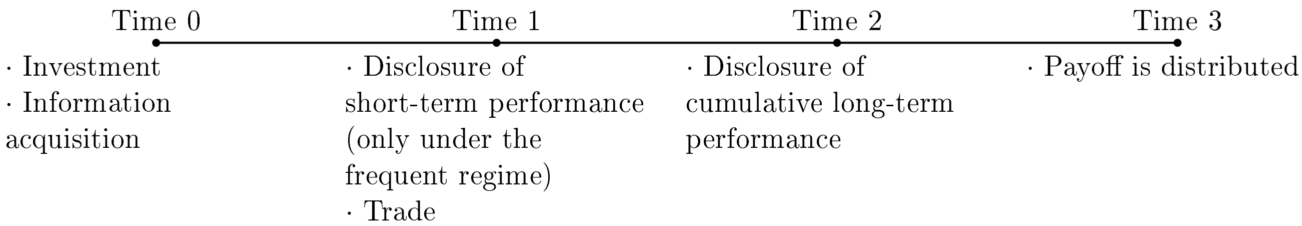
Figure 1 summarizes the timeline of the model.

## 3.1 Investment

The manager's investment decision affects the short- and long- run components of firm performance, $v_1$ and $v_2$ respectively. That is, $v_1 = y_1 + \delta_1$ and $v_2 = y_2$ where $y_t$ is the investment outcome at

[6] Factors such as compensation, reputation, or turnover can lead to a manager's interest in short-term stock price. Prior studies that examine myopia (e.g., Stein (1989), Gigler et al. (2014), and Edmans et al. (2016)) also assume that the manager's weight on interim price is given exogenously. Endogenizing $\alpha$ is beyond the scope of this paper.

Figure 1: Timeline




time $t$ and $\delta_1$ indicates the uncontrollable factor that affects short-run firm performance at time 1, with $\delta_1 \sim \mathcal{N}(0, \sigma_1^2)$.[7]

At time 0, the firm has capital $I$ that can be allocated to two investment projects, $S$ and $L$. The two projects differ in terms of the timing of payoff realization and the net payoff ($y_t$). At time 0, the manager chooses how much to invest in project $S$, which affects short-term firm performance. Investing $k_1$ gives a time 1 investment payoff $y_1 = k_1\mu_1 - \frac{k_1^2}{2}$, where $0 \leq k_1 \leq I$. Project $L$ affects the long-term firm performance. Investing $k_2$ in project $L$ gives a time 2 payoff of $y_2 = k_2\mu_2 - \frac{k_2^2}{2}$, where $0 \leq k_2 \leq I - k_1$. I assume that $\mu_2 \geq 2\mu_1 > 0$, which indicates that the marginal benefit of investing in $L$ is greater than that of investing in $S$. Also, the assumption is a sufficient condition for having a positive amount of capital allocated to the long-term project. In other words, the equilibrium short-term investment amount is always smaller than the available capital. When capital is constrained, the opportunity cost of allocating capital to the short-term project increases in the difference in expected payoffs, $\mu_2 - \mu_1$.

The manager with a short-term price concern $\alpha$ solves the following maximization problem:

$$\max_{k_1,k_2} \alpha E[P_1] + (1-\alpha)E[P_2] \tag{1}$$

$$\text{s.t. } 0 \leq k_1 \leq I \tag{2}$$

$$0 \leq k_2 \leq I - k_1. \tag{3}$$

[7]Assuming uncertainty on both time 1 and time 2 firm performances does not qualitatively change the result but complicates the analysis. Therefore, I assume that $v_2 = y_2$ for tractability.

While the above investment opportunities are common knowledge, actual investment choices of the manager ($k_1$, $k_2$) remain unobservable to the market.

### 3.2 Trading

The market microstructure follows Grossman and Stiglitz (1980). There is a continuum of investors with CARA utility over terminal wealth and risk aversion coefficient $\gamma > 0$. The total mass of the investors is 1, with a fraction $n \in [0, 1]$ being informed and $1 - n$ being uninformed. Investor $i$ has an initial wealth $W$, and there are two assets, a risky asset (firm share) and a risk-free asset with a gross return of 1. The supply of the risky asset $x$ follows $x \sim \mathcal{N}(0, \sigma_x^2)$. The uncertainty in supply $x$ can be due to trading by noise traders and prevents the price from fully revealing investors' private information. If investor $i$ acquires a costly signal, the investor privately observes a conditionally independent signal $s_i = v_1 + \eta_i$, where $\eta_i \sim \mathcal{N}(0, \sigma_\eta^2)$.

### 3.3 Disclosure

At time 1, the firm's accounting system produces a noisy signal on short-term firm performance, $e_1 = v_1 + \varepsilon$, where $\varepsilon \sim \mathcal{N}(0, \sigma_\varepsilon^2)$. Under the frequent regime, the short-term report $e_1$ is released at time 1. At time 2, cumulative firm performance $\{v_1, v_2\}$ becomes public. Under the infrequent regime, there is no interim report at time 1, and the market only observes firm performance $\{v_1, v_2\}$ at time 2. I assume that the mandatory report is the only signal released by the firm.

## 4 Exogenous information acquisition

I derive a rational expectations equilibrium where the market's conjecture on $k_1$ ($\hat{k_1}$) equals the actual choice of the manager. As will be shown in the analysis, the manager's choice of $k_1$ depends on the known parameters. Therefore, the market can perfectly infer the manager's investment choice, although $k_1$ is unobservable. I first solve for the case where $n$ proportion of investors are informed. Then, in the next section, I endogenize the proportion of informed investors.

### 4.1 First-best investments and capital constraint

I first illustrate the first-best investment decision at time 0, defined as the investment that maximizes the long-term firm performance ($\alpha = 0$). In this case, the manager maximizes $E[P_2] = E[v_1+v_2]$. When $I \geq \mu_1+\mu_2$, constraints (2) and (3) are slack and capital is effectively unconstrained. Therefore, the manager can invest optimal amounts in both projects ($k_1^* = \mu_1$ and $k_2^* = \mu_2$).

However, when capital is constrained ($I < \mu_1 + \mu_2$), constraint (3) binds (i.e., $k_2^* = I - k_1$). Solving the maximization problem gives $k_1^{FB} = \max\left\{\dfrac{I - (\mu_2 - \mu_1)}{2}, 0\right\}$ and $k_2^{FB} = I - k_1^{FB}$. Note that $k_1^{FB} < \mu_1$ since $I < \mu_1 + \mu_2$. In other words, it is inefficient to invest $\mu_1$ in project $S$ when the capital is constrained. To focus on the scenario where the manager has to choose between the short- and the long-term projects, I assume that the firm's capital is contrained, $I < \mu_1 + \mu_2$. Also, I assume that $I \geq \mu_2 - \mu_1$. This condition ensures that the first best investment amount in project $S$ is greater than or equal to zero $\left(k_1^{FB} = \frac{I-(\mu_2-\mu_1)}{2} \geq 0\right)$. Overall, the capital $I$ satisfies $0 < \mu_1 < \mu_2 - \mu_1 \leq I < \mu_1 + \mu_2$.

### 4.2 Frequent mandatory reporting regime

I solve for the perfect Bayesian equilibria where the players form rational expectations about the other players' strategies and actions and make optimal decisions given their information sets. Since investors have CARA utility and firm performance follows a normal distribution, I conjecture and verify a linear price equilibrium.

Since firm value is realized at time 2, stock price at time 2 is equal to the liquidating dividend regardless of the reporting regime.

$$P_{2,F} = v_1 + v_2 \tag{4}$$

Investors form a linear conjecture for time 1 price:

$$P_{1,F} = \beta + \beta_v v_1 + \beta_e e_1 + \beta_x x. \tag{5}$$

The CARA-normal setup implies that

$$D_i^F(e_1, s_i, P_{1,F}) = \frac{E(v_1 + v_2|e_1, s_i, P_{1,F}) - P_{1,F}}{\gamma Var(v_1 + v_2|e_1, s_i, P_{1,F})} \tag{6}$$

$$D_U^F(e_1, P_{1,F}) = \frac{E(v_1 + v_2|e_1, P_{1,F}) - P_{1,F}}{\gamma Var(v_1 + v_2|e_1, P_{1,F})}, \tag{7}$$

where $D_i^F, D_U^F$ each indicates informed investor $i$'s and uninformed investors' demand quantities under the frequent regime. Intuitively, the optimal demand is equal to the expected excess return scaled by the investor's risk aversion and the posterior variance of the asset given the investor's information set. The prices are determined so that it satisfies the market clearing condition.

$$\int_0^n D_i^F(e_1, s_i, P_{1,F})di + (1-n)D_U^F(e_1, P_{1,F}) = x \tag{8}$$

The manager chooses $k_1, k_2$ that maximizes the manager's weighted average of the short- and long-run stock prices subject to a capital constraint. The lemma below summarizes the equilibrium investment choices under the frequent regime.

**Lemma 1.** *Under the frequent mandatory reporting regime: When a measure $n$ of investors possess private signals on short-term firm performance, a manager with $\alpha$ chooses*

$$k_{1,F}^* = \frac{\alpha X_F \mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha X_F + 2(1-\alpha)} \geq k_1^{FB}$$

*where* $X_F = \dfrac{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_\varepsilon^2}}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}$ *reflects time 1 price efficiency under the frequent regime.*

Lemma 1 shows that $k^*_{1,F} \geq \frac{I-(\mu_2-\mu_1)}{2} = k_1^{FB}$, implying that overinvestment in the short-term project takes place under the frequent regime.[8] Note that the equilibrium short-term investment is strictly increasing in price informativeness of $P_1$ about short-term firm performance ($X_F$), i.e., $\frac{\partial k^*_{1,F}}{\partial X_F} > 0$. This is because unlike in the first-best setting where the manager only cares about long-term cumulative performance, the manager also cares about interim stock price, $P_1$. The manager has a higher incentive to invest in the short-term project when the interim stock price is more informative about short-term performance, $v_1$.

### 4.3 Infrequent mandatory reporting regime

As in Section 4.2, the price is equal to the realized firm value, $P_{2,I} = v_1 + v_2$. I conjecture and verify a linear form for time 1 price, $P_{1,I} = \lambda + \lambda_v v_1 + \lambda_x x$. Solving for the price and the equilibrium investment choice gives Lemma 2.

**Lemma 2.** *Under the infrequent mandatory reporting regime: When a measure $n$ of investors possess private signals on short-term firm value $v_1$, a manager with $\alpha$ chooses*

$$k^*_{1,I} = \frac{\alpha X_I \mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha X_I + 2(1-\alpha)} \geq k_1^{FB},$$

*where* $X_I = \dfrac{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2}}$ *reflects time 1 price efficiency under the infrequent regime.*

Under the infrequent regime the optimal choice of $k^*_{1,I}$ is greater than or equal to $k_1^{FB} = \dfrac{I-(\mu_2-\mu_1)}{2}$. This indicates that managers overinvest in the short-term project even under the infrequent regime (i.e., myopia persists). The result contrasts with that in Gigler et al. (2014), where the corporate myopia problem is completely resolved under the infrequent regime. This is because information on short-term firm performance is still impounded into the price under the infrequent regime via informed trading in the current model, while Gigler et al. (2014) assume that

[8] Since $I \geq \mu_2 - \mu_1$, the first-best investment in the short-term project is always weakly greater than zero.

there is no information source under the infrequent regime.

### 4.4 Comparison of frequent and infrequent regimes

As noted earlier, equilibrium short-term investment increases with price informativeness about the interim performance. For comparing regimes, it suffices to examine the time 1 price efficiency under the frequent and infrequent regimes when comparing $k^*_{1,F}$ and $k^*_{1,I}$. The following proposition compares the myopic investment level under the two regimes.

**Proposition 1.** *When an exogenous measure $n$ of investors are informed, myopia is always higher under the frequent than under the infrequent regime ($k^*_{1,F} > k^*_{1,I}$).*

Proposition 1 shows that given an exogenous proportion of informed investors, short-termism is always more pronounced in the frequent regime than in the infrequent regime. This is because price informativeness is higher under the frequent than the infrequent regime when there is a fixed proportion of informed investors. The result is consistent with the one in Gigler et al. (2014) which shows that myopia is more pronounced under the frequent regime when a mandatory report is the only information source. Reducing reporting frequency has direct and indirect effects. First, the absence of firm disclosure decreases price informativeness. However, higher weight is put on the signal from informed trading when the firm does not disclose, which indirectly increases price informativeness. Overall, the direct effect dominates, and price efficiency is always higher under the frequent regime. Note that the result in Proposition 1 does not consider endogenous information acquisition decisions or the interaction between firm disclosure and information acquisition, which are considered in Section 5.

The next proposition examines how the gap between the myopic investment level under the two regimes changes with parameters.

**Proposition 2.** *When an exogenous measure $n$ of investors are informed, the investment myopia gap between the frequent and the infrequent reporting regime ($k^*_{1,F} - k^*_{1,I}$)*

*(1) decreases with the proportion of informed investors ($n$),*

*(2) increases with the noise in the informed investors' private signals ($\sigma^2_\eta$),*

*(3) decreases with the mandatory reporting noise ($\sigma^2_\varepsilon$),*

*(4) decreases with the capital ($I$).*

Parts (1) and (2) hold because, although $k^*_{1,F}$ and $k^*_{1,I}$ both increase with $n$ and decrease with $\sigma^2_\eta$, the effect is stronger under the infrequent regime than under the frequent regime because informed trading has a higher impact in the infrequent regime. Part (3) holds because price efficiency decreases with $\sigma^2_\varepsilon$ under the frequent regime but is independent of $\sigma^2_\epsilon$ under the infrequent regime. Given an exogenous proportion of informed investors $n$, reducing the reporting frequency will be more effective in reducing corporate myopia when the mandatory reporting noise is low. In part (4), the increase in capital $I$ mitigates the investment myopia problem, and this effect is more pronounced under the frequent regime. Therefore, switching from the frequent to the infrequent regime will be more effective in mitigating corporate myopia for firms with greater capital constraints. Proposition 2 indicates that the effectiveness of reducing mandatory reporting frequency on mitigating the myopia problem depends on firm-specific and market-wide factors, such as reporting noise, capital constraints, and informed trading characteristics.

# 5 Endogenous information acquisition

This section endogenizes investors' information acquisition decisions and derives the equilibrium proportion of investors $n$ who acquire information among a continuum of investors. At time 0, investor $i$ can choose to acquire information $s_i$ at a fixed cost $c > 0$. An individual investor will pay to observe a private signal when the incremental utility of being informed is greater than or equal to the cost of observing information. I assume that an investor acquires information when indifferent. Lemmas 3 and 4 summarize the equilibrium proportion of informed investors under the infrequent and the frequent regimes.

## 5.1 Equilibrium proportion of informed investors

Lemmas 3 and 4 show that an investor's information acquisition decision depends on the value of $e^{2\gamma c}$, or equivalently the information acquisition cost $c$. A comparison of the equilibrium proportion of informed investors indicates that given an information acquisition cost, the equilibrium proportion of informed investors is always weakly greater under the infrequent regime than under the frequent regime, i.e., $n_I \geq n_F$. This is because the firm's disclosure under the frequent regime reduces the value of acquiring a private signal.

**Lemma 3.** *The equilibrium proportion of informed investors under the frequent regime ($n_F$) is characterized as below.*

*1) When* $e^{2\gamma c} - 1 > \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}$, $n_F = 0$.

*2) When* $e^{2\gamma c} - 1 \leq \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}$, $n_F = 1$.

*3) Otherwise,* $n_F = \gamma\sigma_x\sigma_\eta^2\sqrt{\frac{\frac{1}{\sigma_\eta^2}}{e^{2\gamma c} - 1} - \frac{1}{\sigma_1^2} - \frac{1}{\sigma_\varepsilon^2}} \in (0, 1)$.

**Lemma 4.** *The equilibrium proportion of informed investors under the infrequent regime ($n_I$) is characterized as below.*

*1) When* $e^{2\gamma c} - 1 > \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}}$, $n_I = 0$.

*2) When* $e^{2\gamma c} - 1 \leq \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}$, $n_I = 1$.

*3) Otherwise,* $n_I = \gamma\sigma_x\sigma_\eta^2\sqrt{\frac{\frac{1}{\sigma_\eta^2}}{e^{2\gamma c} - 1} - \frac{1}{\sigma_1^2}} \in (0, 1)$.

## 5.2 Comparison of frequent and infrequent regimes

After substituting in the equilibrium $n_I$ and $n_F$ into price informativeness under the infrequent and the frequent regimes in Lemma 3 and 4, I compare the degree of investment myopia under the two regimes in Proposition 3.

**Proposition 3.** *(a) When the reporting quality* $\left(\frac{1}{\sigma_\varepsilon^2}\right)$ *is relatively low such that* $\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_\eta^2} > \frac{1}{\sigma_\varepsilon^2}$, *there exists an interval of information acquisition cost* $[\underline{c}, \bar{c}] \subset [0, +\infty]$ *such that when* $c \in [\underline{c}, \bar{c}]$, *investment myopia is more pronounced under the infrequent regime than the frequent regime. When* $c \notin [\underline{c}, \bar{c}]$, *investment myopia is more pronounced under the frequent regime than under the infrequent regime.*

*(b) When the reporting quality* $\left(\frac{1}{\sigma_\varepsilon^2}\right)$ *is relatively high such that* $\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_\eta^2} < \frac{1}{\sigma_\varepsilon^2}$, *then investment myopia is always more pronounced under the frequent regime than the infrequent regime.*

Proposition 3 shows that when information acquisition is endogenized, reducing the reporting frequency can exacerbate the corporate myopia problem when the noise of the mandatory report is sufficiently high. This is because the absence of disclosure can encourage more information acquisition, which increases the overall time 1 price efficiency regarding short-term performance. When the reporting quality is low, the increase in price informativeness due to informed trading outweighs the reduction in price efficiency due to the absence of mandatory disclosure. Therefore, the myopic investment level is higher under the infrequent regime than under the frequent regime. This result contrasts with the result in Gigler et al. (2014) that reducing reporting frequency mitigates the corporate myopia problem. However, when the reporting quality is high, the second effect dominates, and the price efficiency under the infrequent regime is lower than that under the frequent regime.

Next, I examine how the gap between the myopic investment level under the two regimes changes with parameters.

**Proposition 4.** *When the proportion of informed investors $n$ is endogenous and $n_F \in (0,1)$, the investment myopia gap between the frequent and the infrequent reporting regime* $(k^*_{1,F} - k^*_{1,I})$

*(1) increases with the mandatory reporting noise* $(\sigma^2_\epsilon)$,

*(2) decreases (increases) with the capital* $(I)$ *when* $k^*_{1,F} > (<) k^*_{1,I}$.

Unlike in the exogenous information acquisition case, the gap between the frequent and the infrequent regime increases with mandatory reporting noise $(\sigma^2_\epsilon)$. This is because the increase in reporting noise has an indirect effect on information acquisition incentives under the frequent reporting regime. A noisier mandatory report triggers more information acquisition, which increases price informativeness under the frequent regime. Thus, the gap in short-term investment between the frequent and the infrequent regime increases with the mandatory reporting noise with endogenous information acquisition. The result indicates that when myopia is more pronounced under the frequent (infrequent) regime, reducing (increasing) the reporting frequency will be more (less) effective in mitigating the myopia problem as the mandatory reporting quality decreases.

The comparative statics on capital $I$ depends on whether the short-term investment level is higher under the frequent or the infrequent regime. When myopia is more (less) pronounced under the frequent regime, the investment gap decreases (increases) with the capital $I$. This indicates that decreasing (increasing) the reporting frequency will be less effective in mitigating the myopia problem as the capital increases. This is because a higher amount of available capital reduces the inefficient short-term investment in both regimes, and the speed of decrease depends on the short-run price efficiencies. When the price efficiency is higher under the frequent regime $(k^*_{1,F} > k^*_{1,I})$, investment myopia decreases faster under the frequent regime than the infrequent regime as the available capital increases. Therefore, the investment gap $k^*_{1,F} - k^*_{1,I}$ decreases with capital $I$. On the contrary, when the price efficiency is higher under the infrequent regime $(k^*_{1,F} < k^*_{1,I})$, the speed of decrease is higher under the infrequent regime and the investment gap increases with $I$.

Overall, the comparative statics results show the importance of taking into account information acquisition incentives. For example, when the proportion of informed investors is fixed, switching from frequent to infrequent regime will be more effective in mitigating myopia when firms report with high precision. On the contrary, when investors' information acquisition decisions are endogenous, an opposite result obtains: reducing the reporting frequency will be more effective when firms report with low precision.

# 6 Extensions

## 6.1 Two-period trading model

The baseline model restricts investors to trade only just after disclosure in the frequent regime. However, investors may have an incentive to trade more aggressively early on when they expect disclosure, and therefore, the value of acquiring information under the frequent regime can increase with the additional trading opportunity. On the contrary, such incentives are less pronounced under the infrequent regime where there is no disclosure. This can potentially affect the overall price informativeness across two periods as well as the manager's investment decisions.

To address this possibility, I consider an extension where investors can trade not just at time 1 but also at time 0. In this setting, investors can also profit from price changes across the two trading periods, which can influence expected price efficiencies and information acquisition incentives. First round trading takes place at time 0 after the manager makes an investment decision and investors make information acquisition decisions. The supply of the risky asset is $x_t$ at time $t$ and follows $x_t \sim \mathcal{N}(0, \sigma_x^2)$. $x_1$ and $x_2$ are independent of each other. The manager's objective function is the weighted average of interim stock prices $P_0$, $P_1$ and $P_2$ ($\alpha\delta P_0 + \alpha(1-\delta)P_1 + (1-\alpha)P_2$), where $\alpha, \delta \in (0, 1)$. $\alpha$ reflects the degree to which the manager cares about interim stock prices, and $\delta$

determines the weight on $P_0$ relative to $P_1$.

### 6.1.1 Exogenous information acquisition

I first analyze the case where a fixed proportion of investors observe conditionally independent signals.

Investor $i$'s final wealth is:

$$W_i = W + (P_1 - P_0)q_{0i} + (v_1 + v_2 - P_1)q_{1i}. \tag{9}$$

Rearranging (9) gives $W_i = W + (v_1 + v_2 - P_0)q_{0i} + (v_1 + v_2 - P_1)(q_{1i} - q_{0i})$. This equation indicates that the choice of trade timing affects the final wealth due to the difference in the expected returns at times 0 and 1. Each investor allocates the demand across two periods to maximize the final wealth.

At time 1, investor $i$ chooses demand that maximizes:

$$\max_{q_{1i}} E\left[-e^{-\gamma(W+(P_1-P_0)q_{0i}+(v_1+v_2-P_1)q_{1i})} \mid \Omega_{1i}\right], \tag{10}$$

where $\Omega_{1i}$ indicates the investor $i$'s information set at time 1.

At time 0, investor $i$ chooses time 0 demand by solving the following problem.

$$\underbrace{\max_{q_{0i}} E\left[\underbrace{\max_{q_{1i}} E\left[-e^{-\gamma(W+(P_1-P_0)q_{0i}+(v_1+v_2-P_1)q_{1i})} \mid \Omega_{1i}\right]}_{\text{Time 1 maximization}} \Big| \Omega_{0i}\right]}_{\text{Time 0 maximization}} \tag{11}$$

where $\Omega_{ti}$ indicates the information set of investor $i$ at time $t$.

Solving the maximization problem gives:

$$q_{1i}^* = \frac{E\left[v_1 + v_2 \mid \Omega_{1i}\right] - P_1}{\gamma \cdot Var\left[v_1 + v_2 \mid \Omega_{1i}\right]} \text{ and} \tag{12}$$

$$q_{0i}^* = \frac{E\left[(v_1 + v_2 - P_0) - (1 - h_i) \cdot (v_1 + v_2 - P_1) \mid \Omega_{0i}\right]}{\gamma \cdot Var\left[(v_1 + v_2 - P_0) - (1 - h_i) \cdot (v_1 + v_2 - P_1) \mid \Omega_{0i}\right]} \tag{13}$$

$$\text{where } h_i = -\frac{Cov\left[P_1 - P_0, v_1 + v_2 - P_1 \mid \Omega_{0i}\right]}{Var\left[v_1 + v_2 - P_1 | \Omega_{0i}\right]} \in (0, 1)$$

The demand at time 1 takes the same structure as in the baseline model. The only difference is that an investor now observes an additional signal $P_0$. In the case of the time 0 demand, the numerator in (13) shows that the time 0 demand decreases with the expected return from time 1 trading ($E[v_1 + v_2 - P_1|\Omega_{0i}]$). The parameter $h_i$ determines the degree to which the investor $i$ takes into account the expected return at time 1. When $h_i$ is higher, a lower time 1 expected return is a stronger indication of price appreciation across two periods, which increases the investor's incentive to trade early on. Also, the denominator of equation (13) indicates that the demand is normalized by the posterior variance of expected returns and the risk aversion parameter.

**Frequent mandatory reporting regime:** I conjecture and verify the linear prices, $P_{0,F} = \beta^0 + \beta_v^0 v_1 + \beta_x^0 x_0$ and $P_{1,F} = \beta^1 + \beta_v^1 v_1 + \beta_x^1 x_1 + \beta_m^1 m_0$ where $m_0$ is the signal from $P_0$ ($m_0 = \frac{P_0 - \beta_0}{\beta_v^0} = v_1 + \frac{\beta_x^0}{\beta_v^0} x_0$). Solving the financial market equilibrium and deriving the optimal $k_1$ gives Lemma 5.

**Lemma 5.** *Under the frequent mandatory reporting regime: When there are two trading periods and a measure $n$ of investors are informed, a manager with $\{\alpha, \delta\}$ chooses*

$$k_{1,F}^* = \frac{\alpha\left[\delta X_{0,F} + (1-\delta) X_{1,F}\right]\mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha\left[\delta X_{0,F} + (1-\delta) X_{1,F}\right] + 2(1-\alpha)}$$

*where $X_{t,F}$ is the price efficiency at time $t$ under the frequent regime.*

**Infrequent mandatory reporting regime:** I conjecture and verify the linear prices, $P_{0,I} = \lambda^0 + \lambda_v^0 v_1 + \lambda_x^0 x_0$ and $P_{1,I} = \lambda^1 + \lambda_v^1 v_1 + \lambda_x^1 x_1 + \lambda_m^1 m_0$. Solving for the financial market equilibrium and deriving the optimal $k_1$ gives Lemma 6.

**Lemma 6.** *Under the infrequent mandatory reporting regime: When there are two trading periods* *and a measure $n$ of investors are informed, a manager with $\alpha$ and $\delta$ chooses*

$$k^*_{1,I} = \frac{\alpha\left[\delta X_{0,I} + (1-\delta)X_{1,I}\right]\mu_1 + (1-\alpha)(I-\mu_2+\mu_1)}{\alpha\left[\delta X_{0,I} + (1-\delta)X_{1,I}\right] + 2(1-\alpha)},$$

*where $X_{t,I}$ is the price efficiency at time $t$.*

**Comparison of frequent and infrequent regime:** Exploiting similarity in expressions in Lemmas 5 and 6, the manager's optimal investment in project $S$ under regime $r \in \{I, F\}$ takes the following form.

$$k^*_{1,r} = \frac{\alpha\left[\delta X_{0,r} + (1-\delta)X_{1,r}\right]\mu_1 + (1-\alpha)(I-\mu_2+\mu_1)}{\alpha\left[\delta X_{0,r} + (1-\delta)X_{1,r}\right] + 2(1-\alpha)} \tag{14}$$

where $X_{t,r}$ indicates price efficiency at time $t$ under regime $r \in \{I, F\}$. Note that the equilibrium short-term investment level is strictly increasing in the average price efficiency across two trading periods $[\delta X_{0,r} + (1-\delta)X_{1,r}]$, where the averaging is based on the manager's preference, $\delta$. Therefore, when comparing the myopic investment level across regimes, it is sufficient to compare the average price informativeness under the two regimes. The following proposition compares the myopia level under the two regimes.

**Proposition 5.** *When there are two trading periods and a measure $n$ of investors are informed, the myopic investment level is always higher under the frequent than under the infrequent regime.*

Proposition 5 indicates that given fixed $n$, corporate myopia is stronger under the frequent regime even when there is an additional trading round. The intuition behind this result is that more information about short-term firm performance is incorporated into the price at both trading periods under the frequent than the infrequent regime. In the second trading period, the same intuition as in the baseline model applies. First, increasing the reporting frequency reduces price informativeness due to the lower weight placed on information from informed trading. However, it also increases the information contained in $P_1$ via firm disclosure. Overall, the second effect dominates, and the price efficiency is higher under the frequent regime. In the case of first trading round, time 1 price efficiency affects the informed investors' time 0 demand quantities in two ways. First, higher price informativeness at time 1 decreases the expected return at time 1, which increases the numerator of informed investor's time 0 demand. At the same time, higher price efficiency increases $h_i$, or an investor's tendency to take into account time 1 expected return when deciding time 0 trading quantity. Together, these effects lead to a higher time 0 price efficiency under the frequent compared to the infrequent regime. Overall, the result indicates that with exogenous $n$, the prediction in Gigler et al. (2014) that myopia is more pronounced under the frequent than the infrequent regime still holds with dynamic trading.

### 6.1.2 Endogenous information acquisition

Next, I endogenize the proportion of informed investors and examine its effect on myopic investment levels under the two regimes. As in the baseline model, investors pay a fixed cost of $c$ to observe a private signal. I first compute the ex-ante expected utility of informed and uninformed investors in Lemma 7. An investor chooses to acquire information only when the incremental expected utility of obtaining information exceeds the cost $c$.

**Lemma 7.** *An informed investor's expected utility is:*

$$EU_I^r = -\exp\{-\gamma(W-c)\}\sqrt{\frac{Var[(v_1+v_2-P_0)-(1-h_I^r)(v_1+v_2-P_1)|\Omega_{0I}]\cdot Var[v_1+v_2-P_1|\Omega_{1I}]}{Var[v_1+v_2-P_1]\cdot Var[P_1-P_0]-Cov^2[P_1-P_0,v_1+v_2-P_1]}}. \tag{15}$$

*An uninformed investor's expected utility is:*

$$EU_U^r = -\exp\{-\gamma(W)\}\sqrt{\frac{Var[(v_1+v_2-P_0)-(1-h_U^r)(v_1+v_2-P_1)|\Omega_{0U}]\cdot Var[v_1+v_2-P_1|\Omega_{1U}]}{Var[v_1+v_2-P_1]\cdot Var[P_1-P_0]-Cov^2[P_1-P_0,v_1+v_2-P_1]}}, \tag{16}$$

*where $r \in \{I,F\}$ indicates a reporting regime and $h_i^r = -\frac{Cov[P_1-P_0,v_1+v_2-P_1|\Omega_{0i}]}{Var[v_1+v_2-P_1|\Omega_{0i}]}, i \in \{I,U\}$.*

Lemma 7 shows that the ex-ante expected utility of acquiring information for investor $i \in \{I, U\}$ decreases with the posterior variances of time 0 trading ($Var[(v_1+v_2-P_0)-(1-h_i)(v_1+v_2-P_1)|\Omega_{0i}]$) and time 1 trading ($Var[v_1+v_2-P_1|\Omega_{1i}]$), where $I$ ($U$) indicates an informed (uninformed) trader. This result is intuitive since higher variance at the time of trading given one's information set decreases the expected profit of investors.

Under the infrequent regime, $n_I \in (0,1)$ is an equilibrium when

$$EU_I(n_I, \sigma_\eta^2) = EU_U(n_I, \sigma_\eta^2 = \infty). \tag{17}$$

However, $n_I$ is only implicitly defined in the above equation, and therefore comparing price efficiency by substituting the equilibrium $n_I$ is not tractable. The same applies to the frequent regime.

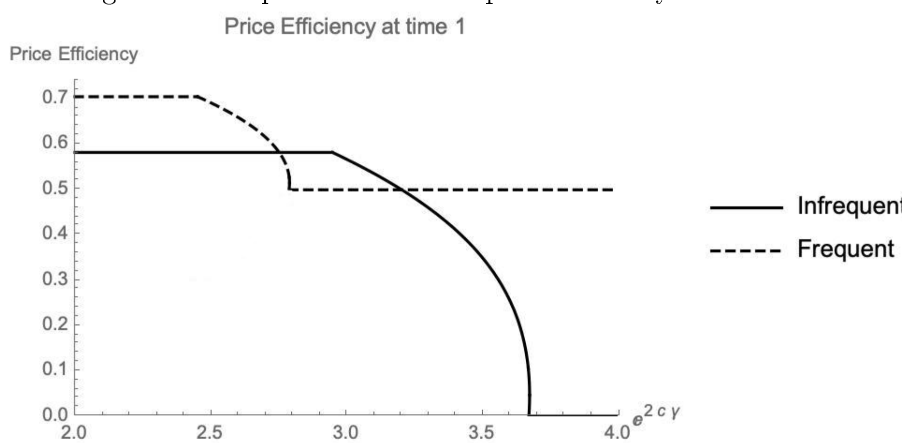
Another difference from the baseline model is that the expected utility of acquiring information may not always monotonically decrease with $n$. The equilibrium $n$ depends on the curvature of the value of information, which in turn depends on the parameter values. Therefore, deriving equilibrium $n$ in a closed-form is intractable.[9] Due to these concerns, I use a numerical example to examine whether the baseline results carry over to this extension. I set $\sigma_1^2 = \sigma_\eta^2 = \sigma_\epsilon^2 = \sigma_x^2 = \gamma = \frac{3}{2}$.

**Comparison of frequent and infrequent regime:** I first compare the price efficiencies under the two reporting regimes across trading periods in Figures 2 and 3. In Figure 2, the x- and y-axes represent the cost of information acquisition and the price efficiency at time 0, respectively. If $c$ decreases below a certain threshold, the short-term price efficiency increases from zero to a positive value. Note that this threshold is higher under the infrequent regime, which indicates that investors start acquiring information at a higher cost under a less frequent regime. The same applies for the case when $n$ changes from the value below 1 to $n = 1$. In Figure 3, the y-axis represents the price

[9] More specifically, unlike in the baseline model where the value of information $\frac{EU_U(n,\sigma_\eta^2=\infty)}{EU_I(n,\sigma_\eta^2)}$ is strictly decreasing in $n$, the value of information under the dynamic trading model is not always monotonic in $n$.

Figure 2: Comparison of time 0 price efficiency


Figure 3: Comparison of time 1 price efficiency

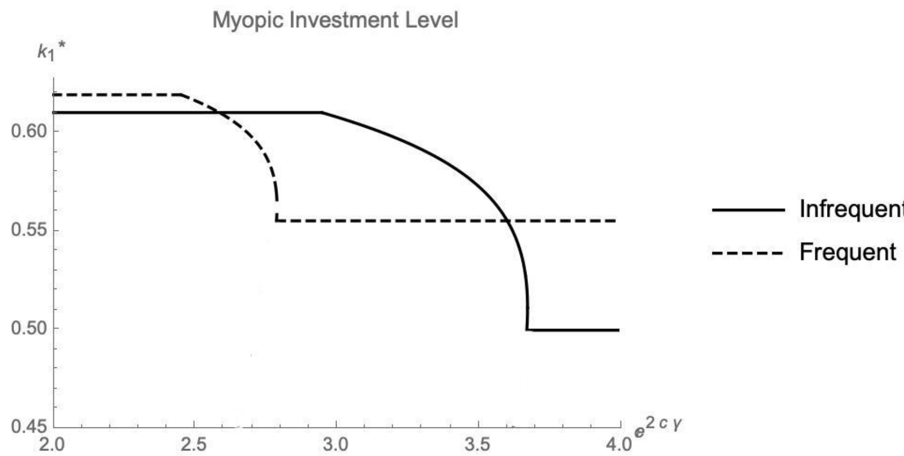



efficiency at time 1.

Both Figures 2 and 3 indicate that there exists an interval of $c$ where the price efficiency is higher under the infrequent regime than that under the frequent regime, consistent with the baseline model. This is because investors have stronger information acquisition incentives under the infrequent regime, even with an additional trading round.

Figure 4 compares the myopic investment under the two regimes as the cost of information acquisition changes. I set $\alpha = \delta = \frac{1}{2}$, $\mu_1 = \mu_2 = 2$ and $I = 1$. Figure 4 indicates that there exists an interval of $c$ where the short-term investment $k_1^*$ is higher under the infrequent regime, which occurs when the average price efficiency across time 0 and 1 is higher under the infrequent regime.

Figure 4: Comparison short-term investment




The result from the numerical example is summarized in Proposition 6.

**Proposition 6.** *When there are two trading periods and information acquisition is endogenous, it is possible that the myopic investment level is higher under the infrequent than under the frequent regime.*

Overall, the numerical example with dynamic trading confirms that even when investors are allowed to trade before disclosure, there still exist cases where short-termism is higher in the infrequent regime than the frequent regime as long as investors' information acquisition is endogenously determined.

## 6.2 Different types of information

In the baseline model, investors are only allowed to gather information about short-term firm performance. However, allowing investors to learn about other types of information can also affect the price efficiency and thus investment decision. To address this possibility, this section considers an extension where long-term performance is noisy and investors can choose to acquire a noisy signal on either short-term or long-term firm performance. A firm's long-term performance follows $v_2 = y_2 + \delta_2$, where $y_2$ is an investment outcome and $\delta_2 \sim \mathcal{N}(0, \sigma_2^2)$. If investor $i$ chooses to acquire the short-term signal, then he/she observes $s_{1i} = v_1 + \eta_i$, where $\eta_i \sim \mathcal{N}(0, \sigma_\eta^2)$. If investor $i$ chooses to acquire the long-term signal, then the investor observes $s_{2i} = v_2 + \zeta_i$, where $\zeta_i \sim \mathcal{N}(0, \sigma_\zeta^2)$. Investors' signals are conditionally independent and $\eta_i$'s and $\zeta_i$'s are mutually independent. I denote $\bar{n}$ as the proportion of investors who are informed about the short-term firm performance and $1 - \bar{n}$ as the proportion of investors informed about long-term firm performance.

### 6.2.1 Exogenous information acquisition

**Infrequent mandatory reporting regime:** Since the cumulative payoff is reported at time 2, the price is simply the realized firm value, $P_{2,I} = v_1 + v_2$. For $P_{1,I}$, I assume and verify the linear conjecture, $P_{1,I} = \lambda_0 + \lambda_1 v_1 + \lambda_2 v_2 + \lambda_x x$. Now that the investors observe either a short-term or long-term signal, information about both short- and long-term performance is incorporated in the price. As the price becomes more informative about short- (long-) run performance, investment myopia increases (decreases).[10]

Investor $i$ who observes the short-term signal $s_{1i}$ chooses the quantity $D_{1i} = \frac{E[v_1+v_2|s_{1i},P_1]-P_1}{\gamma Var[v_1+v_2|s_{1i},P_1]}$. Likewise, investor $j$ who observes long-term signal $s_{2j}$ chooses the quantity $D_{2j} = \frac{E[v_1+v_2|s_{2j},P_1]-P_1}{\gamma Var[v_1+v_2|s_{2j},P_1]}$.

**Frequent mandatory reporting regime:** Similar to the infrequent regime, $P_{2,F} = v_1 + v_2$. For $P_{1,F}$, I conjecture and verify the linear price equation, $P_{1,F} = \beta_0 + \beta_1 v_1 + \beta_2 v_2 + \beta_e e_1 + \beta_x x$. With firm disclosure, information from $e_1$ is also incorporated into the price. I derive the equilibrium demand for both types of informed investors and apply the market clearing condition.

Since the price coefficients are only implicitly defined, I use a numerical example to compare the price efficiencies and thus myopic investment level under the two regimes. I assume that $\sigma_1^2 = 1, \sigma_2^2 = 2, \sigma_\eta^2 = 1, \sigma_\epsilon^2 = \dfrac{1}{10}, \sigma_\zeta^2 = 1$ and $\sigma_x^2 = 1$. Also, $I = 2, \mu_1 = 1, \mu_2 = 2, \alpha = \dfrac{1}{2}, \gamma = 1$ and $\mu = \dfrac{1}{2}$.

[10] In a related study by Edmans (2009), the author finds that informed block-holder's exit can mitigate corporate short-termism problem when the informed traders gathers information about long-run fundamental value.

**Comparison of myopic investment level under the two regimes:** The numerical example gives the following equilibrium prices under the two regimes.

$$P_{1,I} = \lambda_0 + \underbrace{\lambda_1}_{0.228} v_1 + \underbrace{\lambda_2}_{0.435} v_2 + \underbrace{\lambda_x}_{-2.2} x \tag{18}$$

$$P_{1,F} = \beta_0 + \underbrace{\beta_1}_{0.309} v_1 + \underbrace{\beta_2}_{0.576} v_2 + \underbrace{\beta_e}_{0.806} e_1 + \underbrace{\beta_x}_{-1.319} x \tag{19}$$

Note that the equilibrium short-term investment takes the following form.

$$k_1^* = \frac{\alpha(X_1\mu_1 + X_2(I - \mu_2)) + (1-\alpha)(I - \mu_2 + \mu_1)}{2(1-\alpha) + \alpha(X_1 + X_2)}, \tag{20}$$

where $X_1$ and $X_2$ indicate the price informativeness on short- and long-run firm value respectively.

Plugging in the equilibrium price coefficients under the two regimes and comparing gives the following result.

$$k_I^* = 0.461134 < k_F^* = 0.573109. \tag{21}$$

As in the baseline model, myopia is more pronounced under the frequent than under the infrequent regime with exogenous information acquisition.

### 6.2.2 Endogenous information acquisition

In this section, I endogenize the proportion of informed investors that observe the short-term signal, $\bar{n}$. I assume that the investor pays $c_1(c_2) > 0$ to acquire $s_{1i}(s_{2i})$. The lemma below characterizes the equilibrium proportion of investors that are informed about $v_1$.

**Lemma 8.** *The equilibrium proportion of informed investors who are informed about short-term firm value under the regime $r \in \{I, F\}$ ($\bar{n}_r$) is characterized as below.*

*1) When $EU_1^r(\bar{n}_r = 0) < EU_2^r(\bar{n}_r = 0)$, $\bar{n}_r = 0$.*

*2) When $EU_1^r(\bar{n}_r = 1) > EU_2^r(\bar{n}_r = 1)$, $\bar{n}_r = 1$.*

*3) Otherwise, $\bar{n}_r \in (0,1)$ satisfies $EU_1^r(\bar{n}_r) = EU_2^r(\bar{n}_r)$,*

*where $r = I(F)$ indicates infrequent (frequent) reporting regime, and $EU^r_{1(2)}$ represents the expected utility of investor who observes short-(long-) term signal.*

**Comparison using numerical examples:** Again, I rely on a numerical example due to tractability issues. I assume that $\sigma_1^2 = 1, \sigma_2^2 = 2, \sigma_\eta^2 = 1, \sigma_\epsilon^2 = \frac{1}{10}, \sigma_\zeta^2 = 1$ and $\sigma_x^2 = 1$. Also, $I = 2, \mu_1 = 1, \mu_2 = 2, \alpha = \frac{1}{2}, \gamma = 1$, and $c_1 = 1$ and $c_2 = 1.25$. Since characterizing the coefficients $\lambda$'s and $\beta$'s with respect to $\bar{n}$ is intractable, I derive the equilibrium price coefficients by fixing $\bar{n}$ first and then verifying that the given $\bar{n}$ indeed satisfies the information acquisition equilibrium.

As in the exogenous information case, I examine the numerical example. I assume and verify the linear price conjecture after deriving the optimal demand of investors and then applying market clearing. Then, the following equilibrium holds.

$$\bar{n}_I = 1 \tag{22}$$

$$P_{1,I} = \lambda_0 + \underbrace{\lambda_1}_{0.510} v_1 + \underbrace{\lambda_2}_{0} v_2 + \underbrace{\lambda_x}_{-2.587} x \tag{23}$$

$$\bar{n}_F = 0 \tag{24}$$

$$P_{1,F} = \beta_0 + \underbrace{\beta_1}_{0} v_1 + \underbrace{\beta_2}_{0.772} v_2 + \underbrace{\beta_e}_{0.909} e_1 + \underbrace{\beta_x}_{-0.926} x \tag{25}$$

I plug in the equilibrium $\bar{n}$ as well as the equilibrium price coefficients to obtain short-term investment under the two regimes ($k_{1,I}^*$ and $k_{1,F}^*$):

$$k_I^* = 0.602 > k_F^* = 0.518. \tag{26}$$

**Proposition 7.** *When investors can acquire either short- or long-term information, and when information acquisition is endogenous, it is possible that the myopic investment level is higher under the infrequent than under the frequent regime.*

The above comparison between the frequent and the infrequent reporting regime indicates that once I endogenize information acquisition choices, investors are more (less) likely to acquire long- (short-) term information under the frequent regime (i.e., $\bar{n}_I > \bar{n}_F$). Thus, there exist cases where myopia is more pronounced under the infrequent regime than under the frequent regime.

### 6.3 Alternative market microstructure

Next, I examine whether the results hold under a Kyle (1985) setup. There are three types of risk-neutral market participants: a market maker, an informed investor, and noise traders. The investor submits market orders to the market maker. The primary differences with the baseline model are that the investor is risk-neutral, and the trading has a price impact.

I find that in a Kyle (1985) setting, investment myopia increases with mandatory reporting frequency under exogenous information acquisition. However, once I endogenize the information acquisition decision, inefficient short-term investment level can decrease with reporting frequency when the firm's reporting quality is low. Overall, the main results in Proposition 1 and Proposition 3 are sustained in this alternative setup.

### 6.4 Voluntary disclosure

Finally, I incorporate a firm's voluntary disclosure decision. The manager has an option of disclosing a short-term signal $e_1$ voluntarily at a cost $c_v > 0$ under the infrequent regime.[11] Since the signal is always disclosed under the frequent reporting regime, voluntary disclosure is redundant under the frequent regime.[12] Due to tractability issues arising from nonlinear prices, I examine the impact of voluntary disclosure under the Kyle (1985) setting. Intuitively, a higher

[11] The voluntary disclosure cost can be interpreted as the manager's personal cost (e.g., time, resources) required to prepare voluntary disclosure.

[12] I assume that the cost of mandatory disclosure ($c_m$) is equal to zero to maintain consistency with the prior analysis. However, a positive mandatory disclosure cost does not affect the result.

voluntary disclosure cost decreases the price informativeness under the infrequent regime when a fixed number of investors are informed. When investors can choose to acquire information, higher voluntary disclosure cost increases the investor's information acquisition incentive, which increases price informativeness about short-term performance. Together, the effect of changing the voluntary disclosure cost on corporate myopia is qualitatively the same as that of changing the mandatory reporting frequency. This is because a firm's voluntary and mandatory disclosure has the same information and the firm's signal has a substitutive relationship with the informed trader's signal. The details of the results in Section 6.3 and 6.4 are included in Appendix B.

# 7 Discussion

In this section, I discuss the main results and their implications for the empirical literature. First, this study highlights the importance of examining the overall information environment when testing the effect of mandatory reporting frequency on corporate myopia. A previous analytical study by Gigler et al. (2014) shows that reducing reporting frequency can completely mitigate the myopia problem. However, this paper shows that with additional information sources (e.g., informed trading), information about short-term firm value can still get incorporated into the interim stock price, which induces myopic investment even under the infrequent regime. With endogenous information acquisition, the myopia level can be more pronounced under the infrequent regime rather than the frequent regime when the mandatory reporting noise is sufficiently high. This indicates that the mixed findings in prior studies that examine the relationship between reporting frequency and myopia using different countries (e.g., Ernstberger et al. (2017), Fu et al. (2020), Kajüter et al. (2019), Kraft et al. (2017), Nallareddy et al. (2017)) could be due to differences in mandatory reporting quality.

If quarterly reporting quality differs across countries, changing the mandatory reporting frequency can have different effects on myopia. For instance, unlike in the U.S., where firms are required to disclose quarterly financial statements, the EU gives more flexibility regarding the content of mandated quarterly reporting. Consequently, some companies only issued qualitative reports without incorporating quantitative information such as earnings or sales. Ernstberger et al. (2017) find that between the years 2005 and 2014, only 8.9 percent of the quarterly reports included financial statements, and 51.4 percent reported quarterly earnings numbers. Also, the authors document that the percentage of firms that issued quantitative earnings signals was second-lowest in the U.K. among the European countries included in their sample.[13] Suppose this indicates that the quarterly reporting quality was lower in the U.K. compared to other European countries that mandated quarterly reporting. In that case, the result in Propositions 3 indicates that switching from semi-annual to quarterly reporting may not mitigate the short-termism problem in the U.K. and can even exacerbate investment myopia problems depending on the information acquisition cost.

Second, the comparative statics results provide empirically testable hypotheses based on firm-specific characteristics. For example, Proposition 4 shows that the gap in short-term investment under the frequent and the infrequent regime increases with mandatory reporting noise. Hence, when the short-termism problem is more pronounced under the frequent regime, switching from semi-annual to quarterly reporting will be more effective in mitigating myopia for firms with lower reporting quality. Nallareddy et al. (2017) find that the flexibility in quarterly reporting for European firms leads to higher variance in reporting quality, which indicates that the researchers should be cautious when testing the average effect. That is, a variation in firm-specific reporting quality can lead to insignificant findings. Therefore, future papers should condition on firm-specific characteristics and examine whether the change in reporting regime affects firms differentially. Also,

[13] Also, Nallareddy et al. (2017) find that, between the years 2007 and 2009, only 5 percent of the U.K. firms that mandatorily switched from semi-annual to quarterly reporting practices included quantitative information in their reporting.

Proposition 4 shows that a firm's capital can also affect the effectiveness of reducing the mandatory reporting frequency. Overall, the results in Proposition 4 emphasize the importance of considering firm-specific characteristics when examining the effect of changing the reporting frequency on the short-termism problem.

Finally, the results in this paper can be generalized to alternative information channels such as analyst reports and information spillover from peer firm disclosure that can also interact with mandatory disclosure. I expect similar results to hold as long as the information from alternative sources has a substitutive relationship with the firm's mandatory disclosure content. If the information is complementary to firm disclosure, the disclosure will encourage more information acquisition. However, its effect on myopia will depend on the nature of the information. For instance, if the complementary information is about long-term firm performance, this will mitigate the myopia problem. On the contrary, if the complementary signal concerns short-term firm performance, then more information acquisition will exacerbate the short-termism problem.

# 8 Conclusion

This study examines the relationship between mandatory reporting frequency and corporate myopia in the presence of alternative information channels. I find that myopic investment is sustained even when the mandatory reporting frequency is low. In addition, I provide conditions for a negative relation between mandatory reporting frequency and investment short-termism. When the number of informed investors is determined endogenously, switching to a less frequent reporting regime can exacerbate the investment myopia problem when mandatory disclosure quality is sufficiently low.

This paper offers practical implications for regulators who are debating the benefits and costs of changing reporting frequency. Among potential benefits and costs, this study focuses on the cost of short-termism. The results show that increasing the reporting frequency may not always lead to higher corporate myopia. Moreover, the effectiveness of mitigating short-termism problems depends on both market-related and firm-specific factors. Hence, regulators should carefully examine capital market features such as information acquisition incentives and the firm's reporting quality when evaluating the total cost of increasing reporting frequency.

# Appendix A

## Proof of Lemma 1.

I derive the informed and uninformed investors' demand function.
the CARA-normal setup implies that

$$D_i^F(e_1, s_i, P_{1,F}) = \frac{E(v_1 + v_2|e_1, s_i, P_{1,F}) - P_{1,F}}{\gamma Var(v_1 + v_2|e_1, s_i, P_{1,F})} \tag{27}$$

$$D_U^F(e_1, P_{1,F}) = \frac{E(v_1 + v_2|e_1, P_{1,F}) - P_{1,F}}{\gamma Var(v_1 + v_2|e_1, P_{1,F})}, \tag{28}$$

where $D_i^F, D_U^F$ each indicates informed investor $i$'s and uninformed investors' demand quantities under the frequent regime.

The prices are determined so that it satisfies the market clearing condition.

$$\int_0^n D_i^F(e_1, s_i, P_{1,F})di + (1-n)D_U^F(e_1, P_{1,F}) = x \tag{29}$$

Solving for the market clearing condition gives the following price equation at time 1.

$$\begin{aligned} P_{1,F} = & \underbrace{\frac{\frac{1}{\sigma_1^2}E[v_1]}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\beta_v}{\beta_x}\right)^2 + \frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}}_{\beta} + E[v_2] + \underbrace{\frac{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\beta_v}{\beta_x}\right)^2}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\beta_v}{\beta_x}\right)^2 + \frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}}_{\beta_v} v_1 \\ & + \underbrace{\frac{\frac{1}{\sigma_\varepsilon^2}}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\beta_v}{\beta_x}\right)^2 + \frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}}_{\beta_e} e_1 + \underbrace{\frac{\frac{1}{\sigma_x^2}\frac{\beta_v}{\beta_x} - \gamma}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\beta_v}{\beta_x}\right)^2 + \frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}}_{\beta_x} x, \\ & \text{where } \frac{\beta_v}{\beta_x} = -\frac{n}{\gamma\sigma_\eta^2} \end{aligned} \tag{30}$$

Given the equilibrium prices, the manager chooses $k_1$ that maximizes

$$k_1, k_2 \in \arg\max \alpha E[P_{1,F}] + (1-\alpha)E[P_{2,F}] \tag{31}$$

$$\text{s.t. } 0 \le k_1 \le I \tag{32}$$

$$0 \le k_2 \le I - k_1. \tag{33}$$

Solving for the above maximization gives:

$$k_{1,F}^* = \min\left\{\frac{\alpha X_F \mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha X_F + 2(1-\alpha)}, I\right\} \tag{34}$$

where $X_F = \frac{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_\varepsilon^2}}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}$. Note that $\frac{\alpha X_F \mu_1 + (1-\alpha)(I-\mu_2+\mu_1)}{\alpha X_F + 2(1-\alpha)} < I$ under the assumption $0 < \mu_1 < \mu_2 - \mu_1 \le I < \mu_1 + \mu_2$.

Rearranging $\frac{\alpha X_F \mu_1 + (1-\alpha)(I-\mu_2+\mu_1)}{\alpha X_F + 2(1-\alpha)} < I$ gives:

$$\alpha X_F \mu_1 + (1-\alpha)(I - \mu_2 + \mu_1) < I(\alpha X_F + 2(1-\alpha)) \tag{35}$$

$$\iff -(I - \mu_1) \cdot (\alpha X_F + (1-\alpha)) < \mu_2(1-\alpha) \tag{36}$$

(36) is always satisfied under the parameter constraint $0 < \mu_1 < \mu_2 - \mu_1 \le I < \mu_1 + \mu_2$ since the left-hand

side of (36) is negative, and the right-hand side is positive. Therefore, $k_{1,F}^* = \dfrac{\alpha X_F \mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha X_F + 2(1-\alpha)}$

Note that the equilibrium short-term investment is strictly increasing in price informativeness of $P_1$ about short-term firm performance ($X_F$), or $\frac{\partial k_{1,F}^*}{\partial X_F} > 0$. Therefore, $X_F \geq 0$ indicates $k_{1,F}^* \geq k_1^{FB}$.

## Proof of Lemma 2.

The CARA-normal setup implies that

$$D_i^I(s_i, P_{1,I}) = \frac{E(v_1 + v_2 | s_i, P_{1,I}) - P_{1,I}}{\gamma Var(v_1 + v_2 | s_i, P_{1,I})} \tag{37}$$

$$D_U^I(P_{1,I}) = \frac{E(v_1 + v_2 | P_{1,I}) - P_{1,I}}{\gamma Var(v_1 + v_2 | P_{1,I})}, \tag{38}$$

where $D_i^I$ and $D_U^I$ each indicates informed investors $i$'s and uninformed investors' demand quantities under the infrequent regime.

Given random supply of the risky asset ($x$), market clearing condition indicates:

$$P_{1,I} = \underbrace{\frac{\frac{1}{\sigma_1^2} E[v_1]}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v}{\lambda_x}\right)^2 + \frac{1}{\sigma_1^2}}}_{\lambda} + E[v_2] + \underbrace{\frac{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v}{\lambda_x}\right)^2}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v}{\lambda_x}\right)^2 + \frac{1}{\sigma_1^2}}}_{\lambda_v} v_1 + \underbrace{\frac{\frac{1}{\sigma_x^2}\frac{\lambda_v}{\lambda_x} - \gamma}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v}{\lambda_x}\right)^2 + \frac{1}{\sigma_1^2}}}_{\lambda_x} x, \tag{39}$$

$$\text{where } \frac{\lambda_v}{\lambda_x} = -\frac{n}{\gamma \sigma_\eta^2}$$

Given the equilibrium prices, the manager chooses $k_1$ that maximizes

$$\max_{k_1} \alpha E[P_{1,I}] + (1-\alpha) E[P_{2,I}] \tag{40}$$

$$\text{s.t. } 0 \leq k_1 \leq I \tag{41}$$

$$0 \leq k_2 \leq I - k_1. \tag{42}$$

Solving for the maximization problem gives:

$$k_{1,I}^* = \min\left\{ \frac{\alpha X_I \mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha X_I + 2(1-\alpha)}, I \right\}, \tag{43}$$

where $X_I = \dfrac{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{n}{\gamma \sigma_\eta^2}\right)^2}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{n}{\gamma \sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2}}$. Under the parameter constraint $\mu_2 - \mu_1 \leq I < \mu_1 + \mu_2$ and $2\mu_1 < \mu_2$, $\dfrac{\alpha X_I \mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha X_I + 2(1-\alpha)} < I$ and $k_{1,I}^* = \dfrac{\alpha X_I \mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha X_I + 2(1-\alpha)}$.

Note that the equilibrium short-term investment is strictly increasing in price informativeness of $P_1$ about short-term firm performance ($X_I$), or $\frac{\partial k_{1,I}^*}{\partial X_I} > 0$. Therefore, $k_{1,I}^* \geq k_1^{FB}$ since $X_I \geq 0$.

## Proof of Proposition 1.

From Lemma 1 and Lemma 2, note that the optimal investment $k_1^*$ takes the following form, where $X$ is the price efficiency at time 1:

$$k_1^* = \frac{\alpha(X)\mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha(X) + 2(1-\alpha)}. \tag{44}$$

Also, $k_1^*$ is increasing in the time 1 price efficiency $X$.

$$\frac{\partial k_1^*}{\partial X} = \frac{\alpha(1-\alpha)(\mu_2+\mu_1-I)}{(\alpha(X)+2(1-\alpha))^2} > 0. \tag{45}$$

I examine time 1 price efficiency under the frequent and the infrequent regime to compare $k_{1,F}^*$ and $k_{1,I}^*$.

Comparing $X_I = \dfrac{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2}{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}}$ and $X_F = \dfrac{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_\varepsilon^2}}{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}+\frac{1}{\sigma_\varepsilon^2}}$, $X_F > X_I$ holds given a fixed proportion of informed investors ($n$).

## Proof of Proposition 2

Taking FOC of $k_{1,F}^* - k_{1,I}^*$ with respect to $n, \sigma_\eta^2, \sigma_\epsilon^2$ and $I$ gives the following results.

$$\frac{\partial}{\partial n}(k_{1,F}^* - k_{1,I}^*) = -\frac{(\alpha-2)(\alpha-1)\alpha\gamma^4\left(I-\mu_1-\mu_2\right)\left(\sigma_1{}^2\right){}^2\left(\sigma_\eta{}^2\right){}^4\left(\sigma_x{}^2\right){}^2\left(2n+\gamma^2\sigma_\eta{}^2\sigma_x{}^2\right)A_1}{D_1\cdot D_2} < 0 \tag{46}$$

$$\frac{\partial}{\partial \sigma_\eta^2}(k_{1,F}^* - k_{1,I}^*) = \frac{(\alpha-2)(\alpha-1)\alpha\gamma^4 n\left(I-\mu_1-\mu_2\right)\left(\sigma_1{}^2\right){}^2\left(\sigma_\eta{}^2\right){}^3\left(\sigma_x{}^2\right){}^2\left(2n+\gamma^2\sigma_\eta{}^2\sigma_x{}^2\right)\cdot A_1}{D_1\cdot D_2} > 0 \tag{47}$$

$$\frac{\partial}{\partial \sigma_\epsilon^2}(k_{1,F}^* - k_{1,I}^*) = -\frac{(\alpha-1)\alpha\gamma^4\left(I-\mu_1-\mu_2\right)\sigma_1{}^2\left(\sigma_\eta{}^2\right){}^4\left(\sigma_x{}^2\right){}^2}{\left((\alpha-2)\sigma_1{}^2\left(n\sigma_\epsilon{}^2\left(n+\gamma^2\sigma_\eta{}^2\sigma_x{}^2\right)+\gamma^2\left(\sigma_\eta{}^2\right){}^2\sigma_x{}^2\right)+2(\alpha-1)\gamma^2\left(\sigma_\eta{}^2\right){}^2\sigma_x{}^2\sigma_\epsilon{}^2\right){}^2} < 0 \tag{48}$$

$$\frac{\partial}{\partial I}(k_{1,F}^* - k_{1,I}^*) = -\frac{(\alpha-1)\alpha(X_I-X_F)}{(\alpha(X_I-2)+2)(\alpha(X_F-2)+2)} < 0 \tag{49}$$

$$\begin{aligned}
\text{where } A_1 &= \left((\alpha-2)\sigma_1{}^2\left(2n\sigma_\epsilon{}^2\left(n+\gamma^2\sigma_\eta{}^2\sigma_x{}^2\right)+\gamma^2\left(\sigma_\eta{}^2\right){}^2\sigma_x{}^2\right)+4(\alpha-1)\gamma^2\left(\sigma_\eta{}^2\right){}^2\sigma_x{}^2\sigma_\epsilon{}^2\right) < 0,\\
D_1 &= \left((\alpha-2)n\sigma_1{}^2\left(n+\gamma^2\sigma_\eta{}^2\sigma_x{}^2\right)+2(\alpha-1)\gamma^2\left(\sigma_\eta{}^2\right){}^2\sigma_x{}^2\right){}^2 > 0,\\
\text{and } D_2 &= \left((\alpha-2)\sigma_1{}^2\left(n\sigma_\epsilon{}^2\left(n+\gamma^2\sigma_\eta{}^2\sigma_x{}^2\right)+\gamma^2\left(\sigma_\eta{}^2\right){}^2\sigma_x{}^2\right)+2(\alpha-1)\gamma^2\left(\sigma_\eta{}^2\right){}^2\sigma_x{}^2\sigma_\epsilon{}^2\right){}^2 > 0
\end{aligned}$$

## Proof of Lemmas 3 and 4

**Lemma 4.** The informed investor's expected utility under the infrequent regime is characterized as in the following lemma. The ex-ante expected utility can be calculated as below.

Using certainty equivalent, an investor $i$'s expected utility of acquiring information at time 0 is:

$$E[U_i(W+D_i(v_1+v_2-P_1)-c)] = E_{P_1,s_i}\left[E_{v_1,v_2}\left[U_j(W+D_i(v_1+v_2-P_1)-c)|P_1,s_i\right]\right] \tag{50}$$

$$= E_{P_1,s_i}\left[-\exp\left\{-\gamma(W-c)+\frac{1}{2}\frac{(E[v_1+v_2|P_1,s_i-P_1])^2}{Var[v_1+v_2|P_1,s_i]}\right\}\right] \tag{51}$$

$$= -\exp\{-\gamma(W-c)\}\int_{P_1}\int_{s_i}\exp\left\{\frac{1}{2}\frac{(E[v_1+v_2|P_1,s_i-P_1])^2}{Var[v_1+v_2|P_1,s_i]}\right\}f(P_1,s_i)ds_i dP_1, \tag{52}$$

where $f(P_1, s_i)$ is the joint p.d.f of $P_1$ and $s_i$:

$$\begin{pmatrix} P_1 \\ s_i \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} E[P_1] \\ E[v_1] \end{pmatrix}, \begin{pmatrix} Var[P_1] & Cov[P_1,s_i] \\ Cov[P_1,s_i] & Var[s_i] \end{pmatrix}\right).$$

Simplifying (52) gives individual investor's ex ante expected utility of acquiring information:

$$EU_i(\hat{\sigma}_\eta^2, \hat{c}, n) = -e^{\gamma\hat{c}-\gamma W}\sqrt{\frac{{\frac{1}{\sigma_1}}^2}{\frac{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2+\frac{\sigma_x^2}{\sigma_1^2}\left(\frac{n}{\gamma^2\sigma_\eta^2}+\sigma_x^2\right)^2}{\left(\frac{n}{\sigma_\eta^2}\frac{\sigma_x^2}{\gamma}+\frac{1}{\gamma}\left(\frac{n}{\gamma^2\sigma_\eta^2}\right)^2+\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2}}\sqrt{Var[v_1+v_2-P_1|\{s_j,P_1\}]} \tag{53}$$

$$= -e^{\gamma\hat{c}-\gamma W}\sqrt{\frac{{\frac{1}{\sigma_1}}^2}{\frac{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2+\frac{\sigma_x^2}{\sigma_1^2}\left(\frac{n}{\gamma^2\sigma_\eta^2}+\sigma_x^2\right)^2}{\left(\frac{n}{\sigma_\eta^2}\frac{\sigma_x^2}{\gamma}+\frac{1}{\gamma}\left(\frac{n}{\gamma^2\sigma_\eta^2}\right)^2+\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2}\left(\frac{1}{\hat{\sigma}_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}\right)}}, \tag{54}$$

where $\hat{\sigma}_\eta^2$ and $\hat{c}$ indicate the investor $i$'s choice.

1) $n_I = 0$ is an equilibrium when

$$EU(\sigma_\eta^2, c, n_I = 0) < EU(\infty, 0, n_I = 0) \tag{55}$$

$$\text{or when,} \ -e^{\gamma c-\gamma W}\sqrt{\frac{{\frac{1}{\sigma_1}}^2}{\frac{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2+\frac{\sigma_x^2}{\sigma_1^2}(\sigma_x^2)^2}{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2}\left(\frac{1}{\sigma_\eta^2}+\frac{1}{\sigma_1^2}\right)}} < -e^{-\gamma W}\sqrt{\frac{{\frac{1}{\sigma_1}}^2}{\frac{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2+\frac{\sigma_x^2}{\sigma_1^2}(\sigma_x^2)^2}{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2}\left(\frac{1}{\sigma_1^2}\right)}}. \tag{56}$$

Above condition can be summarized as $e^{2\gamma c} - 1 > \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}}$.

2) $n_I = 1$ is an equilibrium when

$$EU(\sigma_\eta^2, c, n_I = 1) \geq EU(\infty, 0, n_I = 1) \tag{57}$$

or when,

$$-e^{\gamma c-\gamma W}\sqrt{\frac{{\frac{1}{\sigma_1}}^2}{\frac{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2+\frac{\sigma_x^2}{\sigma_1^2}\left(\frac{1}{\gamma^2\sigma_\eta^2}+\sigma_x^2\right)^2}{\left(\frac{1}{\sigma_\eta^2}\frac{\sigma_x^2}{\gamma}+\frac{1}{\gamma}\left(\frac{1}{\gamma^2\sigma_\eta^2}\right)^2+\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2}\left(\frac{1}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}\right)}}$$

$$> -e^{-\gamma W}\sqrt{\frac{{\frac{1}{\sigma_1}}^2}{\frac{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2+\frac{\sigma_x^2}{\sigma_1^2}\left(\frac{1}{\gamma^2\sigma_\eta^2}+\sigma_x^2\right)^2}{\left(\frac{1}{\sigma_\eta^2}\frac{\sigma_x^2}{\gamma}+\frac{1}{\gamma}\left(\frac{1}{\gamma^2\sigma_\eta^2}\right)^2+\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2}\left(\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}\right)}}. \tag{58}$$

$$\text{The condition is summarized as } e^{2\gamma c} - 1 < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2} \tag{59}$$

3) Otherwise, $n_I \in (0, 1)$ and equilibrium $n_I$ satisfies

$$EU(\sigma_\eta^2, c, n_I) = EU(\infty, 0, n_I) \tag{60}$$

Therefore, equilibrium proportion of informed investors under the infrequent regime ($n_I$) is:

$$n_I = \gamma\sigma_x\sigma_\eta^2\sqrt{\frac{\frac{1}{\sigma_\eta^2}}{e^{2\gamma c}-1} - \frac{1}{\sigma_1^2}} \tag{61}$$

**Lemma 3**. Diamond (1985) shows that the information acquisition decision with firm disclosure is identical to the case where investors have prior precision $\dfrac{1}{\sigma_1^2}+\dfrac{1}{\sigma_\varepsilon^2}$ instead of $\dfrac{1}{\sigma_1^2}$. Using the same method, an individual investor $i$'s ex ante expected utility given $\{n,\sigma_\eta^2,c\}$ is given by

$$EU_i(\hat{\sigma}_\eta^2,\hat{c},n)=-e^{\gamma\hat{c}-\gamma W}\sqrt{\frac{{\frac{1}{\sigma_1}}^2+\frac{1}{\sigma_\epsilon^2}}{\frac{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2+\frac{\sigma_x^2}{\sigma_1^2}\left(\frac{n}{\gamma^2\sigma_\eta^2}+\sigma_x^2\right)^2}{\left(\frac{n}{\hat{\sigma}_\eta^2}\frac{\sigma_x^2}{\gamma}+\frac{1}{\gamma}\left(\frac{n}{\gamma^2\sigma_\eta^2}\right)^2+\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2}\left(\frac{1}{\hat{\sigma}_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+{\frac{1}{\sigma_1}}^2+\frac{1}{\sigma_\epsilon^2}\right)}} \tag{62}$$

$$=-e^{\gamma\hat{c}-\gamma W}\sqrt{\frac{{\frac{1}{\sigma_1}}^2+\frac{1}{\sigma_\epsilon^2}}{\frac{\left(\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2+\frac{\sigma_x^2}{\sigma_1^2}\left(\frac{n}{\gamma^2\sigma_\eta^2}+\sigma_x^2\right)^2}{\left(\frac{n}{\hat{\sigma}_\eta^2}\frac{\sigma_x^2}{\gamma}+\frac{1}{\gamma}\left(\frac{n}{\gamma^2\sigma_\eta^2}\right)^2+\frac{\sigma_x^2}{\gamma\sigma_1^2}\right)^2}}}\sqrt{Var[v_1+v_2-P_1|\{e_1,P_1,s_j\}]}. \tag{63}$$

1) $n_F=0$ is an equilibrium when

$$EU(\sigma_\eta^2,c,n_F=0)<EU(\infty,0,n_F=0) \tag{64}$$

$$\text{or when, } e^{2\gamma c}-1>\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_\epsilon^2}} \tag{65}$$

2) $n_F=1$ is an equilibrium when

$$EU(\sigma_\eta^2,c,n_F=1)>EU(\infty,0,n_F=1) \tag{66}$$

$$\text{or when, } e^{2\gamma c}-1\leq\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_\epsilon^2}+\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2} \tag{67}$$

3) Otherwise, $n_F\in(0,1)$ and equilibrium $n_F$ satisfies

$$EU(\sigma_\eta^2,c,n_F)=EU(\infty,0,n_F) \tag{68}$$

Therefore, equilibrium proportion of informed investors under the frequent regime ($n_F$) is:

$$n_F=\gamma\sigma_x\sigma_\eta^2\sqrt{\frac{\frac{1}{\sigma_\eta^2}}{e^{2\gamma c}-1}-\frac{1}{\sigma_1^2}-\frac{1}{\sigma_\varepsilon^2}} \tag{69}$$

## Proof of Proposition 3.

**Case A.** I first consider the case where $\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2>\frac{1}{\sigma_\varepsilon^2}$ holds.

$\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2>\frac{1}{\sigma_\varepsilon^2}$ implies the following.

$$\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_\varepsilon^2}+\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}<\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}<\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_\varepsilon^2}}<\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}} \tag{70}$$

Therefore, depending on the value of $e^{2\gamma c}-1$, there are five cases.

(1) When $e^{2\gamma c}-1<\dfrac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_\varepsilon^2}+\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}$,

$n_I = n_F = 1$.

$$X_F = \frac{\frac{1}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_\varepsilon^2}}{\frac{1}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}} \tag{71}$$

$$X_I = \frac{\frac{1}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}{\frac{1}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2}} \tag{72}$$

and therefore, $X_F > X_I$ and $k_{1,F}^* > k_{1,I}^*$.

(2) When $\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2} \leq e^{2\gamma c} - 1 < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}$,

$n_I = 1, n_F = \gamma\sigma_x\sigma_\eta^2\sqrt{\frac{\frac{1}{\sigma_\eta^2}}{e^{2\gamma c}-1} - \frac{1}{\sigma_1^2} - \frac{1}{\sigma_\varepsilon^2}}$.

$X_F$ is continuous and strictly decreasing in the value of $e^{2\gamma c} - 1$. Also, $X_F > X_I$ when $e^{2\gamma c} - 1$ takes the minimum possible value in this region $\left(\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}\right)$. Similarly, when $e^{2\gamma c} - 1$ takes the maximum possible value in this region $\left(\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}\right)$, $n_F = \gamma\sigma_x\sigma_\eta^2\sqrt{\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 - \frac{1}{\sigma_\varepsilon^2}}$. Plugging $n_F$ into $X_F$ gives:

$$X_F = \frac{\frac{n_F}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}{\frac{n_F}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2}} \tag{73}$$

which is smaller than $X_I$ since $n_F < n_I = 1$.

Together, this indicates that there exists a threshold value $\underline{c}$ above which $X_I > X_F$ holds.

(3) When $\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2} \leq e^{2\gamma c} - 1 < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}$,

$n_F < n_I \in (0, 1]$. Using the same logic as in (2), equilibrium $n_I$ and $n_F$ can be derived. Plugging these back into $X_I, X_F$ gives:

$$X_I = \frac{\frac{n_I}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}{\frac{n_I}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2}} \tag{74}$$

$$X_F = \frac{\frac{n_F}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}{\frac{n_F}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2}} \tag{75}$$

Since $n_F < n_I$, $X_F < X_I$.

(4) When $\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}} \leq e^{2\gamma c} - 1 < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}}$,

$n_F = 0$ and $n_I \in (0, 1)$. Using the same logic as in Case 2, it can be shown that there exists a threshold value $\bar{c}$ below which $X_I > X_F$.

(5) When $\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}} < e^{2\gamma c} - 1$, $n_I = n_F = 0$ and $X_F > X_I$.

**Case B.** Next I consider the case where $\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 < \frac{1}{\sigma_\varepsilon^2} < \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_\eta^2}$ holds.

$\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 < \frac{1}{\sigma_\varepsilon^2}$ implies:

$$\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2} < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}} < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2} < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}} \tag{76}$$

(1) When $e^{2\gamma c} - 1 < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}$,
$n_I = n_F = 1$ and thus $X_F > X_I$.

(2) When $\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2} \le e^{2\gamma c} - 1 < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}$,

$n_I = 1, n_F = \gamma\sigma_x\sigma_\eta^2\sqrt{\frac{\frac{1}{\sigma_\eta^2}}{e^{2\gamma c}-1} - \frac{1}{\sigma_1^2} - \frac{1}{\sigma_\varepsilon^2}}$.

Using the same logic as in Case A, $X_F$ is continuous and strictly decreasing in the value of $e^{2\gamma c} - 1$ and $X_F > X_I$ when $e^{2\gamma c} - 1$ takes the minimum possible value in this region $\left(\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}\right)$. Finally, when $e^{2\gamma c} - 1$ takes the maximum possible value in this region $\left(\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}}\right)$, $n_F = 0$. Plugging $p_F$ into $X_F$ gives:

$$X_F = \frac{\frac{1}{\sigma_\epsilon^2}}{\frac{1}{\sigma_\epsilon^2} + \frac{1}{\sigma_1^2}} \tag{77}$$

which is smaller than $X_I$ since $\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 < \frac{1}{\sigma_\varepsilon^2} < \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_\eta^2}$.

Together, this indicates that there exists a threshold value $\underline{c}$ above which $X_I > X_F$ holds.

(3) When $\frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_\varepsilon^2}} \le e^{2\gamma c} - 1 < \frac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}$,
$0 = n_F < n_I = 1$. Plugging these back into $X_I, X_F$ gives:

$$X_I = \frac{\frac{1}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2}{\frac{1}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_1^2}} \tag{78}$$

$$X_F = \frac{\frac{1}{\sigma_\epsilon^2}}{\frac{1}{\sigma_\epsilon^2} + \frac{1}{\sigma_1^2}} \tag{79}$$

Therefore, $X_F < X_I$.

(4) When $\dfrac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2} \leq e^{2\gamma c}-1 < \dfrac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}}$,
$n_F = 0$ and $n_I \in (0,1)$. Using the same logic as in Case 2, it can be shown that there exists a threshold value $\bar{c}$ below which $X_I > X_F$.

(5) When $\dfrac{\frac{1}{\sigma_\eta^2}}{\frac{1}{\sigma_1^2}} < e^{2\gamma c}-1$, $n_I = n_F = 0$ and $X_F > X_I$.

**Case C.** Finally, I consider the case where $\frac{1}{\sigma_\varepsilon^2} > \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_\eta^2}$. In this case, the same ordering applies as in Case B. However, given the assumption $\frac{1}{\sigma_\varepsilon^2} > \frac{1}{\sigma_x^2}\left(\frac{1}{\gamma\sigma_\eta^2}\right)^2 + \frac{1}{\sigma_\eta^2}$, $X_F > X_I$ in all five regions.

## Proof of Proposition 4.

Since $k^*_{1,I}$ does not change with $\sigma^2_\epsilon$,

$$\frac{\partial}{\partial\sigma_\epsilon^2}(k^*_{1,F}-k^*_{1,I}) = \frac{\partial k^*_{1,F}}{\partial\sigma_\epsilon^2} = \frac{\partial k^*_{1,F}}{\partial X_F}\cdot\frac{\partial X_F}{\partial\sigma_\epsilon^2} \tag{80}$$

$$= \frac{(1-\alpha)\alpha(\mu_1+\mu_2-I)}{(\alpha(X_F-2)+2)^2}\cdot\frac{\gamma\sigma_\eta^4\sigma_x\left(e^{2c\gamma}-1\right)^2}{2\sigma_1^2\sqrt{\frac{1}{\sigma_\eta^2(e^{2c\gamma}-1)}-\frac{1}{\sigma_1^2}-\frac{1}{\sigma_\epsilon^2}}\left(\gamma\sigma_\eta^2\sigma_x\sigma_\epsilon^2\left(e^{2c\gamma}-1\right)\sqrt{\frac{1}{\sigma_\eta^2(e^{2c\gamma}-1)}-\frac{1}{\sigma_1^2}-\frac{1}{\sigma_\epsilon^2}}+\sigma_\epsilon^2\right)^2} > 0 \tag{81}$$

$$\frac{\partial}{\partial I}(k^*_{1,F}-k^*_{1,I}) = -\frac{(\alpha-1)\alpha(X_I-X_F)}{(\alpha(X_I-2)+2)(\alpha(X_F-2)+2)} < 0 \text{ when } X_F > X_I \tag{82}$$

$$> 0 \text{ when } X_F < X_I. \tag{83}$$

## Proof of Lemma 5.

**Time 1**
At time 1, informed ($q^*_{1i}$) and uninformed investors ($q^*_{1u}$) choose the following quantity.

$$q^*_{1i} = \frac{1}{\gamma}\left(\frac{1}{\sigma_1^2}+\frac{1}{\sigma_\epsilon^2}+\frac{1}{\left(\frac{\beta_x^0}{\beta_v^0}\right)^2\sigma_x^2}+\frac{1}{\left(\frac{\beta_x^1}{\beta_v^1}\right)^2\sigma_x^2}+\frac{1}{\sigma_\eta^2}\right)\left[\frac{\frac{1}{\sigma_1^2}\cdot E(v_1)+\frac{1}{\sigma_\epsilon^2}\cdot e_1+\frac{1}{\left(\frac{\beta_x^0}{\beta_v^0}\right)^2\sigma_x^2}\cdot m_0+\frac{1}{\left(\frac{\beta_x^1}{\beta_v^1}\right)^2\sigma_x^2}\cdot m_1+\frac{1}{\sigma_\eta^2}\cdot s_i}{\left(\frac{1}{\sigma_1^2}+\frac{1}{\sigma_\epsilon^2}+\frac{1}{\left(\frac{\beta_x^0}{\beta_v^0}\right)^2\sigma_x^2}+\frac{1}{\left(\frac{\beta_x^1}{\beta_v^1}\right)^2\sigma_x^2}+\frac{1}{\sigma_\eta^2}\right)}\right]$$

$$+\frac{1}{\gamma}\left(\frac{1}{\sigma_1^2}+\frac{1}{\sigma_\epsilon^2}+\frac{1}{\left(\frac{\beta_x^0}{\beta_v^0}\right)^2\sigma_x^2}+\frac{1}{\left(\frac{\beta_x^1}{\beta_v^1}\right)^2\sigma_x^2}+\frac{1}{\sigma_\eta^2}\right)[(E(v_2)-P_1)] \tag{84}$$

$$q^*_{1u} = \frac{1}{\gamma}\left(\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\beta_x^0}{\beta_v^0}\right)^2\sigma_x^2}+\frac{1}{\left(\frac{\beta_x^1}{\beta_v^1}\right)^2\sigma_x^2}+\frac{1}{\sigma_\epsilon^2}\right)\left[\frac{\frac{1}{\sigma_1^2}\cdot E(v_1)+\frac{1}{\sigma_\epsilon^2}\cdot e_1+\frac{1}{\left(\frac{\beta_x^0}{\beta_v^0}\right)^2\sigma_x^2}\cdot m_0+\frac{1}{\left(\frac{\beta_x^1}{\beta_v^1}\right)^2\sigma_x^2}\cdot m_1}{\left(\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\beta_x^0}{\beta_v^0}\right)^2\sigma_x^2}+\frac{1}{\left(\frac{\beta_x^1}{\beta_v^1}\right)^2\sigma_x^2}+\frac{1}{\sigma_\epsilon^2}\right)}\right]$$

$$+\frac{1}{\gamma}\left(\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\beta_x^0}{\beta_v^0}\right)^2\sigma_x^2}+\frac{1}{\left(\frac{\beta_x^1}{\beta_v^1}\right)^2\sigma_x^2}+\frac{1}{\sigma_\epsilon^2}\right)[(E(v_2)-P_1)] \tag{85}$$

where $m_1(m_0)$ is a signal from $P_1(P_0)$.

Applying market clearing condition,

$$\int_i q_{1i}^* d_i + (1-n)\cdot q_{1u}^* = x_1 \tag{86}$$

Solving for the market clearing condition gives:

$$\begin{aligned} P_{1,F} = &\underbrace{\frac{\frac{1}{\sigma_1^2}E[v_1]}{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^0}{\beta_x^0}\right)^2+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^1}{\beta_x^1}\right)^2+\frac{1}{\sigma_\epsilon^2}+\frac{1}{\sigma_1^2}}}_{\beta^1}+E[v_2]+\underbrace{\frac{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^1}{\beta_x^1}\right)^2}{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^0}{\beta_x^0}\right)^2+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^1}{\beta_x^1}\right)^2+\frac{1}{\sigma_\epsilon^2}+\frac{1}{\sigma_1^2}}}_{\beta_v^1}v_1 \\ &+\underbrace{\frac{\frac{1}{\sigma_x^2}\left(\frac{\beta_v^0}{\beta_x^0}\right)^2}{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^0}{\beta_x^0}\right)^2+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^1}{\beta_x^1}\right)^2+\frac{1}{\sigma_\epsilon^2}+\frac{1}{\sigma_1^2}}}_{\beta_m^1}m_0+\underbrace{\frac{\frac{1}{\sigma_\epsilon^2}}{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^0}{\beta_x^0}\right)^2+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^1}{\beta_x^1}\right)^2+\frac{1}{\sigma_\epsilon^2}+\frac{1}{\sigma_1^2}}}_{\beta_e^1}e_1 \\ &+\underbrace{\frac{\frac{1}{\sigma_x^2}\frac{\beta_v^1}{\beta_x^1}-\gamma}{\frac{n}{\sigma_\eta^2}+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^0}{\beta_x^0}\right)^2+\frac{1}{\sigma_x^2}\left(\frac{\beta_v^1}{\beta_x^1}\right)^2+\frac{1}{\sigma_\epsilon^2}+\frac{1}{\sigma_1^2}}}_{\beta_x^1}x_1, \end{aligned} \tag{87}$$

where $\frac{\beta_v^1}{\beta_x^1}=-\frac{n}{\gamma\sigma_\eta^2}$

**Time 0**

$$q_{0u}^*=\underbrace{\frac{\left(1-\beta_v^1-\beta_e^1\right)^2\cdot Var\left[v_1|m_0\right]+\left(\beta_x^1\right)^2\sigma_x^2+\left(\beta_e^1\right)^2\sigma_\epsilon^2}{\gamma\cdot Var\left[v_1\mid m_0\right]\cdot\left(\beta_x^1\right)^2\sigma_x^2+\left(\beta_e^1\right)^2\sigma_\epsilon^2}}_{Var^{-1}[P_1-P_0+h_u^F(v_1+v_2-P_1)|\{m_0\}]}$$

$$\left[(E\left[P_1\mid m_0\right]-P_0)+\underbrace{\frac{\left(\beta_x^1\right)^2\sigma_x^2+\left(\beta_e^1\right)^2\sigma_\epsilon^2-\left(\beta_v^1+\beta_e^1\right)\left(1-\beta_v^1-\beta_e^1\right)\cdot Var\left[v_1\mid m_0\right]}{\left(1-\beta_v^1-\beta_e^1\right)^2\cdot Var\left[v_1|m_0\right]+(\beta_x^1)^2\sigma_x^2}}_{h_u^F\in(0,1)}\cdot(E[v_1+v_2-P_1|m_0])\right] \tag{88}$$

$$=\underbrace{\frac{\left(1-\beta_v^1-\beta_e^1\right)^2\cdot Var\left[v_1|m_0\right]+\left(\beta_x^1\right)^2\sigma_x^2+\left(\beta_e^1\right)^2\sigma_\epsilon^2}{\gamma\cdot Var\left[v_1\mid m_0\right]\cdot\left(\beta_x^1\right)^2\sigma_x^2+\left(\beta_e^1\right)^2\sigma_\epsilon^2}}_{Var^{-1}[P_1-P_0+h_u^F(v_1+v_2-P_1)|\{m_0\}]}\left[E[v_1+v_2-P_0|m_0]-(1-h_u^F)E[v_1+v_2-P_1|m_0]\right] \tag{89}$$

$$q_{0i}^*=\underbrace{\frac{\left(1-\beta_v^1-\beta_e^1\right)^2\cdot Var\left[v_1|m_0,s_i\right]+\left(\beta_x^1\right)^2\sigma_x^2+\left(\beta_e^1\right)^2\sigma_\epsilon^2}{\gamma\cdot Var\left[v_1\mid m_0,s_i\right]\cdot\left(\beta_x^1\right)^2\sigma_x^2+\left(\beta_e^1\right)^2\sigma_\epsilon^2}}_{Var^{-1}[P_1-P_0+h_u^F(v_1+v_2-P_1)|\{m_0,s_i\}]}$$

$$\left[\left(E\left[P_1 \mid m_0, s_i\right]-P_0\right)+\underbrace{\frac{\left(\beta_x^1\right)^2 \sigma_x^2+\left(\beta_e^1\right)^2 \sigma_\epsilon^2-\left(\beta_v^1+\beta_e^1\right)\left(1-\beta_v^1-\beta_e^1\right) \cdot Var\left[v_1 \mid m_0, s_i\right]}{\left(1-\beta_v^1-\beta_e^1\right)^2 \cdot Var\left[v_1 | m_0, s_i\right]+(\beta_x^1)^2 \sigma_x^2}}_{h_i^F \in(0,1)} \cdot\left(E[v_1+v_2-P_1 | m_0, s_i]\right)\right] \tag{90}$$

$$=\underbrace{\frac{\left(1-\beta_v^1-\beta_e^1\right)^2 \cdot Var\left[v_1 | m_0, s_i\right]+\left(\beta_x^1\right)^2 \sigma_x^2+\left(\beta_e^1\right)^2 \sigma_\epsilon^2}{\gamma \cdot Var\left[v_1 \mid m_0, s_i\right] \cdot\left(\beta_x^1\right)^2 \sigma_x^2+\left(\beta_e^1\right)^2 \sigma_\epsilon^2}}_{Var^{-1}\left[P_1-P_0+h_i^F\left(v_1+v_2-P_1\right) |\left\{m_0, s_i\right\}\right]}\left[E[v_1+v_2-P_0 | m_0]-(1-h_i^F) E[v_1+v_2-P_1 | m_0]\right] \tag{91}$$

Applying market clearing condition gives the equilibrium price equation at time 0.

$$P_{0,F}=\beta^0+v_1 \cdot \underbrace{\frac{\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{\left(1-\beta_v^1-\beta_e^1\right) \cdot \beta_m^1}{(\beta_x^1)^2 \sigma_x^2+(\beta_e^1)^2 \sigma_\epsilon^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{(1-\beta_v^1-\beta_e^1)^2}{(\beta_x^1)^2 \sigma_x^2+(\beta_e^1)^2 \sigma_\epsilon^2}}}_{\beta_v^0}+x_0 \cdot \beta_x^0 \tag{92}$$

where $\beta^0=\dfrac{\left(\beta^1 \frac{\left(1-\beta_v^1-\beta_e^1\right)}{(\beta_x^1)^2 \sigma_x^2+(\beta_e^1)^2 \sigma_\epsilon^2}+E[v_1] \cdot \frac{1}{\sigma_1^2}-E[v_2] \cdot\left(\frac{\left(1-\beta_v^1-\beta_e^1\right) \cdot(\beta_v^1+\beta_e^1)}{(\beta_x^1)^2 \sigma_x^2+(\beta_e^1)^2 \sigma_\epsilon^2}-\frac{1}{\sigma_1^2}-\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \sigma_x^2}-\frac{n}{\sigma_\eta^2}\right)\right)}{\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{(1-\beta_v^1-\beta_e^1)^2}{(\beta_x^1)^2 \sigma_x^2+(\beta_e^1)^2 \sigma_\epsilon^2}}$

and $\beta_x^0=\dfrac{\left(\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{\left(1-\beta_v^1-\beta_e^1\right) \cdot \beta_m^1}{(\beta_x^1)^2 \sigma_x^2+(\beta_e^1)^2 \sigma_\epsilon^2}\right)\left(-\frac{\gamma \sigma_\eta^2}{n}\right)}{\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{(1-\beta_v^1-\beta_e^1)^2}{(\beta_x^1)^2 \sigma_x^2+(\beta_e^1)^2 \sigma_\epsilon^2}}$

Plugging in the price coefficients gives the following price informativeness at time 1 and time 0.

$$X_{1,F}=\frac{\frac{1}{\sigma_\epsilon^2}+\frac{2}{\sigma_x^2}\left(\frac{n}{\gamma \sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}}{\frac{1}{\sigma_\epsilon^2}+\frac{n}{\sigma_\eta^2}+\frac{2}{\sigma_x^2}\left(\frac{n}{\gamma \sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}}, X_{0,F}=\frac{\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma \sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}+\frac{\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \sigma_x^2}\left(\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \sigma_x^2}+\frac{1}{\sigma_1^2}\right)}{\left(\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \sigma_x^2}+\gamma\right)^2 \sigma_x^2+\frac{1}{\sigma_\epsilon^2}}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma \sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}+\frac{\left(\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \sigma_x^2}+\frac{1}{\sigma_1^2}\right)^2}{\left(\frac{1}{\left(\frac{\gamma \sigma_\eta^2}{n}\right)^2 \sigma_x^2}+\gamma\right)^2 \sigma_x^2+\frac{1}{\sigma_\epsilon^2}}}. \tag{93}$$

Plugging in price efficiencies into the investment equation $k_{1,F}^*=\dfrac{\alpha\left[\delta X_{0,F}+(1-\delta) X_{1,F}\right] \mu_1+(1-\alpha)(I-\mu_2+\mu_1)}{\alpha\left[\delta X_{0,F}+(1-\delta) X_{1,F}\right]+2(1-\alpha)}$ gives the equilibrium short-term investment.

## Proof of Lemma 6.

**Time 1**

At time 1, informed ($q^*_{1i}$) and uninformed investors ($q^*_{1u}$) choose the following quantity.

$$q^*_{1i} = \frac{1}{\gamma}\left(\frac{1}{\sigma_1^2} + \frac{1}{\left(\frac{\lambda_x^0}{\lambda_v^0}\right)^2\sigma_x^2} + \frac{1}{\left(\frac{\lambda_x^1}{\lambda_v^1}\right)^2\sigma_x^2} + \frac{1}{\sigma_\eta^2}\right)\left[\frac{\frac{1}{\sigma_1^2}\cdot E(v_1) + \frac{1}{\left(\frac{\lambda_x^0}{\lambda_v^0}\right)^2\sigma_x^2}\cdot m_0 + \frac{1}{\left(\frac{\lambda_x^1}{\lambda_v^1}\right)^2\sigma_x^2}\cdot m_1 + \frac{1}{\sigma_\eta^2}\cdot s_i}{\left(\frac{1}{\sigma_1^2} + \frac{1}{\left(\frac{\lambda_x^0}{\lambda_v^0}\right)^2\sigma_x^2} + \frac{1}{\left(\frac{\lambda_x^1}{\lambda_v^1}\right)^2\sigma_x^2} + \frac{1}{\sigma_\eta^2}\right)} + (E(v_2) - P_1)\right] \tag{94}$$

$$q^*_{1u} = \frac{1}{\gamma}\left(\frac{1}{\sigma_1^2} + \frac{1}{\left(\frac{\lambda_x^0}{\lambda_v^0}\right)^2\sigma_x^2} + \frac{1}{\left(\frac{\lambda_x^1}{\lambda_v^1}\right)^2\sigma_x^2}\right)\left[\frac{\frac{1}{\sigma_1^2}\cdot E(v_1) + \frac{1}{\left(\frac{\lambda_x^0}{\lambda_v^0}\right)^2\sigma_x^2}\cdot m_0 + \frac{1}{\left(\frac{\lambda_x^1}{\lambda_v^1}\right)^2\sigma_x^2}\cdot m_1}{\left(\frac{1}{\sigma_1^2} + \frac{1}{\left(\frac{\lambda_x^0}{\lambda_v^0}\right)^2\sigma_x^2} + \frac{1}{\left(\frac{\lambda_x^1}{\lambda_v^1}\right)^2\sigma_x^2}\right)} + (E(v_2) - P_1)\right] \tag{95}$$

where $m_1$ is a signal from $P_1$, $\left(m_1 = \frac{1}{\lambda_v^1}(P_1 - \lambda^1 - \lambda_m^1 m_0) = v_1 + \frac{\lambda_x^1}{\lambda_v^1}x_1\right)$, and $m_0$ a signal from $P_0$.

Applying market clearing condition,

$$\int_i q^*_{1i}d_i + (1-n)\cdot q^*_{1u} = x_1 \tag{96}$$

Solving for the market clearing condition gives:

$$\begin{aligned}P_{1,I} = &\underbrace{\frac{\frac{1}{\sigma_1^2}E[v_1]}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^0}{\lambda_x^0}\right)^2 + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^1}{\lambda_x^1}\right)^2 + \frac{1}{\sigma_1^2}}}_{\lambda^1} + E[v_2] + \underbrace{\frac{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^1}{\lambda_x^1}\right)^2}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^0}{\lambda_x^0}\right)^2 + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^1}{\lambda_x^1}\right)^2 + \frac{1}{\sigma_1^2}}}_{\lambda_v^1} v_1 \\ &+ \underbrace{\frac{\frac{1}{\sigma_x^2}\left(\frac{\lambda_v^0}{\lambda_x^0}\right)^2}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^0}{\lambda_x^0}\right)^2 + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^1}{\lambda_x^1}\right)^2 + \frac{1}{\sigma_1^2}}}_{\lambda_m^1} m_0 + \underbrace{\frac{\frac{1}{\sigma_x^2}\frac{\lambda_v^1}{\lambda_x^1} - \gamma}{\frac{n}{\sigma_\eta^2} + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^0}{\lambda_x^0}\right)^2 + \frac{1}{\sigma_x^2}\left(\frac{\lambda_v^1}{\lambda_x^1}\right)^2 + \frac{1}{\sigma_1^2}}}_{\lambda_x^1} x_1,\end{aligned} \tag{97}$$

where $\frac{\lambda_v^1}{\lambda_x^1} = -\frac{n}{\gamma\sigma_\eta^2}$

**Time 0**

Time 0 quantity of investor $i$ follows

$$q^*_{0i} = \frac{(E[P_1 \mid \Omega_{0i}] - P_0) + h_i^I \cdot E[v_1 + v_2 - P_1 \mid \Omega_{0i}]}{\gamma\left(Var[P_1 - P_0 \mid \Omega_{0j}] + h_i^I \cdot Cov[P_1 - P_0, v_1 + v_2 - P_1)|\Omega_{0i}]\right.} \tag{98}$$

$$\text{where } h_i^I = -\frac{Cov[P_1 - P_0, v_1 + v_2 - P_1 \mid \Omega_{0i}]}{Var[v_1 + v_2 - P_1|\Omega_{0i}]}$$

Under the infrequent regime, an uninformed investor's information set at time 0 is $\Omega_{0u} = \{m_0\}$. An informed investor's information set at time 0 is $\Omega_{0i} = \{m_0, s_i\}$. Calculating conditional expectation and variance, and then plugging into the equilibrium time 0 demand gives the following.

$$
\begin{aligned}
q_{0u}^* = & \underbrace{\frac{\left(1-\lambda_v^1\right)^2 \cdot Var\left[v_1|m_0\right]+\left(\lambda_x^1\right)^2 \sigma_x^2}{\gamma \cdot Var\left[v_1 \mid m_0\right] \cdot \left(\lambda_x^1\right)^2 \sigma_x^2}}_{Var^{-1}[P_1-P_0+h_u^I(v_1+v_2-P_1)|\{m_0\}]} \\
& \left[\left(E\left[P_1 \mid m_0\right]-P_0\right)+\underbrace{\frac{\left(\lambda_x^1\right)^2 \sigma_x^2-\lambda_v^1\left(1-\lambda_v^1\right) \cdot Var\left[v_1 \mid m_0\right]}{\left(1-\lambda_v^1\right)^2 \cdot Var\left[v_1|m_0\right]+(\lambda_x^1)^2\sigma_x^2}}_{h_u^I\in(0,1)} \cdot \left(E[v_1+v_2-P_1|m_0]\right)\right] && (99)\\
= & \underbrace{\frac{\left(1-\lambda_v^1\right)^2 \cdot Var\left[v_1|m_0\right]+\left(\lambda_x^1\right)^2 \sigma_x^2}{\gamma \cdot Var\left[v_1 \mid m_0\right] \cdot \left(\lambda_x^1\right)^2 \sigma_x^2}}_{Var^{-1}[P_1-P_0+h_u^I(v_1+v_2-P_1)|\{m_0\}]} \left[E[v_1+v_2-P_0|m_0]-(1-h_u^I)E[v_1+v_2-P_1|m_0]\right] && (100)\\
q_{0i}^* = & \underbrace{\frac{\left(1-\lambda_v^1\right)^2 \cdot Var\left[v_1|m_0,s_i\right]+\left(\lambda_x^1\right)^2 \sigma_x^2}{\gamma \cdot Var\left[v_1 \mid m_0,s_i\right] \cdot \left(\lambda_x^1\right)^2 \sigma_x^2}}_{Var^{-1}[P_1-P_0+h_i^I(v_1+v_2-P_1)|\{m_0,s_i\}]} \\
& \left[\left(E\left[P_1 \mid m_0,s_i\right]-P_0\right)+\underbrace{\frac{\left(\lambda_x^1\right)^2 \sigma_x^2-\lambda_v^1\left(1-\lambda_v^1\right) \cdot Var\left[v_1 \mid m_0,s_i\right]}{\left(1-\lambda_v^1\right)^2 \cdot Var\left[v_1|m_0,s_i\right]+(\lambda_x^1)^2\sigma_x^2}}_{h_i^I\in(0,1)} \cdot \left(E[v_1+v_2-P_1|m_0,s_i]\right)\right] && (101)\\
= & \underbrace{\frac{\left(1-\lambda_v^1\right)^2 \cdot Var\left[v_1|m_0,s_i\right]+\left(\lambda_x^1\right)^2 \sigma_x^2}{\gamma \cdot Var\left[v_1 \mid m_0,s_i\right] \cdot \left(\lambda_x^1\right)^2 \sigma_x^2}}_{Var^{-1}[P_1-P_0+h_i^I(v_1+v_2-P_1)|\{m_0,s_i\}]} \left[E[v_1+v_2-P_0|m_0]-(1-h_i^I)E[v_1+v_2-P_1|m_0,s_i]\right] && (102)
\end{aligned}
$$

Applying market clearing condition gives the equilibrium price equation at time 0.

$$
P_{0,I} = \lambda^0 + v_1 \cdot \underbrace{\frac{\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{\left(1-\lambda_v^1\right)\cdot\lambda_m^1}{(\lambda_x^1)^2\sigma_x^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{\left(1-\lambda_1^1\right)^2}{(\lambda_x^1)^2\sigma_x^2}}}_{\lambda_v^0} + x_0 \cdot \lambda_x^0 \tag{103}
$$

$$
\text{where } \lambda^0 = \frac{\left(\lambda^1 \frac{1-\lambda_v^1}{(\lambda_x^1)^2\sigma_x^2} + E[v_1]\cdot\frac{1}{\sigma_1^2} - E[v_2]\cdot\left(\frac{\lambda_v^1(1-\lambda_v^1)}{(\lambda_x^1)^2\sigma_x^2}-\frac{1}{\sigma_1^2}-\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}-\frac{n}{\sigma_\eta^2}\right)\right)}{\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{\left(1-\lambda_1^1\right)^2}{(\lambda_x^1)^2\sigma_x^2}}
$$

$$
\text{and } \lambda_x^0 = \frac{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{\left(1-\lambda_v^1\right)\cdot\lambda_m^1}{(\lambda_x^1)^2\sigma_x^2}\right)\left(-\frac{\gamma\sigma_\eta^2}{n}\right)}{\frac{1}{\sigma_1^2}+\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2 \cdot \sigma_x^2}+\frac{n}{\sigma_\eta^2}+\frac{\left(1-\lambda_1^1\right)^2}{(\lambda_x^1)^2\sigma_x^2}}
$$

Substituting the equilibrium price coefficients gives the following price informativeness at time 1 and time 0 respectively.

$$X_{1,I}=\frac{\frac{2}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}}{\frac{n}{\sigma_\eta^2}+\frac{2}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}},X_{0,I}=\frac{\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}+\frac{\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\frac{1}{\sigma_1^2}\right)}{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\gamma\right)^2\sigma_x^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}+\frac{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\frac{1}{\sigma_1^2}\right)^2}{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\gamma\right)^2\sigma_x^2}}. \tag{104}$$

Plugging in price efficiencies into $k_{1,I}^*=\frac{\alpha\left[\delta X_{0,I}+(1-\delta)X_{1,I}\right]\mu_1+(1-\alpha)(I-\mu_1+\mu_2)}{\alpha\left[\delta X_{0,I}+(1-\delta)X_{1,I}\right]+2(1-\alpha)}$ gives the optimal short-term investment. Due to parameter constraint, $k_{1,I}^*<I$.

## Proof of Proposition 5.

Solving for the maximization problem gives the equilibrium short-term investment $k_1^*$:

$$k_1^*=\frac{\alpha\left[\delta X_0+(1-\delta)X_1\right]\mu_1+(1-\alpha)(I-\mu_2+\mu_1)}{\alpha\left[\delta X_0+(1-\delta)X_1\right]+2(1-\alpha)} \tag{105}$$

where $X_t$ indicates price efficiency at time $t$.

Since $k_1^*$ is increasing in the aggregate price efficiency at time 0 and time 1 $[\delta X_0+(1-\delta)X_1]$ it suffices to compare the price efficiency under the two regimes.

**Time 1**

| | Infrequent | Frequent |
|---|---|---|
| Time 1 | $\frac{\frac{2}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}}{\frac{n}{\sigma_\eta^2}+\frac{2}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}}$ | $\frac{\frac{1}{\sigma_\epsilon^2}+\frac{2}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}}{\frac{1}{\sigma_\epsilon^2}+\frac{n}{\sigma_\eta^2}+\frac{2}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{1}{\sigma_1^2}}$ |

Given fixed number of informed investors, the price efficiency at time 1 is higher under the frequent regime.

**Time 0**

| | Infrequent | Frequent |
|---|---|---|
| Time 0 | $\frac{\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}+\frac{\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\frac{1}{\sigma_1^2}\right)}{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\gamma\right)^2\sigma_x^2}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}+\frac{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\frac{1}{\sigma_1^2}\right)^2}{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\gamma\right)^2\sigma_x^2}}$ | $\frac{\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}+\frac{\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\frac{1}{\sigma_1^2}\right)}{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\gamma\right)^2\sigma_x^2+\frac{1}{\sigma_\epsilon^2}}}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}+\frac{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\frac{1}{\sigma_1^2}\right)^2}{\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\gamma\right)^2\sigma_x^2+\frac{1}{\sigma_\epsilon^2}}}$ |

It can be shown that the price efficiency is higher under the frequent regime following the logic below.

Suppose $A_1=\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2},A_2=\frac{1}{\sigma_1^2}+\frac{1}{\sigma_x^2}\left(\frac{n}{\gamma\sigma_\eta^2}\right)^2+\frac{n}{\sigma_\eta^2}$

$$B_1 = \frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}\left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\frac{1}{\sigma_1^2}\right), B_2 = \left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)^2\sigma_x^2}+\frac{1}{\sigma_1^2}\right)^2$$

$$C = \left(\frac{1}{\left(\frac{\gamma\sigma_\eta^2}{n}\right)\sigma_x^2}+\gamma\right)^2\sigma_x^2.$$

then, the price efficiency at time 0 under the frequent regime can be written as $\dfrac{A_1+\frac{B_1}{C+\frac{1}{\sigma_\epsilon^2}}}{A_2+\frac{B_2}{C+\frac{1}{\sigma_\epsilon^2}}}$.

$$\frac{\partial}{\partial\frac{1}{\sigma_\epsilon^2}}\frac{A_1+\frac{B_1}{C+\frac{1}{\sigma_\epsilon^2}}}{A_2+\frac{B_2}{C+\frac{1}{\sigma_\epsilon^2}}} = -\frac{1}{(C+\frac{1}{\sigma_\epsilon^2})^2}\frac{B_1A_2-A_1B_2}{\left(A_2+\frac{B_2}{C+\frac{1}{\sigma_\epsilon^2}}\right)^2} > 0 \tag{106}$$

since $B_1A_2 - A_1B_2 < 0$.

## Proof of Lemma 7.

Let's denote expected utility of investor $j$ at time zero as $E_j^0$:

$$E_j^0 = \max E\left[E\left[-e^{-\gamma(W+(P_1-P_0)q_{0j}+(P_2-P_1)q_{1j})} \mid \Omega_{1j}\right]\Big|\Omega_{0j}\right] \tag{107}$$

$$= -e^{-\gamma W}\underbrace{\min_{q_{0j}} E\left[e^{-\gamma(P_1-P_0)q_{0j}}\cdot\underbrace{\min_{q_{1j}} E\left[e^{-\gamma(P_2-P_1)q_{1j}}\Big|\Omega_{1j}\right]}_{\text{Time 1 maximization}}\Big|\Omega_{0j}\right]}_{\text{Time 0 maximization}} \tag{108}$$

$E_j^0$ can be derived by plugging in equilibrium $q_{j1}$ and $q_{j0}$ into the utility function and taking expectation as below.

$$E_j^0 = \sqrt{\frac{Var(v_1+v_2-P_1|\Omega_{1j})}{Var(v_1+v_2-P_1|\Omega_{0j})}}\exp\left\{-\frac{1}{2Var(P_1-P_0+h_j(v_1+v_2-P_1)|\Omega_{0j})}Y\right\} \tag{109}$$

where $Y = \left(E^2[P_1-P_0|\Omega_{0j}+2h_jE[P_1-P_0|\Omega_{0j}]E[v_1+v_2-P_1|\Omega_{0i}]+\frac{Var[P_1-P_0|\Omega_{0j}]}{Var[v_1+v_2-P_1|\Omega_{0j}]}E^2[v_1+v_2-P_1|\Omega_{0j}]]\right)$.

The ex-ante expected utility can be derived by taking expectation of $E_j^0$, or $E[E_j^0]$. Both $E_j^0$ and $E[E_j^0]$ can be derived by using the following formula.

$$\begin{aligned}
&E[\exp\{b_1X_1+b_2X_2+a_{11}X_1^2+2a_{12}X_1X_2+a_{22}X_2^2\}]\\
&=\frac{1}{S^{1/2}}\exp\left\{\frac{1}{S}\left\{\frac{1}{2}[b_1^2(\sigma_1^2-2a_{22}|\Sigma|)+2b_1b_2(\sigma_{12}+2a_{12}|\Sigma|)+b_2^2(\sigma_2^2-2a_{11}|\Sigma|)]\right\}\right\}\\
&+\frac{1}{S^{1/2}}\exp\left\{\frac{1}{S}\left\{\mu_1[b_1+2(a_{11}b_2-a_{12}b_1)\sigma_{12}+2(a_{12}b_2-a_{22}b_1)\sigma_2^2]\right\}\right\}\\
&+\frac{1}{S^{1/2}}\exp\left\{\frac{1}{S}\left\{\mu_2[b_2+2(a_{12}b_1-a_{11}b_2)\sigma_1^2+2(a_{22}b_1-a_{12}b_2)\sigma_{12}]\right\}\right\}\\
&+\frac{1}{S^{1/2}}\exp\left\{\frac{1}{S}\left\{\mu_1^2 1_{11}(1-2a_{22}\sigma_2^2)+2\mu_1\mu_2(a_{12}+2|A|\sigma_{12}+\mu_2^2a_{22}(1-2a_{11}\sigma_1^2))\right\}\right\}
\end{aligned} \tag{110}$$

when $X_1 \sim \mathcal{N}(\mu_1,\sigma_1^2)$, $X_2 \sim \mathcal{N}(\mu_2,\sigma_2^2)$, $Cov(X_1,X_2)=\sigma_{12}$, and $S = |I-2\Sigma A| = 1-2(a_{11}\sigma_1^2+2a_{12}\sigma_{12}+a_{22}\sigma_2^2)+4|A||\Sigma|$, $|A| = a_{11}a_{22}-a_{12}^2$, and $|\Sigma| = \sigma_1^2\sigma_2^2-\sigma_{12}^2$.

## Proof of Lemma 8.

As in Lemma 7, the expected utility of investor $i$ with information set $\Omega_i$ at time 1 gives

$$EU_i = -\exp\{-\gamma(W-c)\}\sqrt{\frac{Var[v_1+v_2-P_1|\Omega_i]}{Var[v_1+v_2-P_1]}}. \tag{111}$$

The ratio of expected utilities for short- and long-term information under the infrequent regime is:

$$\frac{EU_1^I}{EU_2^I} = \exp\left(\gamma(c_1-c_2)\right) \tag{112}$$

$$\sqrt{\frac{(\sigma_2^2\sigma_\eta^2\left(\lambda_1^2\sigma_1^2+\lambda_x^2\sigma_x^2\right)-2\lambda_1\lambda_2\sigma_1^2\sigma_2^2\sigma_\eta^2+\sigma_1^2\sigma_\eta^2\left(\lambda_2^2\sigma_2^2+\lambda_x^2\sigma_x^2\right)+\lambda_x^2\sigma_1^2\sigma_2^2\sigma_x^2)((\sigma_2^2+\sigma_\zeta^2)\left(\lambda_1^2\sigma_1^2+\lambda_2^2\sigma_2^2+\lambda_x^2\sigma_x^2\right)-\lambda_2^2\sigma_2^4)}{((\sigma_1^2+\sigma_\eta^2)\left(\lambda_1^2\sigma_1^2+\lambda_2^2\sigma_2^2+\lambda_x^2\sigma_x^2\right)-\lambda_1^2\sigma_1^4)(\sigma_2^2\sigma_\zeta^2\left(\lambda_1^2\sigma_1^2+\lambda_x^2\sigma_x^2\right)-2\lambda_1\lambda_2\sigma_1^2\sigma_2^2\sigma_\zeta^2+\sigma_1^2\sigma_\zeta^2\left(\lambda_2^2\sigma_2^2+\lambda_x^2\sigma_x^2\right)+\lambda_x^2\sigma_1^2\sigma_2^2\sigma_x^2)}} \tag{113}$$

The ratio of expected utilities for short- and long-term information is under the frequent regime is:

$$\frac{EU_1^F}{EU_2^F} = \exp\left(\gamma(c_1-c_2)\right)\sqrt{\frac{N_1\cdot N_2}{D_1\cdot D_2}} \tag{114}$$

$$\text{where } N = 1(\sigma_1^2\sigma_2^2\sigma_\eta^2\sigma_\epsilon^2(\beta_1-\beta_2^2+\beta_x^2\sigma_x^2(\sigma_1^2\sigma_2^2(\sigma_\eta^2+\sigma_\epsilon^2)+\sigma_1^2\sigma_\eta^2\sigma_\epsilon^2+\sigma_2^2\sigma_\eta^2\sigma_\epsilon^2)) \tag{115}$$

$$N_2 = (\beta_1^2\sigma_1^2\sigma_\epsilon^2(\sigma_2^2+\sigma_\zeta^2)+\beta_2^2\sigma_2^2\sigma_\zeta^2(\sigma_1^2+\sigma_\epsilon^2)+\beta_x^2\sigma_x^2(\sigma_1^2+\sigma_\epsilon^2)(\sigma_2^2+\sigma_\zeta^2)) \tag{116}$$

$$D_1 = \beta_1^2\sigma_1^2\sigma_\eta^2\sigma_\epsilon^2+\beta_2^2\sigma_2^2(\sigma_1^2(\sigma_\eta^2+\sigma_\epsilon^2)+\sigma_\eta^2\sigma_\epsilon^2)+\beta_x^2\sigma_x^2(\sigma_1^2(\sigma_\eta^2+\sigma_\epsilon^2)+\sigma_\eta^2\sigma_\epsilon^2) \tag{117}$$

$$D_2 = \sigma_1^2\sigma_2^2\sigma_\zeta^2\sigma_\epsilon^2(\beta_1-\beta_2^2+\beta_x^2\sigma_x^2(\sigma_1^2\sigma_2^2(\sigma_\zeta^2+\sigma_\epsilon^2)+\sigma_1^2\sigma_\zeta^2\sigma_\epsilon^2+\sigma_2^2\sigma_\zeta^2\sigma_\epsilon^2) \tag{118}$$

## Proof of Proposition 7.

**Infrequent regime**

Let's set $\bar{n}_I = 1$. Then, the equilibrium price is:

$$P_{1,I} = \lambda_0 + \underbrace{\lambda_1}_{0.510} v_1 + \underbrace{\lambda_2}_{0} v_2 + \underbrace{\lambda_x}_{-2.587} x \tag{119}$$

Next, I verify that the above equilibrium $\bar{n}_I$ is indeed the endogenous equilibrium.

$$EU_1^I(\bar{n}_I = 1) - EU_2^I(\bar{n}_I = 1) = 0.165 > 0 \tag{120}$$

The above relation indicates that $\bar{n}_I = 1$ is indeed an information acquisition equilibrium.

**Frequent regime**

Let's set $\bar{n}_F = 0$. Then, the equilibrium price is:

$$P_{1,F} = \beta_0 + \underbrace{\beta_1}_{0} v_1 + \underbrace{\beta_2}_{0.772} v_2 + \underbrace{\beta_e}_{0.909} e_1 + \underbrace{\beta_x}_{-0.926} x \tag{121}$$

Next, I verify that the above equilibrium $\bar{n}_F = 0$ is indeed the endogenous equilibrium.

$$EU_1^F(\bar{n}_F = 0) - EU_2^F(\bar{n}_F = 0) = -0.014 < 0 \tag{122}$$

The above relation indicates that $\bar{n}_F = 0$ is an information acquisition equilibrium.

**Comparison of equilibrium myopic investment level**

I plug in the equilibrium $\bar{n}$'s as well as the equilibrium price coefficients to obtain short-term investment under the two regimes ($k^*_{1,I}$ and $k^*_{1,F}$).

$$k^*_I = 0.602 > k^*_F = 0.518 \tag{123}$$

# Appendix B: Proof of the result with a Kyle (1985) setting

## B.1 Proof of the result in Section 6.3

The notations are the same as in the baseline model.

### B.1.1 Exogenous information acquisition

**Proposition B.1** *When an investor is informed, investment myopia is always higher under the frequent than under the infrequent regime ($k^*_{1,F} > k^*_{1,I}$).*

***Proof of Proposition B.1.*** As in the baseline model, a manager's investment choice follows below equation:

$$k_1^* = \frac{\alpha(X)\mu_1 + (1-\alpha)(I - \mu_2 + \mu_1)}{\alpha(X) + 2(1-\alpha)}, \tag{1}$$

where $X$ is the price informativeness regarding short-term performance. To examine price efficiency under the two regimes, I derive the financial market equilibrium under a Kyle (1985) setting.

**Frequent regime**
I conjecture the following.

$$P_1 = E[v_1|e_1, \hat{k}_1] + \lambda_F \cdot z_F + E[v_2|\hat{k}_1] \tag{2}$$

$$q_F = \gamma_F \left(s_1 - E[v_1|e_1, \hat{k}_1]\right) \tag{3}$$

$$z_F = q_{i,F} + x = \gamma_F \left(s_1 - E[v_1|e_1, \hat{k}_1]\right) + x, \tag{4}$$

where $q_F$ indicates the informed investor's demand at time 1 under the frequent regime and $z_F$ indicates order flow at time 1 under the frequent regime. $q_F$ shows that the informed investor trades based on the incremental information in their private signals given mandatory disclosure $e_1$ ($s_1 - E[v_1|e_1, \hat{k}_1]$). Using Bayesian updating, $P_1$ is characterized as below.

$$P_1 = E[v_1|e_1, z_F, \hat{k}_1] + E[v_2|\hat{k}_1] \tag{5}$$

$$= \underbrace{\left(\hat{k}_1\mu_1 - \frac{\hat{k}_1^2}{2}\right) + \frac{\sigma_1^2}{\sigma_1^2 + \sigma_\varepsilon^2}(e_1 - E[e_1|\hat{k}_1]) + \frac{\gamma_F \frac{\sigma_1^2\sigma_\varepsilon^2}{\sigma_1^2+\sigma_\varepsilon^2}}{\gamma_F^2(\frac{\sigma_1^2\sigma_\varepsilon^2}{\sigma_1^2+\sigma_\varepsilon^2} + \sigma_\eta^2) + \sigma_x^2} z_F}_{E[v_1|e_1, z_F, \hat{k}_1]} + \underbrace{\left((I - \hat{k}_1)\mu_2 - \frac{(I-\hat{k}_1)^2}{2}\right)}_{E[v_2|\hat{k}_1]}, \tag{6}$$

where $z_F$ is the order flow under the frequent regime.

Informed investor chooses $q_F$ after $e_1$ is disclosed so that $q_F$ maximizes the expected profit.

$$\max_{q_F} E[q_F(v_1 + v_2 - P_1)|e_1, s_1] = \max_{q_F} E[q_F(v_1 - E[v_1|e_1, \hat{k}_1] - \lambda_F z_F)|e_1, s_1] \tag{7}$$

Taking FOC gives:

$$q_F^* = \underbrace{\frac{1}{2\lambda_F}\frac{\sigma_1^2\sigma_\varepsilon^2}{\sigma_1^2\sigma_\varepsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\varepsilon^2\sigma_\eta^2}}_{\gamma_F}(s_1 - E[v_1|e_1, \hat{k}_1]) \tag{8}$$

Solving (6) and (8) jointly gives:

$$\gamma_F = \frac{\sigma_x}{\sqrt{(\sigma_1^2\sigma_\varepsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\eta^2\sigma_\varepsilon^2)}}\sqrt{\sigma_1^2 + \sigma_\varepsilon^2} \tag{9}$$

$$\lambda_F = \frac{\sigma_1^2\sigma_\varepsilon^2}{2(\sigma_1^2\sigma_\varepsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\varepsilon^2\sigma_\eta^2)}\frac{1}{\sigma_x}\sqrt{\frac{\sigma_1^2\sigma_\varepsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\eta^2\sigma_\varepsilon^2}{\sigma_1^2 + \sigma_\varepsilon^2}} \tag{10}$$

**Infrequent regime**
I conjecture the following.

$$P_1 = E[v_1|\hat{k_1}] + \lambda_I z_I + E[v_2|\hat{k_1}] \tag{11}$$

$$q_I = \gamma_I \left(s_1 - E[v_1|\hat{k_1}]\right) \tag{12}$$

$$z_I = q_I + x \tag{13}$$

$$= \gamma_I \left(s_1 - E[v_1|\hat{k_1}]\right) + x \tag{14}$$

where $q_I$ indicates informed trader's demand at time 1 under the infrequent regime and $z_I$ indicates order flow at time 1. Using Bayesian updating, $P_1$ is characterized as below.

$$P_1 = E[v_1|z_I, \hat{k_1}] + E[v_2|\hat{k_1}] \tag{15}$$

$$= \underbrace{\left(\hat{k}_1\mu_1 - \frac{\hat{k}_1^2}{2}\right)}_{E[v_1|\hat{k}_1]} + \underbrace{\frac{\gamma_I \sigma_1^2}{\gamma_I^2(\sigma_1^2 + \sigma_\eta^2) + \sigma_x^2}}_{\lambda_I} z_I + \underbrace{\left((I - \hat{k}_1)\mu_2 - \frac{(I - \hat{k}_1)^2}{2}\right)}_{E[v_2|\hat{k}_1]} \tag{16}$$

The informed investor chooses $q_I$ that maximizes the expected profit: Simplifying the demand function gives

$$q_I^* = \frac{1}{2\lambda_I}\left[(E[v_1|s_1] - E[v_1|\hat{k}_1])\right] \tag{17}$$

$$= \underbrace{\frac{1}{2\lambda_I}\frac{\sigma_1^2}{\sigma_1^2 + \sigma_{\eta^2}}}_{\gamma_I}(s_1 - E[v_1|\hat{k}_1]) \tag{18}$$

Solving (16) and (18) jointly gives:

$$\gamma_I = \frac{\sigma_x}{\sqrt{(\sigma_1^2 + \sigma_\eta^2)}}, \quad \lambda_I = \frac{\sigma_1^2}{2(\sigma_1^2 + \sigma_\eta^2)}\frac{\sqrt{(\sigma_1^2 + \sigma_\eta^2)}}{\sigma_x} \tag{19}$$

The price efficiency under infrequent and frequent regime is characterized as below.

$$X_I = \left(\frac{\sigma_1^2}{2(\sigma_1^2 + \sigma_\eta^2)}\right) \tag{20}$$

$$X_F = \left(\frac{\sigma_1^2}{\sigma_1^2 + \sigma_\varepsilon^2} + \frac{\sigma_1^2\sigma_\varepsilon^2}{2(\sigma_1^2\sigma_\varepsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\varepsilon^2\sigma_\eta^2)} \cdot \frac{\sigma_\epsilon^2}{\sigma_1^2 + \sigma_\epsilon^2}\right) \tag{21}$$

$X_F$ is strictly decreasing in $\sigma_\epsilon^2$. Also, when $\sigma_\epsilon^2 \to 0$, $X_F \to 1 > X_I$. When $\sigma_\epsilon^2 \to \infty$, $X_F \to X_I$. This indicates that the price efficiency with exogenous information acquisition is always higher under the frequent regime than under the infrequent regime. Therefore, $k_{1,F}^* > k_{1,I}^*$.

### B.1.2 Endogenous information acquisition

Let's define the informed investor's ex-ante expected profit of observing information as $\Pi_r$, where $r \in \{F, I\}$.

$$\Pi_F = \lambda_F \sigma_x^2 = \frac{\sigma_1^2\sigma_\varepsilon^2}{2(\sigma_1^2\sigma_\varepsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\varepsilon^2\sigma_\eta^2)}\sqrt{\frac{(\sigma_1^2\sigma_\varepsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\varepsilon^2\sigma_\eta^2)}{(\sigma_1^2 + \sigma_\varepsilon^2)}}\sigma_x \tag{22}$$

$$\Pi_I = \lambda_I \sigma_x^2 = \frac{\sigma_1^2}{2(\sigma_1^2 + \sigma_\eta^2)}\sqrt{\sigma_1^2 + \sigma_\eta^2}\sigma_x \tag{23}$$

Table B.1 summarizes the price efficiencies under the frequent and infrequent regime depending on the information acquisition cost. $\pi_{F(I)}$ indicates the expected profit of acquiring information under the frequent (infrequent) regime, where $\pi_F \leq \pi_I$.

Table B.1: Comparison of price efficiency

| | Frequent | Infrequent |
|---|---|---|
| (A) $c \leq \pi_F$ | $X_F = \frac{\sigma_1^2}{\sigma_1^2+\sigma_\varepsilon^2} + \frac{\sigma_1^2\sigma_\varepsilon^2}{2(\sigma_1^2\sigma_\varepsilon^2+\sigma_1^2\sigma_\eta^2+\sigma_\varepsilon^2\sigma_\eta^2)} \cdot \frac{\sigma_\epsilon^2}{\sigma_1^2+\sigma_\epsilon^2}$ | $X_I = \left(\frac{\sigma_1^2}{2(\sigma_1^2+\sigma_\eta^2)}\right)$ |
| (B) $\pi_F < c < \pi_I$ | $X_F = \frac{\sigma_1^2}{\sigma_1^2+\sigma_\varepsilon^2}$ | $X_I = \left(\frac{\sigma_1^2}{2(\sigma_1^2+\sigma_\eta^2)}\right)$ |
| (C) $\pi_I < c$ | $X_F = \frac{\sigma_1^2}{\sigma_1^2+\sigma_\varepsilon^2}$ | $X_I = 0$ |

**Proposition B.2** *When $c \leq \pi_F$, or $\pi_I < c$, the myopia level is higher under the frequent regime than under the infrequent regime.*

*When $\pi_F < c \leq \pi_I$, the myopia level is lower (higher) under the frequent regime than under the infrequent regime when $\sigma_\epsilon^2 > \sigma_1^2 + 2\sigma_\eta^2$.*

Under cases (A) and (C), there is no difference in the information acquisition incentives under the frequent and the infrequent regime. Therefore, as in the exogenous information acquisition case, price efficiency is always higher under the frequent compared to the infrequent regime. However, under case (B), information acquisition only occurs under the infrequent regime. In this case, it is possible that investment myopia is stronger under the less frequent regime. Consistent with the baseline model, this happens when the reporting quality is sufficiently low. I also document the same results when a single informed investor chooses the precision of his signal.

## B.2 Proof of the results in Section 6.4 with voluntary disclosure

### B.2.1 Frequent Regime

Since the voluntary disclosure signal $e_1$ is identical to the mandated interim report, voluntary disclosure is redundant under the frequent regime and the same equilibrium as in the previous section where a maximum number of informed investor is one takes place.

### B.2.2 Infrequent Regime

I analyze $P_1$ under disclosure and nondisclosure, assuming that the investor is informed. Then, I derive the manager's equilibrium voluntary disclosure strategy.

***When the manager discloses** ($m = e_1$)**,***

I conjecture the following.

$$P_{1,I}^d = E[v_1|e_1, \hat{k}_1] + \lambda_I^d \cdot z_I^d + E[v_2|\hat{k}_1] \tag{24}$$

$$q_I^d = \gamma_I^d \left(s - E[v_1|e_1, \hat{k}_1]\right) \tag{25}$$

$$z_I^d = q_I^d + x \tag{26}$$

where $q_I^d$ indicates informed trader's demand at time 1 and $z_I^d$ indicates order flow at time 1. Also, given disclosure of $e_1$, the expected value of time 2 price $P_2^d = v_1 + v_2$ from the manager's perspective follows the equation below:

$$E[P_2^d|e_1, k_1] = E[v_1|e_1, k_1] + E[v_2|k_1]. \tag{27}$$

Jointly solving for $\gamma_I^d, \lambda_I^d$ using bayesian updating and optimal demand $q_I^d$ gives:

$$\gamma_I^d = \frac{\sigma_x}{\sqrt{Var(v_1|e_1)}}\sqrt{\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\epsilon^2\sigma_\eta^2}}, \quad \lambda_I^d = \frac{\sqrt{Var(v_1|e_1)}}{2\sigma_x}\sqrt{\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\epsilon^2\sigma_\eta^2}} \tag{28}$$

***When the manager withholds** ($m = \emptyset$)**,***

I conjecture the following.

$$P_{1,I}^{nd} = E[v_1|\emptyset, \hat{k}_1] + \lambda_I^{nd} \cdot z_I^{nd} + E[v_2|\hat{k}_1] \tag{29}$$

$$q_I^{nd} = \gamma_I^{nd} \left( s - E[v_1|\emptyset, \hat{k}_1] \right) \tag{30}$$

$$z_I^{nd} = q_I^{nd} + x \tag{31}$$

where $q_I^{nd}$ indicates informed trader's demand at time 1 and $z_I^{nd}$ is the order flow at time 1. Also, the expected value of time 2 price $P_2^{nd} = v_1 + v_2$ from the manager's perspective is the same as when the manager discloses $e_1$. This is because regardless of disclosure decision, the manager always knows the value of $e_1$.

$$E[P_2^{nd}|e_1, k_1] = E[v_1|e_1, k_1] + E[v_2|k_1] \tag{32}$$

Using the same method as before, the coefficients can be derived using bayesian updating and the optimal demand by the informed trader. Jointly solving for these equations leads to the following.

$$\gamma_I^{nd} = \frac{\sigma_x}{\sqrt{Var(v_1|\emptyset)\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2+\sigma_1^2\sigma_\eta^2+\sigma_\epsilon^2\sigma_\eta^2} - \sigma_\eta^2}} \tag{33}$$

$$\lambda_I^{nd} = \frac{\sqrt{Var(v_1|\emptyset)\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2+\sigma_1^2\sigma_\eta^2+\sigma_\epsilon^2\sigma_\eta^2} - \sigma_\eta^2}}{2\sigma_x} \frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\epsilon^2\sigma_\eta^2} \tag{34}$$

Next, I characterize the equilibrium voluntary disclosure decision by the manager at time 1. Given the manager's information set at time 1 $\{e_1, k_1\}$, the manager discloses $e_1$ if and only if:

$$\alpha E[P_1^d - P_1^{nd}|e_1, k_1] > c_v \tag{35}$$

Since $P_1^d$ is increasing in $e_1$, I conjecture a threshold voluntary disclosure strategy with threshold $t$. I assume that the manager withholds information when indifferent. Under the rational expectations equilibrium $(k_1 = \hat{k}_1)$, the equation (35) can be rewritten as:

$$\frac{\alpha}{2}\left[\frac{\sigma_1^2}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}} \frac{2\sigma_1^2\sigma_\eta^2 + \sigma_1^2\sigma_\epsilon^2 + 2\sigma_\epsilon^2 + \sigma_\eta^2 - \sigma_\epsilon^4}{\sigma_1^2\sigma_\eta^2 + \sigma_1^2\sigma_\epsilon^2 + \sigma_\epsilon^2\sigma_\eta^2} \left( \frac{e_1 - E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}} + \frac{\phi\left(\frac{e_1-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)}{\Phi\left(\frac{e_1-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)}\right)\right] > c_v \tag{36}$$

The next lemma establishes the existence of the voluntary disclosure threshold when the investor is informed.

**Lemma B.1** *Suppose the firm is under the infrequent reporting regime with voluntary disclosure. When the trader acquires information ($N = 1$), there exists a unique threshold $t$, above which the manager discloses and below which the manager withholds. The equilibrium threshold $t$ satisfies the following under the rational expectations equilibrium ($k_1 = \hat{k}_1$).*

$$\frac{\alpha}{2}\left[\frac{\sigma_1^2}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}} \frac{2\sigma_1^2\sigma_\eta^2 + \sigma_1^2\sigma_\epsilon^2 + 2\sigma_\epsilon^2 + \sigma_\eta^2 - \sigma_\epsilon^4}{\sigma_1^2\sigma_\eta^2 + \sigma_1^2\sigma_\epsilon^2 + \sigma_\epsilon^2\sigma_\eta^2} \left( \frac{t - E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}} + \frac{\phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)}{\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)}\right)\right] = c_v \tag{37}$$

***Proof of Lemma B.1.*** Let's define $F(e_1) = \frac{\alpha}{2}\left[\frac{\sigma_1^2}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}} \frac{2\sigma_1^2\sigma_\eta^2+\sigma_1^2\sigma_\epsilon^2+2\sigma_\epsilon^2+\sigma_\eta^2-\sigma_\epsilon^4}{\sigma_1^2\sigma_\eta^2+\sigma_1^2\sigma_\epsilon^2+\sigma_\epsilon^2\sigma_\eta^2} \left( \frac{e_1-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}} + \frac{\phi\left(\frac{e_1-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)}{\Phi\left(\frac{e_1-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)}\right)\right] - c_v$. Note that $F(e_1)$ is strictly increasing in $e_1$ due to Sampford's inequality. Also, when $e_1 \to -\infty$,

$F(e_1) \to -c_v$ and when $e_1 \to \infty$, $F(e_1) \to \infty$. Together, these indicate that there exists a unique value $t$ that satisfies $F(t) = 0$.

Note that the following holds. The ex-ante expected profit of acquiring information when the manager voluntarily discloses $e_1$ ($\Pi_I^d$) is the following.

$$\Pi_I^d = E\left[(v_1 + v_2 - P_1)\, q_1 | m \neq \emptyset\right] = \frac{\sigma_x \sqrt{Var(v_1|e_1)}}{2} \sqrt{\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\epsilon^2\sigma_\eta^2}} \tag{38}$$

The ex-ante expected profit of acquiring information when the manager withholds the signal ($m = \emptyset$) is the following.

$$\Pi_I^{nd} = E\left[(v_1 + v_2 - P_1)\, q_1 | m = \emptyset\right] = \frac{\sigma_x \sqrt{Var(v_1|\emptyset)\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2+\sigma_1^2\sigma_\eta^2+\sigma_\epsilon^2\sigma_\eta^2} - \sigma_\eta^2}}{2} \frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\epsilon^2\sigma_\eta^2} \tag{39}$$

$$= \frac{\sigma_x \sqrt{(Var(v_1|e_1) + (Var(v_1|\emptyset) - Var(v_1|e_1)))\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2+\sigma_1^2\sigma_\eta^2+\sigma_\epsilon^2\sigma_\eta^2} - \sigma_\eta^2}}{2} \frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\epsilon^2\sigma_\eta^2} \tag{40}$$

$$= \frac{\sigma_x \sqrt{Var(v_1|e_1) + (Var(v_1|\emptyset) - Var(v_1|e_1))\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2+\sigma_1^2\sigma_\eta^2+\sigma_\epsilon^2\sigma_\eta^2}}}{2} \sqrt{\frac{\sigma_1^2\sigma_\epsilon^2}{\sigma_1^2\sigma_\epsilon^2 + \sigma_1^2\sigma_\eta^2 + \sigma_\epsilon^2\sigma_\eta^2}} > \Pi_I^d \tag{41}$$

Lemma B.1 pins down the ex-ante expected benefit of acquiring information under the infrequent regime. The informed trader acquires information at time 0 if and only if the information acquisition cost $c$ is lower than or equal to the expected benefit under infrequent regime with voluntary disclosure $\Pi_I^v$.

$$c \leq \Pi_I^v = \Phi\left(\frac{t - E[e_1]}{\sqrt{\sigma_1^2 + \sigma_\varepsilon^2}}\right)\Pi_I^{nd} + \left(1 - \Phi\left(\frac{t - E[e_1]}{\sqrt{\sigma_1^2 + \sigma_\varepsilon^2}}\right)\right)\Pi_I^d \tag{42}$$

Next, I characterize the price equations and the manager's investment choice depending on the investor's information acquisition decision.

### B.2.3 Case 1: $c \leq \Pi_I^v$

When $c \leq \Pi_I^v$, then the investor acquires information $s$ at a cost $c$. Then the following price equations hold, whose coefficients satisfy (28), (33) and (34).

$$P_1 = E[v_1|\hat{k}_1, m] + \lambda_I^j \left(\gamma_I^j \left(s - E[v_1|\hat{k}_1, m]\right) + x\right) + E[v_2|\hat{k}_1] \tag{43}$$

$$P_2 = v_1 + v_2 \tag{44}$$

where $j \in \{d, nd\}$

When making an investment decision at time 0, the manager solves the following.

$$\max_{k_1} \alpha E\left[P_1\right] + (1-\alpha)E\left[P_2\right] \tag{45}$$

### B.2.4 Case 2 : $c > \Pi_I^v$

When $c > \Pi_I^v$, or when $N = 0$, then voluntary disclosure is the only source of information under the infrequent regime. The following price equations hold.

$$P_1 = E[v_1|m, \hat{k}_1] + E[v_1|\hat{k}_1] \tag{46}$$

$$P_2 = v_1 + v_2 \tag{47}$$

When there is no informed trading, the below Lemma shows the existence of a threshold voluntary disclosure $T$.

**Lemma B.2** *Suppose the firm is under an infrequent reporting regime with voluntary disclosure. When the investor does not acquire information, there exists a unique threshold $T$, above which the manager discloses and below which the manager withholds. The equilibrium threshold $T$ satisfies the following under the rational expectations equilibrium ($k_1 = \hat{k}_1$).*

$$\alpha \left[ \frac{\sigma_1^2}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}} \left( \frac{T-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}} + \frac{\phi\left(\frac{T-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)}{\Phi\left(\frac{T-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)} \right) \right] = c_v \tag{48}$$

***Proof of Lemma B.2.*** The proof of Lemma B.2 follows the same logic as in Lemma B.1.

Using the voluntary disclosure thresholds in Cases 1 and 2, I derive the myopic investment level when the investor is informed and when the investor is not informed.

**Lemma B.3** *Suppose the firm is under the infrequent mandatory reporting regime with voluntary disclosure. When $c \leq \Pi_I^v$ such that informed trader acquires information, a manager with $\alpha$ chooses*

$$k_{1,I}^* = \min\left\{ \frac{\alpha\left(\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\cdot X + \left(1-\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\right)\cdot\left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2}+\frac{\sigma_\epsilon^2}{\sigma_1^2+\sigma_\epsilon^2}\cdot X\right)\right)\mu_1 + (1-\alpha)(I-\mu_2+\mu_1)}{\alpha\left(\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\cdot X + \left(1-\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\right)\cdot\left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2}+\frac{\sigma_\epsilon^2}{\sigma_1^2+\sigma_\epsilon^2}\cdot X\right)\right) + 2(1-\alpha)}, I \right\}$$

*where* $X = \frac{\sigma_1^2\sigma_\varepsilon^2}{2(\sigma_1^2\sigma_\varepsilon^2+\sigma_1^2\sigma_\eta^2+\sigma_\varepsilon^2\sigma_\eta^2)}$.

*When $c > \Pi_I^v$ such that informed trader does not acquire information, a manager with $\alpha$ chooses*

$$k_{1,I}^* = \min\left\{ \frac{\alpha\left(1-\Phi\left(\frac{T-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\cdot\left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2}\right)\right)\mu_1 + (1-\alpha)(I-\mu_2+\mu_1)}{\alpha\left(1-\Phi\left(\frac{T-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\cdot\left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2}\right)\right) + 2(1-\alpha)}, I \right\}.$$

Table B.2 summarizes the price efficiency at time 1 under the frequent and infrequent regime depending on the information acquisition cost. $\Pi_F$ and $\Pi_I^v$ indicate the expected profit of acquiring information under the frequent regime and under the infrequent regime with voluntary disclosure. Since the myopia level directly depends on the price efficiency at time 1, comparing myopic investment is equivalent to comparing time 1 price efficiency.

Table B.2: Comparison of time 1 price efficiency

| | Frequent | Infrequent |
|---|---|---|
| (A) $c \leq \Pi_F$ | $\frac{\sigma_1^2}{\sigma_1^2+\sigma_\varepsilon^2} + X\frac{\sigma_\varepsilon^2}{\sigma_1^2+\sigma_\varepsilon^2}$ | $\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)X + \left(1-\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\right)\left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2}+\frac{\sigma_\epsilon^2}{\sigma_1^2+\sigma_\epsilon^2}X\right)$ |
| (B) $\Pi_F < c < \Pi_I^v$ | $\frac{\sigma_1^2}{\sigma_1^2+\sigma_\varepsilon^2}$ | $\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)X + \left(1-\Phi\left(\frac{t-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\right)\left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2}+\frac{\sigma_\epsilon^2}{\sigma_1^2+\sigma_\epsilon^2}X\right)$ |
| (C) $\Pi_I^v < c$ | $\frac{\sigma_1^2}{\sigma_1^2+\sigma_\varepsilon^2}$ | $\left(1-\Phi\left(\frac{T-E[e_1]}{\sqrt{\sigma_1^2+\sigma_\varepsilon^2}}\right)\right)\left(\frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2}\right)$ |

Note that when $N_I = N_F$ (cases (A) and (C)), the price efficiency is always higher under the frequent regime since $X < \frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2}$ and thus $X < \frac{\sigma_1^2}{\sigma_1^2+\sigma_\epsilon^2} + \frac{\sigma_\epsilon^2}{\sigma_1^2+\sigma_\epsilon^2}\cdot X$. On the contrary, under case (B), $N_I = 1$ and $N_F = 0$. Therefore, the price efficiency at time 1 can be higher under the infrequent regime when the voluntary disclosure cost $c_v$ is sufficiently low. This is because the price efficiency decreases with $c_v$, and at the extreme when $c_v = 0$, the price efficiency under the infrequent regime is strictly higher than that under the frequent regime. This confirms the result in the baseline model with informed trading only that there exist cases where reducing the reporting frequency can increase myopic investment level.

Next, I examine 1) the effect of the voluntary disclosure cost on myopic investment *given* an exogenous number of informed investors and 2) the effect of the voluntary disclosure cost on investors' information acquisition incentives.

**Proposition B.3** *Given an exogenous number of informed investors,*
*a) the corporate myopia level under the infrequent regime* $k_{1,I}^*$ *decreases with the voluntary disclosure cost* $c_v$*, and*
*b) the difference between the corporate myopia level under the two regimes* $k_{1,F}^* - k_{1,I}^*$ *increases with the voluntary disclosure cost* $c_v$*.*

***Proof of Proposition B.3.*** The change in $c_v$ only affects $k_{1,I}^*$. Since higher $c_v$ decreases voluntary disclosure it decreases $k_{1,I}$. Therefore, $k_{1,F} - k_{1,I}^*$ increases with $c_v$.

**Proposition B.4** *The increase in* $c_v$ *does not affect the range of parameter* $c$ *corresponding to case (A), increases the range corresponding to case (B), and decreases the range corresponding to case (C).*

***Proof of Propositiion B.4.*** $\Pi_I^v$ is increasing in $c_v$, since higher value of $c_v$ reduces the probability of voluntary disclosure under the infrequent regime. As $c_v$ increases, $\Pi_I^v$ increases while $\Pi_F$ does not change with $c_v$. Therefore, the interval for case (B) increases.

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