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Blockholders, Market Efficiency, and Managerial Myopia

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Abstract

This paper shows how blockholders can add value even if they cannot intervene in a firm's operations. Blockholders have strong incentives to monitor the firm's fundamental value, since they can sell their stakes upon bad news. By trading on their private information (following the "Wall Street Rule"), they cause prices to reflect fundamental value rather than current earnings. This in turn encourages managers to invest for long-run growth rather than short-term profits. Contrary to the view that the U.S.'s liquid markets and transient shareholders exacerbate myopia, this paper shows that they can encourage investment by impounding its effects into prices.

KEYWORDS: Blockholders, market efficiency, myopia, short-termism, intangible investment, Wall Street Rule, voting with your feet
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"The nature of competition has changed, placing a premium on investment in increasingly complex and intangible forms – the kinds of investment most penalized by the U.S. [capital allocation] system." – Porter (1992)

1 Introduction

This paper analyzes how outside blockholders can induce managers to undertake efficient real investment through their informed trading of the firm's shares. By gathering information about a firm's fundamental value and impounding it into prices, they encourage managers to exploit growth opportunities that increase firm value even if such investment reduces interim profits. The model therefore addresses two broad research issues. First, it introduces a potential solution to managerial myopia. Second, it demonstrates that shareholders can add significant value even if they lack control rights to intervene in a firm's operations. This provides a rationalization for the prevalence in the U.S. of small transient blockholders, who rarely intervene and instead typically follow the "Wall Street Rule" of "voting with your feet" – selling their stock if dissatisfied. In particular, it shows that such behavior can enhance long-term investment, contrary to popular belief.

Many academics and practitioners believe that myopia is a potentially fundamental problem faced by the modern firm. In the last century, firms attained leadership positions primarily through superior physical assets that generated cost efficiency. Nowadays, competitive success increasingly depends on product quality, which in turn stems from intangible assets such as human capital and R&D capabilities (Zingales (2000), Thurow (1993)). Building such competencies requires significant and sustained investment. Porter (1992) states that this is an issue of national importance, since the U.S.'s success in global competition hinges critically on whether its capital allocation system can promote such intangible investment.

However, managers may not exploit their firms' growth opportunities if they are concerned with the short-term stock price (Narayanan (1985), Stein (1988, 1989)). Intangible investment reduces interim earnings; as a result, the stock price rationally falls since weak earnings may stem from low firm quality. Fearing this decline, the manager inefficiently forgoes investment opportunities. This problem has been frequently voiced by managers themselves: Graham, Harvey and Rajgopal's (2005) survey finds that 78% of executives would sacrifice long-term value to meet earnings targets. Porter (1992) argues that underinvestment is a particularly severe issue in the U.S., since its liquid stock markets allow investors to sell upon weak financial results, thus causing managers to focus excessively on short-term earnings.

While previous papers have focused on various causes of myopia, this paper analyzes a solution: blockholders. Blockholders have strong incentives to gather costly information about the firm's fundamental value, i.e., to learn whether weak earnings result from low firm quality or desirable long-term investment. These incentives result from the blockholder's ability to profit by selling her stake to liquidity traders if she discovers that the firm is inherently weak. If the firm is intrinsically sound, she does not sell. This attenuates the stock price decline caused by weak earnings, thus encouraging investment[1] ex ante. In short, blockholders cause stock prices to reflect fundamental value rather than earnings; this induces the manager to take actions that boost fundamental value even if they depress earnings. The Wall Street adage that the "market sells first and asks questions later" does not apply to blockholders: owing to their large stakes, they have the incentive to ask questions first and not automatically sell upon losses. A noted real-life example is Warren Buffett, who typically acquires large stakes in firms with significant growth opportunities. He rarely intervenes; instead, his investment shields the firm from stock market concerns, allowing it to focus on long-term corporate value.

Why does such monitoring and trading have to be undertaken by blockholders? Many empirical studies use block size or institutional ownership as a proxy for investor sophistication, under the assumption that sizable investors have greater incentives to become informed. Although this concept appears intuitive, it is surprisingly difficult to deliver in standard models of informed trading. In such models, initial holdings have no effect on incentives, since an investor's ability to trade on information is independent of her stake. This paper introduces a short-sales constraint to generate a relationship between block size, monitoring incentives and thus price efficiency. If short sales are prohibited (or costly), the larger the initial holding, the more the blockholder can sell if she learns bad news. Since she can earn more trading profits from private information, she has greater incentives to collect it in the first place. The model thus provides a framework underpinning the assumed positive link between block size and information. Moreover, it suggests that ownership concentration may be a more accurate measure of investor informedness than total institutional ownership. While institutions plausibly have greater expertise than retail investors in conducting fundamental analysis, large stakes are important to give them the incentives to undertake such analysis.

In some existing blockholder theories, a greater block is always desirable as it increases monitoring and intervention incentives. However, here block size has a non-monotonic effect on market efficiency and ultimately real investment. Trading profits depend not on block size *per se*, but the amount sold upon bad news. If the block becomes too large, market liquidity declines and the blockholder will choose to sell less than her entire stake because of price impact. Since her potential trading profits are lower, she acquires less information and prices less closely reflect fundamental value. This finite optimal block size is consistent with the paucity of substantial blockholders in the U.S. (La Porta, Lopez-de-Silanes and Shleifer (1999)).

Having analyzed the normative question of the optimal block size for firm value, I then address the positive question of what stake is most likely to be observed empirically. Since block size is chosen by the large shareholder herself rather than the firm, the observed stake is likely to be the one that maximizes her private payoff. Owing to the Grossman and Hart

[1] Note that "investment" can encompass any action that enhances firm value, but worsens outsiders' perceptions in the short-run. "Low investment" can therefore represent accounting manipulation to improve outsiders' short-term perceptions. Blockholders can deter such manipulation as they can "see through" the numbers and will sell if high earnings are not backed up by strong fundamentals.

(1980) free-rider problem, the blockholder enjoys none of the benefits of increased investment that she brings, and so her objective function is independent of firm value. Instead, her choice of block size is purely determined by the desire to maximize informed trading profits (net of monitoring costs). Interestingly, even though the blockholder has a very different objective function, her privately optimal block size is the same as the firm value optimum. The key to this congruence is that informed trading is the very mechanism through which the blockholder adds value – while her trades are motivated by her private desire to earn profits, it has real social benefits by inducing efficient investment. Hence, the block size that maximizes trading profits also maximizes firm value.

The role of blockholders identified by this paper differs from prior models. Existing theories involve the shareholder adding value through direct intervention to overcome an effort or private benefits conflict: for example, firing a shirking manager or overturning project choice.[2] This paper shows that blockholders can improve firm value even if they are unable to intervene, and even in the absence of an effort conflict. Here, the blockholder cannot exercise "voice" in a troubled firm but can only trade: i.e., choose between "exit" and exhibiting "loyalty."

The focus on long-term investment is motivated by its increasing importance in the modern corporation. Zingales (2000) argues that exploiting growth opportunities has surpassed traditional shirking issues as the key organizational challenge. While the recent rise in equity-based compensation[3] (Hall and Liebman (1998)) and the sensitivity of CEO turnover to the stock price (Kaplan and Minton (2006)) have likely attenuated effort problems, these measures also plausibly further induce myopia.

The focus on trading, rather than intervention, is also empirically motivated. While intervention may be plausible for overseas blockholders, who typically hold large stakes, the striking feature of many U.S. blockholders is that they are small.[4] In addition, compared to their foreign counterparts, U.S. shareholders face substantial legal and institutional hurdles to intervention (see Becht et al. (2008) and Black (1990)). Both of these factors mean that U.S. blockholders rarely intervene. As Lowenstein (1988) writes: "[Institutional investors] implicitly praise or criticize management, by buying or selling, but seldom get involved more directly, even to the extent of a phone call. There is almost no dissent from the Wall Street Rule." Existing models

[2]Examples include Shleifer and Vishny (1986), Admati, Pfleiderer and Zechner (1994), Burkart, Gromb and Panunzi (1997), Pagano and Roell (1998), Kahn and Winton (1998), Bolton and von Thadden (1998), Maug (1998, 2002), Aghion, Bolton and Tirole (2004) and Faure-Grimaud and Gromb (2004).

[3]Equity compensation would not induce myopia if it had very long vesting periods. However, vesting periods are often short in practice, in part because very long vesting periods subject the manager to high risk. Kole (1997) documents that equity vesting schedules are typically short (2-3 years). Johnson, Ryan and Tian (2007) document significant use of unrestricted stock compensation, and that such compensation indeed leads to value-destructive actions (corporate fraud).

[4]When blockholders are defined as 5% shareholders, Holderness (2007) finds that 96% of U.S. firms contain a blockholder. However, when the minimum ownership is defined as 20%, La Porta, Lopez-de-Silanes and Shleifer (1999) document that 20% (10%) of large (medium) U.S. firms contain a blockholder. They estimate that a 20% stake gives effective control if the shareholder is an insider; the threshold is likely to be higher for outside shareholders. Hence blockholders are prevalent in the U.S., but tend to lack control rights. Holderness finds that concentrated blockholders with board seats tend to be families; this paper focuses on financial blockholders who typically hold smaller stakes and have less frequent board representation.

therefore have difficulty in explaining the role that such blockholders play in corporate governance, and thus why they are so prevalent.[5] This open question provides the second motivation for this paper. More generally, it suggests that U.S. firms may not be poorly governed, even though the absence of large blockholders weakens the "voice" mechanism.

These two departures from the literature lead to differences in the mechanism through which the blockholder adds value. In existing theories, she is an adversary of the CEO, disciplining a shirking manager by intervention. Here, the blockholder acts as an ally to the manager: her loyalty provides support to the share price upon weak earnings and encourages investment ex ante. This paper therefore provides a dynamically consistent reason for why the manager may wish to attract blockholders, for instance through dividend policy (Allen, Bernardo and Welch (2000)) or privately placing equity to a concentrated investor (Gomes and Phillips (2007)).[6]

These contrasting mechanisms further lead to differences on the effect of liquidity on the blockholder's value added. Maug (1998) shows that when block size is endogenous, increasing liquidity always improves firm value, because it encourages a greater block to form in the first place. In this paper, even though the blockholder adds value through trading rather than intervention, the optimal liquidity is also infinite. However, our conclusions differ if block size is held constant (e.g. is restricted by regulation or disclosure requirements), and so the beneficial effect of liquidity on initial block size is not obtained. Motivated by intervention papers which assume exogenous block size, Bhide (1993) argues that, since blockholders add value through "voice", and "voice" and "exit" are mutually exclusive, liquidity is undesirable as it allows a shareholder to leave rather than intervening. Indeed, Maug (1998) shows that when block size is exogenously high, increasing liquidity is harmful.

In this paper, the blockholder adds value through "loyalty" to a fundamentally sound firm suffering interim turbulence. "Loyalty" and "exit" are similarly mutually exclusive, and so it may seem that liquidity is also undesirable (holding block size constant), since it allows shareholders to sell easily upon weak financial results, thus causing managers to focus excessively on short-term earnings. Indeed, Porter (1992) and Thurow (1993) feared that the myopia allegedly induced by the "Wall Street Rule" would cause the U.S. economy to be surpassed by Japan, and advocated government policies to reduce liquidity and thus create unconditionally "long-term" shareholders who never sell.

However, this paper shows that the mutual exclusivity of "loyalty" and "exit" paradoxically leads to complementarities between them. If a blockholder has retained her stake in a firm with weak earnings, this is a particularly positive indicator of fundamental value if she could easily have sold instead. In short, the power of loyalty relies on the threat of exit. The core

[5] Similarly, intervention models would imply little role for holders of non-voting shares, even if they have large stakes. This paper shows that such investors can improve firm value by their trading behavior.

[6] A manager may voluntarily attract an adversarial blockholder when raising financing for the first time, to signal quality or commit to value-maximization. However, ex post he may have an incentive to persuade the blockholder to leave. The dynamic consistency in this paper is similar to Zwiebel (1996) who shows how a manager may voluntarily wish to retain high leverage, even after financing has been raised. Unlike in Zwiebel (1996), here dynamic consistency does not rely on the presence of an external discipliner.

result of this paper, that blockholders promote investment, does not stem from simply assuming that blockholders always hold their stakes for the long run. The *conditional* loyalty of transient financial blockholders, who are notoriously unafraid to sell stocks they deem to be fundamentally weak, may be more effective at promoting long-term investment than the unconditional loyalty of, for example, family owners who are unlikely to exit. The U.S. capital allocation system may therefore be significantly more investment-friendly than commonly believed, since its liquidity can support rather than deter investment. This may explain why the above fears for the U.S.'s international competitiveness have not been borne out.

When block size is exogenous, the optimal liquidity is finite because too much liquidity camouflages the blockholder's trades and reduces price informativeness. (With endogenous stakes, liquidity is desirable even at high levels since block size endogenously rises with liquidity to prevent such camouflage). However, it is always the case that increasing liquidity from low levels increases firm value, by encouraging the blockholder to monitor and trade, thus augmenting price efficiency. This result contrasts with Maug (1998) where increasing liquidity (even from low levels) can be undesirable, if block size is fixed at a high level. The analysis with exogenous block size is important as it shows that the desirability of liquidity when stakes are endogenous does not arise purely because liquidity encourages block formation. Thus, even if the benefit first noted by Maug are difficult to obtain (e.g. because block size is constrained by regulation), increasing liquidity can still be desirable.

While the paper's main result is that blockholders can encourage investment, the corollary is that a key cost of the U.S.'s dispersed ownership is myopia. This leads to an additional policy implication. Previous papers argue that the main problem with atomistic shareholders is that they lack the control rights to intervene and thus allow the manager to shirk (e.g., Roe (1994)). In this case, potential solutions to dispersed ownership are equity compensation and regulations against takeover defenses. However, if the main cost is that dispersed shareholders focus on current earnings and thus induce myopia, these policies exacerbate the problem. The problem with small shareholders may not be so much the "separation of ownership from control" (Berle and Means (1932)) as the "separation of ownership from information."

The paper closes with empirical implications. One set relates to real effects. The benefits of large stakes are especially strong in firms with profitable growth opportunities and high information asymmetry, such as R&D-intensive companies. In addition, blockholders should increase firm investment, as found by Cronqvist and Fahlenbrach (2006), and deter earnings manipulation (Dechow, Sloan and Sweeney (1996), Farber (2005), Burns, Kedia and Lipson (2006)). These predictions particularly distinguish this model from theories focused on effort.

A second set concerns stock-price effects, and is unique to a model where blockholders add value through trading. While the initial holding does not matter in standard trading models, here block size increases an investor's private information, trading profits and price efficiency. More generally, the model suggests a different way of thinking about blockholders that can give rise to new directions for empirical research. Previous studies have been primarily motivated by perceptions of blockholders as controlling entities (e.g. Barclay and Holderness (1989, 1991)), but new research questions may be motivated by conceptualizing them as informed traders.

This paper is organized as follows. Section 2 reviews relevant literature, and Section 3 introduces the basic model which links block size to financial market efficiency. Section 4 presents the core result of the paper by introducing managerial decisions and illustrating the impact on real efficiency. Section 5 generates empirical predictions and Section 6 concludes. Appendix A contains proofs.

2 The Setting

The three options of "exit," "voice" and "loyalty" were first studied by Hirschman (1970) in the context of dissatisfied customers. However, there have been few models analyzing the impact of shareholder exit on management decisions. There are two informal views of the "Wall Street Rule" held by practitioners: that the threat of shareholder exit is a potent deterrent to shirking, but it also exacerbates myopia as it induces managers to boost short-term earnings to discourage exit. These views have not been formally scrutinized by theoretical analysis.

This paper challenges the conventional wisdom that the Wall Street Rule promotes myopia by showing that short-term trading can, curiously, increase long-term investment. A contemporaneous study by Admati and Pfleiderer (2008) challenges the view that exit is effective at deterring shirking by showing that it may exacerbate the problem in some cases. Our papers thus focus on fundamentally different agency problems: while Admati and Pfleiderer analyze effort, this paper studies myopia. Unlike effort, myopia involves no intrinsic conflict between private benefits and firm value, and the problem is most severe if the manager is sensitive to stock prices. The focus on separate agency issues leads to blockholders adding value in different ways. As in intervention models, the blockholder in Admati and Pfleiderer is an adversary of the manager, although she exerts discipline by "exit" instead of "voice." Here, she exhibits "loyalty" and is an ally, thus providing a dynamically consistent motivation for managers to seek blockholders. A second difference is that Admati and Pfleiderer assume that the blockholder is exogenously informed, and so the level of monitoring is fixed. This paper endogenizes costly information gathering and generates testable predictions regarding the effect of block size on monitoring and trading, and in turn market efficiency, real investment and firm value. Both are shown to have non-monotonic effects.

The concept of long-term investment increasing in ex post monitoring is shared by Edmans (2007). Debt concentrates equityholders' stakes, giving them incentives to find out the cause of interim losses. Therefore, debt can allow efficient liquidation of an incompetent manager who suffers short-term losses, without simultaneously deterring skilled managers from long-term projects that risk such losses. While Edmans (2007) is a theory of capital structure, this paper is a theory of ownership structure. There is no debt and the analysis focuses on the effect of blockholder size. In addition, Edmans (2007) contains no stock price mechanism and thus no analysis of the Wall Street Rule or the desirability of liquidity.

A large number of papers have analyzed other links between financial and real efficiency. In Holmstrom and Tirole (1993), increased market efficiency means that the stock price is a less noisy signal of firm value. This allows a risk-averse manager to be given more equity compensation, alleviating the effort conflict. In their model, concentrated ownership reduces liquidity and thus market efficiency. Monitoring is performed by atomistic shareholders and they do not consider blockholders as potential monitors. The blockholder may be a particularly important monitor as her large stake gives her incentives to gather intangible information not held by small shareholders. In her absence, the stock price only reflects tangible information and tying the manager's pay to it distorts investment incentives.

In Fishman and Hagerty (1989), as in this paper, managers fearing future misvaluation invest inefficiently ex ante. Their solution is for firms to invest in disclosure, to reduce outsiders' cost of learning fundamental value. In the current model, the firm is already at maximal disclosure (since it is difficult to communicate the soft information that is particularly relevant to intangible investment) and monitoring is instead incentivized by large stakes. In Stein (1996), managers exploit *current* misvaluation by raising overvalued equity and investing inefficiently ex post.

Another link between financial and real efficiency arises if the manager learns from stock prices to improve decision making. Theoretical and empirical examples include Dow and Gorton (1997), Subrahmanyam and Titman (1999), Goldstein and Guembel (2007), Dow, Goldstein and Guembel (2007), Durnev, Morck and Yeung (2004), Luo (2005) and Chen, Goldstein and Jiang (2006). In the present paper, instead of learning from the market to guide subsequent decisions, the manager is more informed than the market and is concerned with its misvaluation of previous decisions. Both channels may coexist in reality, since they apply to different types of information. The manager can plausibly learn from the market's analysis of a given *common* information set ("hard" information) as the market accumulates multiple viewpoints. However, the manager is more informed with respect to "soft" information that is difficult to communicate to the market.

A final strand of related literature concerns insider trading by management. Proponents argue that it can increase the efficiency of stock prices, with consequent real benefits (e.g. Manne (1966)). The blockholder is likely to be significantly more effective than the manager at impounding fundamental value information into prices, for several reasons. First, unlike the blockholder who can trade freely based on her information, the manager is conflicted since the stock price is used to evaluate him. If he has negative private information, he is unlikely to reveal it by selling stock as the low share price may lead to him being fired. Second, conflicts may also arise because the manager has control over the information flow and investment decisions (Bernhardt, Hollifield and Hughson (1995)). He may release false negative (positive) information and subsequently buy (sell) shares, or sell his shares and take the incorrect investment decision. Third, the manager's trading may be hindered by insider trading laws, wealth constraints (limiting purchases) or lock-ups of stock as part of incentive packages (limiting sales). Finally, while the manager is automatically informed in insider trading papers, this paper endogenizes costly information acquisition. One paper that does analyze insider trading by the blockholder is Maug (2002), who shows that legalizing such actions can induce her to sell on negative information rather than engage in value-enhancing intervention.

3 Blockholders and Market Efficiency

This section analyzes the effect of block size on monitoring and stock prices. The real consequences are analyzed in Section 4, where managerial decisions are introduced.

I consider a firm with one share outstanding. A blockholder (B) owns α units and atomistic shareholders collectively own the remaining $1-\alpha$. All agents are risk-neutral and the risk-free rate is normalized to zero. There are three periods, summarized in Figure 1. At $t=1$, a public signal $s \in \{s_g, s_b\}$ is released, which can be interpreted as an earnings announcement. It is imperfectly informative about the firm's $t=3$ value V. If $s=s_g$, $V=X>0$ with certainty; if $s=s_b$, $V=0$ or X with equal probability. I refer to a firm with $V=X$ (0) as a "high (low)-quality firm;" $s=s_g$ is a "good signal" and $s=s_b$ is a "bad signal" (also referred to in the text as "losses" or "low earnings".)

At $t=2$, B can choose to exert monitoring effort $\mu \in [0,1]$, at cost $\frac{1}{2}c\mu^2$. Monitoring gives B a private signal $i \in \{i_g, i_b\}$ of the firm's fundamental value V, the precision of which rises in μ as follows:

$$\begin{aligned}\Pr(i_g|X) = \Pr(i_b|0) &= \frac{1}{2} + \frac{1}{2}\mu \\ \Pr(i_g|0) = \Pr(i_b|X) &= \frac{1}{2} - \frac{1}{2}\mu.\end{aligned}$$

The posterior probabilities that the firm is of high quality are thus given by:

$$\begin{aligned}\Pr(X|i_g) &= \frac{1+\mu}{2} \\ \Pr(X|i_b) &= \frac{1-\mu}{2} = \pi_b. \end{aligned} \tag{1}$$

If $\mu=0$, the private information is completely uninformative and the posterior equals the prior $\frac{1}{2}$; if $\mu=1$, B knows fundamental value with certainty. There is then a round of trading. B either demands nothing ($b=0$) or sells β units ($b=-\beta$). B sells if she receives signal i_b and holds otherwise.[7] I assume $\beta \leq \alpha$ owing to short-sales constraints, since this paper's focus is non-interventionist financial blockholders such as mutual funds, pension funds and insurance

[7]The core analysis involves the blockholder selling or holding, since this paper's focus is the Wall Street Rule: the shareholder exit that is widely believed to exacerbate myopia. The results are unchanged by allowing the blockholder to buy a fixed amount regardless of her initial stake. While the incentives to buy are unaffected by α, the ability to sell remains (non-monotonically) increasing in α. Hence monitoring incentives remain non-monotonically increasing in α. The results are available from the author upon request.

companies, most of which are unable to sell short. The results continue to hold with costly short sales.

Also at $t = 2$, liquidity traders demand u, where u is exponentially distributed, i.e.

$$f(u) = \begin{cases} 0 \text{ if } u \leq 0 \\ \lambda e^{-\lambda u} \text{ if } u > 0, \end{cases}$$

where $\lambda = \frac{1}{\nu(1-\alpha)}$ and $\nu \leq 1$ is a liquidity parameter. The competitive market maker sees total demand $d = b + u$ and sets a price P equal to the conditional expectation of V given d and s, similar to Kyle (1985).

ν captures factors other than free float $(1 - \alpha)$ that affect liquidity, such as transactions costs, taxes, disclosure requirements, and other regulations. This paper shows that there is an optimal ν, even if α is constant. Since the mean liquidity trade is $E(u) = \frac{1}{\lambda}$, we have the standard feature that the volume of liquidity trades is increasing in the amount held by small shareholders $(1 - \alpha)$, since liquidity trades often emanate from current investors. While liquidity trades are literally modeled as purchases, all of the model's results will continue to hold if the distribution of liquidity trades are transposed downwards, so that the bulk of such trades are sales. Since only current shareholders can sell the stock, there is a clear connection between free float and liquidity. This linkage remains under the literal interpretation of liquidity trades as purchases. Current shareholders are likely to be more informed about a particular stock than non-shareholders, and thus more likely purchasers if there is ambiguity aversion, or if non-shareholders do not know about the stock's existence (see Merton (1987) for a model where investors are restricted to buy stocks that they know about). In Bolton and von Thadden (1998), Kahn and Winton (1998) and Holmstrom and Tirole (1993), liquidity purchases also stem from existing owners.

The exponential distribution of u (also used in Barlevy and Veronesi (2000)) is used for tractability, as it allows B's sale volume to be derived in closed form. (The key idea that block size affects the ability to sell on negative information, and thus monitoring incentives, does not depend on the functional form for u). Kyle (1985) achieves tractability with normal liquidity trader demand as firm value is also normal. In most corporate finance models featuring the Kyle model, firm value is binary and so the informed trader's order cannot be solved for; such papers therefore typically restrict her trade to exogenous amounts. The exponential distribution allows us to derive her trade endogenously.

3.1 Market Equilibrium

If signal s_g is emitted, the market maker knows that the firm is of high quality, and so sets $P = X$. Since the signal is fully revealing, B has no incentives to monitor or trade. The remainder of this section focuses on the interesting case of $s = s_b$, and so "$\mid s_b$" notation is omitted for brevity. Since the signal is not fully revealing, B does monitor and trade, and the market maker tries to infer B's information from total order flow d.

Lemma 1 below presents the Nash equilibrium, where B's trading and monitoring decisions are optimal given the market maker's pricing function, and the market maker's pricing function earns him zero profit given B's decisions. I assume $X \leq 8c$ to ensure that effort does not exceed the maximum of 1.

Lemma 1 *Upon observing s_b and total demand d, the market maker sets the following prices:*

$$\begin{cases} P = \pi_b X \text{ if } d \leq 0 \\ P = \pi_m X \text{ if } d > 0. \end{cases} \tag{2}$$

where

$$\pi_m = \Pr(X|d > 0) = \frac{1 + e^{-\lambda\beta} + \mu\left(1 - e^{-\lambda\beta}\right)}{2\left(1 + e^{-\lambda\beta}\right)}. \tag{3}$$

B exerts monitoring effort

$$\mu = \frac{\beta X}{4c}. \tag{4}$$

If and only if she observes signal i_b, B sells

$$\beta = \min\left(\frac{1}{\lambda}, \alpha\right). \tag{5}$$

A full proof is in the Appendix; here I summarize the key intuition. If $d \leq 0$, the market maker knows that B has sold and thus has received i_b. He therefore sets prices according to the posterior $\pi_b = \Pr(X|i_b)$ in equation (1). $d > 0$ is consistent with both selling and not selling. The market maker sets prices according to the posterior $\pi_m = \Pr(X|d > 0)$ in equation (3). This gives rise to equation (2).

If B receives signal i_b, she wishes to sell. As in Kyle (1985), in the absence of short-sale constraints, her optimal trade is finite ($\frac{1}{\lambda}$) as she is concerned with excessive price impact. However, B is unable to sell more than α, her initial holding. If $\alpha \leq \frac{1}{\lambda}$, then $\beta = \alpha$: liquidity is sufficiently high that B finds it optimal to sell her entire stake.

Lemma 2 *The maximum sale volume β is given by*

$$\beta = \alpha^* = \frac{\nu}{\nu + 1}. \tag{6}$$

Blockholder effort μ is also maximized when $\alpha = \alpha^*$. Both β and μ are increasing in α if $\alpha < \alpha^*$, and decreasing in α if $\alpha > \alpha^*$.

For $\alpha < \alpha^*$, a larger initial stake raises the amount that B can sell upon negative information, and thus the incentives to become informed in the first place. Simply put, the benefits of information are higher as B can make greater use of it. Empirical studies frequently assume that that incentives to monitor and trade are increasing in block size.[8] While intuitive, such a

[8] For example, Boehmer and Kelley (2007) assume that "institutions could engage in information production once their holdings exceed a certain threshold." Rubin (2007) posits that "the probability that a particular institution will incur the costs to do so is higher if it enjoys a comparatively large ownership share."

result is not delivered by standard models of informed trading with no constraints (e.g. Kyle (1985) and its variants). In these models, monitoring is independent of initial holdings: if they uncover negative information about a stock they do not own, they can short sell. Similarly, in typical applications of the Kyle model to corporate finance (e.g. Dow and Gorton (1997), Maug (1998), Bolton and von Thadden (1998), Faure-Grimaud and Gromb (2004)), liquidity trades are discrete. Therefore, the informed party has to match liquidity traders' volumes to avoid being revealed, and so her orders are again independent of her initial stake. This paper generates a link between α and μ via the combination of continuous liquidity trader demand and short-sales constraints. It thus provides a theoretical framework underpinning the above empirical assumption.[9]

While certain investors (such as hedge funds) can short sell, shorting a stock is significantly costlier than unwinding a long position. The non-monotonic relationship between α, and β and μ, continue to hold if short-sales are allowed but incur a cost. (The cost must be sufficiently nontrivial that the reduction in short-sale costs that results from increasing α outweighs the negative effect on liquidity; the results are available from the author upon request). Equity analysts are also potential monitors and can move prices even without trading. However, they have significantly fewer incentives to be accurate given their zero stakes; there is abundant evidence of equity analyst bias. Despite the actions of hedge funds and analysts, information asymmetry is an accepted feature of modern financial markets. Cross-sectional differences in equity analyst coverage and hedge fund activity generate empirical predictions regarding the firms in which blockholders are more likely to be found: see Section 5.

However, a second consequence of a higher stake is that it reduces liquidity. From (5), this lessens the amount that B chooses to sell if she receives signal i_b. From (4), this in turn reduces her monitoring incentives. The optimal block size to maximize information acquisition is thus finite at α^*. The sensitivity of effort to block size is decreasing in c. c is the cost of acquiring private information not already in the market and is therefore inversely related to the firm's information asymmetry. If the firm has high analyst coverage (and thus low information asymmetry), most value-relevant information is already known by the market and the cost of acquiring incremental information is high.

It is straightforward to show both that B does not sell (hold) upon receiving i_g (i_b). Selling in the absence of negative private information would drive the price down and reduce her portfolio value at $t = 2$ as well as $t = 3$. Hence, even a blockholder concerned with interim performance (e.g., a fund manager evaluated by both investors and her boss) will not sell purely on public information.

[9] In Van Nieuwerburgh and Veldkamp (2006), monitoring does increase in the investor's holding, but because she is risk averse and wishes to reduce uncertainty, rather than a greater block expanding the set of feasible trading strategies.

3.2 Market Efficiency

Define market efficiency as the proximity of expected prices to fundamental value.[10] A high-quality firm has a $\left(\frac{1}{2}+\frac{1}{2}\mu\right)$ chance of emitting signal i_g. B does not sell, and so the price is $\pi_m X$ with certainty. It has a $\left(\frac{1}{2}-\frac{1}{2}\mu\right)$ chance of emitting signal i_b, in which case B sells. If $u \leq \beta$ (which occurs w.p. $1-e^{-\lambda\beta}$), then $d \leq 0$ and the price is $\pi_b X$. Otherwise the price is $\pi_m X$. Hence

$$E[P \mid X] = X\pi_X,$$

where the expectation is taken over the possible realizations of i and u, and

$$\begin{aligned}\pi_X &= \left[\frac{1}{2}+\frac{1}{2}\mu+\left(\frac{1}{2}-\frac{1}{2}\mu\right)e^{-\lambda\beta}\right]\pi_m+\left(\frac{1}{2}-\frac{1}{2}\mu\right)\left(1-e^{-\lambda\beta}\right)\pi_b \leq 1 \\ &= \frac{1}{2}\left(\mu^2\frac{1-e^{-\lambda\beta}}{1+e^{-\lambda\beta}}+1\right). \end{aligned} \tag{7}$$

Since the fundamental value of a high-quality firm is X, market efficiency is increasing in π_X. Hence, we will use π_X as our measure of market efficiency.[11]

Proposition 1 *(Market Efficiency): Market efficiency π_X is maximized at $\alpha = \alpha^*$. It is increasing in α for $\alpha < \alpha^*$, and decreasing in α for $\alpha > \alpha^*$.*

Proof If $\alpha < \alpha^*$, then $\beta = \alpha$. Differentiating equation (7) with respect to α gives

$$\frac{\partial \pi_X}{\partial \alpha} = \underbrace{\frac{\mu^2\lambda e^{-\lambda\alpha}}{\left(1+e^{-\lambda\alpha}\right)^2}}_{\textit{trading effect}} + \underbrace{\frac{\mu^2\frac{\alpha\lambda}{1-\alpha}e^{-\lambda\alpha}}{\left(1+e^{-\lambda\alpha}\right)^2}}_{\textit{camouflage effect}} + \underbrace{\mu\frac{1-e^{-\lambda\alpha}}{1+e^{-\lambda\alpha}}\frac{\partial\mu}{\partial\alpha}}_{\textit{effort effect}}. \tag{8}$$

The "trading effect" is the direct impact of α. It is positive if and only if $\alpha < \alpha^*$: an increase in α raises her sale volume. Simply put, if B trades more, her trading (or non-trading) impounds more information into prices.

The "camouflage effect" operates indirectly through α decreasing liquidity. Since liquidity camouflages B's trades, this effect is positive for all levels of α, as a fall in liquidity increases her effect on prices.

The "effort effect" operates indirectly through α affecting μ. This effect is positive if and only if $\frac{\partial\mu}{\partial\alpha} > 0$, i.e., $\alpha < \alpha^*$. Increased effort leads to B receiving a more informative signal. Her trades thus convey greater information about V.

Overall, if $\alpha < \alpha^*$, all three effects are positive, and so an increase in α raises market efficiency.

[10] Note that the price is always efficient in the sense of equaling fundamental value conditional upon an information set. However, when α rises, this information set is richer and so prices are closer to fundamental value.

[11] An alternative measure is the difference in expected prices between the two firm types, i.e. $E[P \mid X] - E[P \mid 0]$. This leads to the same results.

If $\alpha > \alpha^*$, then $\beta = \frac{1}{\lambda}$. Differentiating with respect to α gives

$$\frac{\partial \pi_X}{\partial \alpha} = \underbrace{\mu \frac{1-e^{-1}}{1+e^{-1}} \frac{\partial \mu}{\partial \alpha}}_{\textit{effort effect}}.$$

From Lemma 2, the trading effect is negative, as liquidity is sufficiently low that B only sells $\frac{1}{\lambda}$, which is decreasing in α. The negative trading effect exactly cancels out the positive camouflage effect. This leaves the effort effect, which is negative from Lemma 2. ■

Even considering only the benefits of blockholders and ignoring their costs, the optimal block size is a finite level, α^*. This result contrasts with some intervention models such as Shleifer and Vishny (1986), Maug (1998) and Kahn and Winton (1998) where firm value is monotonically increasing in block size.[12] In this model, it is not block size *per se* that matters, but the associated optimal trading volume: prices are a function not of α, but $\min\left(\frac{1}{\lambda}, \alpha\right)$. A large block increases information revelation only to the extent that there is sufficient market liquidity to allow it to be sold entirely. Put differently, B's loyalty is less of a positive boost to the stock price if exit was difficult in the first place. This finite optimum is consistent with the finding that, while blockholders are common in the U.S. (Holderness (2007)), substantial blockholders are rare (La Porta et al. (1999)).

In reality, other market participants may be able to observe blockholders' sales with a lag, by studying Section 13 filings. This would strengthen B's impact on market efficiency. Since sales are only observed with a lag, B's profits from informed selling are unchanged. However, her price impact is greater: after the filing is made, the price moves even closer to fundamental value since the market can now observe the trade directly.

4 Blockholders and Long-Term Investment

The previous section linked blockholders to increased financial market efficiency. This section demonstrates that the latter can in turn augment real efficiency, by addressing the potentially important myopia issue. I thus illustrate a social benefit for information gathering that is motivated purely by the private desire to profit from informed trading.

The model is extended to allow for managerial decisions. The risk-neutral[13] manager (M) places weight ω on the $t = 2$ stock price and $1 - \omega$ on the $t = 3$ firm value, where $0 < \omega < 1$. Since this paper focuses on the solution to myopia rather than its cause, the concern with current stock price in particular ($\omega > 0$) is taken as exogenous. This is a standard assumption

[12] Holmstrom and Tirole (1993) and Bolton and von Thadden (1998) also derive a non-monotonic effect of block size. In their models, market efficiency is maximized with a zero block. They derive finite optimal block sizes as they trade off market efficiency against, respectively, monitoring costs and intervention. In this paper, the optimal block size is finite even focusing on market efficiency alone. Burkart, Gromb and Panunzi (1997) derive a finite optimal block size as too large a block can erode managerial initiative. In Pagano and Roell (1998), too large a block can lead to overmonitoring.

[13] Introducing managerial risk-aversion would strengthen the results, since the blockholder reduces the variance in the price of a high quality firm that emits s_b, as well as increasing its mean.

in the literature, motivated by a number of underlying factors;[14] these are not explicitly modeled so that the analysis can focus on the effect of blockholders on myopia.

At $t = 0$, the manager of a high-quality firm can invest in a long-term project that unambiguously creates fundamental value, but risks low interim earnings. The most natural example is intangible investment that is expensed and thus difficult to distinguish from losses made by a low-quality firm. Let $\theta \in [0, 1]$ denote the amount of investment. θ boosts the firm's $t = 3$ value to $V = X + g\theta$, but risks emitting s_b at $t = 1$ with probability θ^2 (otherwise, s_g is emitted). g measures the productivity of the investment project. The choice of θ does not involve a personal utility cost to M: there is no standard effort conflict.

At $t = 0$, the manager of a high-quality firm chooses θ to maximize

$$J = (1 - \omega)(X + g\theta) + \omega\theta^2\pi_X (X + g\theta) + \omega(1 - \theta^2)(X + g\theta).^{15} \tag{9}$$

$\pi_X (X + g\theta)$ is the expected price of the high-quality firm if it emits s_b. Its price is $\pi_m (X + g\theta)$ if $d > 0$; this in turn occurs if B receives i_g (which occurs with probability $\left(\frac{1}{2} + \frac{1}{2}\mu\right)$) or if B receives i_b (w.p. $\left(\frac{1}{2} - \frac{1}{2}\mu\right)$) and $u > \beta$ (w.p. $e^{-\lambda\beta}$). On the other hand, its price is $\pi_b (X + g\theta)$ if $d \leq 0$; this in turn occurs if B receives i_b and $u \leq \beta$ so that her sale of β turns total order flow negative.

Lemma 3 *M chooses investment level θ given by*

$$\theta = \min\left(\frac{\sqrt{X^2 + \frac{3g^2}{A}} - X}{3g}, 1\right), \tag{10}$$

where

$$A = \omega(1 - \pi_X) > 0. \tag{11}$$

If $\theta < 1$, it is increasing in g, and decreasing in X and ω.

The amount of long-term investment is naturally increasing in its productivity, and decreasing with the cost of emitting s_b. The latter is positively related to the difference in value between high- and low-quality firms X and M's concern for the current stock price ω.

[14]These include takeover threat (Stein (1988)), concern for managerial reputation (Narayanan (1985), Scharfstein and Stein (1990)), or the manager expecting to sell his own shares at $t = 2$ (Stein (1989)). In addition, $\omega > 0$ may occur if the manager risks being fired at $t = 2$ if earnings are low; such can be rational since losses can result from low managerial ability. A number of these factors, such as reputational concerns, are not a function of compensation policy and thus are difficult for the firm to control. Even if the manager's sole objective is to maximize long-run shareholder value, he will care about the stock price as it affects the terms at which the firm can raise equity at $t = 2$ (Stein (1996)).

[15]The probability that a firm with low earnings is of high quality is $\frac{1}{2}$. This probability results from the proportion of high quality firms in the entire economy and the frequency with which they emit s_b. I assume that the firm is atomistic and thus its investment decision has negligible effect on this probability, which remains $\frac{1}{2}$. Hence π_X remains as in equation (7). A previous version of this paper showed that the results continue to hold if the firm is non-atomistic and affects this probability, at the cost of significantly complicating the analysis.

Taking first-order conditions with respect to α, and calculating cross-partials with respect to g, c and ω leads to Proposition 2 below, the main result of the paper.

Proposition 2 *(Investment): If $\alpha = 0$, M invests efficiently ($\theta = 1$) if M's weight on the current stock price ω are sufficiently low, and the productivity of investment g is sufficiently high. If $\theta < 1$, investment is maximized when $\alpha = \alpha^*$ and increases with block size α if and only if $\alpha < \alpha^*$. The block-sensitivity of investment $\frac{\partial \theta}{\partial \alpha}$ is particularly large when g is high ($\frac{\partial^2 \theta}{\partial \alpha \partial g} > 0$), and c and ω are low ($\frac{\partial^2 \theta}{\partial \alpha \partial c} < 0$ and $\frac{\partial^2 \theta}{\partial \alpha \partial \omega} < 0$).*

Proof See the Appendix. ■

The central result of this paper is that blockholders can add value, even in the absence of an underlying effort conflict and the ability to intervene. By engaging in informed trading to maximize their own speculative profit, they can promote long-term investment. A larger block raises M's incentives to undertake positive-NPV long-term investment projects that risk interim turbulence, because the stock price fall upon emitting a bad signal is attenuated. For $\alpha < \alpha^*$, increasing block size raises market efficiency π_X (Proposition 1). From equations (10) and (11), a higher π_X in turn augments real efficiency.

While Proposition 2 shows that sizable shareholders promote investment, the corollary to this result is that a key cost of dispersed ownership is myopia, rather than the shirking traditionally focused upon (e.g., Roe (1994)). This has important policy implications: if effort is the main problem, equity compensation and a more active takeover market are potential solutions. However, if myopia is the principal issue, such measures make it worse.

The beneficial effect of a blockholder on investment, $\frac{\partial \theta}{\partial \alpha}$, is decreasing in c and thus increasing in information asymmetry. Where information asymmetry is high, the blockholder impounds more information into prices. The blockholder's impact is also increasing in the profitability of investment g up to a point ($\frac{\partial^2 \theta}{\partial \alpha \partial g} > 0$). However, if g is very high, $\theta = 1$ and $\frac{\partial \theta}{\partial \alpha} = 0$: the investment opportunity is sufficiently attractive that M pursues it fully even in the absence of a blockholder. In a similar vein, the impact of higher block size is greatest for moderate levels of ω. If M is greatly concerned with interim performance, he will still act myopically even in the presence of a blockholder ($\frac{\partial^2 \theta}{\partial \alpha \partial \omega} < 0$). On the other hand, if the stock price is not a concern, M invests efficiently in the first place.

4.1 Does Liquidity Deter Investment?

The previous section studied the optimal α for firm value, holding liquidity constant. This section now examines the effect of liquidity ν on investment. I first assume that α is exogenous and show that increasing ν boosts investment at low levels, but reduces it at high levels. Next, I allow α to be endogenously chosen by the blockholder in response to liquidity, in order to maximize her total payoff. In this case, increasing ν always boosts investment.

Even though, in reality, α is most likely to be endogenously chosen, the analysis with exogenous α is important to identify the source of the liquidity benefits. Maug (1998) was the first to show that liquidity is universally desirable when α is endogenous. However, if α is exogenous and high[16], increasing ν is harmful. Hence, in his model, the benefits of liquidity stem entirely due its effect on block size; liquidity is only desirable if block sizes are free to rise in response to greater liquidity.

In this paper, augmenting liquidity from low levels is beneficial even if α is exogenous, and so liquidity has benefits other than encouraging block formation. This result shows that liquidity can be desirable even if block size is restricted (e.g. owing to regulation or disclosure requirements) and unable to rise in response to increased liquidity. In the U.S., ownership is fragmented despite high liquidity, suggesting that other forces may restrict α; even if this is the case, liquidity can be beneficial.

4.1.1 Exogenous Block Size

Proposition 3 *(Liquidity, Exogenous Block Size): Holding α constant, market efficiency and investment are maximized at $\nu^* = \frac{\alpha}{1-\alpha}$. They are increasing (decreasing) in ν for $\nu < (>)\ \nu^*$.*

From Proposition 2, investment is increasing in market efficiency. Market efficiency in turn depends on two factors: how much information B gathers, and the extent to which this information is impounded into prices. While liquidity increases monitoring through augmenting trading profits, it also camouflages her trades and reduces their price impact. For low (high) levels of efficiency, the first (second) effect dominates. If there is zero liquidity, B does not monitor; if liquidity is infinite, she does not affect prices. The non-monotonic effect of liquidity contrasts with previous papers such as Holmstrom and Tirole (1993) and Faure-Grimaud and Gromb (2004), where augmenting liquidity always increases stock price informativeness. There is no camouflage effect as the informed investor's trades are unbounded; here, B's maximum sale is capped at α due to short-sales constraints.[17]

As summarized by Bhide (1993), liquidity is undesirable in most previous papers, where block size is exogenous and the blockholder chooses between intervention and intentional exit.[18] In such papers, the blockholder adds value through voice; since voice and exit are mutually exclusive, liquidity hinders the former by facilitating the latter. Here, the blockholder adds value through retaining her stake through interim turbulence, increasing investment ex ante. Since loyalty and exit are similarly mutually exclusive, it might seem that liquidity is also undesirable

[16] In Maug (1998), liquidity is undesirable if α is exogenous and exceeds $c_M / (H - L)$, where c_M is the cost of intervention, and $H - L$ is the gain in firm value from intervening. This condition is independent of liquidity, and so even if liquidity is initially low, raising liquidity can be harmful. In this paper, raising liquidity from low levels is always beneficial.

[17] Some previous blockholder models (where α is not endogenously chosen by B) also conclude liquidity is not unambiguously desirable. In Kahn and Winton (1998), liquidity has no effect, rather than a non-monotonic effect. Bolton and von Thadden (1998) do feature an optimal level of liquidity. This arises because greater liquidity means a lower stake: in their paper, liquidity is $(1 - \alpha)$, so higher liquidity can only be achieved by a lower α, which reduces intervention and thus firm value. In this paper, liquidity is $\nu(1 - \alpha)$ where ν captures factors that affect liquidity unrelated to free float. It shows that there is an optimal ν, even if α is constant.

[18] Faure-Grimaud and Gromb (2004) demonstrate that liquidity encourages intervention as it allows the stock price to reflect these value gains and thus the blockholder to earn a return if she has to exit unexpectedly, due to a liquidity shock. In their model, exit is not intentional.

in this model as it encourages exit. This is indeed the conventional wisdom: liquidity allows shareholders to sell upon weak earnings and thus makes managers even more concerned with earnings. A number of commentators (e.g., Porter (1992)) argued that the U.S.'s liquid capital markets deter long-term investment, and called for policy intervention to reduce liquidity.

This papers shows that, even holding α exogenous, increasing liquidity from low levels can promote investment, and thus has very different policy implications. Although loyalty and exit are indeed mutually exclusive, this paradoxically leads to complementarities between them. The power of loyalty relies on the threat of exit. By making exit more feasible, increased liquidity renders loyalty more meaningful. In this model, the blockholder does not promote investment simply by being a "long-term" investor who never sells; instead it is the possibility of selling in the short-run that encourages the manager to make long-term decisions. Indeed, if market illiquidity compelled the blockholder always to hold for the long-run, she has no effect on stock prices and investment. The fact that she has not sold upon bad news is uninformative if she is unable to sell in the first place.

This marks an important distinction from intervention models. If the blockholder has no control rights, allowing her to sell in the short-term is beneficial for firm value as it can promote investment. By contrast, if the blockholder is interventionist, the possibility of short-term selling may induce her to step in and force the manager to undertake myopic decisions. Therefore, not only is it unnecessary for blockholders to have control rights in order to add value to a firm, but it may also be undesirable: to the extent that blockholders have short-term considerations, they may add more value if they lack control rights.

A short-term blockholder without control rights might threaten to punish the manager by selling her stake if earnings are low (because of investment). However, such a threat is not credible as it is dynamically inconsistent: once the firm announces low earnings, they are immediately incorporated into the stock price, and so the blockholder cannot profit by selling. The argument against liquid stock markets assumes that it allows shareholders to sell upon interim losses, but this view lacks a theoretical framework to explain why investors would sell upon weak earnings. In an unbiased market, the stock price reacts immediately to public information such as earnings, and so there is no rational reason to exit upon short-term losses. Investors can only profit by trading on private information, and so trading is desirable as it impounds such information into the stock price: particularly if the trader has a sizable stake and so is likely have engaged in fundamental analysis.[19]

4.1.2 Endogenous Block Size

Thus far, the analysis has focused on the normative analysis of the block size that maximizes firm value, α^*. I now turn to the positive question of which block size is most likely to be

[19] Yan and Zhang (2007) show empirically that investors who trade frequently are better informed than those who rarely trade. Moreover, the stocks that they own do not exhibit long-run reversals, which is inconsistent with the view that they encourage short-termism. The frequent trading observed in the U.S. may thus be a positive sign, as it suggests that information is being impounded into prices.

observed empirically. In reality, α will be chosen by the blockholder to maximize her individual payoff. Therefore, the empirically observed block size will typically be the private optimum α_P^*, which I now derive.

As in Maug (1998), I assume that B owns no shares initially and buys α at $t = 0$; her purchase is fully observed. Selling shareholders will therefore demand the value of increased investment which will result from block formation (as in Grossman and Hart (1980)) but also be willing to accept an adverse selection discount since, if they continue to hold the shares, they will risk informed trading losses.

If B owns α, her expected total profits are given by:

$$\Theta(\alpha) = (1 - q + q\theta^2)(X + g\theta)\mu \frac{\beta e^{-\lambda\beta}}{1 + e^{-\lambda\beta}}.$$

This loss will be suffered by the $1 - \alpha$ atomistic shareholders, and so they expect to lose $\frac{1}{1-\alpha}\Theta(\alpha)$ per share. Expecting such losses, existing shareholders will be willing to sell for

$$P = V(\alpha) - \frac{1}{1-\alpha}\Theta(\alpha),$$

where

$$V(\alpha) = q(X + g\theta(\alpha)).$$

is firm value and q is the proportion of high-quality firms in the economy.

For her α shares, B thus pays $\alpha V(\alpha) - \frac{\alpha}{1-\alpha}\Theta(\alpha)$. They are worth $\alpha V(\alpha) + \Theta(\alpha) - \Psi(\alpha)$ to her, where

$$\Psi(\alpha) = \frac{1 - q + q\theta^2}{32c}\beta^2 X^2$$

is expected monitoring costs.[20] She thus chooses α_P^* to maximize her total payoff,

$$\frac{1}{1-\alpha}\Theta(\alpha) - \Psi(\alpha).$$

As in Maug (1998), her gross profits $\frac{1}{1-\alpha}\Theta(\alpha)$ are unrelated to V, owing to the Grossman and Hart (1980) free-rider problem. They stem instead from two sources. $\Theta(\alpha)$ is the actual trading profits that she realizes after acquiring the stake, and she earns $\frac{\alpha}{1-\alpha}\Theta(\alpha)$ because she buys her initial stake α at an adverse selection discount.

The solution is stated in Proposition 4 below:

Proposition 4 *(Liquidity, Endogenous Block Size): The privately optimal block size is* $\alpha_P^* = \frac{\nu}{\nu+1}$. *Allowing for the endogeneity of block size, investment* θ *is unambiguously increasing in liquidity* ν.

The earlier analysis considered firm value, $V(\alpha)$, and showed that $\alpha^* = \frac{\nu}{\nu+1}$ maximizes firm value. However, B's objective function is completely independent of V: she does not

[20]Note that $\Psi(\alpha)$ and $\Theta(\alpha)$ are total amounts, whereas $V(\alpha)$ is a per-share amount.

benefit from the improvement in firm value that results from her monitoring, since shareholders take this into account when deciding P. Instead, B is concerned only with her trading profits (including the adverse selection discount), net of monitoring costs $\Psi(\alpha)$. Curiously, even though these objective functions are quite different, the optimum is still the same. B has incentives to acquire the block size that is optimal for V, even though her payoff is independent of V. The key to this congruence is that informed trading is the very mechanism through which the blockholder adds value, and so the α that maximizes trading profits (and thus her objective function) also maximizes V. This result does not hold in models where the governance mechanism is "voice" rather than "exit."

Increasing liquidity raises the private optimum, α_P^*, which in turn augments market efficiency (and thus investment) through the effort and trading effects. However, higher liquidity also directly reduces market efficiency through the camouflage effect. Proposition 4 states that, overall, greater liquidity unambiguously boosts investment. This result echoes Maug (1998), who also shows that liquidity is always desirable when α is endogenous. However, our results for exogenous α are subtly different. In Maug (1998), if α is exogenously high, augmenting liquidity reduces firm value (even if liquidity is currently low), and so the benefits of liquidity operate entirely through their effect on initial block formation. In this paper, increasing liquidity from low levels (if $\nu < \frac{\alpha}{1-\alpha}$) unambiguously increases firm value even if α is exogenous.

In sum, there are two effects of greater liquidity. First, as Maug (1998) showed, it leads to greater blocks. Second, it leads to more liquid trading by those blocks. In Maug's effort model, when α is exogenously high and so liquidity only leads to liquid trading, increasing ν is undesirable. In a myopia model, Porter (1992) and Thurow (1993) argue that liquid trading is similarly undesirable as it leads to short-termism. By contrast, this paper shows that liquid trading alone can improve investment. The result that liquidity can be desirable even when α is exogenous is potentially important, because legal or institutional factors may deter B from endogenously setting $\alpha = \alpha_P^*$ and thus the first benefit from being obtained (see, e.g., Roe (1990)). For example, certain shareholders choose to hold fewer than 5% to avoid triggering a Section 13(d) filing, or hold fewer than 10% to avoid being classified as an insider. This paper shows that liquidity can be desirable even if it does not lead to Maug's advantage of more concentrated ownership owing to regulatory constraints.

4.2 Further Applications of the Investment Model

In the general model, θ is any action that boosts fundamental value but risks emitting s_b. Thus far, θ has been interpreted as intangible investment and s_b as short-term losses, but there are many additional applications. s_b is any observable action that reduces outsiders' assessment of firm quality since it is also consistent with a low-quality firm. Therefore, θ can represent fully observable investment for which the motive or quality is unknown. The fundamental problem with investment is that the associated expenditures are difficult to interpret, even if they are fully visible (Myers (1989)). While R&D can be reported separately on the income statement and costlessly observed by atomistic shareholders, they do not know whether a rise in R&D results from managerial excess (bad news about agency costs), the need to compensate for failed past R&D efforts (bad news about operating costs), or efficient exploitation of new growth opportunities (good news). Upon observing significant investment for which the motive is unclear, B will gather information and trade accordingly.

Low θ can also represent the pursuit of myopic actions which temporarily boost outsiders' perceptions, such as accounting manipulation, fraud or "milking" customer reputation through lowering product or service quality. Johnson et al. (2007) document a significant correlation between corporate fraud and unrestricted stock compensation, and Peng and Roell (2006) find that vested options encourage executives to manipulate earnings. Since the manager can sell unrestricted stock and exercise vested options immediately, such compensation increases ω. Allowing the manager of a low-quality firm to undertake a value-destructive action that gives a probability of yielding s_g (so that s_g is also imperfectly informative) would reinforce the results of the core model. The presence of a blockholder reduces the CEO's ability to deceive the market about his firm's quality, even in the short-run.

5 Empirical Implications

This paper's broad objective is to demonstrate that blockholders can add value even if they are unable to intervene, which potentially explains the prevalence of small blockholders in the U.S. While the model also generates a number of more specific empirical implications, it must be stressed that there are significant challenges in testing them. First, the key variable (block size) is endogenous, as shown in Section 4.1.2. Therefore, it is insufficient simply to document significant correlations between block size and an outcome variable. To show that blockholders have the effects predicted in the model, it is necessary to identify sources of exogenous variation in block size. Second, empirical tests will need to take into account the model's specific setting, i.e. exclude inside blockholders and blockholders who rarely trade on information (such as families or index funds), and focus on situations where short-sales costs are non-trivial.

The clearest implication of the model appears to be that blockholders should have superior information, earn higher returns, and their purchases (sales) should lead to stock price increases (decreases). Moreover, the magnitude of these effects should be concave in block size. This prediction is unique to a framework where blockholders add value through trading, rather than intervention, and where block size is a continuous variable. In standard microstructure models (e.g. Kyle (1985)), block size has no effect on information acquisition incentives. Blockholders thus generate no excess returns, and their sales are no more informative than any other investor's trades. Owing to the short-sales constraint introduced by this paper, private information is concave in block size. Bushee and Goodman (2007) indeed find that the private information content of an institutional investor's trade is increasing in block size, Heflin and Shaw (2000) and Rubin (2007) document that ownership concentration depresses liquidity as other market participants fear informed trading losses, and Jiambalvo, Rajgopal and Venkatachalam (2002) find that the extent to which stock prices reflect future (rather than current) earnings is positively related to institutional ownership.

As a result of their superior information, block sales should convey negative news and depress the stock price, unless these sales are motivated by non-informational reasons (considered later). Scholes (1972) and Mikkelson and Partch (1985) show that the negative stock price reaction to secondary block distributions is due to information, rather than the sudden increase in supply or a reduction in expected blockholder monitoring. Mikkelson and Partch (1985) further find that the negative price impact is increasing in the size of the block sold but not the blockholders' initial stake. This result supports the model's prediction that it is the amount traded that matters, not α *per se*.[21] Sias, Starks and Titman (2006) show that the positive correlation between institutional ownership changes and stock returns is causal, rather than institutions predicting future returns, or following short-term momentum strategies and responding to past returns. Moreover, they demonstrate that the price effects result from information, rather than liquidity or supply effects.

Although blockholders move prices, the model predicts that they still earn trading profits as the stock price is only partially revealing. Indeed, Parrino, Sias and Starks (2003) show that they sell in advance of forced CEO turnover (a sign of severe firm problems), and that long-horizon returns are negative after such sales. Institutions with larger positions sell to a greater degree, implying they are better informed. Chen, Harford and Li (2007) find that large shareholders sell in advance of value-destructive mergers.

Additional implications of the model are more challenging to test. Proposition 2 predicts that investment is concave in block size. The primary interpretation of θ is intangible investment, which presents empirical difficulties. Blockholders are particularly valuable in promoting unobservable investment, but such investment will also be invisible to the empiricist. A potential indirect measure is Tobin's q, which measures the capitalized value of growth opportunities. However, as explained in Section 4.2, θ can also represent observable investment. While the total quantity of R&D and capex can be verifiably communicated in financial statements, its quality cannot be. Even though CEOs can disclose the amount of investment, they still perceive strong disincentives to invest (Graham et al. (2005)), since atomistic shareholders cannot distinguish productive investment from wasteful expenditure. Indeed, Lee and O'Neill (2003) and Baysinger, Kosnik and Turk (1991) find a positive correlation between ownership concentration and R&D, and Lee (2005) finds the same result for patents in the U.S.[22]

However, α is endogenous and may be itself determined by R&D, or a third unobservable variable may have a causal effect on both variables. Thus, the above cross-sectional correlations

[21] α *per se* would matter if blockholders' superior information arises because their control rights grant them preferential access to information. In this paper, superior information arises from greater incentives to gather it.

[22] Hansen and Hill (1991), Bushee (1998) and Wahal and McConnell (2000) show a positive association between R&D and institutional ownership; the latter is typically highly correlated with blockholdings. Bushee also finds that myopia is driven by momentum investors who trade on current earnings and have small holdings.

can only be interpreted as tentative support for the model. A way of identifying causality could be to note that the empirically chosen α is likely to be the one chosen by the blockholder. While the paper shows that the private optimum equals the firm value optimum, factors outside the model (and unrelated to R&D) could cause the privately chosen α to shift from α_P^*. Examples include a negative liquidity shock, a sudden increase in surplus cash (from the sale of other holdings or investor inflows), temporary stock underpricing, a change in fund management, or a change in regulation. Indeed, Cronqvist and Fahlenbrach (2008) use a time-series approach, tracking the effect of changes in block ownership within a firm. They find that the appearance of certain blockholders in a corporation subsequently leads to a significant increase in investment. One potential argument against their causal interpretation is that blockholders face substantial barriers to intervention. This paper shows that causation is possible without intervention: the arrival of the blockholder allows the manager to pursue investment projects that he previously avoided owing to fears of interim turbulence. Becker, Cronqvist and Fahlenbrach (2008) use a geographic instrument to identify exogenous changes in α.

Section 4.2 also notes that low θ can also be interpreted as the pursuit of actions that reduce fundamental value but increase investors' short-term perceptions of the firm, such as accounting manipulation. Blockholders will "see through" such actions and thus deter them. Burns et al. (2006) find that ownership concentration is correlated with fewer and less severe financial restatements. By contrast, dispersed quasi-indexing institutions are positively associated with restatements, likely because they trade on publicly announced earnings rather than studying fundamental value. Dechow, Sloan and Sweeney (1996) and Farber (2005) find that firms identified by the SEC as fraudulently manipulating earnings have lower blockholdings. Again, such cross-sectional correlations can only be interpreted as weak support of the model since earnings manipulation may deter blockholders. A definitive test of this prediction requires an instrument for block size.

In a similar vein to Proposition 2, Proposition 1 predicts that price efficiency is concave in block size. Amihud and Li (2006) find that the price reaction to dividends is decreasing in institutional ownership (which is typically highly correlated with blockholdings); their interpretation is that institutional investors have already gathered and traded upon the information that would be conveyed by the dividend change. A similar test could focus on the stock price reaction to earnings announcements. Event-drift is another measure of price efficiency; Bartov, Radhakrishnan and Krinsky (2000) find that post-earnings announcement drift is lower in the presence of greater institutional ownership. Again, such correlations need not imply causation; inefficient prices could attract blockholders as the potential for trading profits is higher. Boehmer and Kelley (2007) document a causal positive relationship between institutional ownership and price efficiency. Both institutional trading and the level of institutional holdings (in the absence of trading) are associated with efficiency. This is consistent with the model, since blockholders can increase price efficiency either by trading on bad news, or not trading on good news.

An additional implication arises if price efficiency is the explanatory variable. The model predicts that price efficiency should lead to greater investment and lower earnings management. This prediction may have fewer endogeneity concerns than the prediction for block size and investment, since reverse causality to price efficiency seems less plausible.

I now turn to the predicted relationship between block size and firm value. As stated in Proposition 4, blockholders have a private incentive to endogenously choose the block size that maximizes firm value. If block size is always at the firm value optimum, there should be no relationship (as noted by Demsetz and Lehn (1985) in the context of managerial ownership and firm value). However, as discussed earlier, certain factors such as liquidity shocks may cause the privately chosen stake to shift from the firm value optimum. If we allow for the possibility of such deviations, this generates the cross-sectional prediction that firm value is concave in block size. While other papers show that too large a block can be inefficient, in some of these papers the inefficiencies arise from the loss of private benefits (Pagano and Roell (1998)) or underdiversification, which are not included in the stock price. Therefore, these papers would not generate this prediction. However, Burkart, Gromb and Panunzi (1997) do share the prediction that firm value is concave in block size, since too large a block reduces managerial initiative.

The time-series analog of the above prediction is that unanticipated block increases (decreases) in block size should generate positive (negative) event-study reactions when initial block size is low, but the effects are reversed when initial block size is high. Changes in block size may represent exogenous changes to the private optimum (e.g. liquidity shocks) which move it closer to or further from the firm value optimum. Moreover, the absolute magnitude of these changes should be increasing in growth opportunities and information asymmetry. Models where firm value is monotonically increasing in block size would predict that rises in block size would always have a positive effect.

Testing this prediction requires identification of changes in block size that are not motivated by information. (As noted earlier, information-based purchases and sales should cause price reactions in the same direction as the trade, regardless of initial block size.) Wruck (1989) therefore focuses on private sales of equity: since the purchaser is buying a large stake, he will undertake extensive due diligence to ensure he is not trading against unreleased information. She finds that increases in ownership concentration lead to increases (decreases) in firm value for low (moderate) levels of initial concentration, consistent with this paper (and also with Burkart, Gromb and Panunzi (1997)).

6 Conclusion

The traditional view of corporate governance is that it is exerted through direct intervention in a firm's operations. Under such a view, concentrated shareholders are desirable as they have both the incentives and control rights to intervene. However, the dominant shareholding structure in the U.S. is one of small blockholders. Compounded with substantial legal and institutional impediments to intervention, it might appear that U.S. firms are poorly governed and their blockholders play a limited role.

This paper offers a different perspective. It shows that blockholders can significantly enhance firm value even if they lack control rights. By gathering and trading on non-verifiable information, they cause prices to reflect fundamental value rather than current earnings. This can encourage managers to undertake long-term, intangible investment – arguably the primary challenge facing the modern firm.

In the 1980s and early 1990s, many commentators predicted that the U.S. economy would be surpassed by Japan, particularly in R&D-intensive industries, as its liquid capital markets were argued to be a deterrent to investment. This paper shows that short-term trading may in fact support long-term investment, as it impounds its effects into stock prices. Thus the U.S. capital allocation system may be significantly more investment-friendly than widely believed, potentially explaining why the above fears have not materialized. Any policy interventions should be targeted towards encouraging larger stakes, rather than inhibiting trading.

While the core model focuses on the effect of blockholders on myopia, the trading mechanism in the paper can attenuate many other agency problems, such as shirking (see, e.g., Admati and Pfleiderer (2008) and Edmans and Manso (2008)).[23] Even more broadly, the model suggests how any agent that gathers information about fundamental value and incorporates it into prices can improve managers' ex ante decisions and thus real efficiency. This illustrates a social benefit of short-sellers (such as hedge funds) and equity analysts, although these actors also reduce the incremental role for blockholders.

The paper suggests a number of potential avenues for future research. On the theoretical side, one limitation is that it focuses on a single blockholder, but empirically many firms are held by more than one blockholder. Edmans and Manso (2008) show that splitting a stake between multiple blockholders increases price informativeness and firm value, and thus generate multiple blockholders as an optimal shareholding structure. In addition, it may be interesting to endogenize the manager's compensation contract though the addition of other agency problems, and examine the interplay between block size and compensation. On the empirical side, the paper generates a number of predictions for the effect of blockholders on firm value and investment, although empirical testing will require identification of exogenous shifts in block size. In addition, the model suggests that new directions for empirical research may arise from perceiving blockholders as informed traders rather than controlling entities. They should therefore generate trading profits and augment price efficiency.

[23]The model can thus reconcile evidence on blockholders' low ability to intervene (Black (1990), La Porta et al. (1999) and Becht et al. (2006)) with ample studies which show that blockholders affect corpoate decisions. See, for example, Qiu (2007) and Chen, Harford and Li (2007) on the beneficial effect of institutions on M&A decisions, and Cronqvist and Fahlenbrach (2006) on their influence of corporate policies in general. Chen et al. show this benefit is increasing in block size and the absence of business ties (which is related to the threat of exit).

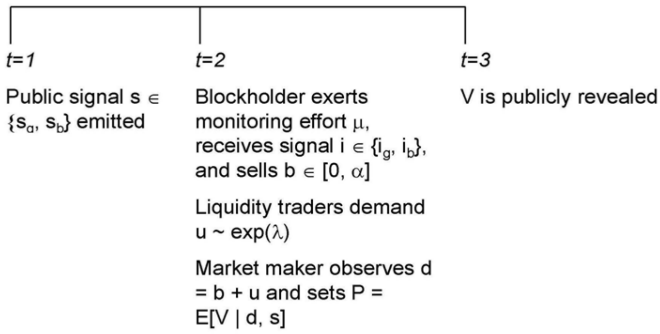

Figure 1: Timeline of model

A Proofs

Proof of Lemma 1

Let $\widehat{\beta}$ denote the market maker's conjecture about the amount sold by B upon receiving i_b, and $\widehat{\mu}$ denote the conjectured monitoring effort. If $d \leq 0$, the market maker knows that B has sold, and thus received i_b. If $d > 0$, the posterior probability that i_g was received is

$$\Pr(i_g|d>0) = \frac{\lambda e^{-\lambda d}\Pr(i_g)}{\lambda e^{-\lambda d}\Pr(i_g) + \lambda e^{-\lambda(d+\widehat{\beta})}\Pr(i_b)}.$$

Using $\Pr(X|d>0) = \Pr(X|i_g)\Pr(i_g|d>0) + \Pr(X|i_b)\Pr(i_b|d>0)$, we eventually obtain

$$\Pr(X|d>0) = \frac{1+e^{-\lambda\widehat{\beta}} + \widehat{\mu}\left(1-e^{-\lambda\widehat{\beta}}\right)}{2\left(1+e^{-\lambda\widehat{\beta}}\right)}.$$

Hence the market maker sets the following prices:

$$\begin{cases} P = \frac{1-\widehat{\mu}}{2}X \text{ if } d \leq 0 \\ P = \frac{1+e^{-\lambda\widehat{\beta}}+\widehat{\mu}\left(1-e^{-\lambda\widehat{\beta}}\right)}{2\left(1+e^{-\lambda\widehat{\beta}}\right)}X \text{ if } d > 0. \end{cases}$$

If B has received i_b, the firm is worth $P = \frac{1-\mu}{2}X$ to her. Since the market maker's conjecture is correct in equilibrium, $\widehat{\mu} = \mu$ and so B makes zero profit if $d \leq 0$. She only makes a profit if $d > 0$, i.e. $u > \beta$, which occurs with probability $e^{-\lambda\beta}$. Her objective function is therefore

$$\max_{\beta\leq\alpha} \beta X \int_{\beta}^{\infty} \left[\frac{1+e^{-\lambda\widehat{\beta}}+\widehat{\mu}\left(1-e^{-\lambda\widehat{\beta}}\right)}{2\left(1+e^{-\lambda\widehat{\beta}}\right)} - \frac{1-\mu}{2}\right]\lambda e^{-\lambda u}du.$$

The optimum is given by

$$\beta = \begin{cases} \alpha \text{ if } \alpha \leq \frac{1}{\lambda} \\ \frac{1}{\lambda} \text{ if } \alpha > \frac{1}{\lambda}, \end{cases}$$

as in equation (5). Since the market maker's belief is correct in equilibrium, $\widehat{\beta} = \beta$.

Now consider B's monitoring decision. Net of monitoring costs, B's profits are given by:

$$\begin{aligned} &\Pr(i_b)\beta\left[\Pr(u>\beta)(P|d>0) + \Pr(u\leq\beta)(P|d\leq 0) - E[V|i_b]\right] - \frac{1}{2}c\mu^2 \\ &= \frac{1}{2}\beta X\left[e^{-\lambda\beta}\frac{1+e^{-\lambda\beta}+\widehat{\mu}\left(1-e^{-\lambda\beta}\right)}{2\left(1+e^{-\lambda\beta}\right)} + \left(1-e^{-\lambda\beta}\right)\frac{1-\widehat{\mu}}{2} - \frac{1-\mu}{2}\right] - \frac{1}{2}c\mu^2, \end{aligned} \qquad (12)$$

where the first $\frac{1}{2}$ is the probability that i_b is received and $e^{-\lambda\beta}$ is the probability that $u > \beta$. Differentiating with respect to μ and then setting $\widehat{\mu} = \mu$ derives the optimal μ yields

$$\mu = \frac{\beta X}{4c},$$

as given by (4). (We take the positive root in the quadratic formula since $\mu \in [0, 1]$.)

Proof of Lemma 2 (Blockholder's stake that maximizes trading and effort)

The blockholder's trade is

$$\beta = \min\left(\nu(1-\alpha), \alpha\right)$$

This is maximized at $\nu(1-\alpha) = \alpha$, i.e. $\alpha = \frac{\nu}{\nu+1}$. Since $\alpha = \frac{\nu}{\nu+1}$ maximizes β, it also maximizes $\mu = \frac{\beta X}{4c}$.

Proof of Lemma 3 (Project Choice)

Taking first-order conditions with respect to θ yields

$$\frac{\partial J}{\partial \theta} = (1-\omega)g + \omega(1-\theta^2)g + \omega\theta^2\pi_X g - 2\omega\theta(X + g\theta)(1-\pi_X). \tag{13}$$

The first term represents the increase in V. The second term reflects the rise in P if s_g is emitted. The third term stems from the higher stock price if s_b is emitted, since it may have been given by a high-quality firm now worth $X + g\theta$. The fourth term is the only negative term, which results from the increased probability of giving s_b.

The non-trivial case is $\theta < 1$. Let $A = \omega(1-\pi_X) > 0$.Setting the first-order condition (13) to zero, applying the quadratic formula and taking the positive root (since $\theta \geq 0$) leads to equation (10):

$$\theta = \min\left(\frac{\sqrt{X^2 + \frac{3g^2}{A}} - X}{3g}, 1\right)$$

For $\theta < 1$, the partial derivatives are as follows (noting that $\sqrt{X^2 + \frac{3g^2}{A}} > X$ to ascertain their signs):

$$\frac{\partial \theta}{\partial g} = \frac{X}{3g^2} - \frac{X^2}{3g^2\sqrt{X^2 + \frac{3g^2}{A}}} > 0 \tag{14}$$

$$\frac{\partial \theta}{\partial \omega} = \frac{\partial \theta}{\partial A}\frac{\partial A}{\partial \omega} = -\frac{g}{2A^2\sqrt{X^2 + \frac{3g^2}{A}}}(1-\pi_X) < 0$$

$$\frac{\partial \theta}{\partial X} = \frac{1}{3g}\left[\frac{X}{2\sqrt{X^2 + \frac{3g^2}{A}}} - 1\right] < 0.$$

Proof of Proposition 2 (Investment)

Assume $\theta < 1$. Differentiating (10) with respect to α yields

$$\frac{\partial \theta}{\partial \alpha} = \frac{\partial \theta}{\partial A}\frac{\partial A}{\partial \alpha}, \tag{15}$$

where

$$\frac{\partial \theta}{\partial A} = -\frac{1}{2A^2\sqrt{\left(\frac{X}{g}\right)^2 + \frac{3}{A}}}, \tag{16}$$

$$\frac{\partial A}{\partial \alpha} = -\omega \frac{\partial \pi_X}{\partial \alpha}.$$

Hence, $\frac{\partial \theta}{\partial \alpha}$ has the same sign as $\frac{\partial \pi_X}{\partial \alpha}$. From Proposition 1, θ is therefore increasing (decreasing) in α if $\alpha > (<)\ \alpha^*$.

For the cross-partials, we have

$$\frac{\partial^2 \theta}{\partial \alpha \partial g} = \frac{\partial^2 \theta}{\partial A \partial g}\frac{\partial A}{\partial \alpha} = -\frac{1}{2A^2}\frac{X^2}{\left(\sqrt{X^2 + \frac{3g^2}{A}}\right)^3}\frac{\partial A}{\partial \alpha} > 0,$$

$$\frac{\partial^2 \theta}{\partial \alpha \partial \omega} = \frac{\partial^2 \theta}{\partial A \partial \omega}\frac{\partial A}{\partial \alpha} = \frac{1}{4}\left(\frac{1}{A^2\sqrt{\left(\frac{X}{g}\right)^2 + \frac{3}{A}}}\right)^3 \left(\frac{4A^3X^2}{g^2} + 9A^2\right)(1-\pi_X)\frac{\partial A}{\partial \alpha} < 0,$$

$$\frac{\partial^2 \theta}{\partial \alpha \partial c} = \frac{\partial\left(\frac{\partial \theta}{\partial \alpha}\right)}{\partial c} = \frac{\omega}{2A^2\sqrt{\left(\frac{X}{g}\right)^2 + \frac{3}{A}}}\frac{\partial^2 \pi_X}{\partial \alpha \partial c} < 0.$$

$\frac{\partial^2 \pi_X}{\partial \alpha \partial c} < 0$ since $\frac{\partial \mu}{\partial \alpha} = \frac{X}{4c}$ for $\alpha < \alpha^*$ and so a rise in c reduces the effort effect.

Proof of Proposition 3 (Liquidity, Exogenous Block Size)

From equation (7), the measure of market efficiency is

$$\pi_X = \frac{1}{2}\left(\mu^2 \frac{1 - e^{-\lambda\beta}}{1 + e^{-\lambda\beta}} + 1\right). \tag{17}$$

If $\alpha \leq \frac{\nu}{\nu+1}$, then $\beta = \alpha$ and so $\mu = \frac{\alpha X}{4c}$. The derivative with respect to ν is:

$$\frac{\partial \pi_X}{\partial \nu} = -\frac{\mu^2 J \frac{\alpha\lambda}{\nu}}{(1+J)^2} < 0.$$

where $J = e^{-\frac{\alpha}{\nu(1-\alpha)}}$, which is the negative camouflage effect. Thus, market efficiency is maximized at the lowest possible ν. If $\alpha \leq \frac{\nu}{\nu+1}$, then $\nu \geq \frac{\alpha}{1-\alpha}$ and so the lowest possible ν is $\frac{\alpha}{1-\alpha}$.

If $\alpha > \frac{\nu}{\nu+1}$, then $\beta = \frac{1}{\lambda}$ and so $\mu = \frac{X}{4c\lambda}$, which is increasing in ν, i.e. $\frac{\partial \mu}{\partial \nu} > 0$. Differentiating (17) with respect to ν gives

$$\mu \frac{1-e^{-1}}{1+e^{-1}} \frac{\partial \mu}{\partial \nu} > 0,$$

which reflects the beneficial effects of liquidity on effort. If $\alpha > \frac{\nu}{\nu+1}$, then $\nu < \frac{\alpha}{1-\alpha}$ and so the highest possible ν is $\frac{\alpha}{1-\alpha}$. In both cases, $\nu = \frac{\alpha}{1-\alpha}$ maximizes market efficiency. From equations (10) and (11), increasing π_X in turn augments θ.

Proof of Proposition 4 (Liquidity, Endogenous Block Size)

We first consider the case of $\alpha \leq \frac{1}{\lambda}$ so $\alpha \leq \frac{\nu}{\nu+1} \leq \frac{1}{2}$ and $\beta = \alpha$. B's objective function is

$$\begin{aligned} &\frac{1-q+q\theta^2}{4c}\left[\alpha^2 X \frac{X+g\theta}{1-\alpha}\frac{J}{1+J} - \frac{\alpha^2 X^2}{8}\right] \\ &= \frac{1-q+q\theta^2}{4c}\left[\alpha^2 X^2\left(\frac{J}{1+J}\frac{1}{1-\alpha} - \frac{1}{8}\right) + \frac{\alpha^2 g\theta X}{1-\alpha}\frac{J}{1+J}\right]. \end{aligned} \tag{18}$$

Differentiating (18) with respect to α (and dropping the constant $\frac{1}{4c}$) yields

$$\begin{aligned} &2q\theta\frac{\partial\theta}{\partial\alpha}\left[\alpha^2 X^2\left(\frac{J}{1+J}\frac{1}{1-\alpha} - \frac{1}{8}\right) + gX\frac{\alpha^2\theta}{(1-\alpha)}\frac{J}{1+J}\right] \\ &+ (1-q+q\theta^2)\frac{\partial}{\partial\alpha}\left[\alpha^2 X^2\left(\frac{J}{1+J}\frac{1}{1-\alpha} - \frac{1}{8}\right)\right] \\ &+ (1-q+q\theta^2)gX\frac{\partial}{\partial\alpha}\left[\frac{\alpha^2}{(1-\alpha)}\theta\frac{J}{1+J}\right]. \end{aligned} \tag{19}$$

The first term in (19) is positive since $\frac{\partial\theta}{\partial\alpha} > 0$ (because $\alpha \leq \frac{\nu}{\nu+1}$) and the term in square brackets is also positive, since it is proportional to the objective function. To prove the third term is positive, we calculate

$$\frac{\partial}{\partial\alpha}\left[\frac{\alpha^2}{(1-\alpha)}\theta\frac{J}{1+J}\right] = \frac{\partial\theta}{\partial\alpha}\left[\frac{\alpha^2}{(1-\alpha)}\frac{J}{1+J}\right] + \frac{\partial}{\partial\alpha}\left[\frac{\alpha^2}{(1-\alpha)}\right]\theta\frac{J}{1+J} + \frac{\partial}{\partial\alpha}\left[\frac{J}{1+J}\right]\frac{\alpha^2}{(1-\alpha)}\theta.$$

The first term is positive. The sum of the last two terms (canceling θ) is

$$\frac{\alpha}{(1-\alpha)^2}\frac{J}{1+J}\left[(2-\alpha) - \frac{\alpha\lambda}{1+J}\right].$$

Since $\alpha\lambda < 1$ and $J > 0$, $(2-\alpha) - \dfrac{\alpha\lambda}{1+J} > 0$, and so the third term in (19) is positive. Hence, to prove that (19) is overall positive, it is sufficient to show that the second term is positive, i.e.

$$\frac{\partial}{\partial \alpha}\left[\alpha^2 X^2\left(\frac{J}{1+J}\frac{1}{1-\alpha}-\frac{1}{8}\right)\right]>0.$$

Differentiating this with respect to α yields

$$2\alpha X^2\left[\frac{J}{1+J}\frac{1}{1-\alpha}-\frac{1}{8}\right]+\alpha^2 X^2\left[-\frac{J\frac{\lambda}{1-\alpha}}{(1+J)^2}\frac{1}{1-\alpha}+\frac{J}{1+J}\frac{1}{(1-\alpha)^2}\right],$$

which has the same sign as

$$\frac{J}{1+J}\frac{1}{1-\alpha}\left[1-\frac{\alpha\lambda}{2(1+J)(1-\alpha)}+\frac{\alpha}{2(1-\alpha)}\right]-\frac{1}{8}. \tag{20}$$

To prove that (20) is positive, it is sufficient to show that this is true when $\frac{J}{1+J}\frac{1}{1-\alpha}$ is at its smallest possible value. Since $0\le\alpha\le\frac{\nu}{\nu+1}$ and $\frac{J}{1+J}$ is decreasing in α, it can be no lower than $\frac{e^{-1}}{1+e^{-1}}$. Similarly, $\frac{1}{1-\alpha}$ can be no lower than 1, and so $\frac{J}{1+J}\frac{1}{1-\alpha}\ge\frac{e^{-1}}{1+e^{-1}}\simeq 0.27$.[24]

Moreover, since $\alpha\lambda<1$ and $J>0$, $\frac{\alpha\lambda}{2(1+J)(1-\alpha)}<\frac{1}{2(1-\alpha)}$. Then (20) is greater than

$$\frac{e^{-1}}{1+e^{-1}}\left[1-\frac{1}{2(1-\alpha)}+\frac{\alpha}{2(1-\alpha)}\right]-\frac{1}{8}\ge\frac{e^{-1}}{1+e^{-1}}\left[1-\frac{1}{2}\right]-\frac{1}{8}>0.$$

Hence (19) is positive, and so B wishes to set α as high as possible, i.e. $\alpha_P^*=\frac{\nu}{\nu+1}$. B could also choose $\alpha>\frac{1}{\lambda}$ and so $\beta=\frac{1}{\lambda}$. B's objective function therefore becomes

$$\begin{aligned}&\frac{1-q+q\theta^2}{4c}\left[\frac{X}{\lambda^2}\frac{X+g\theta}{1-\alpha}\frac{e^{-1}}{1+e^{-1}}-\frac{X^2}{8\lambda^2}\right]\\&=\frac{1-q+q\theta^2}{4c}\left[X\left(X+g\theta\right)\nu^2(1-\alpha)\frac{e^{-1}}{1+e^{-1}}-\frac{X^2\nu^2(1-\alpha)^2}{8}\right].\end{aligned} \tag{21}$$

Differentiating the above with respect to α (and dropping the constant $\frac{1}{4c}$) yields

$$\begin{aligned}&2q\theta\frac{\partial\theta}{\partial\alpha}\left[X^2\left(\nu^2(1-\alpha)\frac{e^{-1}}{1+e^{-1}}-\frac{\nu^2(1-\alpha)^2}{8}\right)+g\theta X\nu^2(1-\alpha)\frac{e^{-1}}{1+e^{-1}}\right]\\&+(1-q+q\theta^2)\frac{\partial}{\partial\alpha}\left[X^2\left(\nu^2(1-\alpha)\frac{e^{-1}}{1+e^{-1}}-\frac{\nu^2(1-\alpha)^2}{8}\right)\right]\\&+(1-q+q\theta^2)gX\frac{\partial}{\partial\alpha}\left[\nu^2(1-\alpha)\theta\frac{e^{-1}}{1+e^{-1}}\right].\end{aligned} \tag{22}$$

The first term is negative since $\frac{\partial\theta}{\partial\alpha}$ for $\alpha>\frac{\nu}{\nu+1}$, and the third term is also negative. Hence, it is sufficient to show that

[24] Of course, the value of α that minimizes $\frac{1}{1-\alpha}$ does not also minimize $\frac{J}{1+J}$. Thus, $\frac{J}{1+J}\frac{1}{1-\alpha}$ will be strictly higher than $\frac{e^{-1}}{1+e^{-1}}$. This does not affect our analysis; it is sufficient for $\frac{J}{1+J}\frac{1}{1-\alpha}$ to be never lower than $\frac{e^{-1}}{1+e^{-1}}$.

$$\frac{\partial}{\partial \alpha}\left[X^2\left(\nu^2(1-\alpha)\frac{e^{-1}}{1+e^{-1}}-\frac{\nu^2(1-\alpha)^2}{8}\right)\right]<0$$

Ignoring constants, this derivative is

$$-\frac{e^{-1}}{1+e^{-1}}+\frac{2(1-\alpha)}{8}.$$

Since $\alpha \geq 0$, it can be no greater than

$$-\frac{e^{-1}}{1+e^{-1}}+\frac{1}{4}<0.$$

Hence (22) is negative, and B wishes to set α as low as possible, i.e. at $\frac{\nu}{\nu+1}$. Thus $\alpha_P^*=\frac{\nu}{\nu+1}$ is the global optimum, and is increasing in ν.

From equations (10) and (11), investment θ is monotonic in π_X. In turn,

$$\pi_X=\frac{1}{2}\left(\frac{\alpha_P^{*2}X^2}{16c^2}\frac{1-e^{-\frac{\alpha_P^*}{\nu(1-\alpha_P^*)}}}{1+e^{-\frac{\alpha_P^*}{\nu(1-\alpha_P^*)}}}+1\right).$$

Ignoring constants, we have

$$\frac{\partial \pi_X}{\partial \nu}=\frac{\alpha X^2}{8c^2}\left[\frac{\partial \alpha_P^*}{\partial \nu}\frac{1-J}{1+J}-\frac{\alpha_P^* Z}{(1+J)^2}\right]$$

where

$$Z=\frac{\partial J}{\partial \nu}=-J\frac{\nu\frac{\partial \alpha_P^*}{\partial \nu}-\alpha_P^*\left(1-\alpha_P^*\right)}{\nu^2(1-\alpha_P^*)^2}.$$

Since $\alpha_P^*=\frac{\nu}{\nu+1}$, $\frac{\partial \alpha_P^*}{\partial \nu}=\frac{1}{(\nu+1)^2}$. Since $\alpha_P^*\left(1-\alpha_P^*\right)=\frac{\nu}{(\nu+1)^2}$, we have $Z=0$. Thus $\frac{\partial \pi_X}{\partial \nu}$ has the same sign as $\frac{\partial \alpha_P^*}{\partial \nu}$, and is also positive.

References

[1] Admati, Anat and Paul Pfleiderer (2008): "The "Wall Street Walk" and Shareholder Activism: Exit as a Form of Voice." *Review of Financial Studies*, forthcoming

[2] Admati, Anat, Paul Pfleiderer and Josef Zechner (1994): "Large Shareholder Activism, Risk Sharing, and Financial Market Equilibrium." *Journal of Political Economy* 102, 1097-1130

[3] Allen, Franklin, Antonio Bernardo and Ivo Welch (2000): "A Theory of Dividends Based on Tax Clienteles." *Journal of Finance* 55, 2499-2536

[4] Amihud, Yakov and Kefei Li (2006): "The Declining Information Content of Dividend Announcements and the Effects of Institutional Holdings." *Journal of Financial and Quantitative Analysis* 41, 637-660

[5] Barclay, Michael and Clifford Holderness (1989): "Private Benefits From Control of Public Corporations." *Journal of Financial Economics* 25, 371-395

[6] Barclay, Michael and Clifford Holderness (1991): "Negotiated Block Trades and Corporate Control." *Journal of Finance* 46, 861-878

[7] Barlevy, Gadi and Pietro Veronesi (2000): "Information Acquisition in Financial Markets." *Review of Economic Studies* 67, 79-90

[8] Bartov, Eli, Suresh Radhakrishnan and Itzhak Krinsky (2000): "Investor Sophistication and Patterns in Stock Returns After Earnings Announcements." *The Accounting Review* 75, 43-63

[9] Baysinger, Barry, Rita Kosnik and Thomas Turk (1991): "Effects of Board and Ownership Structure on Corporate R&D Strategy." *Academy of Management Journal* 34, 205-214

[10] Becht, Marco, Julian Franks, Colin Mayer and Stefano Rossi (2008): "Returns to Shareholder Activism: Evidence from a Clinical Study of the Hermes UK Focus Fund." *Review of Financial Studies*, forthcoming

[11] Becker, Bo, Henrik Cronqvist and Rüdiger Fahlenbrach (2008): "Estimating the Effect of Large Shareholders Using a Geographic Instrument." Working Paper, University of Illinois at Urbana-Champaign

[12] Berle, Adolf and Gardner Means (1932): "The Modern Corporation and Private Property." MacMillan, New York

[13] Bernhardt, Dan, Burton Hollifield and Eric Hughson (1995): "Investment and Insider Trading". *Review of Financial Studies* 8, 501-543

[14] Bhide, Amar (1993): "The Hidden Costs of Stock Market Liquidity." *Journal of Financial Economics* 34, 31-51

[15] Black, Bernard (1990): "Shareholder Passivity Reexamined." *Michigan Law Review* 89, 520-608

[16] Boehmer, Ekkehart and Eric Kelley (2007): "Institutional Investors and the Informational Efficiency of Prices." Working Paper, Texas A&M University

[17] Bolton, Patrick and Ernst-Ludwig von Thadden (1998): "Blocks, Liquidity, and Corporate Control." *Journal of Finance* 53, 1-25

[18] Burkart, Mike, Denis Gromb and Fausto Panunzi (1997): "Large Shareholders, Monitoring, and the Value of the Firm." *Quarterly Journal of Economics* 112, 693-728

[19] Burns, Natasha, Simi Kedia and Marc Lipson (2006): "The Effects of Institutional Ownership on Financial Reporting Practices." Working Paper, University of Georgia

[20] Bushee, Brian and Theodore Goodman (2007): "Which Institutional Investors Trade Based on Private Information About Earnings and Returns?" *Journal of Accounting Research* 45, 289-321

[21] Chen, Qi, Itay Goldstein and Wei Jiang (2006): "Price Informativeness and Investment Sensitivity to Stock Price." *Review of Financial Studies*, forthcoming

[22] Chen, Xia, Jarrad Harford and Kai Li (2007): "Monitoring: Which Institutions Matter?" *Journal of Financial Economics* 86, 279-305

[23] Cronqvist, Henrik and Rüdiger Fahlenbrach (2008): "Large Shareholders and Corporate Policies." *Review of Financial Studies*, forthcoming

[24] Dechow, Patricia, Richard Sloan and Amy Sweeney (1996): "Causes and Consequences of Earnings Manipulation: An Analysis of Firms Subject to Enforcement Actions by the SEC." *Contemporary Accounting Research* 13, 1-36

[25] Demsetz, Harold and Kenneth Lehn, 1985, "The Structure of Corporate Ownership: Causes and Consequences." *Journal of Political Economy* 93, 1155-1177

[26] Dow, James and Gary Gorton (1997): "Stock Market Efficiency and Economic Efficiency: Is There a Connection?" *Journal of Finance* 52, 1087-1129

[27] Dow, James, Itay Goldstein and Alexander Guembel (2007): "Incentives for Information Production in Markets where Prices Affect Real Investment." Working Paper, London Business School

[28] Durnev, Art, Randall Morck, and Bernard Yeung (2004): "Value-Enhancing Capital Budgeting and Firm-Specific Stock Return Variation." *Journal of Finance* 59, 65-105

[29] Edmans, Alex (2007): "Leverage, Ownership Concentration, and the Tension Between Liquidation and Investment." Working Paper, University of Pennslyvania

[30] Edmans, Alex and Gustavo Manso (2007): "Governance Through Exit and Voice: A Theory of Multiple Blockholders." Working Paper, University of Pennslyvania

[31] Farber, David (2005): "Restoring Trust After Fraud: Does Corporate Governance Matter?" *The Accounting Review* 80, 539-561

[32] Faure-Grimaud, Antoine and Denis Gromb (2004): "Public Trading and Private Incentives." *Review of Financial Studies* 17, 985-1014

[33] Field, Laura and Dennis Sheehan (2004): "IPO Underpricing and Outside Blockholdings." *Journal of Corporate Finance* 10, 263-280

[34] Fishman, Michael and Kathleen Hagerty (1989): "Disclosure Decisions by Firms and the Competition for Price Efficiency." *Journal of Finance* 44, 633-646

[35] Goldman, Eitan and Steve Slezak (2006): "An Equilibrium Model of Incentive Contracts in the Presence of Information Manipulation". *Journal of Financial Economics* 80, 603-626

[36] Goldstein, Itay and Alexander Guembel (2007): "Manipulation and the Allocational Role of Prices". *Review of Economic Studies*, forthcoming

[37] Gomes, Armando and Gordon Phillips (2005): "Private and Public Security Issuance by Public Firms: The Role of Asymmetric Information." Working Paper, Washington University in St. Louis

[38] Graham, John, Campbell Harvey and Shivaram Rajgopal (2005): "The Economic Implications of Corporate Financial Reporting." *Journal of Accounting and Economics* 40, 3-73

[39] Grossman, Sanford and Oliver Hart (1980): "Takeover Bids, the Free-Rider Problem, and the Theory of the Corporation." *Bell Journal of Economics* 11, 42-64

[40] Hall, Brian and Jeffrey Liebman (1998): "Are CEOs Really Paid Like Bureaucrats?" *Quarterly Journal of Economics* 113, 653-691

[41] Hansen, Gary and Charles Hill (1991): "Are Institutional Investors Myopic? A Time-Series Study of Four Technology-Driven Industries." *Strategic Management Journal* 12, 1-16

[42] Heflin, Frank and Kenneth Shaw (2000): "Blockholder Ownership and Market Liquidity". *Journal of Financial and Quantitative Analysis* 35, 621-633

[43] Hirschman, Albert (1970): "Exit, Voice and Loyalty." Harvard University Press, Cambridge

[44] Holderness, Clifford (2007): "The Myth of Diffuse Ownership in the United States." *Review of Financial Studies*, forthcoming

[45] Holmstrom, Bengt and Jean Tirole (1993): "Market Liquidity and Performance Monitoring." *Journal of Political Economy* 101, 678-709

[46] Jiambalvo, James, Shivaram Rajgopal and Mohan Venkatachalam (2002): "Institutional Ownership and the Extent to which Stock Prices Reflect Future Earnings." *Contemporary Accounting Research* 19, 117-145

[47] Johnson, Shane, Harley Ryan and Yisong Tian (2007): "Managerial Incentives and Corporate Fraud: The Source of Incentives Matter." Working Paper, Texas A&M University

[48] Kahn, Charles and Andrew Winton (1998): "Ownership Structure, Speculation, and Shareholder Intervention." *Journal of Finance* 53, 99-129

[49] Kaplan, Steven and Bernadette Minton (2006): "How has CEO Turnover Changed? Increasingly Performance Sensitive Boards and Increasingly Uneasy CEOs." Working Paper, University of Chicago

[50] Kole, Stacey (1997): "The Complexity of Compensation Contracts." *Journal of Financial Economics* 43, 79-104

[51] Kyle, Albert (1985): "Continuous Auctions and Insider Trading." *Econometrica* 53, 1315-1335

[52] La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer (1999): "Corporate Ownership Around the World." *Journal of Finance* 54, 471-517

[53] Lee, Peggy (2005): "A Comparison of Ownership Structures and Innovations of US and Japanese Firms." *Managerial and Decision Economics* 26, 39-50

[54] Lee, Peggy and Hugh O'Neill (2003): "Ownership Structures and R&D Investments of U.S. and Japanese Firms: Agency and Stewardship Perspectives." *Academy of Management Journal* 46, 212-225

[55] Lowenstein, Louis (1988): "What's Wrong With Wall Street? Short-Term Gain and the Absentee Shareholder." Addison-Wesley, Reading

[56] Luo, Yuanzhi (2005): "Do Insiders Learn from Outsiders? Evidence from Mergers and Acquisitions." *Journal of Finance* 60, 1951-1982

[57] Manne, Henry (1966): "Insider Trading and the Stock Market." Free Press, New York

[58] Maug, Ernst (1998): "Large Shareholders and Monitors: Is There a Trade-Off Between Liquidity and Control?" *Journal of Finance* 53, 65-98

[59] Maug, Ernst (2002): "Insider Trading Legislation and Corporate Governance." *European Economic Review* 46, 1569-1597

[60] Mikkelson, Wayne and Megan Partch (1985): "Stock Price Effects and Costs of Secondary Distributions." *Journal of Financial Economics* 14, 165-194

[61] Myers, Stewart (1989): "Signaling and Accounting Information." NBER Working Paper 3193

[62] Narayanan, M. P. (1985): "Managerial Incentives for Short-Term Results." *Journal of Finance* 40, 1469-1484

[63] Parrino, Robert, Richard Sias and Laura Starks (2003): "Voting With Their Feet: Institutional Ownership Changes Around Forced CEO Turnover." *Journal of Financial Economics* 68, 3-46

[64] Peng, Lin and Ailsa Roell (2006): "Executive Pay, Earnings Manipulation and Shareholder Litigation." *Review of Finance*, forthcoming

[65] Porter, Michael (1992): "Capital Disadvantage: America's Failing Capital Investment System." *Harvard Business Review* 70, 65-82

[66] Qiu, Lily (2007): "Selection or Influence? Institutional Investors and Corporate Acquisitions." Working Paper, Brown University

[67] Roe, Mark (1990): "Political and Legal Restraints on Ownership and Control of Public Companies." *Journal of Financial Economics* 27, 7-41

[68] Roe, Mark (1994): "Strong Managers, Weak Owners: The Political Roots of American Corporate Finance." Princeton University Press, Princeton

[69] Rubin, Amir (2007): "Ownership Level, Ownership Concentration and Liquidity." *Journal of Financial Markets* 10, 219-248

[70] Scharfstein, David and Jeremy Stein (1990): "Herd Behavior and Investment." *American Economic Review* 80, 465-479

[71] Scholes, Myron (1972): "The Market for Securities: Substitution Versus Price Pressure and the Effects of Information on Share Prices." *Journal of Business* 45, 179-211

[72] Sias, Richard, Laura Starks and Sheridan Titman (2006): "Changes in Institutional Ownership and Stock Returns: Assessment and Methodology." *Journal of Business* 79, 2869-2910

[73] Shleifer, Andrei and Robert Vishny (1986): "Large Shareholders and Corporate Control." *Journal of Political Economy* 94, 461-488

[74] Stein, Jeremy (1988): "Takeover Threats and Managerial Myopia." *Journal of Political Economy* 46, 61-80

[75] Stein, Jeremy (1989): "Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior." *Quarterly Journal of Economics* 104, 655-669

[76] Stein, Jeremy (1996): "Rational Capital Budgeting in an Irrational World." *Journal of Business* 69, 429-455

[77] Stiglitz, Joseph (1981): "Pareto Optimality and Competition." *Journal of Finance* 36, 235-251

[78] Subrahmanyam, Avanidhar and Sheridan Titman (1999): "The Going-Public Decision and the Development of Financial Markets." *Journal of Finance* 54, 1045-1082

[79] Thurow, Lester (1993): "Head to Head: The Coming Economics Battle Among Japan, Europe and America." Warner Books, New York

[80] Van Nieuwerburgh, Stijn and Laura Veldkamp (2006): "Information Acquisition and Portfolio Under-Diversification." Working Paper, New York University

[81] Wahal, Sunil and John McConnell (2000): "Do Institutional Investors Exacerbate Managerial Myopia?" *Journal of Corporate Finance* 6, 307-329

[82] Wruck, Karen (1989): "Equity Ownership Concentration and Firm Value: Evidence From Private Equity Financings." *Journal of Financial Economics* 23, 3-28

[83] Yan, Xuemin and Zhe Zhang (2007): "Institutional Investors and Equity Returns: Are Short-Term Institutions Better Informed?" *Review of Financial Studies*, forthcoming

[84] Zingales, Luigi (2000): "In Search of New Foundations." *Journal of Finance* 55, 1623-1653

[85] Zwiebel, Jeffrey (1996): "Dynamic Capital Structure Under Managerial Entrenchment." *American Economic Review* 86, 1197-1215

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