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. By trading, they can attenuate managerial myopia by making prices reflect fundamental value rather than current earnings. Blockholders have a strong incentive to acquire costly information on the cause of interim losses. If losses result from efficient long-term investment rather than poor firm quality, they retain their stake through the turbulence. This expected share price support encourages managers to exploit growth opportunities that reduce short-term earnings. The model thus justifies the prevalence of small blockholders in the U.S. who typically lack the control rights assumed by existing theories. Block size has a non-monotonic effect on firm value. A higher stake allows blockholders to sell more upon negative information, encouraging investigation. However, if block size is too high, excessive price impact reduces trading profits and thus monitoring incentives. Contrary to the view that the U.S.'s liquid stock markets and transient shareholders exacerbate myopia, this paper shows that they can increase investment through improving market efficiency. Hence the U.S. capital allocation system may be significantly more investment-friendly than commonly believed.

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"The nature of competition has changed, placing a premium on investment in increasingly complex and intangible forms – the kind of investment most penalized by the U.S. [capital allocation] system." – Porter (1992)

"[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" – Lowenstein (1988)

1 Introduction

This paper analyzes how outside blockholders can promote efficient investment through their trading behavior. By gathering information about a firm's long-term prospects and impounding it into prices, they encourage managers to exploit growth opportunities that increase firm value even at the expense of short-term losses. The model therefore addresses two broad research issues. First, it introduces a mechanism through which managerial myopia can be attenuated. Second, it demonstrates that shareholders can add significant value even if they lack the control rights to intervene in a firm's operations, thus providing a rationalization for the prevalence of small transient blockholders in the U.S.

Many academics and practitioners believe that myopia is a potentially fundamental problem faced by the modern firm. In the last century, many 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 ability to compete successfully on world markets hinges critically on whether its capital allocation system can promote such investment.

However, some managers may fail to exploit their firms' growth opportunities. These failures typically do not result from a traditional effort conflict,[1] but from the manager's concern with the short-term stock price (Narayanan (1985), Stein (1988, 1989)). Intangible investment may depress interim financial performance and the stock price if outsiders cannot distinguish an investing firm from a low quality firm. 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 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.

While previous papers have focused on various causes of myopia, this paper analyzes a solution: blockholders. Owing to their sizable stakes, blockholders have strong incentives to gather

[1] Throughout this paper, the effort conflict is broadly defined to include shirking, pursuit of private benefits, and managerial rent extraction.

costly information about the firm's fundamental value, i.e., to learn whether weak earnings result from low firm quality or a sound long-term strategy. These incentives result from the blockholder's ability to profit by selling her stake to liquidity traders if she discovers that the firm is of poor quality.[2] If the firm is intrinsically sound, she does not sell. This attenuates the stock price decline caused by weak earnings and encourages investment ex ante.

While the blockholder's information gathering is motivated by her private desire to profit from liquidity traders, it has real social benefits by improving management decisions. These benefits are particularly high for firms with moderately profitable opportunities. If there are few profitable projects, there is little need to encourage investment. If all projects are highly attractive and tangible, or if the manager is unconcerned by the short-term stock price, investment is efficient even without a blockholder.

Contrary to many existing papers, here block size has a non-monotonic effect on market efficiency and ultimately real investment. Up to a point, the larger the initial holding, the more the blockholder can sell upon negative information if there are short-sales constraints. These greater trading profits raise her incentives to gather information in the first place. (The relationship between block size and monitoring incentives continues to hold if the blockholder can buy upon favorable information). However, 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 chooses to sell less than her entire stake because of price impact. Since her potential trading profits are lower, she acquires less information. 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)).

The role of blockholders identified by this paper contrasts with prior models. Existing theories involve the shareholder adding value through disciplinary action: she intervenes to overcome an underlying effort conflict by firing a shirking manager, implementing a restructuring or overturning project choice.[3] This paper shows that blockholders can play a significant role even if they are unable to intervene, and even in the absence of an effort conflict. Here, the blockholder cannot "voice" by intervening in a troubled firm but can only trade: i.e., choose between "exit" (selling her stake) and exhibiting "loyalty."[4]

The focus on long-term investment is motivated by its increasing importance in the modern corporation. At a firm level, Zingales (2000) argues that exploiting growth opportunities has surpassed traditional shirking issues as the key organizational challenge. While the recent rise

[2] There are numerous real-life examples of the "Wall Street Rule" being followed. Kahn and Winton (1998) cite the case of Fidelity Investment's Magellan mutual funds, which came to hold 49% of its assets in stakes of 5% or more in high-technology companies in March 1995. By late 1995, Magellan had reduced its technology holdings to 8.5% just in advance of a downturn in those stocks, suggesting that it had obtained negative information from its monitoring activities which was not yet reflected in the stock price.

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

[4] "Loyalty" is not a behavioral phenomenon in this paper. The blockholder retains her stake if and only if such behavior is individually profit-maximizing.

in equity-based compensation (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. Compared to their overseas counterparts, U.S. blockholders face substantial legal and institutional hurdles to intervention (see Becht et al. (2006) and Black (1990)). In addition, a large number of U.S. blockholders are transient financial investors with small[5] stakes and thus few control rights. Existing models have difficulty in justifying a role for such blockholders in the U.S. This open question provides the second motivation for this paper.

These two departures from the literature lead to differences in the mechanism through which the blockholder adds value. In existing theories, she adds value by being an adversary of the CEO, exerting discipline 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.

These contrasting roles further lead to differences on the effect of liquidity on the blockholder's value added. Since "voice" and "exit" are mutually exclusive, Bhide (1993) argues that market liquidity is undesirable as it allows a shareholder to leave rather than intervening. While "loyalty" and "exit" are similarly mutually exclusive, this dichotomy 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 result of this paper, that blockholders promote investment, does not stem from simply assuming that blockholders always hold their stakes for the long run and ignore interim performance measures. In fact, it is most applicable to transient financial blockholders who are notoriously willing to sell stocks they deem to be fundamentally weak, unlike, for example, family owners who are unlikely to exit. This conclusion contradicts the widely held notion that the U.S.'s fluid capital markets induce underinvestment by allowing blockholders to sell easily upon poor financial results, and may help explain why predictions that the U.S. economy would be surpassed by Japan (Porter (1992), Thurow (1993)) have not been borne out. The U.S. capital allocation system may be significantly more investment-friendly than commonly believed, already containing a partial solution to the potentially significant problem of myopia.

As with block size, the effect of liquidity on the blockholder's value added is also non-monotonic (for a given block size). If liquidity is very low, the blockholder cannot profit from informed trading. She does not monitor, and so no information is impounded in the stock

[5] La Porta et al. (1999) document that 80% (90%) of large (medium) U.S. firms do not contain a shareholder who owns 20% of the votes (La Porta et al. (1999)). La Porta et al. estimate that a 20% stake gives effective control if the shareholder is an insider; the threshold is likely to be higher for outside shareholders. Recent hand-collected data of Holderness (2006) challenges this view, showing that U.S. ownership concentration is similar to the rest of the world. Much of this concentration stems from family blockholders, for which existing theories are most applicable. Financial blockholders typically hold far smaller stakes, and are the focus of this paper.

price. If there is substantial liquidity, the blockholder becomes informed, but her trades have little effect on the stock price and so prices are again uninformative. To the extent that the U.S. capital allocation system deters investment, the principal cause is dispersed ownership rather than liquidity. The shareholder trading facilitated by liquidity is only harmful if it is driven by short-run earnings. If shareholders are sizable, their trades are likely to be driven by fundamental value and so trading increases price efficiency.

While the paper's main result is that blockholders can encourage investment as well as effort, the corollary is that a key cost of the U.S.'s dispersed ownership is myopia. This has important policy implications. Previous papers argue that the main cost of dispersed ownership is shirking, in which case potential solutions are equity compensation and regulations against takeover defenses. If the main cost is myopia, these policies exacerbate the problem.

The core model does not require an effort decision for blockholders to add value. However, the trading mechanism analyzed by this paper can attenuate many other agency problems than myopia, such as shirking. Blockholders' trading can also encourage effort that does not pay off immediately, by impounding its effects into the interim share price. The blockholder's beneficial effects on effort and investment interact. If the manager knows that the presence of blockholders will allow him to undertake long-term investments if the firm is successful, he exerts greater effort to ensure the firm's success in the first place.

Introducing effort also provides an endogenous justification for the equity compensation that induces myopia. If stock-based pay aligns the manager with the current stock price as well as fundamental value, it both encourages effort and deters investment. The relative importance of shirking and investment jointly determines the socially optimal block size and manager-shareholder alignment. If incentivizing both decisions is critical, high equity-based pay is desirable to elicit effort, accompanied by a large block to maintain investment. If project selection is unimportant and effort is sufficiently induced by compensation, dispersed ownership is optimal: a blockholder would expend monitoring costs with no accompanying social benefit. If investment is the only critical decision, flat pay and dispersed ownership are desirable.

A shareholder's private incentives to acquire a block may differ significantly from social incentives. Once she has built her stake, the blockholder only captures a proportion of the value gains from monitoring. In addition, if the blockholder cannot buy shares anonymously, free-riding by small shareholders will make it costly to establish her position in the first place. By contrast, the blockholder is motivated by informed trading profits, which do not enter the social welfare function as these are pure transfers from liquidity investors. Hence, the actual block size reached through private trading may be inefficiently too low or too high.

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 that exhibit information asymmetry, such as R&D-intensive companies. In addition, the formation of a large block should increase firm investment, as found by Cronqvist and Fahlenbrach (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. Blockholders should lead to an increase in price efficiency, for example by reducing event-drift anomalies.

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 shows that the core results hold if the blockholder is allowed to buy on good information, and Appendix B contains proofs.

2 Related Literature

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 formal models analyzing the impact of shareholder exit on management decisions.[6] A notable exception is a contemporaneous working paper by Admati and Pfleiderer (2006). While they follow the literature by analyzing an effort conflict, I consider long-term investment. These are fundamentally different agency problems: with myopia there is 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 exerts discipline, but through "exit" instead of "voice;" here, she is an ally of the manager and exhibits "loyalty". While it is intuitive that liquidity is desirable if the blockholder exits to discipline an effort problem, the beneficial effect of liquidity on investment is less obvious. Indeed, conventional wisdom (e.g., Porter (1992)) is that the U.S.'s fluid capital markets necessarily exacerbate myopia.

A second difference is that Admati and Pfleiderer assume that the large shareholder is exogenously informed, and so the level of monitoring is fixed. This paper endogenizes costly information gathering and generates testable predictions on the effect of block size and liquidity on market efficiency, investment and in turn firm value. Both are shown to have non-monotonic effects.

The concept of investment increasing in ex post monitoring is shared by Edmans (2006a), who analyzes levered investment funds. Debt concentrates investors' equity stakes, giving them incentives to find out the cause of interim losses. Therefore, debt can allow efficient liquidation of an incompetent fund manager who suffers short-term losses, without simultaneously deterring skilled managers from long-term trades that risk such losses. If low earnings result from interim turbulence in a long-term arbitrage trade rather than low ability, the fund is continued. While Edmans (2006a) is a theory of capital structure, where the shareholder's dollar investment is

[6] Kahn and Winton (1998) do consider the possibility of blockholder exit. However, this does not add value, but merely leads to the blockholder profiting at the expense of liquidity traders. In Gopalan (2006), blockholder exit can add value by reducing the stock price and facilitating takeovers, but the incumbent management takes no decisions in his model.

fixed and debt induces monitoring, this paper is a theory of ownership structure. There is no debt and the analysis focuses on the effect of blockholder size. In addition, there is no stock price mechanism in Edmans (2006a).

A large number of papers have analyzed the links between financial and real efficiency. In Holmstrom and Tirole (1993), increased market efficiency improves the stock market's ability to evaluate management, thus allowing the manager's pay to be tied to stock prices. In their model, concentrated ownership reduces liquidity and thus market efficiency; they do not consider the blockholder as a potential monitor. This extension is particularly important if short-sale constraints deter non-shareholders from costly monitoring due to their reduced ability to trade on information. Moreover, in my paper the blockholder has information not held by other investors: in her absence, the stock price only reflects tangible information and tying the manager's pay to it distorts 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 encourage speculators to gather information about fundamental value and impound it into the stock price by trading. In my 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), Baker, Stein and Wurgler (2003), Jensen (2004), and Polk and Sapienza (2006), managers exploit *current* misvaluation by raising overvalued equity and investing inefficiently ex post.

An additional channel arises through the role of the stock market as an aggregator of information about the profitability of a firm's investment opportunities. More efficient stock prices can guide management decisions: theoretical and empirical examples include Dow and Gorton (1997), Subrahmanyam and Titman (1999), Chen, Goldstein and Jiang (2006), Durnev, Morck and Yeung (2004), and Luo (2005). In the present paper, instead of learning from the market to make subsequent investment decisions, the manager is more informed than the market and is concerned with its misvaluation of previous actions. The manager can plausibly learn from the market's analysis of a given *common* information set as it accumulates multiple viewpoints. However, the manager is more informed with respect to "soft" information that is difficult to communicate to the market.

The role of blockholders analyzed in this paper may coexist with the functions analyzed by previous models. Using Holmstrom and Tirole's (1993) categorization, interventionist blockholders gather "strategic" information about potential future operational improvements. The shareholders in my model gather "speculative" information about current values to guide trading. Hence this paper should be seen as complementary to existing research and particularly attuned to blockholders that cannot or do not wish to intervene.

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. Table 1 lists the key parameters in the model.

I consider a firm with one share outstanding. A blockholder owns α units and atomistic shareholders collectively own the remaining $1-\alpha$. α is later endogenized in Section 4.3. All agents are risk-neutral and the risk-free rate is normalized to zero.

There are three periods in the core model, summarized in Figure 1. At $t=1$, a public signal $s \in (s_g, s_b)$ is given about the firm's $t=3$ value V. The signal can be interpreted as a public earnings announcement. Such signals are imperfectly informative about V. If $s=s_b$, $V=X_h$ with probability κ and $V=X_l$ with probability $(1-\kappa)$. If $s=s_g$, $V=X_h$ with probability 1. I refer to a firm with $V=X_h$ (X_l) as a "high (low)-quality firm;" $s=s_g$ is a "good signal" and $s=s_b$ is a "bad signal." Let $\Delta X = X_h - X_l$.

At $t=2$, the blockholder exerts monitoring effort $e_B \in [0,1]$, at cost $\frac{1}{2}c_B e_B^2$. With probability e_B, she finds out the true value of V; with probability $1-e_B$, monitoring fails and no information is received.[7] The blockholder will only obtain information if $s=s_b$, since s_g is already fully revealing. There is then a round of trading. In the core model, the blockholder either demands nothing ($b=0$) or sells β units ($b=-\beta$), where $\beta \leq \alpha$ owing to short-sales constraints; Appendix A shows that allowing the blockholder to buy does not affect the results. Short-sales constraints are relevant as this paper's focus is non-interventionist financial blockholders such as mutual funds, pension funds and insurance companies, who are prohibited from taking short positions. The results continue to hold if short sales are allowed but incur a non-zero cost.

Also at $t=2$, liquidity traders appear and demand $u \sim U[0,n]$, where $n=\nu(1-\alpha)$ and ν is a liquidity parameter. In this paper, the term "liquidity" may refer to either n or ν, and it will be made clear to which it refers. As is standard, the volume of liquidity trades depends on the amount held by small shareholders $(1-\alpha)$, since liquidity trades often arise from selling by current investors.[8] 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).

3.1 Market Maker

I use the Nash equilibrium solution concept to solve for the blockholder's optimal sale volume upon negative information (β) and the market maker's pricing function ($P(d)$). If signal s_g is

[7] Monitoring need not require obtaining private information. Even though public information may be freely available, its analysis may be costly and require expertise. In practice, institutional investors employ large research staffs who deeply analyze public information to form their own financial projections and valuations. For example, after a drug has passed through early phases of development, it requires detailed analysis to estimate the probability that the drug eventually becomes launched, its future sales after launch and competitive response, and any cannibalization of the firm's existing products. While boards are even more informed than blockholders, many researchers have documented that boards frequently fail to monitor. The blockholder in this paper should be thought of as monitoring both the board and management together.

[8] Even though u is always non-negative in the model for clarity, liquidity trades can involve either purchases or sales since all of the model's results hold up to a vertical translation of u. Other papers where liquidity depends on the free float include Holmstrom and Tirole (1993), Bolton and von Thadden (1998), Maug (1998), Kahn and Winton (1998) and Faure-Grimaud and Gromb (2004).

emitted, the market maker knows that the firm is of high quality, and so sets $P = X_h$. (The remainder of this section considers the case where $s = s_b$ and so "$\mid s_b$" notation is omitted for brevity). Upon seeing s_b, the market maker has a prior κ that the firm is of high quality. After receiving order d, he updates this prior to form a posterior π_d. Let $\widehat{\beta}$ denote the market maker's conjecture about the amount sold by the blockholder upon negative information, and $\widehat{e_B}$ denote the conjectured monitoring effort. He therefore sets prices as in Lemma 1:

Lemma 1 *Upon observing signal s_b and total demand d, and given conjecture $\widehat{\beta}$, the market maker sets the following prices:*

$$\begin{cases} P = X_l \text{ if } d < 0 \\ P = X_l + \kappa \Delta X \text{ if } 0 \leq d < n - \widehat{\beta} \\ P = X_l + \frac{\kappa}{1-\widehat{e_B}+\widehat{e_B}\kappa}\Delta X \text{ if } d \geq n - \widehat{\beta}. \end{cases} \tag{1}$$

If $d < 0$, the market maker knows for certain that the blockholder has sold; since the blockholder sells only upon discovering that $V = X_l$, $\pi_{d<0} = 0$. $0 \leq d < n - \widehat{\beta}$ is equally consistent with blockholder selling and no blockholder action, and so the posterior equals the prior. The interesting case is $d \geq n - \widehat{\beta}$, where the posterior exceeds the prior, since the market maker believes that the blockholder did not sell. If $\widehat{e_B}$ rises, it is more likely that the decision not to sell results from discovering that the firm is of high quality, rather than the failure to obtain information, and so $\pi_{d \geq n - \widehat{\beta}}$ is higher. In the extreme, if $\widehat{e_B} = 0$, total order flow is uninformative and $\pi_{d \geq n - \widehat{\beta}} = \kappa$. If $\widehat{e_B} = 1$, the blockholder is always informed and so $\pi_{d \geq n - \widehat{\beta}} = 1$.

3.2 The Optimal β and Comparative Statics

Given the market maker's pricing function, the price the blockholder will receive on the traded stake will depend on liquidity trader demand u as follows:

$$\begin{cases} P = X_l \text{ if } u < \beta \\ P = X_l + \kappa \Delta X \text{ if } \beta \leq u < n - \widehat{\beta} + \beta \\ P = X_l + \frac{\kappa}{1-\widehat{e_B}+\widehat{e_B}\kappa}\Delta X \text{ if } u \geq n - \widehat{\beta} + \beta. \end{cases}$$

Her objective function is thus:

$$\frac{\beta \kappa \Delta X}{n} \left[n - \max(\widehat{\beta}, \beta) + \frac{\max(\widehat{\beta} - \beta, 0)}{1 - \widehat{e_B} + \widehat{e_B}\kappa} \right]$$

The third term arises since the blockholder may choose to undercut the market maker's conjecture ($\beta < \widehat{\beta}$): by selling less than expected, the blockholder may be able to "fool" the market maker into thinking that she has not sold, and thus receive the higher price of $P = X_l + \frac{\kappa}{1-\widehat{e_B}+\widehat{e_B}\kappa}\Delta X$.

After applying the Nash conditions, the equilibrium is summarized in Lemma 2:

Lemma 2 *Upon observing s_b and total demand d, the market maker sets the following prices:*

$$\begin{cases} P = X_l \text{ if } d < 0 \\ P = X_l + \kappa \Delta X \text{ if } 0 \leq d < n - \beta^* \\ P = X_l + \frac{\kappa}{1-e_B+e_B\kappa} \Delta X \text{ if } d \geq n - \beta^*. \end{cases} \tag{2}$$

Upon learning that fundamental value is X_l, the blockholder sells

$$\beta^* = \min\left(\frac{n}{2}, \alpha\right). \tag{3}$$

The blockholder exerts monitoring effort

$$e_B = \beta^* \left(\frac{n-\beta^*}{n}\right) F,^{9} \tag{4}$$

where

$$F = \frac{\kappa(1-\kappa)\Delta X}{c_B}. \tag{5}$$

For the most part, this paper focuses on the interesting case when the short-sale constraint binds, i.e., $\alpha \leq \frac{n}{2}$ (equivalent to $\alpha \leq \frac{\nu}{\nu+2}$) so $\beta^* = \alpha$. This means that the blockholder can sell her entire stake without being constrained by liquidity. Since $\alpha < 1$, $n < 2$ is assumed for this constraint to be meaningful. Monitoring effort is therefore highest when

$$\alpha = 1 - \sqrt{\frac{1}{1+\nu}} < \frac{n}{2}. \tag{6}$$

For $\alpha < 1 - \sqrt{\frac{1}{1+\nu}}$, a larger initial stake raises the amount that the blockholder chooses to sell upon negative information, and thus the incentives to become informed in the first place. Simply put, the benefits of information are higher as the blockholder can make greater use of it. The binding of the short-sale constraint means that investors monitor their largest shareholdings more closely, which is consistent with reality. In the absence of such a constraint, investors would monitor all stocks equally regardless of their initial holdings: if they uncover negative information about a stock they do not own, they can short sell.[10] In previous papers where information is gathered purely to drive trading decisions (e.g., Faure-Grimaud and Gromb (2004), Holmstrom and Tirole (1993)), the potential monitor's initial stake does not matter.

[9] I assume that this does not exceed 1 to avoid having to write $\min(\cdot)$ functions throughout the paper.

[10] Monitoring may be undertaken by investors without an initial stake if they can short sell, such as hedge funds. However, selling a stock short is significantly costlier than unwinding a long position. The results hold if short-sales are allowed but incur a non-zero cost: monitoring incentives remain increasing in α. Equity analysts are also potential monitors and can move prices even without trading. However, they have significantly fewer incentives to be accurate or impartial given their zero stakes; there is abundant evidence of equity analyst bias. Despite the actions of hedge funds and analysts, information asymmetry continues to prevail in modern financial markets, leading to an incremental role for blockholders. Since hedge funds and analysts may be more effective in some firms than others, I later introduce an information asymmetry parameter y.

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.

However, a second consequence of a higher stake is that it reduces liquidity. From (4), this lessens monitoring incentives, as it is liquidity traders that allow the blockholder to profit from trading on her private information. Hence the optimal α for effort incentives is less than the optimal sale volume of $\frac{n}{2}$, as shown in equation (6).

The level of monitoring is increasing in the variance in firm quality, captured both by ΔX and the closeness of κ to $\frac{1}{2}$ (as this maximizes $\kappa(1-\kappa)$). Monitoring naturally decreases in its cost c_B. All of these parameters also affect the sensitivity of e_B to α, since

$$\frac{\partial e_B}{\partial \alpha} = \left(1 - \frac{2\alpha - \alpha^2}{\nu(1-\alpha)^2}\right) F. \tag{7}$$

Since $\frac{\partial^2 e_B}{\partial \alpha^2} < 0$, the positive impact of α on e_B falls as α rises; for $\alpha > 1 - \sqrt{\frac{1}{1+\nu}}$ it becomes negative.

It is straightforward to show both that the blockholder does not sell if she discovers $V = X_h$, and does not trade if uninformed. Uninformed trading would move prices against her as the market maker assumes she is informed, and the consequent losses would 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 upon a poor interim signal in the absence of information.

If the blockholder faces the risk of liquidity shocks which force her to sell regardless of her information, this is likely to *increase* her trading gains, since the market does not know whether a sale is motivated by information or a liquidity shock.

The results of this subsection are summarized in Lemma 3 below:

Lemma 3 *Assume $\alpha \leq \frac{\nu}{\nu+2}$ and take κ as exogenous. Upon observing signal s_b, the blockholder exerts monitoring effort $e_B = \alpha\left(\frac{n-\alpha}{n}\right)\frac{\kappa(1-\kappa)\Delta X}{c_B}$ and sells α if and only if she discovers $V = X_l$. Monitoring effort e_B is increasing in α if $\alpha < 1 - \sqrt{\frac{1}{1+\nu}}$, and decreasing in α if $\alpha > 1 - \sqrt{\frac{1}{1+\nu}}$. e_B is increasing in ν, $\kappa(1-\kappa)$ and ΔX, and decreasing in c_B.*

3.3 Expected Prices

If $V = X_h$, the blockholder never sells, and so $d = u$. Thus $0 \leq d < n - \alpha$ with probability $\frac{n-\alpha}{n}$ and $d \geq n - \alpha$ with probability $\frac{\alpha}{n}$. Hence the expected price of a high-quality firm, if signal s_b is emitted, is

$$
\begin{aligned}
E[P \mid X_h] &= X_l + \left[\frac{n-\alpha}{n}\kappa + \frac{\alpha}{n}\frac{\kappa}{1-e_B+e_B\kappa}\right]\Delta X \\
&= X_l + \frac{\kappa\Delta X}{n}\left[n-\alpha+\frac{\alpha}{1-e_B+e_B\kappa}\right] = X_l + E[\pi \mid X_h]\Delta X. \qquad (8)
\end{aligned}
$$

The derivative with respect to α is given by

$$
\begin{aligned}
\frac{\partial E[P \mid X_h]}{\partial \alpha} &= \underbrace{\frac{\kappa\Delta X}{n}\left[\frac{1}{1-e_B+e_B\kappa}-1\right]}_{\textit{trading effect}} \\
&\quad + \underbrace{\frac{\kappa\Delta X}{n}\frac{\partial e_B}{\partial \alpha}\frac{\alpha(1-\kappa)}{\left[1-e_B+e_B\kappa\right]^2}}_{\textit{effort effect}} + \underbrace{\frac{\kappa\Delta X}{n^2}\nu\alpha\left[\frac{1}{1-e_B+e_B\kappa}-1\right]}_{\textit{camouflage effect}}. \qquad (9)
\end{aligned}
$$

The "trading effect" is the direct impact of α. Recall the blockholder chooses to sell $\min\left(\frac{n}{2},\alpha\right)$. If $\alpha \leq \frac{n}{2}$, an increase in α raises her equilibrium sale volume, which expands the region $n-\alpha \leq d < n$ where the market maker is certain that the blockholder has not sold. If the blockholder sells more upon finding negative information, even a moderate total order flow is inconsistent with blockholder selling, and thus raises expected firm quality. Simply put, if the blockholder trades more, her trading (or non-trading) impounds more information into prices.

The "effort effect" operates indirectly through α affecting e_B. This effect is positive if $\frac{\partial e_B}{\partial \alpha} > 0$, i.e., $\alpha < 1-\sqrt{\frac{1}{1+\nu}}$. Increased effort raises the expected price: the more informed the blockholder, the more likely her decision not to sell results from high firm quality rather than unsuccessful monitoring.

The "camouflage effect" operates indirectly through α decreasing liquidity. Since liquidity camouflages the blockholder's trades, this effect is positive if $\alpha \leq \frac{n}{2}$, as a fall in liquidity increases her effect on prices.

Now consider a low-quality firm. $d \geq n-\alpha$ arises if the blockholder is uninformed and $u \geq n-\alpha$; $0 \leq d < n-\alpha$ occurs either if the blockholder is uninformed and $u < n-\alpha$, or monitoring is successful and $\alpha \leq u < n$; $d < 0$ if the blockholder is informed and $u < \alpha$. Thus,

$$
\begin{aligned}
E[P \mid X_l] &= X_l + \left[(1-e_B)\frac{\alpha}{n}\frac{\kappa}{1-e_B+e_B\kappa}\right]\Delta X \\
&\quad + \left[(1-e_B)\frac{n-\alpha}{n}\kappa + e_B\frac{n-\alpha}{n}\kappa\right]\Delta X + \left[e_B\frac{\alpha}{n}0\right]\Delta X \\
&= X_l + \frac{\kappa\Delta X}{n}\left[n-\alpha+(1-e_B)\frac{\alpha}{1-e_B+e_B\kappa}\right] = X_l + E[\pi \mid X_l]\Delta X, \qquad (10)
\end{aligned}
$$

where

$$
\begin{aligned}
\frac{\partial E[P \mid X_l]}{\partial \alpha} &= \frac{\kappa \Delta X}{n}\left[\frac{1-e_B}{1-e_B+e_B\kappa}-1\right] \\
&+\frac{\kappa \Delta X}{n}\frac{\partial e_B}{\partial \alpha}\left[-\frac{\alpha}{1-e_B+e_B\kappa}+\frac{(1-e_B)\alpha(1-\kappa)}{(1-e_B+e_B\kappa)^2}\right] \\
&+\frac{\kappa \Delta X}{n^2}\nu\alpha\left[\frac{1-e_B}{1-e_B+e_B\kappa}-1\right]. \qquad (11)
\end{aligned}
$$

As in equation (9), the three terms in equation (11) represent the trading, effort and camouflage effects, but the signs of all effects are reversed.

The difference in expected prices between the two firm types is

$$
E[P \mid X_h] - E[P \mid X_l] = \frac{\kappa \Delta X}{n} e_B \frac{\alpha}{1-e_B+e_B\kappa}. \qquad (12)
$$

A greater difference represents increased market efficiency. Let $\overline{\alpha}$ denote the optimal block size that maximizes market efficiency, defined by $\frac{\partial(E[P \mid X_h]-E[P \mid X_l])}{\partial \alpha}|_{\alpha=\overline{\alpha}} = 0$. ($\overline{\alpha}$ is different from the socially and privately optimal block sizes, which will be derived later). Equations (9) and (11) show that $\overline{\alpha}$ exceeds the level that maximizes effort, $1-\sqrt{\frac{1}{1+\nu}}$. When $\alpha = 1-\sqrt{\frac{1}{1+\nu}}$, the effort effect is zero, but the trading and camouflage effects remain positive (negative) for the high (low)-quality firm. However, $\overline{\alpha}$ is bounded below $\frac{\nu}{\nu+2}$. If $\alpha > \frac{n}{2}$ (i.e., $\alpha > \frac{\nu}{\nu+2}$), then α is replaced by $\frac{n}{2}$ in equations (8) and (10). n drops out, and the trading and camouflage effects are zero, leaving only the effort effect.

Even considering only the benefits of blockholders and ignoring their costs, the optimal block size is a finite $\overline{\alpha}$. This result contrasts with intervention models such as Shleifer and Vishny (1986), Maug (1998) and Kahn and Winton (1998) where a larger block is always desired.[11] 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, the entire stake, but $\min\left(\frac{n}{2}, \alpha\right)$. A large block increases information revelation only to the extent that there is sufficient market liquidity to allow the sale of an entire block. Put differently, the blockholder's loyalty is less of a positive boost to the stock price if exit was difficult in the first place.

In reality, other market participants may be able to observe blockholders' sales with a lag, by studying 13d or 13f filings. This would strengthen the blockholder's impact on market efficiency. Since sales are only observed with a lag, the blockholder's profits from informed selling are unchanged. However, her price impact is greater since her trade becomes visible.

The results of this subsection are summarized in Lemma 4 and Proposition 1 below:

Lemma 4 *The expected prices of a high and low quality firm, if signal s_b is emitted, are as*

[11] In Bolton and von Thadden (1998) and Holmstrom and Tirole (1993), market efficiency (or the related concept of liquidity) is maximized with a zero block. They derive finite optimal block sizes as they trade off market efficiency against, respectively, intervention and monitoring costs. In this paper, the optimal block size is finite even focusing on market efficiency alone.

follows:

$$E[P \mid X_h] = X_l + \frac{\kappa \Delta X}{n}\left[n - \alpha + \frac{\alpha}{1 - e_B + e_B\kappa}\right] = X_l + E[\pi \mid X_h]\Delta X,$$

$$E[P \mid X_l] = X_l + \frac{\kappa \Delta X}{n}\left[n - \alpha + (1 - e_B)\frac{\alpha}{1 - e_B + e_B\kappa}\right] = X_l + E[\pi \mid X_l]\Delta X,$$

where e_B is given by Lemma 3.

Proposition 1 *Market efficiency is maximized for a finite block size $\overline{\alpha}$, defined by $\frac{\partial(E[P \mid X_h] - E[P \mid X_l])}{\partial \alpha}|_{\alpha=\overline{\alpha}} = 0$, where $1 - \sqrt{\frac{1}{1+\nu}} < \overline{\alpha} < \frac{\nu}{\nu+2}$. Market efficiency is increasing in α for $\alpha < \overline{\alpha}$, and decreasing in α for $\alpha > \overline{\alpha}$.*

Appendix A extends the model by allowing the blockholder to buy upon favorable information, and shows that none of the above qualitative results change. As before, increasing α expands the set of possible trading strategies that an informed blockholder can undertake by loosening the short-sales constraint, and thus makes monitoring even more profitable. The simplified model without buying is used in this paper to maximize clarity.

4 Blockholders and Managerial Decisions

4.1 Long-Term Investment

The previous section linked blockholders to increased financial market efficiency. This section demonstrates that the latter can in turn augment product market efficiency, and thus have real benefits, by encouraging long-term behavior. 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[12] manager places weight $\mu\omega$ on the $t = 2$ stock price and $\mu(1 - \omega)$ on the $t = 3$ firm value, where $0 < \omega < 1$. The μ parameter captures the strength of the manager's overall alignment with shareholders in general. It is initially assumed exogenous, but endogenized in Section 4.3. 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 in the literature, motivated by a number of underlying factors;[13] these are not explicitly modeled so that the analysis can focus on the myopia issue.

At $t = 0$, the manager of a high-quality firm can invest in a long-term project that unambiguously creates fundamental value, but risks interim turbulence. The most natural example

[12] 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.

[13] 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)). 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 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)).

is intangible investment that is expensed and thus difficult to distinguish from losses. Let $\theta \in [0,1]$ denote the amount of investment. θ boosts the firm's $t = 3$ value to $V = X_h + g\theta$, but risks emitting signal s_b at $t = 1$ with probability $y\theta^2$, where $0 < y < 1$ (otherwise, s_g is given). g measures the productivity of the investment project, and y denotes the extent of information asymmetry between the firm and investors, i.e., the extent to which investors cannot distinguish a low-quality firm from a high-quality firm that is investing.

In addition, the manager derives a private benefit of $b\theta$, where $b > 0$. This is introduced simply to act as a "tie breaker" so that the manager strictly prefers to maximize firm value even in the absence of incentive pay ($\mu = 0$), for instance due to reputational concerns. $b > 0$ also highlights the contrast with papers that analyze effort conflicts, where the actions that yield private benefits also destroy fundamental value ($b < 0$). To ensure that private benefits purely act as a tie breaker and do not dominate the manager's decisions, I assume the following technical condition: b is "small" in the sense of

$$\frac{\mu g + b}{2\mu^2} \frac{3b}{\omega A(\frac{n}{2})} < (\Delta X)^2, \tag{13}$$

where

$$A(\alpha) = \frac{y\kappa}{n}\left[\frac{n}{\kappa} - n + \alpha - \frac{\alpha}{1 - e_B + e_B\kappa}\right] > 0. \tag{14}$$

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

$$\begin{aligned} J &= \mu(1-\omega)(X_h + g\theta) + \mu\omega y\theta^2\left(X_l + \frac{\kappa}{n}(\Delta X + g\theta)\left[n - \alpha + \frac{\alpha}{1 - e_B + e_B\kappa}\right]\right) \\ &\quad + \mu\omega(1 - y\theta^2)(X_h + g\theta) + b\theta. \end{aligned} \tag{15}$$

Taking first-order conditions with respect to θ yields

$$\begin{aligned} \frac{\partial J}{\partial \theta} &= \mu(1-\omega)g \\ &\quad + \mu\omega(1 - y\theta^2)g \\ &\quad + \mu\omega y\theta^2\frac{\kappa}{n}g\left[n - \alpha + \frac{\alpha}{1 - e_B + e_B\kappa}\right] \\ &\quad - 2\mu\omega y\theta(\Delta X + g\theta)\frac{\kappa}{n}\left[\frac{n}{\kappa} - n + \alpha - \frac{\alpha}{1 - e_B + e_B\kappa}\right] \\ &\quad + b. \end{aligned} \tag{16}$$

The first term represents the increase in long-term fundamental value. The second term reflects the rise in the $t = 2$ stock price 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 $X_h + g\theta$. The fourth term is the only negative term, which results from the increased probability of giving s_b. The final term denotes the manager's intrinsic incentives to maximize firm value.

Lemma 5 *Taking κ and e_B as exogenous, the manager chooses investment level θ given by*

$$\theta(\kappa, e_B) = \min\left(\frac{\sqrt{(\Delta X)^2 + \frac{3g(\mu g + b)}{\mu\omega A}} - \Delta X}{3g}, 1\right), \tag{17}$$

Assuming an interior solution, θ is increasing in g, and decreasing in ΔX, y, ω and μ.

The amount of long-term investment is naturally increasing in its productivity, and decreasing with the cost of interim turbulence. The latter is positively related to the difference in value between high- and low-quality firms ΔX, the level of information asymmetry y, and the manager's concern for the current stock price ω. If g is high and ΔX, ω and y are sufficiently low, θ will be at its first-best value of 1.

Less obviously, θ is also decreasing in μ, the manager's alignment with shareholders in general (rather than the short-term stock price in particular). If $\mu = 0$, the manager invests efficiently, i.e., $\theta = 1$. Owing to reputational concerns, the manager is naturally aligned with shareholders with respect to θ in the absence of extrinsic incentives. However, creating additional alignment ($\mu > 0$) paradoxically overturns this intrinsic desire to invest and induces myopia – even if the additional alignment is with respect to fundamental value as well as current stock price. It is difficult to tie the manager to V without simultaneously aligning him with P, hence ω is assumed constant. For example, improved corporate governance may reduce managerial entrenchment, but also render the manager more susceptible to the goals of shareholders who expect liquidity shocks. Granting the manager a large equity stake creates concern for the current stock price as he may sell his shares in the interim.[14]

Lemma 6 *Taking κ and e_B as exogenous, and assuming an interior solution, the sensitivity of θ with respect to α is*

$$\frac{\partial\theta(\kappa, e_B)}{\partial\alpha} = -\frac{\mu g + b}{2\mu\omega A^2\sqrt{(\Delta X)^2 + \frac{3g(\mu g + b)}{\mu\omega A}}}\frac{\partial A}{\partial\alpha}, \tag{18}$$

where

$$\begin{aligned}\frac{\partial A}{\partial\alpha} &= \frac{y\kappa}{n}\left[1 - \frac{1}{1 - e_B + e_B\kappa}\right] \\ &\quad -\frac{y\kappa}{n}\frac{\partial e_B}{\partial\alpha}\frac{\alpha(1-\kappa)}{[1 - e_B + e_B\kappa]^2} \\ &\quad +\frac{y\kappa}{n^2}\nu\alpha\left[1 - \frac{1}{1 - e_B + e_B\kappa}\right].\end{aligned} \tag{19}$$

[14] Ofek and Yermack (2000) document that CEOs often have few restrictions on selling their shares. One potential reason is long vesting periods would expose the CEO to great risk, as the stock price in several years' time will depend on many factors outside his control.

If and only if $\alpha < \overline{\alpha}$*, we have* $\frac{\partial A}{\partial \alpha} < 0$, $\frac{\partial \theta(\kappa, e_B)}{\partial \alpha} > 0$, $\frac{\partial^2 \theta(\kappa, e_B)}{\partial \alpha \partial g} > 0$, $\frac{\partial^2 \theta(\kappa, e_B)}{\partial \alpha \partial y} > 0$, $\frac{\partial^2 \theta(\kappa, e_B)}{\partial \alpha \partial \omega} < 0$ *and* $\frac{\partial^2 \theta(\kappa, e_B)}{\partial \alpha \partial \mu} < 0$.

A larger block raises the manager'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. Hence blockholders can add value, even in the absence of an underlying effort conflict and the ability to intervene, by promoting 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.

A higher α is more valuable for a firm with profitable investment opportunities for two reasons. First, raising α has a proportional effect on θ: since θ is initially larger if g is higher, the increase in g is greater ($\frac{\partial^2 \theta(\kappa, e_B)}{\partial \alpha \partial g} > 0$). Second, the consequent uplift to firm value is a function of $g\frac{\partial \theta(\kappa, e_B)}{\partial \alpha}$. However, if g is very high, $\theta = 1$ and $\frac{\partial \theta(\kappa, e_B)}{\partial \alpha} = 0$: the investment opportunity is sufficiently attractive that the manager pursues it to the fullest extent 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 the manager is greatly concerned with interim performance, he will still act myopically even in the presence of a blockholder ($\frac{\partial^2 \theta(\kappa, e_B)}{\partial \alpha \partial \omega} < 0$). On the other hand, if stock price is not a concern, the manager invests efficiently in the first place. By contrast, the importance of a block is monotonically increasing in information asymmetry. Projects with high y both suffer the greatest underinvestment (since $\frac{\partial \theta(\kappa, e_B)}{\partial y} < 0$) and are especially encouraged by a large shareholder (since $\frac{\partial^2 \theta(\kappa, e_B)}{\partial \alpha \partial y} > 0$).

In sum, blockholders are particularly valuable in firms for which motivating long-term investment is a "critical" issue. I define the "criticalness" of a problem as the potential increase in firm value attainable from solving the problem and achieving the first-best outcome. Criticalness is not only non-monotonic in the profitability of investment g but also depends on many other factors. Investment is not a critical issue either if it is unimportant for firm value (g is low) or efficient anyway (g is high, y and ω are low, or investment is contractible).

Thus far, κ has been taken as exogenous. In equilibrium it depends on θ: as θ increases, s_b is more likely to be associated with a high-quality firm. Let the proportion of high-quality firms in the economy be $q \leq \frac{1}{2}$. This leads to Lemma 7 below:

Lemma 7 *Taking* θ *as exogenous, the prior probability that a firm emitting* s_b *is of high quality is*

$$\kappa(\theta) = \frac{qy\theta^2}{qy\theta^2 + 1 - q}.$$

I can now derive comparative statics regarding the equilibrium investment θ^*, allowing for the endogeneity of κ, θ and e_B. Proposition 2 below represents the main result of the paper.

Proposition 2 *The manager invests efficiently ($\theta^* = 1$) regardless of block size if the level of information asymmetry y, the manager's weight on the current stock price ω, and the manager's alignment with shareholders μ are sufficiently low, and the productivity of investment g is sufficiently high. If $\theta^* < 1$, investment*

(i) increases with the productivity of investment g,

(ii) increases with block size α if and only if $\alpha < \overline{\alpha}$. This increase is particularly large when the productivity of investment g and information asymmetry y are high, and the manager's weight on the current stock price ω and alignment with shareholders μ are low, and

(iii) increases with the proportion of good firms in the economy q.

4.1.1 Does Liquidity Deter Investment?

In previous papers, where the blockholder's value added stems from voice, liquidity may be undesirable as it allows her instead to exit (Bhide (1993)).[15] Voice and exit are mutually exclusive and thus facilitating one hinders the other. Aghion, Bolton and Tirole (2004) entitle their analysis "liquidity versus incentives." 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 in this model by encouraging exit. This is indeed the conventional wisdom: liquidity allows shareholders to sell upon weak earnings and thus makes managers even more concerned with short-term financial results. A number of commentators (e.g., Porter (1992)) attribute the alleged underinvestment of U.S. firms to liquid capital markets, and called for policy intervention to reduce liquidity.

This papers shows that liquidity 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. Conversely, if the blockholder could never exit owing to market liquidity, her actions have no effect on stock prices and investment.

Trading is only harmful if it is guided by earnings rather than fundamental value, but the conventional view lacks a theoretical framework to explain why investors would sell upon weak earnings. In an efficient 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; as demonstrated, this result holds even if the investor faces short-term pressures. Investors can only profit by trading on private information, and so trading is desirable as it impounds private information into the stock price.

However, the optimal liquidity is finite. As shown in Section 3.3, with ν fixed, increasing α

[15] Bhide's conclusion applies in particular to models where block size is exogenous and the blockholder chooses between either intervention or intentional exit. Maug (1998) shows that liquidity is desirable to allow block formation in the first place. 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.

has a non-monotonic effect on the expected price and the optimal α depends on ν. Similarly, fixing α, increasing ν also has a non-monotonic effect on market efficiency, and the optimal ν depends on α. Differentiating (8), the ν which maximizes market efficiency, and thus investment, is bounded at

$$\nu = \frac{\alpha^2}{1-\alpha}\frac{F}{e_B(1-e_B+e_B\kappa)}. \tag{20}$$

Market efficiency depends on two factors: how much information the blockholder gathers, and the extent to which this information is impounded into prices. While liquidity unambiguously increases monitoring through augmenting trading profits, it also camouflages her trades and reduces their price impact. If there is zero liquidity, the blockholder does not monitor; if liquidity is infinite, the blockholder 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, the blockholder's maximum sale is capped at α due to short-sales constraints.

The complementarities between α and ν suggest that policy interventions should be directed towards increasing α, rather than reducing ν. Far from being a solution to myopia, measures to restrict liquidity may exacerbate the problem by reducing price efficiency. A high α leads to blockholders' trades being even more reflective of fundamental value, and reduces the likelihood that such trades are camouflaged.

4.1.2 Further Applications of the Investment Model

In the general model, θ is any action that boosts fundamental value but risks of emitting the bad signal. 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 or characteristic 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 is unknown. The fundamental problem with investment is that the associated expenditures are difficult to interpret. An unexpected increase in cash outflows could mean that management is wasting resources (bad news about agency problems), expenditures required to support current activities are higher than expected (bad news about operating costs), or investment opportunities are unexpectedly favorable (good news) (Myers (1989)). For example, atomistic shareholders can costlessly observe from financial statements that a firm has increased R&D. They do not know whether this increase results from managerial excess, the failure of existing R&D efforts, or efficient exploitation of new growth opportunities. Upon observing significant investment for which the motive is unclear, the blockholder will gather information and trade accordingly.

Low θ can also represent the pursuit of myopic actions which boost the interim stock price (and thus reduce the risk of being interpreted as low quality) at the expense of long-term fundamental value, such as accounting manipulation[16] or "milking" customer reputation through lowering product or service quality. Bergstresser and Philippon (2006) and Peng and Roell (2006) find that equity compensation provides incentives for executives to manipulate earnings. Allowing the manager of a low-quality firm to undertake a value-destructive action that gives a probability of yielding s_g would reinforce the results of the core model. In addition, low θ can represent *over*investment: pursuing visible negative-NPV projects to trick the market into believing that the firm is of high quality. This is particularly the case if the level of investment is observable but the quality is not, as in Bebchuk and Stole (1993) and Bizjak, Brickley and Coles (1993). The model simply requires low θ to be detrimental to fundamental value, and is agnostic as to whether this involves underinvestment or overinvestment. The presence of a blockholder reduces the CEO's ability to deceive the market about his firm's quality, even in the short-run.

4.2 Managerial Effort

The core model involved no managerial effort decision, to illustrate how blockholders can add value even absent the effort conflict assumed in prior literature. It focused on the myopia issue owing to its perceived importance today, but the trading mechanism has far more general applications in attenuating other agency problems, including shirking. This sub-section extends the model to show that blockholders can also elicit effort without intervention.

All firms are now identical at time $t = -1$. The manager exerts effort of $e_M \in [0, 1]$ at personal cost $\frac{1}{2}e_M^2$. With probability ze_M, the firm becomes high quality, and then chooses $\theta \in [0, 1]$ at $t = 0$ as before. $z < \frac{1}{2}$ measures the effectiveness of effort. With probability $1 - ze_M$, the firm becomes low quality and there is no additional decision at $t = 0$. The manager knows that he will choose θ^* if his effort is successful. His objective function is thus given by

$$\begin{aligned} &ze_M\mu\left\{\omega\left(X_l + \left(y\theta^{*2}E[\pi \mid X_h] + 1 - y\theta^{*2}\right)(\Delta X + g\theta^*)\right) + (1-\omega)\left(X_h + g\theta^*\right)\right\} \\ &+(1 - ze_M)\mu\left\{\omega\left(X_l + E[\pi \mid X_l](\Delta X + g\theta^*)\right) + (1-\omega)X_l\right\} - \frac{1}{2}e_M^2. \end{aligned}$$

He chooses initial effort level[17]

$$e_M^* = \min\left(\mu z\left(\Delta X + g\theta^*\right)\left[1 - \omega E[\pi \mid X_l] - \omega y\theta^{*2}\left(1 - E[\pi \mid X_h]\right)\right], 1\right).$$

If the solution is interior,

[16] One direct cost of accounting manipulation is economically costly lawsuits (Peng and Roell (2006)). Goldman and Slezak (2006) also show that equity-based compensation induces manipulation, and assume that such activities consume corporate resources, thus eroding fundamental value.

[17] This formulation assumes θ^* is independent of e_M. In reality, raising e_M augments κ and thus e_B, further increasing θ^* which reinforces the effect in this equation. This effect is not included in the equation for clarity.

$$\frac{\partial e_M^*}{\partial \alpha} > 0 \text{ if and only if } \alpha < \overline{\alpha}.$$

Effort is naturally increasing in its effectiveness z and the manager's equity alignment μ. If these parameters are sufficiently high, then effort is at its first-best level of 1 even for low α, and shirking is not a critical issue. Assuming an interior solution, effort is increasing in α for two reasons. First, assume that θ is not a choice variable. As shown in Section 3, higher α raises the difference in the $t = 2$ prices of high and low quality firms. Since the manager attaches weight $\omega > 0$ to the stock price, effort incentives rise. In previous models, the principal monitors to find out e_M^*; such monitoring is required since the $t = 3$ outcome is not a sufficient statistic, but affected by luck as well as effort. In this paper, monitoring produces no additional information about e_M^* but instead allows the blockholder to learn the same information (V) earlier. Thus the effects of effort are impounded into the $t = 2$ share price, encouraging the manager to exert personally costly effort that only pays off in the long run. This effect is shared with Admati and Pfleiderer (2006), and is particularly strong for high ω and z, i.e., $\frac{\partial^2 e_M^*}{\partial \alpha \partial \omega} > 0$ and $\frac{\partial^2 e_M^*}{\partial \alpha \partial z} > 0$.

Second, take into account the fact that θ is a choice variable. This leads to an effect not featured in Admati and Pfleiderer. High α allows the manager to select a greater θ if the firm becomes successful. Anticipating this, he exerts more effort at $t = -1$ to ensure success in the first place. In other words, the manager expends effort in launching a new product, not only because the first model will boost the firm's fundamental value and share price, but also because it gives him the option to launch future models. This option to upgrade in the future is particularly valuable if the firm has a blockholder to allow such follow-on investments to be pursued.

The results for this subsection are summarized in Proposition 3:

Proposition 3 *The manager exerts the efficient level of effort ($e_M^* = 1$) regardless of block size if the effectiveness of effort z and the manager's alignment with equityholders μ are sufficiently high. If $e_M^* < 1$, effort*

(i) increases with block size α if and only if $\alpha < \overline{\alpha}$,

(ii) increases with its effectiveness z, and

(iii) increases with the manager's alignment with equityholders μ.

4.3 Optimal Block Size

Thus far, α has been taken as exogenous and the analysis has focused on the α that maximizes market efficiency. This subsection first analyzes the socially optimal α that maximizes firm value net of the costs of blockholders. I then show that the privately optimal α, which is more likely to be observed empirically, may differ substantially owing to free-rider problems. Both analyses use the extended model involving costly managerial myopia with an effort decision.

The socially optimal α can be achieved (at least temporarily) in practice if the firm is owned by a founding entrepreneur who is taking the company public, a formulation used by

Faure-Grimaud and Gromb (2004) and Kahn and Winton (1998). The founder will choose the shareholder structure that maximizes firm value, for instance by bringing in a blockholder prior to an IPO. His objective function is given by

$$W(\alpha) = V(\alpha) - \Psi(\alpha), \tag{21}$$

where

$$V(\alpha) = e_M^*(X_h + g\theta^*) + (1 - e_M^*)X_l,$$

$$\Psi(\alpha) = \frac{1}{2c_B}(1 - e_M^* + e_M^* y\theta^{*2}) \left[\alpha\left(\frac{n-\alpha}{n}\right)\kappa(1-\kappa)(\Delta X + g\theta^*)\right]^2.$$

There are two costs of blockholders endogenized by this model. The first is the indirect cost resulting from reduced liquidity, which is only suffered for $\alpha > 1 - \sqrt{\frac{1}{1+\nu}}$. This cost is contained within the θ^* and e_M^* terms within V. The second is the direct cost of expected monitoring expenses, $\Psi(\alpha)$. This cost is borne for all levels of α and lowers IPO proceeds as the blockholder demands compensation for his expected monitoring. While the blockholder enjoys private benefits from monitoring in the form of trading profits, these come at the expense of small shareholders and thus cancel out in equation (21).[18]

The marginal effect of raising α on firm value is

$$\frac{\partial W}{\partial \alpha} = \frac{\partial e_M^*}{\partial \alpha}(\Delta X + g\theta^*) + e_M^* g\frac{\partial \theta^*}{\partial \alpha} - \frac{\partial \Psi}{\partial \alpha}. \tag{22}$$

The first two terms represent the effects of a higher block on managerial effort and long-term investment. These are positive for $\alpha < \overline{\alpha}$. Owing to the increased monitoring expenses captured by the third term, the socially optimal block size, α^*, is less than $\overline{\alpha}$, the level that maximizes market efficiency. α^* is determined by the intersection of the benefit and cost functions. It thus decreases with the cost of information acquisition and rises with the magnitudes of $\frac{\partial e_M^*}{\partial \alpha}$ and $\frac{\partial \theta^*}{\partial \alpha}$, i.e., the criticalness of the investment and effort issues. (Recall that this is a different concept from the productivity of investment and effort, g and z).

If $\frac{\partial e_M^*}{\partial \alpha} = \frac{\partial \theta^*}{\partial \alpha} = 0$, either because effort and investment are at their first-best levels regardless of α (e.g., $\omega = 0$, or these decisions are contractible), or neither decision is important ($g = z = 0$), efficient prices have no impact on managerial decisions. Therefore, monitoring is socially wasteful as it expends resources and does not increase total surplus, merely achieving wealth transfers to the blockholder from small shareholders. This result echoes Stiglitz (1981), who shows that increased financial market efficiency is alone insufficient to raise product market efficiency. The optimal block size is zero in these cases.

[18] The objective function assumes that the liquidity traders in the model are the small shareholders who subscribe to the IPO. Hence the blockholder's gains from informed trading do not appear in the objective function as they are pure transfers from atomistic shareholders. If some liquidity trades originate from investors outside the original shareholder base, the IPO proceeds and optimal α are both higher.

Next, I consider the effect of changing the intensity of the manager's alignment with shareholders μ, by varying the strength of corporate governance or the manager's pay-performance sensitivity. The effect of raising μ is given by

$$\frac{\partial W}{\partial \mu} = \frac{\partial e_M^*}{\partial \mu}(\Delta X + g\theta^*) + e_M^* g \frac{\partial \theta^*}{\partial \mu} - \frac{\partial \Psi}{\partial \mu}. \tag{23}$$

Since $\frac{\partial e_M^*}{\partial \mu} > 0$ and $\frac{\partial \theta^*}{\partial \mu} < 0$, there is a trade-off between effort and investment. Combining the results of (22) and (23), the optimal α and μ depend on firm characteristics. If both managerial decisions are critical, high μ is used to elicit effort and high α minimizes the side-effect of myopia. If effort alone is critical, there is little need to accompany the increased μ with higher α to maintain investment. Alternatively, if project selection is the principal issue, low μ is optimal. Flat pay is a less costly way of inducing investment than introducing a blockholder, as the latter incurs monitoring expenses. Investment concerns may explain why the intensity of pay-performance sensitivity observed in practice is too low to be reconciled with effort models (Murphy (1999)).

I now analyze a shareholder's private incentives to acquire a block on the open market when ownership is initially dispersed. Assume that the shareholder buys α at $t = 0$ and her purchase is perfectly observed. Selling shareholders will anticipate the increased firm value resulting from the imminent block formation. Per share, they will demand

$$P_0 = e_M^*(X_h + g\theta^*) + (1 - e_M^*)X_l - \alpha\left(\frac{n-\alpha}{n}\right) e_B \kappa(1-\kappa)(\Delta X + g\theta^*),$$

where the first two terms represent expected firm value given block size α, and the third term denotes expected trading losses. Since the direct value of the block is $e_M^*(X_h + g\theta^*) + (1 - e_M^*)X_l$, the blockholder's overall payoff is

$$\begin{aligned}
& \alpha\left(\frac{n-\alpha}{n}\right) e_B \kappa(1-\kappa)(\Delta X + g\theta^*) \\
& + \left[\alpha\left(\frac{n-\alpha}{n}\right) e_B \kappa(1-\kappa)(\Delta X + g\theta^*) - \Psi(\alpha)\right] \\
= \; & 2\alpha\left(\frac{n-\alpha}{n}\right) e_B \kappa(1-\kappa)(\Delta X + g\theta^*) - \Psi(\alpha).
\end{aligned} \tag{24}$$

The first term is the blockholder's gain from buying shares at a discount at $t = 0$: existing shareholders will sell at a discount because they fear future trading losses against an informed investor. The second term is the actual realized trading gains, less the costs of information gathering. The shareholder's private incentives to acquire a block are driven purely by her expected trading gains, and are independent of the social benefits which depend on $\frac{\partial e_M^*}{\partial \alpha}$ and $\frac{\partial \theta^*}{\partial \alpha}$. The crux of the misalignment is free-riding by small shareholders, which prevents the blockholder from sharing in the value creation, as in Grossman and Hart (1980). If the real benefits are sufficiently high, blocks will be inefficiently small. Consistent with Bhide (1993), government policies to encourage dispersed ownership in all cases may be misguided, since private incentives to acquire blocks are sometimes inadequate. Somewhat surprisingly, the privately optimal α may be too high. If managerial decisions are not critical, monitoring effort is a deadweight cost which merely leads to the blockholder profiting from liquidity investors.

In practice, the presence of liquidity traders at $t = 0$ allows the block to form anonymously, as in Kyle and Vila (1991). In the extreme, she will be able to acquire shares for $V(0)$, the expected firm value under dispersed ownership. This price is neither inflated by the prospective value creation, nor discounted by the expected trading losses. The blockholder's payoff becomes

$$\alpha\left[V(\alpha)-V(0)\right]+\alpha\left(\frac{n-\alpha}{n}\right)e_B\kappa(1-\kappa)(\Delta X+g\theta^*)-\Psi(\alpha), \tag{25}$$

compared to the social gains of

$$V(\alpha)-V(0)-\Psi(\alpha).$$

Private and social incentives still do not coincide owing to a second free-rider problem. Even if the blockholder can acquire her stake anonymously, she only enjoys $\alpha\%$ of the increase in firm value, similar to Shleifer and Vishny (1986). Her incentives continue to be inflated by the potential trading gains, and so the privately optimal α is again too high or too low.

Reality is likely to lie between the two extremes of equations (24) and (25). Therefore, the blockholder's incentives are partially aligned with social objectives.

5 Empirical Predictions

The model generates a number of empirical implications. Many of these are quite different from the empirical observations that motivated this paper: the potential importance of managerial myopia in many firms and the prevalence of non-controlling blockholders in the U.S. Individual predictions are not intended to be exclusive tests of the model: while some are supported by existing empirical results, other models (involving effort and/or intervention) may generate the same prediction and new empirical tests would be needed to distinguish them. However, the combination of predictions appears unique to a model which features blockholder trading to promote investment.

These predictions naturally assume that other variables are held constant. To be consistent with the model, tests should exclude blockholders who never (or very rarely) trade on information, such as families or index funds. For brevity, predictions on the effects of block size assume that the market liquidity constraint is not hit. If block size becomes too large, the predicted relationships change direction.

Prediction 1: Blockholders should be more prevalent in firms with abundant long-term opportunities that exhibit information asymmetry.

From equation (22), the optimal α is highest when the productivity of investment (g) and the manager's short-term concerns (ω) are moderate, and information asymmetry (y) is high.[19] While the core model considers a single project for clarity, it naturally extends to multiple investment opportunities. Firms with abundant long-term opportunities may have some exceptionally profitable projects that would be pursued anyway, but likely also have moderate investments that require a blockholder to be implemented.

At least three types of firm satisfy these criteria, and thus should feature blockholders. First, firms with low equity analyst coverage exhibit high information asymmetry. Second, R&D-intensive companies feature both abundant growth opportunities and information asymmetry. Indeed, a number of empirical papers use R&D to measure information asymmetry *because* it proxies for growth opportunities, e.g., Bizjak et al. (1993) and references therein.

Third, many start-up firms have both features. Indeed, fledging companies are commonly privately owned; while the advice and expertise provided by venture capital investors is a primary reason for this financing structure, the protection of a fledgling company from the demands of the stock market is another plausible advantage. When such firms go public, the venture capitalist often retains a large stake for a significant period.

Prediction 2: Blockholders lead to long-term behavior.

This prediction directly follows from Proposition 2. While Prediction 1 concerns firm characteristics that will attract blockholders, this prediction addresses the effect of blockholders on the firm. Long-term behavior can be measured by investment (R&D/sales or capex/sales), earnings management (accruals), or the capitalized value of growth opportunities (Tobin's q). Since α is endogenous, cross-sectional tests may have difficulty in assigning causality and thus distinguishing between Predictions 1 and 2; yet since both predictions are generated by the model, a correlation would be supportive.

Cronqvist and Fahlenbrach (2006) use a time-series approach, tracking individual blockholders over time. This has the potential to test Prediction 2 in particular. They find that the appearance of certain blockholders in a corporation leads to a significant increase in investment. Their timing analysis suggests the relationship is causal, rather than a result of selection. One argument against their causal interpretation is that it is unlikely that blockholders can change corporate policies, given 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.

Predictions 1 and 2 appear unique to a model where the blockholder's principal role is to induce investment. They thus have the potential to distinguish this paper from existing theories focused upon effort. However, they also could be generated by a model where the blockholder intervenes to optimize investment. These explanations can be distinguished by examining the

[19] Equation (22) refers to the socially desirable α. The privately optimal α is most likely to be observed empirically. Since private and social incentives are partially aligned, predictions can be made using the social optimum, although the strength of the empirical relationship may be reduced by the two free-rider problems.

aforementioned evidence on barriers to intervention in the U.S., and through Prediction 3 below which is specific to a theory of blockholder trading.

Prediction 3: Blockholders increase price efficiency.

Proposition 1 states that prices reflect fundamental value faster in the presence of blockholders, not only because the blockholder herself has a large incentive to gather information, but also because other market participants infer information from her trading decisions.

Amihud and Li (2006) find that the price reaction to dividends is significantly smaller for firms with higher institutional ownership; their interpretation is that institutional investors have already gathered and traded upon the information that would be conveyed by the dividend change. While institutional ownership is likely correlated with blockholdings, it would be valuable to study the impact of blockholdings directly. Additional tests could involve measures of price efficiency, such as Hou and Moskowitz's (2005) measure of the delay with which the stock price responds to information, and event-drift anomalies such as post-earnings announcement drift. While such drift is commonly attributed to investors' behavioral biases, it may instead be boundedly rational, given the costs of analyzing even freely available information. An earnings announcement is often accompanied by a trading update and management projections; assessing the implications of such information for the future stock price is far from costless. Blockholders have a particularly strong incentive to analyze such news quickly and impound it into prices.[20] As with Prediction 2, empirical tests will have to account for the endogeneity of α: inefficient prices likely attract blockholders, weakening the positive relationship between block size and price efficiency generated by a simple comparative statics analysis.

Prediction 4: Blockholdings are positively correlated with pay-performance sensitivity.

From Lemma 6, the value of a blockholder rises with pay-performance sensitivity (for low ω) since myopia becomes a greater concern. This relationship should be particularly strong in industries where investment is important. Hartzell and Starks (2003) indeed find a significant positive correlation between institutional ownership concentration and pay-performance sensitivity.[21]

Prediction 5: Block size is increasing in market liquidity.

[20] While there is no drift in the present model, it can easily be extended to incorporate drift if the quantifiable information (earnings) is positively correlated with the information that must be analyzed (trading outlook). A trading strategy that involves buying (selling) shares with positive (negative) earnings surprises would exploit such correlation without the need to quantify the tacit information. However, arbitrage is limited by the risk of such strategies (Shleifer and Vishny (1997)), hence the continued existence of the anomaly.

[21] Contract theory approaches do not have an unambiguous prediction for this relationship. Blockholders may be substitutes for managerial equity alignment in inducing effort, implying a negative correlation (as argued by Mehran (1995)). They may also be complements. Hartzell and Starks's interpretation is that external monitors are able to force firms to raise pay-performance sensitivity to efficient levels. This paper offers an alternative explanation for causation that does not assume intervention: the appearance of blockholders attenuates myopia and allows firms to increase equity pay to elicit effort.

Increased liquidity ν augments the optimal trading volume in the absence of short-sales constraints, and thus raises the socially optimal block size. In addition, greater liquidity may allow a block to form anonymously, reducing the Grossman and Hart (1980) free-rider problem, and therefore increases the privately optimal block size also. Standard measures of liquidity are likely to proxy for n, upon which block size has a direct negative effect; ν can be derived using the relationship $n = \nu(1 - \alpha)$.

Prediction 6: Large blockholders do not constitute the prevalent shareholding structure.

This prediction follows from equation (22). In intervention models, such as Shleifer and Vishny (1986) and Kahn and Winton (1998), firm value rises monotonically in block size. In isolation, they predict that the prevalent shareholding structure should be one of highly concentrated ownership. In my model, even without assuming that blockholder costs are first-order, a larger block is only beneficial up to a point ($\overline{\alpha}$). This is consistent with the finding that, while blockholders are common in the U.S. (Holderness (2006)), substantial blockholders are rare (La Porta et al. (1999)).[22]

Prediction 7: Blockholder sales are associated with stock price declines.

In the model, block sales to lead to stock price declines since they convey negative information. The timing of the decline depends on the observability of the sale. If it is directly observed at the time (e.g., in secondary distributions), the stock price should decline immediately with no long-horizon drift.[23] Indeed, Scholes (1972) and Mikkelson and Partch (1985) conclude that the negative stock price reaction to secondary 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*. In addition, the stock price changes show that blockholder trades do affect market prices.

If the block sale can only be observed by the econometrician ex post via proxy filings, it should lead to negative long-horizon drift as the bad news eventually becomes public. Parrino, Sias and Starks (2003) examine sales by institutional investors: like blockholders, they are likely to be more informed than individuals. They find that institutions sell in advance of forced CEO turnover (a sign of severe firm problems), and that the stock price drifts downwards after such

[22] This prediction is distinct from the motivating empirical observation that most U.S. blockholders are unable to intervene. This paper identifies a mechanism through which non-interventionist blockholders can add value, but it is not obvious (from the observation alone) that large blockholders add less value through this mechanism than small blockholders.

[23] An exception is negotiated trades between blockholders: since the purchaser is buying a large stake, she will undertake extensive due diligence to ensure she is not trading against unreleased information. Instead, such trades often lead to blocks being transferred to a more efficient monitor, and are consequently associated with price increases (Barclay and Holderness (1991)).

sales. In separate work, I am analyzing the profitability of a "follow the leader" trading strategy based on blockholders' trading disclosures.

6 Conclusion

Many existing theories illustrate the potential benefits of having blockholders. These models are particularly applicable to shareholders who have the power to intervene, and firms where an effort conflict is first-order.

However, the dominant shareholding structure in the U.S. is one of small blockholders. Compounded with substantial legal and institutional impediments to intervention, the benefits of previous models may be difficult to obtain. Moreover, recent increases in managers' equity alignment may both attenuate shirking and exacerbate short-termism. For many modern firms, the fundamental challenge is building core competencies through intangible investment.

This paper illustrates that blockholders can bring substantial benefits to a firm, even in the absence of control rights or a shirking issue – indeed, they can address the critical problem of managerial myopia. By gathering and trading on non-verifiable information, prices reflect fundamental value rather than current earnings. In turn, this increased market efficiency encourages managers to take positive-NPV projects that risk interim turbulence. Contrary to popular perception, the liquidity of the U.S. stock market may be beneficial to long-term investment. By increasing the feasibility of exit, the loyalty provided by a blockholder upon weak financial results becomes particularly effective in attenuating the stock price decline. In the 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 are a deterrent to investment. Such predictions have not materialized, potentially as liquidity can have a positive effect on investment. To the extent that the U.S. capital allocation system can be improved, policies should be targeted at encouraging larger stakes, rather than reducing liquidity.

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. Even more broadly, the model can be used to show how any agent that gathers information about fundamental value and incorporates it into prices can improve real efficiency. This illustrates a social benefit of hedge funds and equity analysts, although these actors also reduce the marginal role for blockholders.

The model generates a number of new empirical predictions, some of which I intend to explore in future research. Blockholders should be associated with more efficient prices and greater long-term behavior by firms. They are particularly valuable for firms with abundant long-term investment opportunities that exhibit information asymmetry.

As with all models, the analysis in this paper is incomplete. This paper's goal is to illustrate how and under what conditions blockholders can be a *solution* to myopia. It therefore treats the underlying *causes* of myopia (the manager's alignment with the stock price, and the existence of the interim signal) as exogenous, using previous research to motivate their existence.

One possible extension would therefore be to endogenize the manager's stock price concerns and analyze the optimal balance between short- and long-term incentives. A second involves endogenizing the presence of the interim signal. In Edmans (2006b) I explore this issue to illustrate a cost of mandatory disclosure over and above the expenses of gathering and disseminating information. Laws can only mandate the reporting of "hard" information, such as financial numbers, and have difficulty in alleviating information asymmetry with regards to "soft" information. Mandatory disclosures may distort managers' incentives towards targeting hard numbers at the expense of intangible investment, particularly if ownership is dispersed. Sometimes no information is preferable to incomplete information.

A third extension considers shareholder structure. This paper's analysis has focused on a single blockholder, but many firms are held by more than one blockholder. In Edmans (2006c) I analyze market efficiency when there are multiple blockholders who may act strategically in their monitoring and trading.

α	Blockholder's stake
s_g	Good signal, emitted by high-quality firms only
s_b	Bad signal, emitted by both firm types
P	$t = 2$ stock price
V	$t = 3$ realized fundamental value
X_l	Fundamental value of a low-quality firm
X_h	Fundamental value of a high-quality firm
ΔX	$X_h - X_l$
q	Proportion of high-quality firms in economy
e_B	Blockholder's monitoring effort
c_B	Parameter for blockholder's monitoring cost
b	Blockholder's order
β	Blockholder's equilibrium sale upon learning $V = X_l$
u	Liquidity traders' order. $u \sim U[0, n]$
n	Maximum liquidity traders' order. $n = \nu(1 - \alpha)$
ν	Liquidity parameter
d	Total order. $d = b + u$
κ	Market maker's prior that firm is of high quality if s_b is emitted
π	Market maker's posterior that firm is of high quality after seeing s_b and d
$\overline{\alpha}$	Blockholder's stake that maximizes market efficiency
μ	Manager's alignment with shareholders in general
ω	Manager's alignment with $t = 2$ stock price
θ	Long-term investment choice
g	Productivity of long-term investment
y	Information asymmetry
b	Private benefit to manager of long-term project
e_M	Manager's effort
z	Productivity of managerial effort

Table 1: Key parameters in the model.

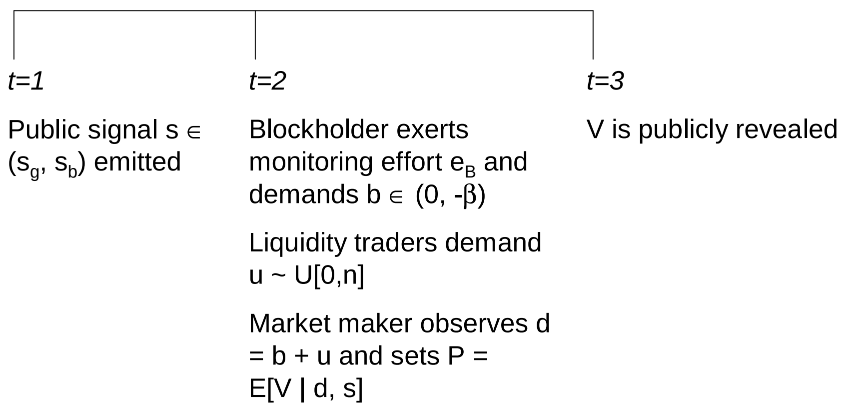

Figure 1: Timeline of model

A Blockholder Purchases

I now allow the blockholder to buy γ upon discovering good news. While setting $\beta^* = \alpha$ is optimal if the blockholder was not allowed to purchase, this may no longer be the case. Hence I analyze the general case where the blockholder buys γ upon good information and sells β upon bad information. As in the model without purchases, it is straightforward to verify that the blockholder does not trade if she is uninformed.

A.1 Market Maker

Again, assume that signal s_b has been received. Solving for a Nash equilibrium and assuming that the short-sale constraint binds yields the following:

Lemma 8 *Upon observing signal s_b and total demand d, the market maker sets the following prices:*

$$\begin{cases} P = X_l \text{ if } d < 0 \\ P = X_l + \frac{\kappa - e_B\kappa}{1-e_B\kappa}\Delta X \text{ if } 0 \leq d < \gamma^* \\ P = X_l + \kappa\Delta X \text{ if } \gamma^* \leq d < n - \beta^* \\ P = X_l + \frac{\kappa}{1-e_B+e_B\kappa}\Delta X \text{ if } n-\beta^* \leq d < n \\ P = X_h \text{ if } d \geq n. \end{cases}$$

Upon learning that fundamental value is X_l, the blockholder sells

$$\beta^* = \alpha.$$

Upon learning that fundamental value is X_h, the blockholder buys

$$\gamma^* = \frac{n}{2} - \frac{\alpha}{2}\left[2 - \frac{1-e_B}{1-e_B\kappa} - \frac{1-e_B}{1-e_B+e_B\kappa}\right]. \tag{26}$$

Increasing α thus has two conflicting effects on monitoring effort. As in the core model, it raises the amount sold upon negative information, β^*, thus augmenting monitoring incentives. However, this increased β^* also reduces γ^* and therefore the quantity purchased upon good news. Since both α and γ^* do not exceed $\frac{n}{2}$, the blockholder's total holding after buying does not exceed n and so there is always a sufficient supply of shares outstanding to allow the blockholder to buy her desired amount.

The overall effect will be positive (as long as α is not so high that liquidity becomes a constraint, as in the core model). Intuitively, increasing α expands the set of possible trading strategies that an informed blockholder can undertake, by loosening the short-sales constraint, and thus makes monitoring even more profitable. Any trading strategy that was feasible under a lower α remains feasible when α is increased.

The positive effect of α can be shown by differentiating the blockholder's objective function with respect to e_B. The blockholder maximizes:

$$Z = \frac{e_B \Delta X \kappa (1-\kappa)}{n} \left[\alpha \left(\gamma^* \frac{1-e_B}{1-e_B\kappa} + n - \alpha - \gamma^* \right) + \gamma^* \left(\alpha \frac{1-e_B}{1-e_B+e_B\kappa} + n - \alpha - \gamma^* \right) \right] -\frac{1}{2} c_B e_B^2.$$

with first-order condition

$$\frac{\Delta X \kappa (1-\kappa)}{n} \left[\alpha \left(\gamma^* \frac{1-e_B}{1-e_B\kappa} + n - \alpha - \gamma^* \right) + \gamma^* \left(\alpha \frac{1-e_B}{1-e_B+e_B\kappa} + n - \alpha - \gamma^* \right) \right] + \frac{\Delta X \kappa (1-\kappa)}{n} e_B \left[\frac{\alpha^2 Q}{2} \left(2 - \frac{1-e_B}{1-e_B\kappa} - \frac{1-e_B}{1-e_B+e_B\kappa} \right) - \frac{\alpha Q n}{2} \right] - c_B e_B = 0,$$

and

$$Q = \frac{1}{1-e_B\kappa} - \frac{\kappa(1-e_B)}{(1-e_B\kappa)^2} + \frac{1}{1-e_B+e_B\kappa} - \frac{(1-\kappa)(1-e_B)}{(1-e_B+e_B\kappa)^2} > 0.$$

A simple expression for e_B cannot be derived in closed form. However, the effect of α on e_B can be ascertained by implicitly differentiating the above with respect to α. This cross-partial is given by

$$\frac{\partial^2 Z}{\partial e_B \partial \alpha} = \frac{\Delta X \kappa (1-\kappa)}{n} \left[n - 2\alpha - \nu(\alpha + \gamma^*) + \gamma^* \left(\frac{1-e_B}{1-e_B+e_B\kappa} + \frac{1-e_B}{1-e_B\kappa} - 2 \right) \right] + \frac{\Delta X \kappa (1-\kappa)}{n} e_B \left[\alpha Q \left(2 - \frac{1-e_B}{1-e_B\kappa} - \frac{1-e_B}{1-e_B+e_B\kappa} \right) - \frac{Qn}{2} \right] + \frac{\nu}{n} Y.$$

At $\alpha = 0$, $\gamma^* = \frac{n}{2}$, $n = \nu$ and $e_B = 0$. Hence

$$\frac{\partial^2 Z}{\partial e_B \partial \alpha} = \Delta X \kappa (1-\kappa) \left(1 - \frac{n}{2} \right),$$

which is positive since $n < 2$. The derivative remains positive for small or moderate levels of α but eventually turns negative owing to the adverse impact on both liquidity n and the purchase volume γ^*. This is similar to the core model, where the impact of α on effort is positive up to $1 - \sqrt{\frac{1}{1+\nu}}$; however, the optimal α to maximize effort can no longer be derived in closed form.

B Proofs

Proof of Lemma 1

If $d < 0$, the market maker knows for certain that the blockholder has sold. Since the blockholder sells only upon discovering that $V = X_l$, $\pi_{d<0} = 0$.

If $0 \leq d < n - \widehat{\beta}$, either liquidity traders have bought $0 \leq u < n - \widehat{\beta}$, or they have bought $\widehat{\beta} \leq u < n$ and the blockholder has sold $\widehat{\beta}$. The posterior probability that the firm is of high quality is given by

$$\pi_{0\leq d<n-\widehat{\beta}} = \Pr(V = X_h | 0 \leq d < n - \widehat{\beta}) = \frac{\Pr(V = X_h,\ 0 \leq d < n - \widehat{\beta})}{\Pr(0 \leq d < n - \widehat{\beta})}.$$

$(V = X_h,\ 0 \leq d < n - \widehat{\beta})$ results from the firm being of high quality (with probability κ) and liquidity traders buying $0 \leq u < n - \widehat{\beta}$ (w.p. $\frac{n-\widehat{\beta}}{n}$). It is irrelevant whether monitoring has succeeded, because the blockholder does not trade in either case. $(0 \leq d < n - \widehat{\beta})$ can result from two cases. First, liquidity traders buy $0 \leq u < n - \widehat{\beta}$ (w.p. $\frac{n-\widehat{\beta}}{n}$) and the blockholder does not trade, either because monitoring has failed or the firm is of high quality (w.p. $1 - \widehat{e_B} + \widehat{e_B}\kappa$). Second, liquidity traders buy $\widehat{\beta} \leq u < n$ (w.p. $\frac{n-\widehat{\beta}}{n}$), monitoring succeeds (w.p. $\widehat{e_B}$), the firm is of low quality (w.p. $1 - \kappa$) and the blockholder sells $\widehat{\beta}$. Thus,

$$\pi_{0\leq d<n-\beta} = \frac{\kappa\frac{n-\widehat{\beta}}{n}}{(1 - \widehat{e_B} + \widehat{e_B}\kappa)\frac{n-\widehat{\beta}}{n} + \widehat{e_B}(1-\kappa)\frac{n-\widehat{\beta}}{n}} = \kappa.$$

The posterior equals the prior, since the order size reveals nothing. If the blockholder sells, the level of liquidity trader demand required to generate $0 \leq d < n - \widehat{\beta}$ is $\widehat{\beta} < u < n$. This occurs with probability $\frac{n-\widehat{\beta}}{n}$: exactly the same probability as $0 \leq u < n - \widehat{\beta}$, the level of liquidity trader demand required to generate $0 \leq d < n - \widehat{\beta}$ if the blockholder does not sell.

The final case is $d \geq n - \widehat{\beta}$. $(V = X_h,\ d \geq n - \widehat{\beta})$ results from high quality and liquidity traders buying $u \geq n - \widehat{\beta}$ (w.p. $\frac{\widehat{\beta}}{n}$). $(d \geq n - \widehat{\beta})$ results from liquidity traders buying $d \geq n - \widehat{\beta}$ (w.p. $\frac{\widehat{\beta}}{n}$) and the blockholder not selling (w.p. $1 - \widehat{e_B} + \widehat{e_B}\kappa$). Thus,

$$\pi_{d\geq n-\widehat{\beta}} = \frac{\kappa\frac{\widehat{\beta}}{n}}{(1 - \widehat{e_B} + \widehat{e_B}\kappa)\frac{\widehat{\beta}}{n}} = \frac{\kappa}{1 - \widehat{e_B} + \widehat{e_B}\kappa}.$$

Combining these results leads to Lemma 1.

Proof of Lemma 2

The blockholder's objective function is

$$\frac{\beta\kappa\Delta X}{n}\left[n - \max(\widehat{\beta}, \beta) + \frac{\max(\widehat{\beta} - \beta, 0)}{\widehat{\phi}}\right],$$

where $\widehat{\phi} = \phi(\widehat{\beta}) = 1 - \widehat{e_B} + \widehat{e_B}\kappa < 1$, and $\widehat{e_B} = \widehat{\beta}\left(\frac{n-\widehat{\beta}}{n}\right)\frac{\kappa(1-\kappa)\Delta X}{c_B}$.

The objective function may have up to two local maxima. If $\beta \geq \widehat{\beta}$, the local maximum is $\beta = \frac{n}{2}$; if $\beta < \widehat{\beta}$, the local maximum is $\beta = \frac{(n-\widehat{\beta})\widehat{\phi}+\widehat{\beta}}{2}$. Depending on $\widehat{\beta}$, either local maximum can be the global optimum. Assume first that $\beta = \frac{n}{2}$ is the global optimum. For this to also be a Nash equilibrium, the market maker's conjecture must be correct and so we now revise her belief to $\widehat{\beta}_1 = \beta = \frac{n}{2}$. We must now check that $\beta = \frac{n}{2}$ remains optimal under $\widehat{\beta}_1 = \frac{n}{2}$. The objective function is now

$$\frac{\beta\kappa\Delta X}{n}\left[n - \max\left(\frac{n}{2}, \beta\right) + \frac{\max\left(\frac{n}{2} - \beta, 0\right)}{\widehat{\phi}_1}\right]$$

where $\widehat{\phi}_1 = \phi(\widehat{\beta}_1)$.

Under $\beta = \frac{n}{2}$, the value of the objective function is $\frac{n}{4}\kappa\Delta X$. The other possible optimum is $\beta = \frac{n\widehat{\phi}_1+n}{4}$ and the value of the objective function is $\frac{n}{16}\kappa\Delta X(\widehat{\phi}_1+1)^2$, which is strictly lower than $\frac{n}{4}\kappa\Delta X$ since $0 < \widehat{\phi}_1 < 1$. The blockholder therefore has no incentive to deviate, and so $\widehat{\beta}_1 = \beta = \frac{n}{2}$ is indeed a Nash equilibrium.

Now assume that $\beta = \frac{(n-\widehat{\beta})\widehat{\phi}+\widehat{\beta}}{2}$ is the global optimum. Can this be a Nash equilibrium? Set $\widehat{\beta}_1 = \beta = \frac{(n-\widehat{\beta})\widehat{\phi}+\widehat{\beta}}{2}$ so that the market maker's belief is correct. However, $\beta = \frac{(n-\widehat{\beta})\widehat{\phi}+\widehat{\beta}}{2}$ is no longer optimizing. The objective function is now:

$$\frac{\beta\kappa\Delta X}{n}\left[n - \max\left(\frac{(n-\widehat{\beta})\widehat{\phi}+\widehat{\beta}}{2}, \beta\right) + \frac{\max\left(\frac{(n-\widehat{\beta})\widehat{\phi}+\widehat{\beta}}{2} - \beta, 0\right)}{\widehat{\phi}_1}\right]$$

There are two possible global maxima. If the optimum is $\beta = \frac{n}{2}$, then the market maker sets $\widehat{\beta}_2 = \frac{n}{2}$ and this is a Nash equilibrium as shown above. The other possible maximum is $\beta < \widehat{\beta}_1$. The optimum can never be $\beta = \widehat{\beta}_1$: if $\beta = \widehat{\beta}_1$, the third term disappears and the objective function becomes $\beta\left(\frac{n-\beta}{n}\right)\kappa\Delta X$ which is maximized at $\frac{n}{2}$, not $\widehat{\beta}_1$.

Continuing the process of "tatonnement", $\widehat{\beta}_i$ continues to fall. Since the value of the objective function under the second local maximum is

$$\frac{\widehat{\beta}_i\kappa\Delta X}{n}\left[n - \widehat{\beta}_{i-1} + \frac{\widehat{\beta}_{i-1} - \widehat{\beta}_i}{\widehat{\phi}_i}\right],$$

it also decreases as $\widehat{\beta}_i$ falls. After a point, it becomes lower than the value of the objective function at $\beta = \frac{n}{2}$ (i.e. $\frac{n}{4}\kappa\Delta X$) and so $\beta = \frac{n}{2}$ becomes the global maximum. The blockholder sets $\beta = \frac{n}{2}$; the market maker responds with $\widehat{\beta}_{i+1} = \frac{n}{2}$ and this is a Nash equilibrium. Hence the only Nash equilibrium is $\beta = \frac{n}{2}$.

As the firm is of low quality with probability $(1-\kappa)$, the blockholder chooses effort level $e_B \in [0,1]$ to maximize

$$\alpha e_B(1-\kappa)\left(\frac{n-\alpha}{n}\right)\kappa\Delta X - \frac{1}{2}c_B e_B^2. \quad (27)$$

Taking first-order conditions derives e_B as given by (4).

Proof of Equation 6 (Blockholder's stake that maximizes effort)

The chosen effort level is

$$\begin{aligned} e_B &= \alpha\left(\frac{n-\alpha}{n}\right)F \\ &= \alpha\left(\frac{\nu(1-\alpha)-\alpha}{\nu(1-\alpha)}\right)F. \end{aligned}$$

Taking first-order conditions with respect to α gives the effort-maximizing block size as

$$\alpha = 1 - \sqrt{\frac{1}{1+\nu}}.$$

From earlier, $\alpha < \frac{\nu(1-\alpha)}{2}$, i.e., $\alpha < \frac{\nu}{\nu+2}$. It can be easily shown that $1 - \sqrt{\frac{1}{1+\nu}} < \frac{\nu}{\nu+2}\ \forall\ \nu$, and so $\alpha = 1 - \sqrt{\frac{1}{1+\nu}}$ is consistent with the constraint. Hence the optimal block size is less than the maximum sale volume $\frac{n}{2}$, owing to the negative effect of block size on liquidity ($n = \nu(1-\alpha)$).

Proof of Lemma 5 (Project Choice)

The non-trivial case is $\theta(\kappa, e_B) < 1$. Let

$$A = \frac{y\kappa}{n}\left[\frac{n}{\kappa} - n + \alpha - \frac{\alpha}{1 - e_B + e_B\kappa}\right].$$

Since $(1-e_B)(1-\kappa) > 0$, $\frac{1}{\kappa} - 1 > \frac{1}{1-e_B+e_B\kappa} - 1$. Since also $n > \alpha$, this leads to $A > 0$.

Setting the first-order condition (16) to zero, and applying the quadratic formula, yields

$$\theta(\kappa, e_B) = \frac{\Delta X \pm \sqrt{(\Delta X)^2 + \frac{3g(\mu g + b)}{\mu\omega A}}}{-3g}.$$

Since $\theta \geq 0$, we take the negative root. Applying the constraint $\theta(\kappa, e_B) \leq 1$, this leads to equation (17):

$$\theta(\kappa, e_B) = \min\left(\frac{\sqrt{(\Delta X)^2 + \frac{3g(\mu g + b)}{\mu\omega A}} - \Delta X}{3g}, 1\right)$$

Since $\frac{\partial J}{\partial \theta} = g > 0$ at $\theta(\kappa, e_B) = 0$, we always have $\theta(\kappa, e_B) > 0$. For $\theta(\kappa, e_B) < 1$,

$$\frac{\partial \theta(\kappa, e_B)}{\partial g} = \frac{\Delta X}{3g^2} - \frac{\frac{3bg}{2\mu\omega A} + (\Delta X)^2}{3g^2\sqrt{(\Delta X)^2 + \frac{3g(\mu g + b)}{\mu\omega A}}}.$$

This is positive if

$$(\Delta X)^2 > \frac{3b^2}{4\mu^2\omega A}.$$

Since A is decreasing in α, the minimum value of A is $A(\frac{n}{2})$. Given technical condition (13), the above inequality holds. Hence $\frac{\partial \theta(\kappa, e_B)}{\partial g} > 0$. The signs of the derivatives with respect to ΔX, ω and y can also be immediately derived.

Proof of Lemma 6 (Project Choice)

Assume $\theta(\kappa, e_B) < 1$. Differentiating (17) with respect to A yields

$$\frac{\partial\theta(\kappa, e_B)}{\partial A} = -\frac{\mu g + b}{2\mu\omega A^2\sqrt{(\Delta X)^2 + \dfrac{3g(\mu g + b)}{\mu\omega A}}} < 0 \tag{28}$$

From the definition of $\overline{\alpha}$, $\frac{\partial A}{\partial \alpha} < 0$ if and only if $\alpha < \overline{\alpha}$. Applying $\frac{\partial\theta(\kappa,e_B)}{\partial\alpha} = \frac{\partial\theta(\kappa,e_B)}{\partial A}\frac{\partial A}{\partial\alpha}$ gives the condition for $\frac{\partial\theta(\kappa,e_B)}{\partial\alpha} > 0$.

Differentiating equation (28) with respect to g yields the result that $\frac{\partial^2\theta(\kappa,e_B)}{\partial A\partial g} < 0$ if and only if

$$(\Delta X)^2 > \frac{\mu g + b}{2\mu^2}\frac{3b}{\omega A}.$$

Since A is decreasing in α, the minimum value of A is $A(\frac{n}{2})$. Given technical condition (13), the above inequality holds. Hence $\frac{\partial^2\theta(\kappa,e_B)}{\partial A\partial g} < 0$, and so $\frac{\partial^2\theta(\kappa,e_B)}{\partial\alpha\partial g} = \frac{\partial^2\theta(\kappa,e_B)}{\partial A\partial g}\frac{\partial A}{\partial\alpha} > 0$ if and only if $\alpha < \overline{\alpha}$. The other cross-partials can be derived similarly.

Proof of Proposition 2 (Equilibrium Project Choice)

The equilibrium is determined by the intersection of $\theta(\kappa, e_B)$, $\kappa(\theta)$ and $e_B(\kappa)$. In (θ, κ, e_B) space, $\kappa(\theta)$ and $e_B(\kappa)$ are both planes, and thus intersect with each other along a line. This line intersects with the line $\theta(\kappa, e_B)$ at a single point, which represents the equilibrium. Since all three functions are increasing in all arguments, any parameter change which induces an upward shift in one function, without decreasing the others, raises θ^*. Using the results of Lemmas 3, 6 and 7 generates the results of Proposition 2.

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