Multiple Blockholders, Price Informativeness, and Firm Value

Alex Edmans∗
University of Pennsylvania
The Wharton School

Gustavo Manso†
Massachusetts Institute of Technology
Sloan School of Management

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Abstract

Most firms have multiple blockholders. This dilution of ownership generates “free-rider” problems and is therefore difficult to explain with traditional theories. In such models, blockholders add value through direct intervention (“voice”) and a concentrated stake is optimal to encourage them to incur the associated costs. This paper rationalizes the presence of multiple blockholders by showing that co-ordination difficulties improve their effectiveness in adding value through a second channel: disciplining the manager through “exit”. Since informed blockholders cannot co-ordinate to limit their trades and maximize combined trading profits, competition among them impounds more information into prices. This makes the threat of disciplinary exit more credible, thus inducing higher managerial effort. The model’s comparative statics derive empirical predictions on the factors affecting optimal blockholder structure.

Keywords: Multiple blockholders, corporate governance, market efficiency, exit, voice, insider trading, free-rider problem, Wall Street Rule

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∗aedmans@wharton.upenn.edu, 2428 SH-DH, 3620 Locust Walk, Philadelphia, PA 19104.
†manso@mit.edu, 50 Memorial Drive E52-446, Cambridge, MA 02142.
1 Introduction

Corporate governance can have substantial effects on firm value. Through ensuring that managers act in shareholders’ interest, it can minimize the agency costs arising from the separation of ownership and control (Berle and Means (1932)). In turn, large shareholders are believed to be an important component of effective governance. A blockholder’s concentrated stake gives her substantial incentives to monitor the manager and, if necessary, intervene to correct value-destructive actions.

However, most firms in reality have multiple small blockholders (see, e.g., Zwiebel (1995), Barca and Becht (2001), Faccio and Lang (2002), Maury and Pajuste (2005), and Holderness (2007)). Such a structure appears to be suboptimal, as splitting equity between numerous shareholders leads to a free-rider problem: each investor individually has insufficient incentives to bear the cost of monitoring, and shareholders cannot coordinate to share this cost.

This paper provides a potential justification for multiple blockholders as an optimal shareholding structure. While splitting a block reduces the effectiveness of blockholder intervention (“voice”), we show that it increases the power of a second governance mechanism: “exit”. By trading on private information, blockholders cause the stock price to more closely reflect fundamental value, thus rewarding the manager ex post for improving firm value. However, such a reward mechanism only elicits effort ex ante if it is dynamically consistent. Once effort has been exerted, blockholders are only concerned with maximizing their trading profits. A single blockholder will strategically limit her order to reduce the revelation of her private information, maximizing her trading profit but lowering price informativeness. By contrast, multiple blockholders trade aggressively to compete for profits, as in a Cournot oligopoly. Total quantities (here, trading volumes) are higher than under monopoly, leading to more information being impounded in prices. Multiple blockholders thus serve as a commitment device to reward the manager ex post for his actions.

The co-ordination problems and externalities created by splitting a block play opposing roles in “voice” and “exit.” For “voice”, the externalities are positive: intervention improves the value of other shareholders’ stakes, but this effect is not internalized.

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1 Prior papers on blockholder trading focus on the “Wall Street Rule” (the possibility of blockholder exit), rather than additional purchases. For example, Hirshman’s (1970) book is titled “Exit, Voice, and Loyalty”, and the models of Edmans (2007) and Admati and Pfleiderer (2006) only analyze block disposal, not enhancement. Although the blockholder can buy as well as sell in this paper, we use the term “exit” to describe the blockholder’s value added through her trading (in either direction), to be consistent with prior literature.
by the individual blockholder. Since co-ordination problems lead to positive externalities being ignored, there is “too little” intervention with multiple blockholders. For “exit”, the externalities are negative. Higher trading volumes reveal more information to the market maker, leading to a less attractive price for other informed traders. If blockholders could co-ordinate, they would form a cartel to internalize this effect, limiting their trades to replicate the single blockholder case and achieve monopoly profits in aggregate. Since they cannot co-ordinate, they act competitively, maximizing their individual trading profits and ignoring these negative externalities. They thus trade “too much” from the viewpoint of maximizing total profits. However, firm value does not depend on trading profits, as these are a mere transfer from atomistic shareholders to blockholders. Instead, “too much” trading is beneficial as it increases price informativeness and induces effort ex ante.

We derive an interior solution for the optimal number of blockholders that maximizes firm value. This optimum depends on a trade-off between the intervention and trading effects. Therefore, the efficient number of blockholders is increasing in the effectiveness of managerial effort and decreasing in the value created by direct blockholder intervention. We show that this optimum may differ from the socially optimal number of blockholders that maximizes total surplus (firm value net of effort costs), and the private optimum that would be chosen by the blockholders to maximize their combined net payoffs. In ongoing work, we are deriving further comparative statics with regards to variables such as the level of information asymmetry and the precision of blockholders’ information. In addition, while the current draft considers identically-sized blockholders and focuses on the optimal number, we are also relaxing this symmetry assumption to investigate the efficient distribution of block sizes.

This paper is organized as follows. Section 2 is a brief literature review. Section 3 presents the model and analyzes the effect of blockholder structure on both “voice” and “exit”. Section 4 derives the optimal number of blockholders and generates comparative static predictions, and Section 5 concludes.

2 Literature Review

The vast majority of blockholder models involve the large shareholder adding value through direct intervention, or “voice” as termed by Hirshman (1970). This can involve proposing profitable investment projects and business strategies, or overturning an inefficient managerial action. In Shleifer and Vishny (1986), Maug (1998) and Kahn and Winton (1998), a larger block is unambiguously more desirable as it addresses the
free-rider problem and maximizes the blockholder’s incentives to intervene. Burkart, Gromb and Panunzi (1997) note that, although beneficial ex post, blockholder intervention may be undesirable ex ante as it discourages managerial initiative. The optimal block size is therefore finite. While Burkart et al. consider a single blockholder, Pagano and Roell (1998) point out that if this finite optimum is lower than the total amount of external financing required, the entrepreneur will need to raise funds from additional shareholders. Although this leads to a multiple blockholder structure, the extra blockholders play an entirely passive role: they are merely a “budget-breaker” to provide the remaining funds. Replacing the additional blockholders by creditors or dispersed shareholders would have the same effect. In this paper, all blockholders play an active role. Bolton and von Thadden (1998) and Faure-Grimaud and Gromb (2004) achieve a finite optimum through a different channel, as too large a block reduces stock market liquidity. Again, they only advocate one blockholder. In addition, the present paper holds the total equity held by blockholders (and thus the free float) fixed, and focuses on the division of this block between one or multiple blockholders. Liquidity is thus unaffected by the splitting of a block.

Two recent papers by Admati and Pfleiderer (2006) and Edmans (2007) analyze blockholders adding value through an alternative mechanism, “exit”. Informed trading causes prices to more accurately reflect fundamental value, in turn inducing the manager to undertake actions that enhance value. Both models consider a single blockholder and do not feature “voice”.

There are relatively few existing theories of multiple large shareholders. A notable exception is Zwiebel (1995), who shows that multiple blockholdings can arise when shareholders compete for the private benefits of control by forming coalitions. The final shareholding structure represents the outcome of a power struggle rather than efficiency, whereas in our paper the number of blockholders is optimally chosen to maximize firm value. Bennedsen and Wolfenzon (2000) show that a founding entrepreneur may choose to distribute control among many outside shareholders, to commit to consuming few private benefits in the future. Multiple blockholdings can be optimal, but for quite different reasons from the present paper. In Bennedsen and Wolfenzon, blockholders merely seek to divert cash flows and add value indirectly by competing with the manager in such activities, reducing the amount of stealing the manager is eventually able to undertake. Our paper features no private benefits or

\[2^{nd} \text{Bolton and von Thadden (1998) do raise the possibility of having more than one non-atomistic shareholder, but suspect that it is “dominated either by full dispersion or by a [single blockholder] structure.” Hence they do not derive multiple blockholders as being optimal.} \]
control contests; blockholders add value positively through exerting effort or increasing stock price informativeness. Maury and Pajuste (2005) consider blockholders who can either divert steal or monitor; again, multiple blocks arise out of a desire to form a controlling coalition and divert cash flows.\footnote{An alternative explanation is that, while a single concentrated block would be first-best in an unconstrained world, multiple small blockholders are a second-best optimum in the presence of blockholder wealth constraints and risk aversion (e.g. Winton (1993)). While these frictions are plausible explanations for small managerial stakes, they are likely weaker for outside shareholders. In particular, institutional investors can hold sizable stakes since they have substantial capital and are held by thousands of individual shareholders, who can diversify away any idiosyncratic risk associated with high exposure to one particular corporation.}

In this paper, financial market efficiency increases real efficiency since it impounds the effects of managerial effort into the stock price. Other papers have documented alternative links between financial and real efficiency. In Holmstrom and Tirole (1993), increased market efficiency means that the stock price is a less noisy signal of firm value, thus allowing a risk-averse manager to be tied more closely to the stock price and ultimately leading to greater managerial effort. In their model, market efficiency is achieved through informed trading by arbitrageurs with no initial stake. Concentrated ownership is undesirable as it reduces liquidity and thus market efficiency; they do not consider the possibility that the concentrated shareholders themselves may be the informed traders. This extension is particularly important if a large stake is required to become informed in the first place.

A second channel arises if managers learn from prices to guide their investment decisions, as in Dow and Gorton (1997), Subrahmanyam and Titman (1999), Goldstein and Guembel (2007) and Dow, Goldstein and Guembel (2007). Third, in Stein (1996), Baker, Stein and Wurgler (2003), and Jensen (2004), managers exploit misvaluation by raising overvalued equity and investing inefficiently ex post.

A final strand of related literature concerns insider trading by managers. Proponents argue that it can increase the efficiency of stock prices, with consequent real benefits (e.g. Manne (1966)). Blockholders are likely to be significantly more effective in this role than the manager, for several reasons. First, unlike blockholders who can trade freely based on her information, the manager is conflicted since the stock price is used to evaluate him. If he has negative private information, he is unlikely to reveal it by selling stock as the low share price may lead to him being fired. By contrast, blockholders are objective monitors. Second, conflicts may also arise because the manager has control over the information flow and investment decisions (Bernhardt et al. (1995)). He may release false negative (positive) information and subsequently buy...
(sell) shares, or sell his shares and take the incorrect investment decision. Third, the manager’s trading may be hindered by insider trading laws, wealth constraints (limiting purchases) or lock-ups of stock as part of incentive packages (limiting sales).

3 Model and Analysis

In this section, we introduce a model in which blockholders can add value to the firm either by direct intervention or by trading shares. The model consists of a game between the manager, market maker and the $I$ blockholders of the firm. The game has two stages.

In the first stage, the manager and blockholders take actions that affect the value of the firm. Firm value is given by

$$\bar{v} = \phi_a \log a + \phi_b \log \sum_i b_i + \tilde{\eta},$$

(1)

where $a$ represents the action taken by the manager, $b_i$ represent the action taken by blockholder $i$, and $\tilde{\eta}$ is normally distributed with mean zero and variance $\sigma^2_{\eta}$. The manager incurs personal cost $a$ when taking action $a$, while each blockholder $i$ incurs personal cost $b_i$ when taking action $b_i$. The manager’s action is broadly defined to encompass any decision that benefits firm value but is personally costly to the manager, such as exerting effort or forgoing private benefits and pet projects. Similarly, the blockholder’s action can involve effort that directly helps the firm (advising the manager), effort that indirectly helps the firm (deterring managerial shirking) or choosing not to extract private benefits. $\phi_a$ ($\phi_b$) measures the productivity of manager (blockholder) effort per unit cost.

Action $a$ is privately observed by the manager, while actions $b_i$ are publicly observed. The assumption that $a$ is privately observable is necessary for stock price informativeness to have real effects. If actions were not hidden, the moral hazard prob-

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$^4$Firm value depends on the sum of blockholder actions, and the action has a linear cost. This is to ensure that adding blockholders does not change the available technology. The common assumption of a quadratic cost (and a linear effect of blockholder effort on firm value) would be inappropriate here: for a fixed convex cost function, the blockholders’ technology would improve if there are multiple small blockholders. A single blockholder would be able to reduce monitoring costs by dividing herself up into multiple small “units”.

$^5$See Barclay and Holderness (1991) for a description of the private benefits that blockholders can extract.
lem disappears. By contrast, the assumption that $b_i$ is observable is made purely for tractability; results are unchanged if $b_i$ is unobserved.

We normalize the number of shares outstanding to 1. The manager holds $\alpha$ shares of the firm, and each blockholder holds $\beta/I$ shares. The free-float is thus fixed at $1 - \alpha - \beta$, separating our paper from previous literature that has analyzed the liquidity effects of concentrated ownership. In our model, a fixed fraction $\beta$ is held by outside blockholders and we focus on its optimal distribution.

In the second stage of the game, the blockholders, noise traders, and a market maker trade the firm’s equity. The noise traders are the firm’s atomistic shareholders. As in Admati and Pfleiderer (2006), each blockholder is assumed to observe firm value $\tilde{v}$ perfectly, while noise traders are uninformed. The blockholder’s superior information can be motivated by a number of underlying assumptions, which are not explicitly modeled since this paper’s focus is on blockholder structure. The blockholder may have greater access to information than atomistic outsiders by virtue of her large stake: given her voting power, management will be more willing to share information with her in the extreme, she may have a board seat. Alternatively, even if her cost of acquiring private information is no lower than other market participants, she has stronger incentives to pay this cost if there are short-sales constraints (or any non-zero short-sales costs). Information is more useful to her, since she can sell more if it turns out to be negative—hence she has a greater incentive to acquire it in the first place (Edmans (2007)). The results are qualitatively unchanged if each blockholder obtains an imperfect signal of $\tilde{v}$.

After observing $\tilde{v}$, each blockholder submits a market order $x_i(\tilde{v})$. Noise traders submit market orders with a normally distributed net quantity $\tilde{\epsilon}$, with mean zero and variance $\sigma_\epsilon^2$. After observing total order flow $\tilde{y} = \sum_i \tilde{x}_i + \tilde{\epsilon}$, the market maker determines the price $\tilde{p}$ and trades the quantity necessary to clear the market. Due to perfect competition, the market maker sets $\tilde{p}$ so that he earns zero profits, i.e. the

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6While Regulation FD has prohibited the selective disclosure of explicitly material private information (e.g. next quarter’s likely earnings), equity analysts and institutional investors continue to hold individual meetings with management to discuss qualitative issues such as recent trading conditions and future prospects. None of this information is explicitly indicative of fundamental value (and thus legal), but still valuable as equity analysts and institutional investors use it in their analyses to form more accurate valuations than the market’s. Here, the blockholders can be thought of as having superior access to similarly useful soft information.

7Indeed, if blockholders’ imperfect signals are less than perfectly correlated, introducing additional blockholders increases the amount of information in the economy, and it becomes easier to justify a multiple blockholder structure.
price equals expected firm value given the order flow.

The manager is risk-neutral and his objective is to maximize the value of his shares less the cost of effort, i.e. \( \alpha p - a \). Each blockholder’s objective is to maximize her trading profits, plus the value of her shares, less her cost of effort.

We solve for the equilibrium of the game by backward induction.

### 3.1 The Trading Stage

To proceed by backward induction, we take the decisions \( a \) of the manager and \( b_i \) of the blockholders as given. The trading stage of the game is similar to the model of speculative trading of Kyle (1985) and its extensions to multiple informed investors.

**Proposition 1** The unique linear equilibrium of the trading stage is symmetric and has the form:

\[
x_i(\tilde{v}) = \beta \left( \tilde{v} - \phi_a \log a - \phi_b \log \sum_i b_i \right) \quad \forall i
\]

\[
p(\tilde{y}) = \phi_a \log a + \phi_b \log \sum_i b_i + \lambda \tilde{y},
\]

where

\[
\lambda = \frac{\sqrt{T} \sigma_\eta}{T + 1 \sigma_\epsilon}
\]

\[
\beta = \frac{1}{\sqrt{T} \sigma_\epsilon}.
\]

**Proof** If the market maker uses a linear pricing rule of the form \( p(y) = \mu + \lambda y \) then the \( i \)th blockholder maximizes:

\[
E[(\tilde{v} - \mu - \lambda y)x_i | \tilde{v} = v] = (v - \mu - \lambda \sum_{j \neq i} x_j)x_i - \lambda x_i^2.
\]

This maximization problem yields,

\[
x_i(v) = \frac{1}{\lambda} [v - \mu - \lambda \sum_j x_j(v)] \quad \forall i.
\]

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8See, for example, Foster and Viswanathan (1993) and Holden and Subrahmanyam (1992).
The strategies of the blockholders are then symmetric and we thus have

\[ x_i(v) = \frac{1}{(I + 1)\lambda} (v - \mu) \quad \forall i. \]

The market maker takes the blockholders’ strategy as given and sets:

\[ p(y) = E[\tilde{v}|y]. \]

Using the normality of \( \tilde{v} \) and \( \tilde{y} \) yields:

\[ \lambda = \sqrt{\frac{T}{I + 1} \sigma_\eta}, \]

\[ \mu = \phi_a \log a + \phi_b \log \sum_i b_i. \]

From this we obtain:

\[ x_i(v) = \frac{1}{\sqrt{T} \sigma_\eta} \frac{\sigma_\epsilon}{\sigma_\eta} (v - \phi_a \log a - \phi_b \log \sum_i b_i) \quad \forall i, \]

\[ p(y) = \phi_a \log a + \phi_b \log \sum_i b_i + \frac{\sqrt{T}}{I + 1} \sigma_\eta \sigma_\epsilon y. \]

From Proposition 1, each blockholder’s trading profits are

\[ \frac{1}{\sqrt{T(I + 1)} \sigma_\eta \sigma_\epsilon}. \tag{6} \]

The trading profits are increasing in \( \sigma_\eta \) and \( \sigma_\epsilon \), as \( \sigma_\eta \) reflects the blockholders’ informational advantage and \( \sigma_\epsilon \) represents their ability to profit from information by trading with liquidity investors. Also, aggregate blockholder trading profits are decreasing in the number \( I \) of blockholders. This is because multiple blockholders compete as in a Cournot oligopoly. Each blockholder chooses her trading volume to maximize individual profits. A higher volume reveals more information and makes the price less attractive to all informed traders, but she does not internalize the effect on the other blockholders and so trades in excess of the level that would maximize total profits.

While greater trading volumes reduce aggregate profits, they also impound more information into prices. Indeed, define \( \sigma_1 = \text{Var}(\tilde{v}|\tilde{p}) \), a measure of price informativeness. A lower \( \sigma_1 \) means that a greater proportion of the variance of \( \tilde{v} \) is explained by prices, i.e. prices are more informative. Using the formula for the conditional variance of bivariate normal distributions, we obtain that \( \sigma_1 = \frac{1}{\tau+1} \sigma_\eta \). This implies that price
informativeness is increasing in the number of blockholders. In the extreme, as the number of blockholders approaches infinity, prices become fully informative. On the other hand, in the monopolistic Kyle model ($I = 1$), the blockholder fully internalizes the effect of a higher trading volume on profits. She limits her order, thus leading to $\sigma_1 = \frac{1}{2}\sigma_\eta$: prices reveal only one-half of the insider's private information.

Therefore, the positive link between the number of blockholders and price informativeness does not arise because a greater number of informed agents mechanically leads to an increase in the amount of information reflected in prices. Indeed, a single blockholder already has a perfect signal of fundamental value; since she faces no trading constraints, she could theoretically impound this entire information into prices. The result arises instead from competition between blockholders.

We also note that the volatility of noise trading has no effect on the informativeness of prices. From equation (5), greater noise allows blockholders to trade more aggressively. This increased informed trading exactly counterbalances the effect of increased noise and leaves price informativeness unchanged.

### 3.2 The Action Stage

We now solve for the optimal actions of the manager and the blockholders in the first stage.

**Proposition 2** The optimal action of the manager is

$$a = \phi_a \alpha \left(\frac{I}{I + 1}\right)$$

and the optimal action of each blockholder is

$$b_i = \phi_b \beta \left(\frac{1}{I}\right)^2.$$  

**Proof** From Proposition 1, if the market maker and blockholders believe that the manager took action $\hat{a}$, then

$$\tilde{p} = \phi_a \log \hat{a} + \phi_b \log \sum_i b_i + \lambda \tilde{y}$$

$$= \phi_a \log \hat{a} + \phi_b \log \sum_i b_i + \lambda (\sum_i \tilde{x}_i + \tilde{\epsilon})$$

$$= \phi_a \log \hat{a} + \phi_b \log \sum_i b_i + \frac{I}{I + 1} (\phi_a \log a + \tilde{y} - \phi_a \log \hat{a}) + \frac{\sqrt{T}}{I + 1} \frac{\sigma_a \tilde{\epsilon}}{\sigma_\epsilon}.$$
The manager maximizes the value of his shares, less the cost of effort:

$$E[\alpha \tilde{p} - a].$$

(10)

Therefore, the optimal action of the manager is

$$a = \phi_a \alpha \left( \frac{I}{I+1} \right).$$

Each blockholder maximizes her trading profits, plus the value of her shares, less her cost of effort. From (6), we know that the blockholder’s trading profits do not depend on the action she has taken in the first stage. Therefore, blockholder $i$ simply chooses $b_i$ to maximize the value of her shares, less her cost of effort:

$$E \left[ \left( \frac{\beta}{I} \right) \tilde{p} - b_i \right].$$

(11)

Therefore, the optimal action of blockholder $i$ is

$$b_i = \phi_b \beta \left( \frac{1}{I} \right)^2.$$ 

(12)

The manager’s action $a$ is increasing in the number $I$ of blockholders. The intuition is as follows. The higher the number of blockholders, the closer the stock price is to the firm’s fundamental value – i.e. the greater the extent to which the stock price reflects the manager’s effort. Therefore, the manager is more willing to bear the cost of working. In effect, blockholder trading rewards managerial effort ex post, therefore inducing it ex ante. The dynamic consistency of this reward mechanism depends on the number of blockholders. Critically, trading occurs after the manager has taken his action, at which point shareholders are concerned only with maximizing their trading profits. A single blockholder optimizes her profits by limiting her order. Therefore, the promise of rewarding effort by bidding up the price to fundamental value is not credible. By contrast, multiple blockholders act aggressively and thus constitute a commitment device to reward the manager ex post for his actions. While such aggressive trading is

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9This is because the blockholder’s action is publicly observable. Informed trading profits depend on the blockholder’s relative information advantage, and this is unaffected by a publicly observable variable. See Kahn and Winton (1998) for a model where the blockholder’s action is unobservable.
motivated purely by the private desire to maximize individual profits in the presence of competition, it has a social benefit by eliciting effort ex ante.\footnote{Fishman and Hagerty (1995) also show that introducing additional informed traders is a commitment to trading more aggressively. They use this result to show that, if there are multiple informed agents, a specific informed agent will sell her information to other traders, rather than only exploiting it herself.}

In sum, multiple blockholders lead to greater trading volumes. This both reduces aggregate profits and impounds more information into prices. Since firm value is increasing in price informativeness (as it induces effort ex ante) and independent of trading profits (which are a pure transfer from atomistic shareholders to blockholders), higher trading volumes lead overall to an increase in firm value.

In the present model, the trading mechanism works despite the fact that the manager’s contract is exogenous. It is even more powerful if the manager is risk-averse and the contract is endogenous, as in Holmstrom and Tirole (1993) and Calcagno and Heider (2007). A more informative (less noisy) stock price means that an incentive contract based on $\tilde{p}$ imposes less risk on the manager. Hence the manager can be given a more highly-powered contract, which induces greater effort.

As in earlier models, the sum of the actions $b_i$ of the blockholders is decreasing in the number of blockholders, owing to the free-rider problem. Therefore, there is a trade-off between the intervention and trading effects.

4 The Optimal Number of Blockholders

In this section we derive the optimal number of blockholders. We start by deriving the optimal number that maximizes firm value, and later discuss the social optimum (that maximizes total surplus, taking into account the costs borne by the manager and blockholder) and the private optimum (that maximizes the total payoff to blockholders).

**Proposition 3** The number $I^*$ of blockholders that maximizes firm value is:

$$I^* = \max \left[ 1, \frac{\phi_a - \phi_b}{\phi_b} \right].$$  \hspace{1cm} (13)

**Proof** Using the results of Proposition 2 we can write the expected value of the firm as

$$E[\tilde{v}] = \phi_a \log \left[ \phi_a \alpha \left( \frac{I}{I+1} \right) \right] + \phi_b \log \left[ \phi_b \beta \left( \frac{1}{I} \right) \right].$$  \hspace{1cm} (14)
We need to maximize the above expression with respect to $I$. The first order condition is given by:

$$\frac{\phi_a - \phi_b - \phi_b I}{I + I^2} = 0. \quad (15)$$

$\hat{I} = (\phi_a - \phi_b)/\phi_b$ satisfies the first order condition. To verify that $I^*$ is indeed a maximum, it is sufficient to note that the left hand side of (15) is positive for $I < \hat{I}$ and negative for $I > \hat{I}$. ■

The optimal number of blockholders solves the trade-off between the positive effect of more blockholders on managerial effort, and the negative effect on blockholder intervention. The optimum is therefore increasing in $\phi_a$, the productivity of the manager’s effort, and declining in $\phi_b$, the productivity of blockholder intervention.

The magnitude of $\phi_b$ depends on the nature of blockholders’ expertise. Using the terminology of Dow and Gorton (1997), if blockholders have forward-looking (“prospective”) information about optimal future investment decisions or strategic choices, direct intervention is particularly valuable and $\phi_b$ is high. For example, venture capital financiers are typically expert in managing start-up businesses and their effort directly affects the firm’s prospects; indeed, venture capital typically features a small number of highly concentrated shareholders. On the other hand, if blockholders do not have specialist expertise in how to manage the company but instead are skilled at gathering backward-looking (“retrospective”) information on to evaluate the effect of past decisions on firm value, their primary contribution is to impound the effects of prior managerial effort into the stock price. In such a case, $\phi_b$ is low and a large number of blockholders is optimal.11 As firms mature, active venture capitalist investors are typically replaced by passive institutional shareholders, and the number of blockholders usually increases.

Another determinant of $\phi_b$ is blockholders’ control rights and thus ability to intervene (holding constant the size of their individual stakes).12 Black (1990) and Becht et al. (2007) note that U.S. shareholders face substantial and institutional hurdles to intervention, compared to their foreign counterparts. This reduces $\phi_b$, thus increasing $I^*$, and is consistent with the fact that firms in the U.S. typically have smaller and more numerous blockholders compared to overseas.

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11Holmstrom and Tirole (1993) refer to these different types of information as “strategic” and “speculative”, respectively.

12In reality, control rights will also be increasing in the size of each blockholder’s individual stake. This will reinforce the negative effect of $I$ on intervention currently in this paper.
Given our broad definition of managerial effort (to encompass any action that increases firm value but is personally costly to the manager), a high $\phi_a$ can result from a number of underlying factors. Under the most literal definition of “working”, $\phi_a$ will be high if managerial effort is particularly productive; this is more likely to be the case in growing and unregulated industries. Additionally, under the interpretation of “avoiding private benefits,” $\phi_a$ will be high if the manager is able to extract substantial rents, as the firm value gains from the first-best action (forgoing private benefits) are high. This will occur if there are weak alternative governance mechanisms (e.g. captured boards). However, poor governance also raises the scope for blockholder value added through direct intervention, measured by $\phi_b$. For example, it may lead to the manager undertaking some negative-NPV projects, which the blockholder can overturn to add value. In sum, the potency of other governance mechanisms affects the scope for blockholders to add value through both “voice” and “exit”, rather than the trade-off between them, and so has an ambiguous effect on $I^\ast$.

While Proposition 3 is concerned with maximizing firm value, the social optimum maximizes total surplus, which takes into account the costs of the manager’s and blockholders’ actions. Informed trading profits do not affect total surplus, since they are a transfer from liquidity traders to the blockholders. In practice, the social optimum will be reached if there is an initial owner choosing shareholder structure when taking the firm public, since his IPO proceeds will equal total surplus. The owner will have to compensate the blockholders (in the form of a lower issue price) for their expected intervention costs, and the manager for his effort in the form of a higher wage.

**Proposition 4** Let $\tilde{I}$ represent the unique positive solution to

$$\frac{\phi_a}{I(I+1)} - \frac{\phi_b}{I} - \frac{\phi_a \alpha}{(I+1)^2} + \frac{\phi_b \beta}{I^2} = 0. \quad (16)$$

The number $I^\ast_{soc}$ of blockholders that maximizes total surplus is

$$I^\ast_{soc} = \max \left[1, \tilde{I} \right]. \quad (17)$$

$I^\ast_{soc}$ may be higher or lower than $I^\ast$.

**Proof** Total surplus is given by:

$$\phi_a \log \left[ \frac{I}{I+1} \right] + \phi_b \log \left[ \frac{\beta}{7} \right] - \phi_a \alpha \left[ \frac{I}{I+1} \right] - \phi_b \beta \frac{1}{7}. \quad (18)$$

13 This can be more directly shown by allowing $\phi_b$ to be a decreasing function of $e$, at the cost of complicating the analysis.
Taking first-order conditions yields equation (16). The Appendix proves that there is a unique positive solution and that it is a maximum.

Compared to equation (15), equation (16) contains two additional terms. Increasing the number of blockholders raises the cost of managerial effort, but reduces the combined cost of blockholder monitoring. The social optimum may thus be higher or lower than the number that maximizes firm value. Since the manager’s (blockholders’) effort is multiplicative in $\alpha (\beta)$, $I^*_{soc}$ rises relative to $I^*$ if $\beta$ is higher and $\alpha$ is lower.

Finally, we analyze the privately optimal division of $\beta$ that would maximize blockholders’ combined payoffs. In other words, we ask the question: if blockholders in aggregate hold $\beta\%$ of the firm, do they have incentives to split or combine stakes to achieve the number that maximizes either firm value or total surplus?

**Proposition 5** Let $\hat{I}$ represent the unique positive solution to

$$\beta \left[ \frac{\phi_a}{I(I+1)} - \frac{\phi_b}{I} \right] + \frac{\phi_b \beta}{I^2} - \frac{(I - 1)}{2\sqrt{I(I+1)}} \sigma_\eta \sigma_\varepsilon = 0. \quad (19)$$

The number $I^*_{soc}$ of blockholders that maximizes total blockholders’ payoff is

$$I^*_{priv} = \max \left[ 1, \hat{I} \right]. \quad (20)$$

$I^*_{priv}$ may be higher or lower than $I^*$, and it may be higher or lower than $I^*_{soc}$.

**Proof** Total blockholders’ payoff is given by:

$$\beta \left\{ \phi_a \log \left[ \phi_a \alpha \left( \frac{I}{I+1} \right) \right] + \phi_b \log \left[ \phi_b \beta \frac{1}{I} \right] \right\} - \phi_b \beta \frac{1}{I} + \frac{\sqrt{I}}{I+1} \sigma_\eta \sigma_\varepsilon. \quad (21)$$

Taking first-order conditions yields equation (19). The Appendix proves that there is a unique positive solution and that it is a maximum.

Blockholders’ objective function differs from firm value in three ways. They only enjoy $\beta\%$ of any increase in firm value; bear the costs of intervention; and are concerned with informed trading profits. Increasing $I$ above $I^*$ therefore has an ambiguous effect: it reduces the combined costs of intervention, but also reduces combined trading profits through exacerbating competition. Therefore, as with the social optimum, the private optimum may be higher or lower than the number that maximizes firm value. $I^*_{priv}$ rises relative to $I^*$ if $\beta$ is higher (as this increases the cost of effort) and $\sigma_\eta$ and $\sigma_\varepsilon$ are lower (as these augment informed trading profits). Thus, if informed trading profits
are particularly important, shareholders will combine blocks to the detriment of firm value.

Blockholders’ objective function also differs from the social optimum in three ways. In addition to being concerned with informed trading profits and only \( \beta \% \) of firm value, they also ignore the cost of managerial effort. Again, the sum of these three effects is ambiguous. Increasing \( I \) above \( I_{soc} \) would both reduce total blockholder costs and total trading profits.

In ongoing work, we are extending the model to analyze further determinants of the optimal block sizes, such as the level of information asymmetry and the precision of blockholders’ retrospective information.

5 Conclusion

This paper offers a rationalization for the multiple blockholder structures observed in many firms. The co-ordination issues resulting from splitting a block lead to free-rider problems that hamper direct blockholder intervention. This is the effect captured by many existing papers, which lead to their advocacy of highly concentrated ownership. However, this paper shows that the same co-ordination problems can be beneficial for firm value: multiple small blockholders act competitively in their trading behavior, impounding a greater level of information in the stock price and thus inducing higher managerial effort. The optimal number that maximizes firm value depends on the relative importance of managerial and blockholder effort. This optimum may differ slightly from the social optimum that maximizes total surplus, and the private optimum that maximizes the blockholders’ combined payoff.

A Proofs

Proof of Proposition 4

Putting equation (16) under a common denominator yields

\[
\frac{\phi_a I (I + 1) - \phi_b I (I + 1)^2 - \phi_a \alpha I^2 + \phi_b \beta (I + 1)^2}{I^2 (I + 1)^2} = 0.
\] (22)

The equation is thus a cubic, and has at most three roots. The function is discontinuous at \( I = -1 \) and approaches \(-\infty\) either side of \( I = -1 \) (since the \(-\frac{\phi_a \alpha}{(I+1)^2}\) term

15
dominates). It is also discontinuous at \( I = 0 \) and approaches \(+\infty\) either side of \( I = 0 \) (since the \( \frac{\phi_b}{I^2} \) term dominates). It is continuous everywhere else.

As \( I \to -\infty \), the \( -\frac{\phi_a}{I^2} \) term in equation (16) dominates, and so the function asymptotes the x-axis from above. Since it approaches \(-\infty\) as \( I \) rises to \(-1\), and is continuous between \( I = -\infty \) and \( I = -1 \), there must be one root between these two points. Similarly, since the function tends to \(+\infty\) as \( I \) rises from just above \(-1\) to just below \( 0 \), and is continuous between these two points, there must be a second root within this interval. As \( I \to +\infty \), the \( -\frac{\phi_a}{I^2} \) term in equation (16) again dominates, and so the function asymptotes the x-axis from below. Since the function tends to \(+\infty\) as \( I \) approaches \( 0 \) from above, and is continuous between \( I = 0 \) and \( I = +\infty \), there must be a third root (\( \tilde{I} \)) between these two points. There can only be one positive root, since there are two negative roots and at most three roots in total. The positive root is a local maximum, since the gradient is negative for \( I < \tilde{I} \) and positive for \( I > \tilde{I} \).

**Proof of Proposition 5**

Owing to the \( \sqrt{I} \) term in the denominator of the final term in equation (19), the only real roots are positive. As \( I \) tends to 0 from above, the function tends to \(+\infty\) since the \( \frac{\phi_b}{I^2} \) term dominates. As \( I \to +\infty \), the \( -\frac{\phi_a}{I^2} \) term dominates the function asymptotes the x-axis from below. There is thus at least one positive root.

The second derivative is given by:

\[
\beta \left[ \frac{-\phi_a(2I + 1)}{I^2(I + 1)^2} + \frac{\phi_b}{I^2} \right] - \frac{2\phi_b \beta}{I^3} \left[ 2\sqrt{I}(I + 1)^2 - (I - 1) \left[ 2\sqrt{I}(2I + 1) + \frac{1}{\sqrt{I}}(I + 1)^2 \right] \right] \frac{1}{4I(I + 1)^4} \sigma_\eta \sigma_\varepsilon.
\]

As \( I \) approaches 0 from above, the second derivative becomes highly negative, as the \( -\frac{2\phi_b \beta}{I^3} \) term dominates. As \( I \) rises, the second derivative becomes less negative and eventually becomes positive as the \( \beta \frac{\phi_a}{I^2} \) term increasingly dominates. Since this term continues to dominate as \( I \) approaches \(+\infty\), the second derivative never becomes negative again. Hence there is only one positive root, \( \tilde{I} \). The positive root is a local maximum, since the gradient is negative for \( I < \tilde{I} \) and positive for \( I > \tilde{I} \).
References


18


