CHAPTER 8

Blockholders: A Survey of Theory and Evidence*

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1. INTRODUCTION

This paper surveys the role of large shareholders in corporate governance. We start by analyzing the underlying property rights of public corporations and blockholders. How are public corporations similar to other forms of private property and how are they different? We then define a blockholder by discussing what distinguishes it from an ordinary shareholder. Next, we present new evidence on the frequency, size, and board representation of blockholders in United States corporations and the resulting association with firm characteristics. We then develop a simple unifying model to present theories of blockholder governance through two channels. The first, traditional channel is direct intervention in a firm's operations, otherwise known as "voice." These theories have motivated empirical research on the determinants and consequences of activism. The second, more recent channel is selling one's shares if the manager underperforms, otherwise known as "exit". These theories give rise to new empirical studies on the two-way relationship between blockholders and financial markets, linking corporate finance with asset pricing. We then survey the empirical evidence on blockholder governance and close with suggestions for future research.

Our major conclusions are as follows:

- Blockholders are ubiquitous. Virtually every corporation, of every size, in every country has them. It is hard to imagine how firms could survive in a market economy without large shareholders. In short, they are important to study.
- There is no unambiguous definition of a blockholder. There is no theoretical basis for the commonly used 5% threshold or indeed any threshold. Future research should study blocks below 5% when possible.
- The dollar value of a block or the concentration of the block in an investor's portfolio could matter as much as the percentage value of a block. These are much-neglected topics ripe for study.
- Blockholders are endogenous. We know of no known credible instruments for block ownership. Insistence on clean identification will result in a focus on narrow questions or the avoidance of research on blockholders altogether; studies should be led by economics, not econometrics. Much can be learned by careful analyses

of blockholders in different settings using a variety of methods. Descriptive analyses can be illuminating if researchers are careful not to make causal claims.

- Blockholders are heterogeneous: they include institutions (e.g. hedge funds, mutual funds, and pension funds), individuals, and other corporations. Each has its own determinants, incentives, and consequences; these considerations are likely to vary by country. Most research, however, treats all blockholders as homogenous.
- Blockholders interact. Although existing research often considers blockholders in isolation, the presence of one blockholder can increase or decrease the effectiveness of other blockholders or even smaller shareholders. Moreover, the direction of complementarity likely varies by blockholder type. For example, an activist blockholder may deter the entry of a second activist, but she may be catalyzed by non-activist blockholders who can potentially vote in the same direction. Moreover, blockholders may interact not only with each other but also with other governance mechanisms. Separately, the effectiveness of a blockholder's monitoring of a given firm may depend on her holdings of other firms, and the blockholder may have effects on stakeholders other than shareholders.
- Blockholders are evolving. For example, institutional investors today are more willing to be hostile toward management than they were only 30 years ago.
- Blockholders can govern through exit, not just through voice. This new way of thinking about blockholders—as informed traders, rather than just as controlling entities—gives rise to new directions for both theoretical and empirical research. Blockholders can both impact and be impacted by financial markets, thereby linking asset pricing with corporate finance.
- Blockholders can exert governance through the threat of exit and voice, rather than only through actual exit and voice. The absence of these actions, therefore, does not imply the absence of blockholder governance. Identifying such threats and their effect on firm outcomes is challenging but important.
- The classification of blockholders into "short-term" and "long-term", based on their holding periods, is often misleading. Whether blockholders pressure managers to pursue the short-term or the long-term depends not on whether they hold for the short-term or long-term, but whether they trade based on long-term or short-term information. Similarly, blockholders are not born short-term or long-term; their holding period is an endogenous choice that depends, among other things, on managerial performance. Finally, whatever actions blockholders take, those actions will be capitalized into a firm's stock price in a forward-looking stock market. A decision by a blockholder who owns his block for only a short period of time can thus have a pronounced impact on the wealth of other shareholders.
- The classification of index funds as "passive" investors is similarly confusing. Passively-managed index funds need not be passive in governance. We propose classifying blockholders as either "activist" blockholders (who govern primarily

through voice), "trading" blockholders (who govern primarily through exit, but may engage in voice though voting), and "index funds" (who may engage in voice through voting).

This chapter builds on and significantly expands two earlier survey papers on blockholders, Holderness (2003) and Edmans (2014). We focus mainly on outside blockholders: large shareholders who are not a firm's officers. The literature on inside blockholders is covered by reviews of CEO compensation, such as Frydman and Jenter (2010), Murphy (2013), Edmans and Gabaix (2016), and Edmans et al. (2017b).

2. THE PROPERTY RIGHTS OF PUBLIC CORPORATIONS AND BLOCKHOLDERS

We begin our review of blockholders at the level of property rights. Which individuals have which rights over (in our case, corporate) property? What are their incentives? How does this property rights arrangement and the resulting decisions compare with alternative arrangements? We start with these fundamental issues because we believe they should guide theoretical and empirical analyses on blockholders. These issues are an anchor to reality because only individuals can make decisions and what decisions individuals make depend on the property rights (rules) confronting them.

When resources are scarce, someone must be assigned decision rights over them: Will a parcel of land be left fallow or planted; if planted, which crop will be grown; who gets to consume the harvested crop? By necessity, the person assigned such rights must be at least partially active by making management decisions. Inanimate objects cannot make decisions; only individuals can.

There are many property rights systems, actual as well as imaginary, to address the scarcity of resources. One such system is private property. Private property has two defining characteristics. The first is the collocation of decision rights and wealth effects in the same person, the owner. Only the owner of a house can decide to re-roof it, and she alone bears the costs and benefits of her decision. This collocation does not guarantee that the owner will make the correct, that is value maximizing, decision, but it does ensure that she has the incentive to do so. If she lacks the ability or inclination to make roofing decisions, she can sell the house to someone better qualified to do so. This gives rise to the second defining characteristic of private property, alienability (or transferability). Alienability allows the transfer of resources to those who value them more highly, perhaps because they will make better decisions. Value depends in part on who the owner is. We shall see that alienability and collocation are also the driving forces behind the corporate governance efforts of large shareholders in public corporations.

Corporations, at least those owned by a small group of individuals, fit into the property rights arrangement we call private property. There is nothing inherently different about corporations compared with other types of private property. The collocation of

decision rights and wealth effects is preserved in the owners of the common stock (whom we refer to as shareholders). Shareholders have the exclusive right to elect the directors, who, in turn, have the exclusive right to manage the corporation. Shareholders also have the exclusive right to any residual profits. This collocation of decision rights and wealth effects gives shareholders both the incentive and the opportunity to elect those directors who will maximize the current stock price. Shareholders also have the right to sell their stake. In fact, the unrestricted alienability of common stock is often viewed as a central feature of public corporations.[1]

The owners of private property often delegate some decision rights. A homeowner, for instance, might hire someone to re-roof her house. That roofer, however, will not have the same incentives as the owner. A hired roofer, for example, is likely to use lower-quality materials that may decay faster than if the owner did her own re-roofing. This difference in incentives, which stems from wealth effects no longer coinciding fully with decision rights, is what causes agency costs. Although agency costs are not inevitable with private property, they are inevitable when decision rights over private property are delegated. After any delegation, however, significant (albeit not total) collocation remains and this mitigates the agency costs. For instance, the homeowner may always fire the roofer. Similarly, the owners of a corporation may hire an outsider to manage their firm. This too will create agency costs, but again the owners have the power and incentives to fire the manager if necessary. Again, there is nothing inherently different about corporations compared with other types of private property.[2]

The problem is that most public corporations have thousands if not millions of shareholders. This has given rise to the belief that public corporations have diffuse, that is totally fractured, ownership. The belief of diffuse ownership is perhaps most notably reflected in the writings of Berle and Means (1932). They warned that "power over industrial property has been cut off from the beneficial ownership of this property—or, in less technical language, from the legal right to enjoy its fruits. . . . There has resulted the dissolution of the old atom of ownership into its component parts, control and beneficial ownership. This dissolution of the atom of property destroys the very foundation on which the economic order of the past three centuries has rested."[3]

Berle and Means are saying that diffusely held corporations—corporations in which no shareholder owns a sufficiently large stake to have the incentive to monitor

[1] Ownership interests in private corporations are also alienable but often with restrictions. For instance, the charters of private companies often give shareholders the right of first refusal when others want to sell their stock. Such arrangements are seldom found in corporations that trade on stock exchanges.

[2] Holderness (2003) analyzes the property rights of joint ownership generally. Joint ownership is more likely than sole ownership to lead to the delegation of decision-making authority which, in turn, inherently creates agency costs. Thus, there must be some countervailing benefit, such as economies of scale, that justify such an arrangement as opposed to a sole owner doing all of the work herself.

[3] Berle and Means (1932, pp. 7–8).

management—are effectively no longer private property because there is no longer a meaningful collocation of decision rights and wealth effects. Managers make decisions but do not bear the wealth consequences of their decisions, giving rise to agency costs. Shareholders collectively bear the wealth consequences of these agency costs but, because of free-rider problems—an individual shareholder bears the entire cost of solving agency problems but only shares a fraction of the benefit—each individual shareholder is rationally passive. Thus, totally diffusely-held corporations would have totally passive shareholders.[4]

Some commentators claim that firms with totally passive shareholders would survive because of other market forces. Managers would still have incentives to increase shareholder value due to reputational concerns or product market competition. We are skeptical of this argument because ultimately it depends on someone having the correct incentives; ultimately it depends on the collocation of wealth effects and decision rights somewhere else in the economy. A shareholder will only hire a reputable manager if she will capture a significant chunk of the value that the manager will create. That requires collocation on the part of the person doing the hiring. Similarly, why would a competitor be able to produce a good at a lower price? Again, someone must have greater wealth-creating incentives, which requires greater collocation. If other organizations have such incentives, then they are likely to out-compete those without.

Thus if ownership were totally diffuse, we agree that firms would be unlikely to survive. However, it is imperative to understand that having a large number of shareholders is not the same as having diffuse ownership. There is a fundamental difference between a firm with one 30% shareholder and many small shareholders versus a firm with a million shareholders each of whom owns only one share. The latter is unlikely to survive because of severe free-rider problems among its shareholders; the former firm may survive because of the large shareholder. Two property rights issues arise with the former, however: Does 30% ownership provide sufficient decision rights and wealth effects for value creation? Can any conflicts between the large and small shareholders be controlled? Many papers on blockholder governance focus on one of these two questions.

In light of all of these property rights considerations, it not surprising that academic research over the past thirty years has revealed that corporate stock ownership is not nearly as diffuse as many commentators had once believed. Simply put, virtually all publicly listed corporations in all countries have large shareholders.[5] For example,

[4] Berle and Means were not alone in these beliefs. Samuelson (1970, pp. 90–91), for instance, wrote, "barring blatant incompetence, management can count on remaining in office." Kaysen (1965) went further and concluded that the managers of public corporations were no longer concerned with creating wealth for shareholders. This view of diffuse ownership also heavily shaped the securities legislation of the 1930s, legislation which continues to govern corporations to this day.

[5] Almost all academic studies of ownership concentration are limited to publicly listed firms because of data availability issue. For private firms, researchers at best have limited anecdotal evidence. That evidence suggests that private firms usually have very concentrated ownership.

La Porta et al. (1998) hand-collect data on the ten largest non-financial firms in each of 49 countries. They find that even among these largest of all firms, "dispersed ownership in large public companies is simply a myth" (p. 1146). Holderness (2009) reaches a similar conclusion about United States corporations. He finds that 96% of domestic corporations have at least one 5% or greater shareholder. Further, he documents that the ownership concentration of United States firms is similar to other countries, even though many commentators assume that the United States is an outlier. There is also evidence that ownership has become more concentrated over time. Holderness (2016b) surveys the extant time-series data, which comes from 12 countries including the United States. In all of these countries, ownership concentration either stayed the same or increased over time even though firms have become much larger in real terms.

This evidence and related evidence also seems to rule out the possibility, raised by Alchian and Demsetz (1972), that firms might go in and out of concentrated ownership as shareholder action is required. Even if corporate ownership is initially diffuse, it could become concentrated in a reasonable time period. Then the newly formed large shareholders would have the power (votes) and incentives to institute the needed corporate changes. These changes would be reflected in the stock price, and the firm would return to diffuse ownership. Although Alchian and Demsetz's hypothesis is reasonable, it is inconsistent with the evidence. In addition to the evidence noted above, Scholes (1972) finds that only 10% of the 345 secondary distributions he studies involves blocks of at least 5%. Barclay and Holderness (1989, p. 376) examine the stock ownership of a random sample of firms over a six-year period and conclude, "the evidence suggests that large blocks, once formed, tend not to be broken up." Donelli et al. (2013) find that blockholders' stakes are high and stable over a 20-year period (1990–2009) in Chile, despite major changes occurring in the Chilean economy in that period. Having at least some large shareholders seems to be an equilibrium condition for most corporations.

One possibility in the spirit of Alchian and Demsetz's temporary formation of blocks involves complementarities between active investors and other large-but-less-active investors. Certain large investors, such as pension funds, are unlikely to initiate or implement major managerial changes because they lack the skills. On the other hand, they often own large blocks, so they have the votes to sway elections. Activist investors, such as Nelson Peltz or Carl Icahn, have the skills to propose and implement major changes, but given the size of many corporations, they lack the votes to swing a proxy contest. Instead, they often accumulate a block and then make their case to other large, but less active, shareholders. This fits the view of alternative managerial teams competing against each other by trying to convince existing large shareholders that their proposals will enhance firm value.[6] In Section 6.3.2 we discuss recent research consistent with this scenario.

[6] Alchian and Demsetz (1972) and Jensen and Ruback (1983) espouse this view of the market for corporate control.

In sum, the natural state of affairs for public corporations in a market economy is to have large shareholders who will be active at least some of the time, as this preserves at least some collocation of decision rights and wealth effects. It is important to recognize that optimal organizational arrangements do not emerge spontaneously but evolve over time. Given that the modern public corporation is a phenomenon of only the last 125 years, we expect the corporate governance actions of large shareholders to continue to evolve. Documenting and understanding this evolution is a topic worthy of researchers' attention.

3. WHAT IS A BLOCKHOLDER?

Although the definition of what constitutes a blockholder would seem to be pivotal for any empirical or theoretical analysis, papers are often surprisingly vague on what constitutes a blockholder. Presumably what distinguishes a blockholder from a mere shareholder is the size of her holding. Most of the literature focuses on the percentage size of a block, but theory suggests that the dollar value of a block is also important.

Percentage ownership. The reasoning for defining blockholders based on their percentage holdings (which we denote with α) is twofold. First, shareholders primarily exercise their decision rights through voting for directors and major corporate decisions; a greater fractional ownership gives an individual shareholder more votes and thus more power. Second, the wealth effects of corporate decisions are ultimately borne by shareholders in proportion to their fractional ownership. For example, if a blockholder is deciding whether to oppose an acquisition that will destroy \$100 million of shareholder value, her benefit from doing so will be $\alpha \times \$100$ million. Thus, her incentives to intervene will vary with her percentage ownership.

At which percentage ownership (α) does a shareholder become a blockholder? There are two ways to approach this question, theoretical and empirical. A few theory papers (e.g. Shleifer and Vishny, 1986) attach significance to 50.1% (majority) ownership, presumably because at that level the blockholder can unilaterally decide the outcome of elections (super-majority voting requirements aside). This, however, does not mean that a majority shareholder is unconstrained. If the majority shareholder is a manager, and many are, she has fiduciary obligations to treat other shareholders equitably. She must also obey the provisions of the corporate charters and bylaws, as well as corporate, civil, and criminal laws. In most cases, these require equal proportional treatment of all shareholders. In short, even majority shareholders are constrained in many dimensions. Perhaps this helps explain why we do not observe a clustering of ownership slightly above 50% (Holderness, 2009). 50% may be a special number to mathematicians, but it holds limited importance for stock ownership.

Some papers use a threshold of 10% or 20% to classify blockholders, but we are unaware of any theoretical basis for these thresholds. Others use 5%, but this is because

most countries (including the United States) mandate public disclosure at this level, rather than a theoretical justification.

An alternative approach is to acknowledge that theory offers little guidance and instead determine what percentage ownership levels appear to be relevant empirically. This is likely to vary with the firm and the variable of interest (firm value, executive compensation, etc.). For instance, there is evidence that initial accumulations of blocks between 5% and 10% are associated with significant announcement effects.[7] On the other hand, although buyers often pay premiums to the post-announcement exchange price for large-percentage blocks, the available evidence for the United States suggests that these premiums are limited to blocks of at least 25%.[8]

Given this ambiguity, our suggestion is that researchers err on the side of expanding the fractional range of ownership in their investigations rather than narrowing it. In particular, it would be interesting to study blocks of less than 5%. In the United States, institutional investors with at least $100 million of assets must disclose such blocks via 13F filings, so some of this data is available. In Section 6 we discuss some papers that study these large-but-less-than-5% blocks (often in the context of institutional investors).

Dollar ownership. Although the vast majority of blockholder papers focus exclusively on percentage ownership, the dollar value of a block (αV, where V is the firm's market capitalization) may also be relevant. Consider a blockholder who is contemplating supporting a restructuring that will add 1% to firm value, i.e. $1\% \times V$. Her benefit from doing so will be $\alpha \times 1\% \times V = 1\% \times V$. Thus, her intervention incentives will vary with her dollar ownership. Combined with our earlier result, this suggests that for a blockholder action with a percentage (multiplicative) effect on firm value, the dollar stake is relevant; for an action with a dollar (additive) effect on firm value, the percentage stake is relevant. In practice, some actions will be multiplicative, such as those that can be rolled out or scaled up across the entire firm (e.g. restructuring); other actions will be additive, such as perk prevention that saves a fixed amount of value. Thus, both percentage and dollar stakes should be of interest to researchers. We develop this point more formally in Section 5, and also discuss a third measure, the concentration of a block within an investor's portfolio.

In large firms, a small percentage ownership can translate into a large dollar ownership, consistent with our earlier recommendation to consider blocks of less than 5%. There is anecdotal evidence that small-percent but large-dollar shareholders can play a major role in corporate governance. In a recent example, Nelson Peltz's Trian Fund Management held only 2.9% of DuPont in November 2015, but this corresponded to a $1.7 billion stake. He launched a proxy fight with the intent of dividing the company

[7] Holderness and Sheehan (1985); Mikkelson and Ruback (1985).
[8] Barclay and Holderness (1989).

into two; although Peltz lost the proxy fight, it catalyzed other large shareholders and eventually led to DuPont's CEO Ellen Kullman being replaced. Subsequently, DuPont agreed to merge with Dow and announced its intention to break up their combined company into three pieces, similar to Peltz's original proposal. Dimson et al. (2015) study an anonymous large asset manager that launched environmental, social, and governance ("ESG") proposals, ultimately benefiting shareholders. Its average percentage ownership was only 0.06%, but since average firm size was $53.5 billion, this translated into an average dollar ownership of $32 million.

Relatively few papers explore the potential importance of the dollar value of a block, either from a theoretical or empirical perspective. Thus, we do not know what dollar-value holding constitutes a blockholder. We believe that much can be gained by studying the potential importance of the dollar value of large blocks. To this end, in Section 4, we report statistics both on the percentage size and dollar value of large blocks of stock in United States corporations.

4. THE ANATOMY OF LARGE BLOCK OWNERSHIP IN THE UNITED STATES

We now present detailed descriptive statistics about large-block ownership in a random sample of United States public corporations. How often do firms have blockholders, and if so, how many do they have? Are blockholders normally directors or are they also managers? How often are blockholders outsiders as opposed to insiders? What types of blockholders are there? The list goes on. Many of these questions are central for existing analyses, but the data needed to address them has not previously been available.

We present ownership data from a random sample of public corporations which is used and more fully described in Holderness (2009). This data is hand-collected from 375 randomly selected exchange-listed corporations. No type of firm is excluded, so some of the sample firms are financials and utilities. The only requirements are that the firms be listed on CRSP and Compustat. We collected a variety of ownership data from the proxies, including the stock ownership of each shareholder who owns at least 5% of the common stock (which is the level at which they are legally mandated to report publicly), the number of identified representatives each blockholder has on the board, the type of blockholder, the stock ownership of the CEO (no matter what the amount), and the stock ownership of the board of directors (again, no matter what the amount). Most of the proxies are from early 1995 (typically February or March), but some proxies are from late 1994 or later in 1995. This is because 1995 is the approximate date of the international databases on block ownership used in Holderness (2009) to permit an international comparison.

We use this sample for two reasons. First, even though it is now somewhat dated, it is the most accurate ownership data for United States firms that we are aware of. Electronic data on large-block ownership is notoriously inaccurate even though it has

been widely used in academic research (again, as more fully discussed in Holderness, 2009). Second, we believe that a random sample of firms is the best way to get a broad assessment of large shareholders. A random sample, for instance, enables us to determine what types of firms have blockholders.

Table 1 presents overview statistics on the large (5%) blockholders at these firms. We see that 96% of the firms have at least one blockholder. When a firm has a blockholder, on average the largest blockholder owns 26% of the stock (median 17.3%), with the percent ranging from 5.4% to 85.5% (Fig. 1). Forty-six of the 375 sample firms (12%) have majority shareholders who own more than 50% of the stock. Thus, three times as many firms have majority shareholders as have no blockholders. Table 1 also reports that 75% of all firms (including those without blockholders) have at least two blockholders; 3% have six (the maximum number in our sample). The largest block in dollar terms is $21.6 billion (Milton Hershey School Trust's block in the Hershey Company).[9]

We question how often ownership is as diffuse as some commentators seem to imagine. Most firms (96% of our random sample) have at least one 5% shareholders. Many firms have several blockholders, again as we have just documented. However, all of our figures under-count ownership concentration because they do not include holdings of large but less-than-5% shareholders. To illustrate these points, we examined the current ownership of Apple (one of the few firms in our 1995 sample that lacked a blockholder) and GE.[10] We considered both 5% blockholders and institutional investors who report holdings below 5%. This information comes from publicly-available 13F filings. We chose these two firms because they should be outliers in terms of ownership concentration. Both are very large (at the time of writing, Apple is the largest public firm in the world), which is relevant because ownership concentration is inversely related to firm size. In addition to being large, GE is old, having been founded in 1889. This is relevant because there is a well-documented negative relation between firm age and ownership concentration.

The two firms have similar ownership concentration. Each has one blockholder, Vanguard in both cases (5.74% in Apple, 5.61% in GE). Vanguard and the nine largest other institutional shareholders in aggregate own 22.61% of Apple and 22.05% of

[9] As previously noted, our ownership data comes from 1995 proxies. We report percentage ownership from those proxies and dollar ownership adjusted by the increase in the CRSP equal-weighted-price index (excluding dividends) from January 1, 1995 to December 31, 2015 (a factor of 6.75).

[10] When Steve Jobs, the co-founder of Apple, was fired as CEO in 1985, he sold almost all of his Apple stock. Prior to this he was the largest shareholder in the company with approximately 10% of the stock. *Los Angeles Times*, October 30, 1985, "Jobs to Sell 1 Million More Apple Shares." At the time of his death in 2011, Jobs was worth approximately $6.7 billion. The bulk of this wealth came from his 7.4% stake in Disney Corporation. He received this stake when he sold Pixar to Disney in 2006. At the time of this sale, Jobs owned 50.1% of Pixar. This is one of the few examples of an ownership block just barely above 50%.

Table 1 Descriptive statistics on large-percentage blocks of common stock in 375 randomly selected CRSP- and Compustat-listed firms. All blocks constitute at least 5% of the firm's outstanding common stock. Firms without large-percentage blocks are included in this table ("No Blocks"). Data comes from 1995 proxy statements. The reported dollar figures are adjusted by the increase in the CRSP equal-weighted-price index (excluding dividends) from January 1, 1995 to December 31, 2015 (a factor of 6.75)

Rank ordering of block	Frequency	Block size in percent						Representative on board (%)
		Mean	Median	SD	Maximum	75th	25th	
1	360 (96%)	26.0	17.3	20.1	85.5	39.4	10.0	66
2	280 (75%)	10.4	8.6	5.8	40.2	11.8	6.7	36
3	168 (45%)	7.6	7.1	2.5	18.6	8.6	5.8	29
4	91 (24%)	6.8	6.4	1.8	16.9	7.7	5.5	25
5	38 (10%)	6.1	5.8	1.0	9.2	6.7	5.5	34
6	13 (3%)	5.7	5.3	0.8	7.6	5.8	5.2	31
All blocks	950	15.2	8.9	15.4	85.5	15.1	6.6	45
No blocks	15 (4%)	NA	NA	NA	NA	NA	NA	NA

Rank ordering of block	Frequency	Block size in dollars						Representative on board (%)
		Mean	Median	SD	Maximum	75th	25th	
1	360 (96%)	$923M	$179M	$2.1B	$21.6B	$747M	$55M	66
2	280 (75%)	$308M	$68M	$722M	$6.9B	$261M	$25M	36
3	168 (45%)	$181M	$59M	$336M	$2.9B	$192M	$22M	29
4	91 (24%)	$135M	$46M	$208M	$1.1B	$179M	$18M	25
5	38 (10%)	$81M	$43M	$102M	$422M	$82M	$15M	34
6	13 (3%)	$78M	$43M	$102M	$355M	$75M	$10M	31
All blocks	950	$490M	$89M	$1.4B	$21.6B	$342M	$28M	45
No blocks	15 (4%)	NA	NA	NA	NA	NA	NA	NA

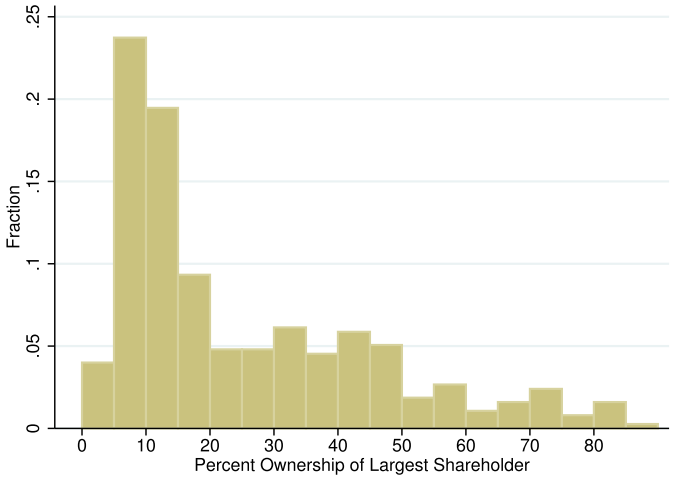

Figure 1 Percent common stock ownership of the largest shareholder in 375 randomly selected CRSP- and Compustat-listed firms. The 15 firms (4% of the sample) without any blocks of at least 5% of the common stock are included in the 0–5% bin. Data comes from 1995 proxy statements.

GE. We again note that these are lower-bound estimates because there may be non-institutional shareholders who own large-but-less-than-5% blocks and therefore do not have to report under Securities and Exchange Commission ("SEC") rules.

An interesting but unstudied topic would be to examine those few firms that do not have any shareholders below a certain functional level (e.g. 5%). For the property rights reasons discussed earlier, our prediction is that this would be a small sample (in our sample, only 4% of firms have no 5% shareholders) and one that has probably declined over time (witness the change with Apple).

Returning to the sample of randomly selected firms, Table 2 classifies the largest blockholder by type. We see that about half of them are individuals (51.9%). The largest blockholders also include mutual funds, other corporations, financial institutions, venture capitalists, and pension funds.

Different types of blockholders are likely to face different incentives and have different skills. Therefore, their impact on firms is likely to be different. One of the first studies of blockholders (Holderness and Sheehan, 1988) compares firms having individual majority shareholders with those having corporate majority shareholders. Despite the potentially large differences between different blockholder types, relatively few studies account for blockholder heterogeneity. One such avenue for future research is suggested by the last column of Table 2: The frequency that the largest blockholder or her named representative serves on the board of directors varies from 91% for individual blockholders to only 5% for mutual funds. Given that directors have the legal right to

Table 2 Descriptive statistics of the largest percentage block of common stock in 375 randomly selected CRSP- and Compustat-listed firms. All blocks constitute at least 5% of the firm's outstanding common stock. Firms without such large-percentage blocks are excluded from this table (15 firms or 4% of the sample). Data comes from 1995 proxy statements. The reported dollar figures are adjusted by the increase in the CRSP equal-weighted-price index (excluding dividends) from January 1, 1995 to December 31, 2015 (a factor of 6.75)

		Block size in percent			Block size in dollars			Representative on board (%)
Type	Number	Mean	Median	SD	Mean	Median	SD	
Individual	187 (51.9%)	31.6	28	20.1	$718M	$131M	$1.9B	91
Mutual fund	66 (18.3%)	9.9	9.7	3.2	$1.0B	$377M	$1.4B	5
Corporate	41 (11.4%)	39.0	39.0	21.8	$1.2B	$352M	$2.5B	83
Financial institution	28 (7.8%)	15.9	12.2	10.2	$1.1B	$171M	$1.8B	25
Venture capital	15 (4.2%)	21.2	20.2	12.3	$210M	$112M	$283M	93
Pension fund	11 (3.1%)	12.1	8.9	11.1	$821M	$165M	$1.2B	18
Other	12 (3.3%)	26.1	7.8	28.5	$3.1B	$767M	$6.1B	58
Total	360 (100.0%)	26.0	17.3	20.1	$923M	$179M	$2.1B	66

manage a corporation (including the exclusive right to hire and fire the CEO), this difference is potentially important.

Table 3 confirms these findings for all 950 blockholders in all of our firms, not just the largest blockholder in each firm. Individuals, corporations, and venture capitalists are the most likely to be on the board; mutual funds and pension funds are the least likely. Given the growing prominence of mutual funds (as illustrated above with Apple and GE), their board representation is a topic worthy of study, in part to see if the board representation of mutual funds has evolved over time. One relevant consideration is that once a shareholder owns 10% of the stock, under securities law she is considered an insider and must comply with insider trading laws even if she or a representative is not a director or officer. Interestingly, 19% of the blocks held by mutual funds in our sample are larger than 10%. It would be illuminating to study how long mutual funds hold such large blocks and how their trading strategies are impacted by having to comply with insider trading laws, in particular given that trading both is a governance mechanism in itself (see the exit models of Section 5.2) and can affect the incentives to govern through voice (Section 5.1).

Examining either the largest block in a firm (Table 2) or all blocks in a firm (Table 3), we see that the percentage size of blocks held by individuals tend to be much larger than those held by mutual funds, but the dollar value is smaller. Corporate blocks are the largest both in percentage and dollar terms.

Another measure of ownership concentration is the aggregate ownership of all large shareholders. We see in Table 4, Panel A that on average the blockholders in a firm collectively own 38.6% (median 36.8%) of the common stock; these numbers include those firms without blockholders counted as zero block ownership. This information is graphed in Fig. 2. If we include all stock holdings of directors and officers (not just 5% blocks) with those of the blockholders, the average aggregate ownership is 43% (median 43%).[11] When one sees such data, it is easy to understand why the Berle and Means view of diffuse ownership has lost favor among economists.

Blockholders can be divided between insiders (directors or officers) and outsiders (neither directors nor officers) as in Panels B and C. Inside blockholders hold an average of 26.8% of the stock (median 20.8%); outside blockholders on average own 11.8% (median 7.8%). This highlights a potential pitfall of relying solely on the director and officer ownership tables found in most proxy statements, as some papers do. These tables do not include outside blockholders. In fact, there are more outside blockholders than inside blockholders among our sample firms, 521 versus 429. The dollar values of the blocks are similar between the two groups, but the percentage size of the insiders' blocks are larger.

[11] Holderness (2009), Table 1.

Table 3 Descriptive statistics on all large-percentage blockholders in 375 randomly selected CRSP- and Compustat-listed firms. All blockholders own at least 5% of the firm's outstanding common stock. Firms without such large-percentage blocks are excluded from this table (15 firms or 4% of the sample). Data comes from 1995 proxy statements. The reported dollar figures are adjusted by the increase in the CRSP equal-weighted-price index (excluding dividends) from January 1, 1995 to December 31, 2015 (a factor of 6.75)

Type	Number	Block size in percent			Block size in dollars			Representative on board (%)
		Mean	Median	SD	Mean	Median	SD	
Individual	375 (39.5%)	20.8	12.9	18.3	$433M	$68M	$1.4B	84
Mutual fund	304 (32.0%)	8.0	7.3	2.9	$440M	$104M	$918M	3
Corporate	70 (7.4%)	27.9	20	21.8	$754M	$122M	$2.0B	69
Financial institution	90 (9.5%)	10.3	7.6	7.4	$593M	$137M	$1.1B	11
Venture capital	42 (4.4%)	13.4	9.8	9.9	$121M	$48M	$197M	71
Pension fund	33 (3.5%)	9.3	8.1	6.6	$408M	$87M	$785M	6
Other	36 (3.8%)	13.7	6.9	18.5	$1.2B	$83M	$3.7B	36
Total	950 (100.0%)	15.2	8.9	15.4	$489M	$89M	$1.4B	45

Table 4 Summary statistics on the aggregate common stock ownership of all blockholders at 375 randomly selected, CRSP- and Compustat-listed firms. Blockholders are those shareholders that own at least 5% of the common stock. Inside blockholders are those blockholders who are directors (or have named representatives on the board). Outside blockholders are those blockholders who are not on the board (or have no named representatives on the board). Firms without blockholders are included in this table at 0% ownership. Ownership data comes from 1995 proxy statements. The reported dollar figures are adjusted by the increase in the CRSP equal-weighted-price index (excluding dividends) from January 1, 1995 to December 31, 2015 (a factor of 6.75)

Panel A: Aggregate block ownership		
Mean ownership	38.6%	$1.24B
Median ownership	36.8%	$285M
SD of ownership	22.9%	$2.5B
Maximum ownership	94.8%	$21.6B
75th	55.4%	$1.2B
25th	20.3%	$84M
Percent of firms with blockholders	96%	
Number of blockholders	950	
Panel B: Inside block ownership		
Mean ownership	26.8%	$675M
Median ownership	20.8%	$83M
SD of ownership	25.2%	$2.0B
Maximum Ownership	85.5%	$21.6B
75th	46.3%	$413M
25th	0.0%	$0
Firms with inside blockholders	72%	
Number of inside blockholders	429 (45% of all blockholders)	
Panel C: Outside block ownership		
Mean ownership	11.8%	$567M
Median ownership	7.8%	$57M
SD of ownership	12.1%	$1.5B
Maximum ownership	68.0%	$16.5B
75th	18.8%	$391M
25th	0.0%	$0
Firms with outside blockholders	71%	
Number of outside blockholders	521 (55% of all blockholders)	

We now study the firm characteristics that are associated with a blockholder (or a blockholder's named representative) serving on the board. We do not claim causality; instead, we view this as a descriptive analysis of what types of firms are associated with blockholder representation on the board. Table 5 contains (marginal) probit regressions on whether the blockholder or a specifically named representative serves on the board of

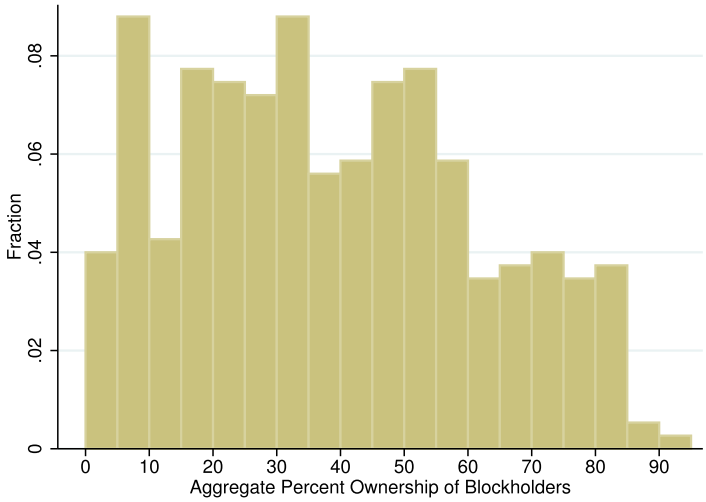

Figure 2 Aggregate percent common stock ownership of all large-percentage shareholders at 375 randomly selected CRSP- and Compustat-listed firms. Blockholders are those shareholders that own at least 5% of the common stock. Firms without blockholders are included in the 0–5% bin. Data comes from 1995 proxy statements.

directors (that is, the blockholder is classified as an insider in Table 4). These regressions confirm the summary statistics from earlier tables. Individuals and venture capitalist blockholders are far more likely to serve as directors than mutual funds and financial blockholders. Board representation by blockholders declines with firm age and increases with both the blockholder's percentage ownership stake and the firm's market-to-book ratio.

In Table 6 we address the corporate role of blockholders: Are they directors, officers, both, or neither? This is most informative about individual blockholders. We see that 62% of the individual blockholders are both directors and officers (and thus likely managing blockholders), and 24% are only directors (and thus likely monitoring blockholders). (We have no instances of a blockholder being an officer but not a director.) The remaining 14% are outsiders, who may be governing through voice or exit, or may instead be purely passive. We return to these broad categories in the theory section. Note that there is increasing evidence that few blockholders are purely passive. For example, Appel et al. (2016b) find that even index funds have a positive causal impact on governance, consistent with these funds' claims to be actively involved in voting.

Lastly, in Table 7 we present exploratory regressions of the firm characteristics that are associated with block ownership. We again view these to be descriptive and not causal. The first regression is a probit on whether a firm has a blockholder or not; the second (third) studies the percentage ownership of the largest blockholder (all

Table 5 Probit regressions on whether a blockholder has an identified representative, which may be the blockholder himself, serving on the board of directors. The dependent variable takes a value of one when there is at least one such representative and zero otherwise. The coefficients report the change in the probability for an infinitesimal change in the continuous variables and the discrete change in the probability for the dummy variables. All blockholders own at least 5% of the firm's common stock. There are 360 firms with 950 total blockholders. These firms come from a random sample of 375 CRSP- and Compustat-listed corporations. Other blockholder types are included in the first regression but are the omitted category from the second regressions. Data comes from 1995 proxy statements, CRSP, and Compustat (robust p-values are in parentheses)

Percent size of block	0.04	0.03
	(0.00)	(0.00)
Ranking of block within firm	0.00	−0.00
	(0.94)	(0.86)
Market value of equity (Log)	−0.03	0.03
	(0.01)	(0.06)
Age of firm (Log)	−0.07	−0.08
	(0.00)	(0.01)
Market-to-book ratio	0.05	0.04
	(0.00)	(0.07)
Individual blockholder		0.57
		(0.00)
Mutual fund blockholder		−0.39
		(0.00)
Corporate blockholder		0.20
		(0.17)
Financial blockholder		−0.24
		(0.06)
Venture capital blockholder		0.40
		(0.00)
Pension blockholder		−0.32
		(0.03)
Pseudo R^2	29%	60%
Observations	950	950

blockholders). The last two regressions are most revealing given how few firms lack a blockholder.

Our first finding is that ownership concentration is negatively related to firm size. This may arise because blockholders' wealth constraints limit the dollar amount that they can invest in a particular firm; a given dollar investment translates into a smaller percentage stake in larger firm.

Table 6 Summary statistics on the corporate positions, if any, of all large-percentage shareholders at 375 randomly selected CRSP- and Compustat-listed firms. Blockholders are those shareholders that own at least 5% of the common stock. There are 950 total blockholders, 375 of whom are individuals, in 360 firms. Both columns sum to 100%. For non-individual blockholders, the table reports if individuals publicly identified with the blockholder served as either directors or officers. Information on ownership data and corporate positions come from 1995 proxy statements

	All blockholders (%)	**Individual blockholders (%)**
Blockholder is both a director and officer	29	62
Blockholder is only a director	18	24
Blockholder holds no corporate position	53	14

Table 7 Regressions of the ownership structure of randomly selected CRSP- and Compustat-listed corporations. The dependent variable in the first regression, which is a probit, is a dummy variable which takes a value of one if a firm has a blockholder and zero otherwise. The coefficients report the change in the probability for an infinitesimal change in the continuous variables and the discrete change in the probability for the dummy variables. The last two regressions are OLS. The dependent variable in the second regression is the percent of the common stock held by the firm's largest blockholder. A blockholder owns at least 5% of a firm's common stock. The dependent variable in the third regression is the percent of the common stock held by all blockholders in aggregate. If a firm has no blockholders, the firm is included at zero block ownership in the last two regressions. Firm Size is the natural log of the market value of the firm's common stock. Firm Age is the natural log of the number of years since incorporation. EBITDA/Assets is a firm's earnings before interest, taxes, and depreciation divided by the book value of its assets. Leverage is the ratio of a firm's book value of debt to the book value of assets. There are 367 observations in all three regressions. (p-values of Huber–White robust t-statistics in parentheses test whether coefficients are significantly different from zero.) Data from CRSP, Compustat, and annual proxy statements (typically 1995)

	Ownership of		
	Firm has a blockholder	**Largest blockholder**	**Ownership of all blockholders**
Market value of equity (Log)	−0.01	−3.36	−5.08
	(0.06)	(0.00)	(0.00)
Age of firm (Log)	−0.01	−1.66	−3.41
	(0.11)	(0.13)	(0.00)
EBITDA/assets	−0.03	11.19	15.89
	(0.61)	(0.01)	(0.00)
Leverage	0.00	17.39	15.27
	(0.94)	(0.00)	(0.00)
Constant		41.68	69.25
		(0.00)	(0.00)
R^2	0.12	0.15	0.25

Second, ownership correlation is negatively related to firm age, potentially driven by company founders selling their stakes piecemeal over time for diversification reasons or by companies issuing equity, often for acquisitions, and thereby diluting the ownership of existing shareholders. These two results confirm Holderness (2016a, p. 12), who "considers the two firm-level factors that existing research suggests are most clearly related to ownership concentration, firm size and firm age." Most research on ownership concentration controls for firm size.[12] Researchers control for firm age less often, but we recommend that it also be included as a control.[13]

Third, Table 7 indicates a positive association between leverage and the level of block ownership. A potential explanation is that more levered firms have less equity as a proportion of aggregate value. Lower total equity consequently means that a given dollar investment by the blockholder translates into a higher percentage stake.

Our sample is limited to United States exchange listed firms from 1995. This raises obvious questions about the concentration of corporate ownership in other countries as well as what has happened to ownership concentration in the United States since 1995.

Holderness (2009) compares the 1995 United States data we have just discussed with hand-collected data from the same vintage from 22 European and East Asian countries. He finds that the United States, rather than being an outlier in ownership concentration, is in the middle of the pack. Nevertheless, once key firm characteristics (notably firm size and firm age) are held constant, significant differences in ownership concentration across countries remain. La Porta et al. (1998) propose that such differences in part reflect legal protections for public market investors. Holderness (2016b), however, finds no evidence that any of 16 widely used indices of shareholder protection, including the rights of shareholders to sue directors, prohibitions on self-dealing by insiders, and the civil law/common law divide, are systematically related to differences in ownership concentration across 32 countries. In contrast, Holderness (2017) finds that these cross-country differences in ownership concentration are strongly and positively correlated with a country's attitude towards egalitarianism, which means a preference for the equal as opposed to hierarchical treatment of individuals. One possibility that is consistent with the data is that large shareholders are more valuable when employees have strong legal rights, which tends to be the case with egalitarian societies.

Zhu (2015) presents data on the ownership concentration of the S&P 1500 firms from 1994 (the time of our random database) to 2012. He finds that over this time ownership concentration increased substantially. By 2012 only 2% of his sample firms

[12] For example, Holderness (2016a, 2016b), Shleifer and Vishny (1986), Stulz (1988, 1990), Karpoff et al. (1996), Field and Karpoff (2002), Franks et al. (2009), and Himmelberg et al. (1999).

[13] Boone et al. (2007) report that CEO ownership and board of director ownership declines for ten years after a firm goes public. Anderson and Reeb (2003) document that block ownership by families is higher for younger firms.

lacked a 5% blockholder. Over this period, both the number and aggregate holdings of financial institutions and private investors increased.

5. THE THEORY

This section reviews the main theories of blockholder governance, and in particular their empirical predictions for what determines the effectiveness of governance. We do so by using a unifying model with common notation, in order to clarify how the various theories relate to each other, and lower the barriers to entry to non-theorists or outsiders to the blockholder literature. In particular, we hope to show that the key models are surprisingly simple and tractable, which allows the economic intuition and empirical implications to be transparent. A separate goal is to illustrate the various modeling techniques that can be used in blockholder theories. Appendix B provides further detail on these techniques, which we hope will be of value to a reader contemplating writing such a model.

We use a modified version of Edmans et al. (2017d), which unifies both voice and exit models in a single model, as our common framework. Proofs of comparative statics and other main results are in Appendix A; for more technical proofs such as existence of equilibrium, we refer the reader to Edmans et al. (2017d). We start in Section 5.1 by analyzing models of governance through voice, move to models of governance through exit in Section 5.2, and finally discuss theories of the costs of blockholders in Section 5.3. In similar spirit to us, Foucault et al. (2013) provide a (quite different) simple unifying model illustrating the effect of liquidity on governance through voice, and also other corporate finance outcomes such as the extent to which managers can learn information from the stock price.

5.1 Voice

5.1.1 The basic free-rider problem and the relevant measure of block size

This section models the free-rider problem, highlighted by Berle and Means (1932) and discussed in Section 2, and analyzes the relevant measure of block size discussed in Section 3. We consider a firm with the number of shares normalized to 1. All players are risk-neutral, and there are four periods with no discounting. At $t = 0$, a single blockholder ("she") owns $\alpha \in (0, 1]$ shares, which will later be endogenized. At $t = 1$, she takes a hidden action $a \in \{0, 1\}$, where $a = 0$ leads to a $t = 3$ firm value of $V = \underline{V}$, and $a = 1$ leads to $V = \overline{V} \equiv \underline{V} + \Delta\underline{V}^{\gamma}$. We use "good" ("bad") to describe a firm where $V = \overline{V}$ $(\underline{V})$. Action $a = 1$ also imposes a cost $\tilde{c}$ on the blockholder, where $\tilde{c} \in [0, \infty)$ is a random variable, with cumulative distribution function F, that she privately observes

at $t = 1$ prior to deciding her action. The cost will depend on factors such as the blockholder's ability to coordinate with other shareholders and managerial entrenchment.[14]

Action $a = 1$ corresponds to any action that improves firm value but is costly to the blockholder. Examples include direct confrontation (e.g. public criticism of management or launching a proxy fight), behind-the-scenes "jawboning" (e.g. advising management on strategy), researching how to vote on a shareholder proposal or proxy contest launched by others, or not taking private benefits for herself. We will refer to this action as monitoring, intervening, or governing through voice. Note that this action applies to both inside and outside blockholders; moreover, while the blockholder here is a large shareholder, many of the insights also apply to monitoring by large debtholders such as banks. Carleton et al. (1998), Becht et al. (2009), and McCahery et al. (2016) provide evidence that a significant amount of shareholder intervention occurs behind the scenes and is unobservable to outsiders. Interventions by banks (outside of bankruptcy) are even more likely to be unobserved, and so we assume that action a is hidden. Even if it is observable, it is unlikely to be contractible, and so the free-rider problem still exists.

The parameter γ captures the elasticity of the monitoring benefits with respect to "baseline" firm value or firm size $\underline{V}$. If $\gamma = 0$, we have $\overline{V} \equiv \underline{V} + \Delta$: monitoring has an additive effect on firm value that is independent of firm size, such as perk prevention. If $\gamma = 1$, we have $\overline{V} \equiv \underline{V}(1 + \Delta)$: monitoring has a multiplicative effect on firm value, such as restructuring.

If the blockholder monitors, her net payoff is $\alpha\left(\underline{V} + \Delta \underline{V}^{\gamma}\right) - c$ where c is the realization of $\widetilde{c}$, else it is $\alpha \underline{V}$. She thus monitors if and only if

$$c \leq c^*_{0,gen} \equiv \alpha \Delta \underline{V}^{\gamma}. \tag{1}$$

She follows a threshold strategy and monitors if and only if the cost of monitoring is no greater than a threshold $c^*_{0,gen}$, and so a higher threshold $c^*_{0,gen}$ corresponds to more monitoring and thus superior governance. The blockholder's chosen threshold (1) maximizes her profits (her share of firm value minus the monitoring cost). The first-best monitoring threshold, that maximizes total surplus (total firm value minus the monitoring cost), is $c^*_{FB} \equiv \Delta \underline{V}^{\gamma}$. Since $\alpha \leq 1$, $c^* \leq c^*_{FB}$. This is the standard free-rider problem: the blockholder monitors too little, because she bears the full cost of monitoring but only shares in α of the benefits. Thus, a higher threshold $c^*_{0,gen}$ not only corresponds to more monitoring, but higher social welfare—in this model, more monitoring is always socially optimal.

Eq. (1) captures two important economic insights. First, the threshold $c^*_{0,gen}$ is increasing in block size α, because the blockholder internalizes a greater proportion of

[14] See, e.g., Becker et al. (2013) for details on the costs of launching a proxy fight. Gantchev (2013) builds a sequential decision model to estimate the costs of proxy fights and other stages of shareholder activism.

the benefits of monitoring (Shleifer and Vishny, 1986).[15] This is the central role of blockholders in corporate governance discussed in Section 2: while any shareholder has the option to intervene, the large shareholder has the greatest incentive to do so. (Section 5.1.4 considers the case in which a minimum stake is required for a shareholder to have sufficient decision rights to intervene.) Thus, in the absence of additional considerations, the socially optimal block size α is 1 (that is, the firm is owned by one person).

Second, Eq. (1) provides guidance on the relevant measure of the blockholder's stake. The blockholder monitors if the cost is below the threshold $c^*_{0,gen}$, and so the relevant measure is proportional to $c^*_{0,gen}$ since it affects the probability of monitoring. If the production function is additive ($\gamma = 0$), then $c^*_{0,gen} = \alpha\Delta$ and the relevant measure is the blockholder's fractional ownership. This fraction, α, must exceed $\frac{c}{\Delta}$ (the cost of monitoring scaled by its benefit) for the blockholder to monitor. If the production function is multiplicative ($\gamma = 1$), then $c^*_{0,gen} = \alpha\Delta\underline{V}$ and the relevant measure is instead the blockholder's dollar stake. This dollar stake, $\alpha\underline{V}$, must exceed $\frac{c}{\Delta}$ for the blockholder to monitor. In the related context of CEO incentives, Baker and Hall (2004) and Edmans et al. (2009) show theoretically that a CEO's dollar, rather than percentage, ownership is relevant when the CEO has a multiplicative effect on firm value.

An alternative specification is for the monitoring cost to be $\tilde{c}X$ where X represents the size of the blockholder's portfolio, i.e. her total investments in all firms. This cost function is plausible if the blockholder has limited monitoring resources—thus, if she has many other investments, the opportunity cost of monitoring one particular firm is especially high. This is plausible for individual blockholders who have limited time, but may not be the case for institutional blockholders—as assets under management rise, their fees rise, allowing them to hire more staff so that the monitoring efforts on one particular holding do not fall. We then have $c^*_{0,gen} = \alpha\underline{V}/X^{\gamma}$, which yields the intuitive result that the monitoring probability is decreasing in her total portfolio size. If $\gamma = 1$, we have $c^*_{0,gen} = \alpha\underline{V}/X$. The blockholder's monitoring probability depends on her dollar block size relative to her dollar portfolio, as used in Fich et al. (2015). Note that, while the relative size measure seems intuitive, it makes two important assumptions—first, the productive function is multiplicative (i.e. the benefits of the blockholder's monitoring are scalable) and the cost function increases in portfolio size (i.e. the blockholder's monitoring activities are not scalable, so that she does not hire more monitoring resources as her portfolio rises). While these assumptions are not implausible, researchers using the relative size measure should make it clear that it requires these assumptions.

Table 8 summarizes how the relevant measure of block size depends on the model specification.

[15] This result arises from the "proxy fight" model of Shleifer and Vishny (1986), which can be applied to all forms of intervention, not just proxy fights. The main model of Shleifer and Vishny (1986) concerns takeovers, which will be considered later.

Table 8 Relevant measure of block size depending on assumptions for costs and benefits of monitoring

Production function	Additive	Multiplicative in $\underline{V}$	Multiplicative in $\underline{V}$
Cost function	Additive	Additive	Multiplicative in X
Block size measure	% block	\$ block	Relative block

For simplicity, we henceforth consider an additive model ($\gamma = 0$), which yields

$$c \leq c_0^* \equiv \alpha \Delta. \tag{2}$$

Since block size determines intervention incentives, Winton (1993), Noe (2002), and Edmans and Manso (2011) show that the number of blockholders affects the strength of voice by impacting block size. Splitting a block between multiple investors (e.g., so that N blockholders each hold α/N shares) weakens voice by reducing each investor's stake.[16] Similarly, Admati et al. (1994) show that diversification concerns lead to a blockholder holding stakes in many firms, but this similarly reduces intervention incentives. Separately, the threshold is naturally increasing in the gains from monitoring Δ. These gains are in turn increasing in factors such as the blockholder's expertise.

Since the blockholder has private information on whether she has intervened, she has private information on firm value. However, she is unable to trade on this information as her trade would be fully revealing. We now analyze two ways in which she may be able to profit by trading—the existence of liquidity traders who camouflage her trade, and the market maker's uncertainty over whether her trade is information-driven—and show that the possibility of trading profits distorts her incentives to intervene.

5.1.2 Liquidity trading

This section shows that the possibility of selling an unmonitored firm for a profit reduces the blockholder's incentives to monitor. We now introduce liquidity traders who, with probability ("w.p.") β, collectively sell $\phi < \alpha$ shares at $t = 2$. Such sales may arise from any non-informational motive, such as liquidity needs (the availability of a superior investment opportunity or withdrawals from end investors) or irrational speculation.[17]

Liquidity traders are uninformed about firm value and thus will not trade otherwise. Their trade is thus given by $h \in \{0, -\phi\}$. In Maug (1998), Bolton and von Thadden (1998), and Edmans (2009), liquidity sales come from existing investors and so liquidity is linear in free float $(1 - \alpha)$. Thus, $\phi = \nu(1 - \alpha)$ where ν is a liquidity parameter.

[16] Brav et al. (2017a) study how multiple investors co-ordinate to engage in intervention, in a theory of "wolf-pack" activism.

[17] Liquidity traders are sometimes referred to as "noise traders" or "households". We use the term "liquidity traders" here to emphasize the fact that liquidity trades need not result from irrational noise trading, and that professional investors as well as households may engage in them.

As we will show, high ν allows the blockholder to sell more without being fully revealed, and thus reduces the cost of trading large amounts. As a result, ν can also be used to study other costs of trading, such as transaction costs (taxes, commissions, or shorting costs) or inventory-holding costs (the market maker's cost of holding risky assets after buying from the blockholder). Thus, "liquidity"—the ease of trading on information—can arise from sources other than "liquidity trading", broadening the empirical predictions.

The existence of liquidity traders may allow the blockholder to camouflage her trades. Let b denote her trade at $t=2$. A competitive market maker ("it") observes each individual trade but not whether it stems from the blockholder or liquidity traders, as in Faure-Grimaud and Gromb (2004). It sets the stock price P to equal expected firm value given the vector of order flows Q, and purchases any sold shares. The blockholder will choose $b \in \{0, -\phi\}$ to camouflage with liquidity traders, and sell ϕ if and only if she does not monitor. Then, if the market maker sees $Q=(0,-\phi)$, i.e. one sell order, it does not know if the sale is from the blockholder or from liquidity traders, and sets a price exceeding $\underline{V}$ to take into account the possibility that the blockholder monitored and it was liquidity traders who sold. As a result, if the blockholder does not monitor, rather than doing nothing as in Section 5.1.1, she can profitably sell her shares: she "cuts and runs".[18] (Unlike in exit theories, considered in Section 5.2, such selling has no beneficial impact on governance, as there is no managerial action).The payoff from doing so is given by:

$$\alpha \underline{V} + \phi \frac{\beta(1-\beta)\widehat{\tau}}{\beta\widehat{\tau} + (1-\widehat{\tau})(1-\beta)}\Delta, \tag{3}$$

where $\widehat{\tau} \equiv F(\widehat{c})$ is the market maker's conjecture of the blockholder's monitoring probability τ and $\widehat{c}$ is its conjecture of her monitoring threshold.[19]

The first term, $\alpha \underline{V}$, is the value of the blockholder's initial stake, as in the core model. The second term is her expected trading profits from cutting and running. It is increasing in ϕ, the amount of shares she can sell, and thus liquidity ν. It is also increasing in the probability of monitoring $\widehat{\tau}$ and the gain from monitoring Δ, as these raise the price made by the price set by the market maker if monitoring may have occurred (i.e. $Q=(0,-\phi)$). There exists a β^* such that trading profits are increasing in β for $\beta < \beta^*$ and decreasing thereafter. If there are no liquidity shocks ($\beta = 0$), we

[18] In a negotiated block sale (studied, e.g., by Barclay and Holderness, 1991), the buyer engages in substantial due diligence, and so the seller cannot exploit private information. Thus, a blockholder who wishes to cut-and-run will sell to an uninformed buyer, such as the market maker in our model. The buyer is nevertheless rational and takes into account the possibility that the seller is informed.

[19] Note that this is equivalent to the case in which c is constant and publicly known, and the blockholder plays a mixed strategy in which she monitors w.p. $\widehat{\tau}$, as in Maug (1998) and Kahn and Winton (1998). A pure strategy based on a variable unobserved by the market maker appears as a mixed strategy to it.

are back to the no-trade model of Section 5.1.1 where the blockholder's trade is fully revealing. If the liquidity shock is certain ($\beta = 1$), then the market maker knows that a $-\phi$ trade must have come from liquidity traders, and identifies the other trade as coming from the blockholder, so she is again fully revealed. The closer β is to β^*, the greater the uncertainty over liquidity trader demand. Thus, the blockholder's sale is more camouflaged, allowing her to profit more from cutting and running.

The blockholder's threshold c_1^* is obtained by comparing (3) with her monitoring payoff $\alpha\overline{V} - c$ and applying the equilibrium condition $c_1^* = \widehat{c}$. The threshold c_1^* thus solves:

$$\alpha\Delta = c_1^* + \phi\frac{\beta(1-\beta)F(c_1^*)}{\beta F(c_1^*) + (1-F(c_1^*))(1-\beta)}\Delta. \tag{4}$$

Eq. (4) shows that the threshold c_1^* is lower than the no-trade threshold of $c_0^* \equiv \alpha\Delta$ (as in (2)) due to the possibility of cutting and running. It is decreasing in liquidity trades ϕ and hump-shaped in β as these terms raise trading profits. This result formalizes Coffee's (1991) and Bhide's (1993) verbal argument that liquidity harms governance, which led academics and practitioners to advocate the Japanese model of illiquid stakes—by making it more expensive to cut and run, illiquidity locks in shareholders for the long term and induces them to govern through voice. Partly motivated by this reasoning, in May 2014, ten member countries of the European Union have agreed to implement a financial transaction tax (still pending). However, as we will show in Section 5.1.4, this argument is incomplete.

5.1.3 Liquidity shock

The blockholder profits from cutting and running if her sale can be disguised as not stemming from information. In Section 5.1.2, this disguise arose from her trade being camouflaged by liquidity traders. An alternative approach is to give the blockholder herself the possibility of a liquidity shock. Then, even if her sale is observed, the market maker does not know whether it is due to a shock or monitoring. This section shows that the blockholder's incentives are lower than the no-trade model of Section 5.1.1, not only because of the possibility of cutting and running (as in Section 5.1.2) but also because the blockholder may be forced to sell a monitored firm for less than $\overline{V}$.

We dispense with liquidity traders; β is now the probability that the blockholder is forced to sell ϕ shares.[20] The liquidity shock is privately observed by the blockholder.[21]

[20] As discussed previously, if the buyer is informed, as in a negotiated block trade, the seller would receive the true value even if she suffers a shock. However, investors with sufficient funds to buy the block and expertise and resources to engage in due diligence are not always available; β is thus the probability that the probability is forced to sell ϕ shares to uninformed buyers.

[21] In Edmans et al. (2017d), a liquidity shock requires the blockholder to raise a certain dollar of funds, rather than sell a certain number of units of shares. We adopt the latter formulation here as it is much

Thus, when the market maker observes a sale, it does not know whether it is of an unmonitored firm, or of a monitored firm due to a blockholder liquidity shock, and so—as in Section 5.1.2—sets a price above $\underline{V}$. The monitoring threshold, c_2^*, is given by:

$$(\alpha - \phi)\,\Delta + \phi\,(1-\beta)\,\frac{1 - F\left(c_2^*\right)}{\beta F\left(c_2^*\right) + 1 - F\left(c_2^*\right)}\Delta = c_2^*. \tag{5}$$

If the blockholder monitors, then regardless of whether she suffers a shock, she retains at least $(\alpha - \phi)$ shares, whose value increases by Δ from intervention. In addition, if she does not suffer a shock (w.p. $(1-\beta)$), she retains the remaining ϕ shares, which are worth $\overline{V}$. If the blockholder does not monitor, then if she does not suffer a shock (w.p. $(1-\beta)$), she sells the remaining ϕ shares for $\underline{V} + \frac{\beta F(c_2^*)}{\beta F(c_2^*)+1-F(c_2^*)}\Delta$. (If she suffers a shock, she sells regardless of whether she has monitored, so this does not affect her monitoring incentives.) Thus, by monitoring, she increases her expected payoff from the remaining ϕ shares by $\overline{V} - \left(\underline{V} + \frac{\beta F(c_2^*)}{\beta F(c_2^*)+1-F(c_2^*)}\Delta\right)$, yielding Eq. (5).

The threshold is increasing in block size α and decreasing in ϕ. Irrespective of whether the blockholder's incentive to cut and run stems from the existence of liquidity traders (as in (4)), or the possibility of disguising her trade as liquidity-driven (as in (5)), the effect of ϕ is the same. A higher ϕ increases the amount that the blockholder can sell if she cuts and runs, and thus discourages monitoring. However, monitoring incentives are also reduced by a second effect—the possibility of a blockholder liquidity shock also reduces the payoff to intervention, since the blockholder may be forced to sell a monitored firm (worth $\overline{V}$) for a price of $\underline{V} + \frac{\beta F(c_2^*)}{\beta F(c_2^*)+1-F(c_2^*)}\Delta$. This further reduces the incentive to monitor. Since this effect is increasing in the probability of a liquidity shock β, monitoring incentives are now decreasing in β rather than hump-shaped as in Section 5.1.2.

Edmans et al. (2017d) analyze how governance is affected by the blockholder holding stakes in multiple firms, as is the case in reality (Antón and Polk, 2014; Bartram et al., 2015; Hau and Lai, 2013; Jotikasthira et al., 2012). Instead of the blockholder owning α shares in 1 firm, she now owns α/n shares in each of a continuum of firms of mass n ("common ownership"); her monitoring cost is i.i.d. across firms. The benefit of common ownership is that it gives the investor a choice of which firms to sell upon a liquidity shock. By the law of large numbers, the proportion of good firms in the blockholder's portfolio will be $F(c^*)$, and so she owns $\alpha\,(1 - F(c^*))$ shares in bad firms. If $\phi \leq \alpha\,(1 - F(c^*))$, she can satisfy her liquidity shock by selling only bad firms. This improves governance over the separate-ownership case in two ways. First, she never has to sell a monitored firm, and thus enjoys the full payoff of $\overline{V}$. Second,

simpler, without changing the insights. The required number of units ϕ need no longer equal $\nu\,(1-\alpha)$ since it is unlikely to depend on free float.

since she never sells a good firm, any firm that is sold is fully revealed as being bad and priced at $\underline{V}$: common ownership intensifies the adverse selection problem upon a sale. Thus, there is no incentive to cut-and-run. As a result, per share owned, the gross payoff from monitoring is the highest possible at $\overline{V} - \underline{V} = \Delta$. On the other hand, common ownership exacerbates the free-rider problem since the blockholder now only owns α/n rather than α shares in each firm. Thus, her overall threshold is given by $c_3^* = \frac{\alpha}{n}\Delta$. If n is sufficiently low, the second force is weaker and so $c_3^* > c_2^*$: common ownership improves governance.

If $\phi \leq \alpha\,(1 - F(c^*)) < \phi < \alpha$, the shock is so large that the blockholder must partially sell good firms also. However, since she fully sells bad firms upon a shock, her payoff from monitoring remains higher than under separate ownership, where a shock would force her to sell good and bad firms to the same degree. In sum, the model suggests a new measure of blockholder governance—the number of blocks held, or alternatively the concentration of the blockholder's stake in her portfolio. However, unlike Section 5.1.1, a low concentration may imply superior governance.

5.1.4 Additional purchases

Thus far, liquidity unambiguously reduces the incentives to intervene. However, Kyle and Vila (1991), Kahn and Winton (1998), and Maug (1998) show that liquidity can improve monitoring incentives through a related channel. While liquidity allows the blockholder to sell her shares if she does not intervene, it also may allow her to buy additional shares if she does. Thus, her payoff from intervention stems from not only the $\alpha\Delta$ increase in value of her original stake, but also the ability to buy additional shares at a price that does not yet reflect her intervention. The exposition here largely follows Maug (1998), applied to our unifying framework.

We return to the model of Section 5.1.2 but, rather than liquidity traders only selling ϕ units, we could now assume that, if they trade (w.p. β), they now are equally likely to buy or sell $\frac{\phi}{2}$.[22] Thus, the blockholder now buys $\frac{\phi}{2}$ (rather than 0) if she intervenes, and sells $\frac{\phi}{2}$ if she does not. An alternative assumption is that liquidity trades continue to involve only a sale of ϕ (not purchases) but that, rather than observing individual trades, the market maker only observes total order flow $d = b + h$, as in Kyle (1985). Let the blockholder trade b_a upon action a. Since the difference in liquidity traders' order is ϕ, the difference between b_0 and b_1 must also be ϕ to achieve camouflage. We adopt the latter formulation to follow Maug (1998). For comparability with the first formulation,

[22] Liquidity-motivated purchases may stem from current shareholders experiencing an inflow of funds. Current shareholders may use this inflow to buy an existing stock that they own if they are less informed about other stocks (see Merton, 1987 for a model in which investors are restricted to buy stocks that they know about) or ambiguity averse. In Bolton and von Thadden (1998), Kahn and Winton (1998), and Holmstrom and Tirole (1993), liquidity purchases also stem from existing owners.

we assume a symmetric strategy and so $b_1 = \frac{\phi}{2}$ and $b_0 = -\frac{\phi}{2}$.[23] Thus, a total order flow $d = -\frac{\phi}{2}$ is uninformative—it is consistent with the blockholder buying and liquidity traders selling, and with the blockholder selling and no liquidity shock. Empirically, Gantchev and Jotikasthira (2017) find that hedge fund activists camouflage their purchases by timing them to coincide with liquidity-driven selling by institutions. As in Section 5.1.4, the profit from informed trading is hump-shaped in β. Since we have already shown this result, here we set $\beta = \frac{1}{2}$ (as in Maug, 1998) to ease the exposition.

The blockholder's threshold is now given by c_4^*, which solves

$$\alpha\Delta = c_4^* + \frac{\phi}{2}\left(F\left(c_4^*\right) - \frac{1}{2}\right)\Delta. \tag{6}$$

While giving the blockholder the option to sell reduces monitoring incentives, giving her the option to buy increases them. If $c_4^* = \alpha\Delta$ (as in the no-trade model of Section 5.1.1), then the monitoring probability is given by $\tau = F(\alpha\Delta) = \frac{1}{2}$. Thus, whether the option to trade (buy and sell) increases or decreases the monitoring threshold c_4^* compared to the no-trade threshold of $\alpha\Delta$ depends on whether $F(\alpha\Delta) \lessgtr \frac{1}{2}$. If $F(\alpha\Delta) > \frac{1}{2}$, the blockholder's monitoring probability exceeds $\frac{1}{2}$ if she cannot trade. Then, the "trading effect"—the impact of the ability to trade on monitoring incentives—is negative. Since monitoring is expected, the stock price is high, which encourages cutting and running: $c_4^* < \alpha\Delta$. If $F(\alpha\Delta) < \frac{1}{2}$, monitoring is unexpected. Thus, the stock price upon trading is low, which encourages monitoring and purchasing: $c_4^* > \alpha\Delta$. In both cases, trading profits are higher if the blockholder takes the unexpected action. The more expected monitoring is, the greater the trading profits from unexpectedly not monitoring.[24]

[23] In Maug (1998), where the monitoring cost c is publicly known and the blockholder plays a mixed strategy, two variables determine her trading intensity: the mixing probability τ and her trading volumes (b_0, b_1). These two variables are constrained by a single equation, the indifference condition for mixing, and so one variable can be arbitrarily chosen. Thus, the restriction to symmetric strategies is without loss of generality. This is likely also the case for the current model, where c is privately observed by the blockholder and τ is the probability that it is below the threshold. Note that some models adopting the Kyle (1985) setup assume that the blockholder matches the liquidity trader's demand and do not consider the possibility of other equilibria. It is important to do so, or to use the framework in which the market maker observes individual trades, rather than total order flow, where there is no multiplicity.

[24] In Kahn and Winton (1998), there is a baseline probability, γ, that $V = \overline{V}$ even in the absence of intervention (the current model has $\gamma = 0$). Thus, the blockholder only faces a monitoring decision w.p. $1 - \gamma$, and so the overall probability of $V = \overline{V}$ is $\gamma' = \gamma + \tau(1 - \gamma)$. Thus, holding constant τ, a higher baseline probability of success, γ, increases γ' and makes success more expected, in turn making the trading effect more negative. When success is more expected, trading profits are higher if the blockholder does not monitor.

Higher ϕ increases the magnitude of the trading effect, which moves c_4^* further above (below) $\alpha\Delta$ if $F(\alpha\Delta) < (>) \frac{1}{2}$.[25] Thus, liquidity enhances monitoring if $F(\alpha\Delta) < \frac{1}{2}$. Conventional wisdom that liquidity necessarily deters intervention by increasing the profitability of selling ignores the fact that liquidity also increases the profitability of additional purchases, encouraging intervention. This result was shown by Kahn and Winton (1998) and Maug (1998) in the context of general blockholder interventions, and Kyle and Vila (1991) in the specific context of takeovers.

Thus, to understand the effect of liquidity ϕ on governance c_4^*, it is necessary to study whether $F(\alpha\Delta) \lessgtr \frac{1}{2}$, by analyzing the α that will arise in equilibrium. There are potentially three ways to solve for α. One approach is to find the α that maximizes governance and thus the firm's market value, which involves $\alpha = 1$ and no free-rider problems. The second is to find the social optimum that maximizes total surplus. This corresponds to firm value minus monitoring costs (net of any private benefits to the blockholder); trading profits are at the expense of liquidity traders so do not feature. This is the approach taken by Burkart et al. (1997), Kahn and Winton (1998), and Faure-Grimaud and Gromb (2004). The social optimum will be chosen by the initial owner when taking the firm public, since the owner will have to compensate the blockholder for her expected monitoring costs in the form of a lower initial price.[26] This will also involve $\alpha = 1$, so that the blockholder internalizes the full costs and benefits of intervention.

However, Maug (1998) argues that the social optimum will not be robust to retrading by the blockholder, and that the stable equilibrium will be the private optimum that maximizes the blockholder's payoff, which is the third approach. Maug (1998) solves for the private optimum assuming that the blockholder's initial purchase is fully observed. Appendix A shows that, in his model, the blockholder chooses:

$$\begin{aligned} \tau &= \frac{1}{2} - \frac{c}{\Delta v} \\ \alpha &= \frac{c}{2\Delta - c}. \end{aligned} \tag{7}$$

The blockholder's chosen stake α is less than $\frac{c}{\Delta}$. Intuitively, her choice of α is not driven by the positive effect of α on intervention: since her purchase is fully observed, selling shareholders charge a price that takes into account the expected gains from monitoring (see Eq. (15) in Appendix A). Instead, the choice of α is determined by the

[25] Kahn and Winton (1998) also feature other potentially informed traders in addition to the blockholder, who can pay a cost to learn firm value and trade on this information. They show that the trading effect is weak when the cost of acquiring information is low and competition among traders is high. This is similar to low liquidity (ϕ) here: low liquidity, like the existence of other traders, reduce the blockholder's profits from informed trading.

[26] Stoughton and Zechner (1998) show how firms may use rationing and underpricing to implement the social optimum in an initial public offering.

expected trading profits that will result. Choosing $\tau = \frac{1}{2}$ (which yields $\alpha = \frac{c}{\Delta}$ from (6)) would maximize the market maker's uncertainty over monitoring and thus her trading profits. However, choosing $\tau < \frac{1}{2}$ (and thus $\alpha < \frac{c}{\Delta}$) means that she monitors less often and thus reduces her expected monitoring costs. In short, the blockholder's desire to avoid costly intervention leads to her choosing a small stake; given this small stake indeed leads to a low monitoring incentive, the possibility of trading profits boosts it. Thus, liquidity improves governance.

The above discussion surrounds how liquidity affects intervention incentives for a given α. In addition, liquidity also affects the stake α that the blockholder chooses. In Maug (1998), if liquidity is sufficiently low, then the blockholder knows that if she acquires a stake of α, she will earn few profits from subsequently monitoring and buying. Thus, she remains at her initial stake of zero and does not intervene.[27] Kahn and Winton (1998) consider a similar two-period model. Liquidity increases the informed trading profits that the blockholder enjoys in the second period, after she has acquired her stake of α. Fearing second-period losses to the blockholder, small shareholders are willing to sell at a greater discount when she acquires α in the first period, and so a larger block is formed.

Minimum stake required for intervention. In the above model, the blockholder buys additional shares to earn trading profits. Shleifer and Vishny (1986) model a different motive. In their model, their are no liquidity trades (by either the blockholder or households), and so she is unable to profit from trading. Instead, they assume that a minimum stake is required to have the decision rights to intervene, and so the blockholder acquires additional shares to achieve it.

Their model involves the following changes to our setup. First, the intervention cost c is now fixed,[28] but instead the intervention gain Δ is privately observed by the blockholder before she takes her action. Second, the blockholder can only intervene if she owns at least $\alpha_{\min}$ shares; however, as discussed in Section 3, what $\alpha_{\min}$ corresponds to in reality is unclear. Shleifer and Vishny (1986) assume that she needs majority control to implement the restructuring and so $\alpha_{\min} = 0.5$; La Porta et al. (1999) conjecture that $\alpha_{\min} = 0.2$ may be enough to give a shareholder effective control in many circumstances.

[27] In Maug (1998), liquidity also increases the discount at which the blockholder can buy her stake α, but does not affect the size of the stake she chooses to buy (see Eq. (7)). The blockholder earns a return from two sources—buying her initial stake α at a discount in the first period, and second-period trading against liquidity investors who own $(1 - \alpha)$. While a greater α allows her to profit more from the first-period discount, it reduces free float and thus second-period trading profits.

[28] Shleifer and Vishny (1986) model this as a cost of launching a takeover bid rather the cost of implementing the intervention. However, since the blockholder will only launch a takeover bid if it will succeed, and always implements the intervention once the bid succeeds, the cost is borne with certainty upon bid launch regardless if it is a cost of making the bid or implementing the intervention.

Thus, at $t = 2$ she attempts to buy $\alpha_{\min} - \alpha$ shares through a publicly-observed tender offer.[29] She will be willing to offer a premium π over current firm value $\underline{V}$ if

$$\begin{aligned} \alpha\Delta + (\alpha_{\min} - \alpha)(\Delta - \pi) - c &\geq 0 \\ \Delta &\geq \frac{1}{\alpha_{\min}}[(\alpha_{\min} - \alpha)\pi + c]. \end{aligned} \tag{8}$$

Thus, upon observing a bid of π, existing small shareholders forecast Δ as $E[\Delta|\Delta \geq \frac{1}{\alpha_{\min}}[(\alpha_{\min} - \alpha)\pi + c]]$. Thus, they will only sell for a premium π over current value $\underline{V}$ that satisfies

$$\pi \geq E\left[\Delta|\Delta \geq \frac{1}{\alpha_{\min}}[(\alpha_{\min} - \alpha)\pi + c]\right]. \tag{9}$$

This is the free-rider problem of Grossman and Hart (1980): small shareholders will demand a price P that incorporates the expected gains from intervention.[30] Note that the Grossman and Hart (1980) free-rider problem is different from the general free-rider problem of Section 5.1.1. The Grossman and Hart (1980) free-rider problem is specific to the case of acquiring additional shares to reach $\alpha_{\min}$, and concerns the higher price that selling shareholders demand.[31] The general free-rider problem arises from the blockholder's stake only giving her a partial share of the benefits of intervention. It thus applies to general monitoring actions, such as engaging with management, that do not require a minimum stake.

The blockholder will offer the minimum premium that satisfies (9), which we call $\pi^*(\alpha)$.[32] Let $\Delta(\alpha)$ denote the minimum value gain that will induce the blockholder to launch the bid. Shleifer and Vishny (1986) show that both $\pi^*(\alpha)$ and $\Delta(\alpha)$ are decreasing in α. The greater the initial block, the fewer shares that the blockholder will need to acquire (at a premium) to obtain $\alpha_{\min}$, thus attenuating the Grossman and Hart (1980) free-rider problem. Viewed another way, a larger stake increases the blockholder's share α of the gains Δ that can be enjoyed without paying any premium, which is the

[29] The authors show that the blockholder will never bid for more.

[30] The free-rider problem also exists in Admati et al. (1994) where the blockholder's trade is again observable. However, since the blockholder is risk-averse, she has incentives to trade even though she is unable to make informed trading profits.

[31] The earlier model of this section, where the blockholder acquires additional shares to obtain trading profits, could be said to feature a variant of the Grossman and Hart (1980) free-rider problem, in that the price paid incorporates the possibility that the blockholder will intervene.

[32] Technically, the Grossman and Perry (1986) refinement (for perfect sequential equilibria) ensures that the minimum premium is offered.

standard free-rider problem. Thus, the two free-rider problems are linked, even though they are conceptually different.[33]

Since α reduces the cost of obtaining control, it also lowers the minimum value gain $\Delta(\alpha)$ that induces the blockholder to obtain control. In turn, through expecting a lower average value gain, small shareholders now demand a lower premium $\pi(\alpha)$, which further lowers the required threshold $\Delta(\alpha)$. As a result, a higher α is associated with more frequent intervention, and thus higher firm value.

5.2 Exit

Many of the above forms of intervention are difficult to implement for some blockholders. First, certain blockholders' competitive advantage may lie in selecting stocks, rather than launching a proxy fight or providing strategic advice. Second, even with expertise, successful intervention can be difficult. The firm can use corporate resources to support the board's recommended slate of directors in a proxy fight or campaign against a takeover bid. Third, blockholders often hold small stakes. For example, Table 2 shows that most blockholders in the United States do not own a majority stake, although as discussed in Section 3, it is not clear what percentage stake gives a blockholder effective control. The theories in Section 5.1.1 show that low α reduces incentives to intervene. Even if the blockholder's incentives were sufficient (e.g., high Δ means that $\alpha\Delta$ is high even if α is low), a low stake reduces her voting power and thus her decision rights to implement any intervention.

In the context of voice theories, the prevalence of small blockholders poses a puzzle—if they cannot intervene, why do they exist, given that holding an undiversified stake is costly from a risk perspective? We now present the models of Admati and Pfleiderer (2009) and Edmans (2009) which show that, even if a blockholder cannot exercise voice, she can still govern through the alternative channel of exit—selling her shares and driving down the stock price, punishing the manager ex post and thus inducing him to maximize value ex ante. For example, despite his expertise in activism, Kirk Kerkorian was unable to persuade GM to accept bids by Renault and Nissan for stakes in the firm, and so sold his 14 million shares in November 2006. This governance mechanism applies predominantly to outside rather than inside blockholders. Note that the exit mechanism highlights the importance of alienability, one of the defining features of private property discussed in Section 2.

The action $a \in \{0, 1\}$ is now taken by a manager ("he"), who bears the cost c. Thus, $a = 0$ (1) refers to the manager shirking (working), c can refer either to the cost of effort or the private benefit from shirking, $\widehat{\tau} \equiv F(\widehat{c})$ is the market maker's conjecture of the

[33] Grossman and Hart (1980) consider $\alpha = 0$, where both free-rider problems are maximized (the blockholder obtains no share of monitoring gains on her initial stake, and she must pay the premium on the entire α_{min} shares).

manager's probability of working, and $\widehat{c}$ is its conjecture of his effort threshold. The manager's objective function is given by

$$\omega P + (1-\omega)\, V.$$

He places weight ω on the stock price and $(1-\omega)$ on fundamental value.[34]

At $t=2$, the blockholder observes the manager's action, and thus firm value V, w.p. γ. The blockholder is exogenously informed, perhaps because her large stake gives her superior access to information; we endogenize γ in Section 5.2.2. As in the model of Section 5.1.2, liquidity traders continue to trade $h=\{0,-\phi\}$ at $t=2$; we again specialize to $\beta=\frac{1}{2}$. Thus, the blockholder trades $b=\{0,-\phi\}$ at $t=2$, and sells if and only if she is informed and knows that $V=\underline{V}$. The market maker again observes individual orders but not trader identity. The prices are given by Bayes' rule as follows:

Q	P
$(0,0)$	$\underline{V}+\frac{\widehat{\tau}}{\widehat{\tau}+(1-\widehat{\tau})(1-\gamma)}\Delta=\underline{V}+\widehat{\chi}_5\Delta$
$(0,-\phi)$	$\underline{V}+\widehat{\tau}\Delta$
$(-\phi,-\phi)$	$\underline{V}$

(10)

where $\widehat{\chi}_5>\widehat{\tau}$. Note that $P(0,0)$ is increasing in γ. The blockholder boosts the stock price by exhibiting loyalty to the firm, i.e. not selling if the manager has worked. The power of loyalty relies on the threat of exit—the more informed the blockholder, the more likely she is to sell if the manager has shirked, and so the knowledge that she has not sold (via $Q=(0,0)$) is a stronger signal that he has worked.

The manager's threshold, c_5^*, is given by

$$c_5^* = (1-\omega)\,\Delta + \frac{1}{2}\omega\gamma\frac{F\left(c_5^*\right)}{F\left(c_5^*\right)+\left(1-F\left(c_5^*\right)\right)(1-\gamma)}\Delta. \tag{11}$$

The first term is the manager's fundamental motives to work, which equal the fundamental value gain Δ multiplied by his weight on fundamental value $(1-\omega)$. The second term is the manager's stock price incentives to work. The no-blockholder case is equivalent to $\gamma=0$, in which case this term is zero. The stock price is uninformative, and so

[34] The concern for the stock price can stem from a number of sources introduced in prior work. Examples include takeover threat (Stein, 1988), termination threat (Edmans, 2011), concern for managerial reputation (Narayanan, 1985; Scharfstein and Stein, 1990), the manager expecting to sell his own shares at $t=2$ (Stein, 1989), the manager considering the interests of shareholders who expect to sell early (Miller and Rock, 1985), or the firm intending to issue equity (Stein, 1996). Edmans et al. (2017d) also note that exit models can also apply to the trading of the firm's debt, in which case P refers to the debt price and the blockholder is a large debtholder. The manager may care about the short-term debt price, or the firm's reputation in debt markets, as it will affect the ease at which he can raise additional debt (e.g. Diamond, 1989).

the manager's incentives to work stem purely from the increase in fundamental value. With a blockholder, this term is positive and so the threshold is strictly higher. W.p. γ, the blockholder has information on firm value. By trading on this information, she makes prices more reflective of fundamental value. She thus increases the incentives of a manager, whose payoff is tied to the stock price, to take actions to improve fundamental value—indeed, for stable equilibria, c_5^* is increasing in γ. Note that, while an increase in c_5^* corresponds to an increase in governance, it also corresponds to a lower frequency of blockholder sales, since the blockholder only sells when the manager shirks. Thus, the blockholder governs more by the *threat* of exit rather than actual exit. The stronger the ex ante threat of exit, the more likely the manager is to work, reducing the need for ex post actual exit. As a result, the empirical frequency of actual exit need not be a good proxy for the strength of governance through exit.

Admati and Pfleiderer (2009) is a variant of the above model, but with $\gamma = 1$.[35] Their main innovation is to consider cases in which the blockholder may have not only private information on the manager's action a, but also the value created by working, Δ. They deliver the surprising result that the blockholder may sometimes worsen the agency problem.[36]

The exit governance mechanism applies to any managerial action. In the above model, this action is effort, as in Admati and Pfleiderer (2009). However, the action could also be an investment decision, which also improves firm value but—instead of being personally costly to the manager—increases the risk of delivering low short-term earnings. If there are also bad firms in the economy, which deliver low short-term earnings due to their low quality, low earnings rationally reduce the stock price. Edmans (2009) shows that the blockholder encourages the manager to invest in long-term projects. If a firm announces low earnings, the blockholder's signal informs her about the cause of low earnings. If they result from investment rather than low firm quality, she retains her stake, supporting the stock price. This expected "loyalty" encourages the manager to invest in the first place. Again, the power of loyalty depends on the threat of exit—the inference that the blockholder has not sold, despite low earnings, is a greater signal that low earnings are due to investment, rather than firm quality, if she could have easily exited instead.

Note that exit does not require the blockholder to be cognizant of the impact of her trading on the manager's behavior for it to be effective. The blockholder could

[35] In addition, the blockholder's ability to profit by selling on information stems from a liquidity shock, as in Section 5.1.3, rather than the existence of liquidity traders. However, as in the voice model, this makes little difference. Another difference is that the blockholder's private information is on the value created by effort Δ rather than the manager's cost of effort c, but this also does not change the broader economics.

[36] If all investors can observe whether the manager has worked, but only the blockholder can observe the value created by working, the blockholder will sell if the value increase is small. Such selling will reduce the stock price and the manager's incentive to work in the first place.

be motivated purely by the private desire to earn informed trading profits, but such self-interested actions have a social benefit by disciplining the manager. In addition, exit theories also highlight an important distinction between price efficiency and price informativeness, two terms often used synonymously. In any rational model, the price is always semi-strong-form efficient conditional upon an information set. However, in the presence of blockholders, this information set is richer, and so price informativeness (strong-form efficiency) is greater.

5.2.1 Factors affecting the strength of exit

Manager's stock price concerns. The manager's threshold depends on his sensitivity to the stock price ω. On the one hand, a higher sensitivity to the stock price (and thus lower sensitivity to fundamental value) reduces effort, since the stock price is only partially reflective of fundamental value. On the other hand, a higher sensitivity increases the potency of governance through exit. Appendix B shows that the sensitivity of c_5^* to γ is increasing in ω. When the manager is more concerned with the stock price, he is more concerned with the effect of blockholder selling if he shirks. In sum, while higher ω reduces effort, this reduction in effort is mitigated by the blockholder.[37]

Number of blockholders. As with the voice channel, the effectiveness of exit also depends on the number of blockholders N, in the opposite direction. While splitting a block weakens voice by exacerbating the free-rider problem, Edmans and Manso (2011) show that the same coordination difficulties strengthen exit. The threat of selling one's shares upon managerial misbehavior elicits effort ex ante only if it is dynamically consistent. Once the manager has taken his action, blockholders cannot change it and are only concerned with maximizing their trading profits. As in Kyle (1985), a single blockholder will strategically limit her order to hide her private information. In contrast, multiple blockholders trade aggressively, as in a Cournot oligopoly (see also Holden and Subrahmanyam, 1992). Such trading impounds more information into P, so that it more closely reflects V, and thus the manager's action.

Number of blocks. Turning to the number of firms in which the blockholder holds a stake n, Edmans et al. (2017d) show that it can increase governance through exit, for similar reasons to voice. Recall that owning multiple blocks gives the blockholder the choice of which firms to sell upon a liquidity shock. Thus, if the manager works and the shock is sufficiently small, he knows that the blockholder will retain her stake, even

[37] Empirically, Edmans et al. (2017a) and Edmans et al. (2017c) measure ω by the amount of equity that is scheduled to vest in a particular period. This amount is determined by equity grants made several years prior and plausibly independent of the current information environment.

if she suffers a shock. Thus, the stock price will be $\overline{V}$, maximizing the reward for working. If he shirks, the blockholder sells. As in the voice model, common ownership exacerbates adverse selection—a sale is inconsistent with a liquidity shock and fully revealing of shirking—and so the stock price will be $\underline{V}$. This maximizes the punishment for shirking.[38]

Blockholder's short-term concerns. Goldman and Strobl (2013) study a blockholder who may be forced to liquidate her shares before V is realized, similar to Section 5.1.3. To increase the price at which any future liquidation will occur, she has incentives to refrain from exit and to buy additional shares instead. Such price inflation is possible only if the firm's assets are complex, i.e., their value does not become publicly observable during the shareholder's tenure. Since the manager wishes to encourage inflation, he chooses excessive investment complexity.

In Dasgupta and Piacentino (2015), the blockholder's short-term concerns arise from a different source: she is a mutual fund who cares about attracting investor flows. She may not sell even if the manager has shirked, because selling would signal that her initial decision to buy the firm was misguided, thereby lowering investors' perceptions of her ability, and thus their inflows into the fund. Hence, the threat of exit is weaker. Song (2015) shows that the negative effect of career concerns on exit also applies in a multiple-blockholder structure. However, he shows that career concerns can strengthen voice by overcoming the free-rider problem typically associated with multiple blockholders. A reputation-conscious blockholder will not intervene, because doing so would signal that she invested in a low-quality stock. Knowing that she cannot rely on her fellow blockholders to intervene if they are reputation-conscious, a reputation-unconscious blockholder has greater incentives to engage in voice herself.

5.2.2 Endogenous information acquisition and the role of liquidity

Thus far, we have assumed that the blockholder is exogenously informed w.p. γ. Edmans (2009) endogenizes the blockholder's incentives to gather information and shows that it depends on liquidity ϕ. We now allow the blockholder to choose γ at a cost $\frac{1}{2g}\gamma^2$. We refer to the choice of γ as "investigation." The quantities $\widehat{\chi}_5$ and $\widehat{\tau}$ in (10) now depend on the market maker's conjecture for γ ($\widehat{\gamma}$) as well as $\widehat{\tau}$. If the blockholder is informed (w.p. γ), then w.p. $(1-\widehat{\tau})$ she learns that $V=\underline{V}$ and thus sells ϕ. If liquidity traders do not sell (w.p. $\frac{1}{2}$), she is camouflaged and receives $\underline{V}+\widehat{\tau}\Delta$ for shares worth $\underline{V}$. Her net

[38] This benefit of common ownership must be traded against any negative effect of being spread too thinly on the blockholder's incentives to acquire information, although Edmans et al. (2017d) show that being spread too thinly can sometimes *increase* information acquisition.

payoff to information is thus given by

$$\frac{1}{2}\gamma\left(1-\widehat{\tau}\right)\phi\widehat{\tau}\Delta-\frac{1}{2}g\gamma^{2}.$$

Taken as given $\widehat{c}$ and $\widehat{\gamma}$, this yields

$$\gamma^{*}=\frac{\phi\Delta}{2g}F\left(\widehat{c}\right)\left(1-F\left(\widehat{c}\right)\right). \tag{12}$$

Investigation is increasing in liquidity ϕ. Intuitively, greater liquidity trading means that the blockholder can sell more if informed, increasing her incentives to become informed. Imposing the equilibrium conditions $\widehat{c}=c_{5}^{*}$ and $\widehat{\gamma}=\gamma^{*}$, for stable equilibria, higher ϕ increases c_{5}^{*}. Working guarantees that the blockholder will not sell; that the blockholder has not sold is a greater signal that the manager has worked—and thus leads to a higher price—if she is more likely to be informed.

If information can be acquired, the question naturally arises as to why the blockholder has a special role in governance—why small shareholders cannot gather information, trade, and increase price informativeness. Indeed, in standard trading models that feature information acquisition, investigation incentives are independent of the initial stake α (as in (12)), because the ability to trade on information is independent of α. Edmans (2009) microfounds the link between block size, information acquisition incentives, and informed trading. He introduces a short-sale constraint, i.e. $b\leq\alpha$, and so a trader with a zero position has little incentive to acquire information, because if she receives a negative signal, she cannot trade on it. (The results are similar with non-trivial short-sale costs.) Edmans (2009) shows that, up to a point, the larger her stake, the more she can sell upon a negative signal and thus the greater the incentives to gather the signal. However, if α becomes too large, liquidity becomes a constraint: the blockholder will not sell her entire stake upon a negative signal because the price impact would be too high. Thus, in contrast to some voice theories, the optimal block size is finite, consistent with the prevalence of small blockholders in the United States.

As a technical note, for block size α to matter, the blockholder's trade can no longer be restricted to an exogenous amount ϕ but must be endogenously derived. Allowing trade to depend on block size may be particularly important in a blockholder trading model (rather than a general informed trading model). Solving for the optimal trading volume is highly complex: while the Kyle (1985) framework allows for trades to derived in closed form, it requires firm value to be normally distributed, but corporate finance models (such as ours) typically feature binary firm value as it substantially improves tractability. Edmans (2009) makes the methodological contribution of introducing exponential liquidity trader demand into a Kyle model to allow informed trades to be derived in closed form when firm value is discrete. It may be of use to other block-

holder theories (e.g. it is used by Song, 2015), and so we cover the methodology—as well as its limitations—in Appendix B.1.

In addition to the comparative statics in Section 5.2.1, the effectiveness of exit also depends on liquidity ν when information acquisition is endogenous. While voice theories have differing predictions, Edmans (2009) shows that liquidity enhances exit through three channels. First, holding private information constant, the blockholder trades more aggressively on her information. Second, holding block size constant, she gathers more private information because she can profit more from trading. Third, because liquidity allows her to sell more upon negative information, she acquires a greater initial block. One disadvantage of liquidity is that a given trade size has less impact on the stock price because the blockholder's informed trade is camouflaged by uninformed trades from liquidity investors.[39] However, the overall effect of liquidity on price informativeness—and thus governance—is positive.[40]

As discussed earlier, governance through exit can improve a variety of managerial actions, such as effort and long-term investment. The positive impact of liquidity on investment contrasts recent proposals to restrict short-term selling by investors, on the grounds that it will discourage long-term investment by firms. In Section 5.1.4 we discussed restrictions on liquidity that will hinder both buying and selling (such as transactions taxes); here, we consider restrictions on sales in particular. In July 2015, Hillary Clinton proposed a sharp increase in the capital gains tax rate for investments held for fewer than two years; one month previously, Toyota announced a new class of "long-term" shares, which give investors a higher payoff if they hold on to them for five years. The Florange law, passed in France in 2014, gives shares registered for more than two years double voting rights; a similar law was passed in Italy the same year but later reversed after protests by investors. More generally, Bolton and Samama (2013) provide conceptual arguments for "loyalty shares", which provide either financial rewards or greater voting rights for long-term shareholders.

However, the above model shows that short-term trading can encourage long-term investment, because it can incorporate long-term information into the stock price. The crux is that blockholders are unlikely to trade on short-term earnings as they are already in the stock price; instead, their large stakes give them incentives to gather information about long-term fundamental value V. As a result, they will sell firms

[39] In the Kyle (1985) model, block size is irrelevant (owing to the absence of short-sale constraints) and information is exogenous. Thus, the second and third benefits of liquidity do not apply. The first benefit of liquidity is fully offset by the disadvantage of liquidity, so price informativeness is independent of liquidity. However, with endogenous information acquisition, liquidity is unambiguously beneficial for price informativeness, even when block size is irrelevant for trading (see also Edmans and Manso, 2011).

[40] Admati and Pfleiderer (2009) do not feature liquidity traders, but transaction costs reduce the effectiveness of governance through exit. To the extent that illiquidity proxies for transaction costs, their model also predicts that liquidity improves governance.

that have achieved short-term earnings at the expense of long-run value, and retain their stakes in firms with short-term losses if the cause is long-run investment. What matters is not short-term or long-term *trading*, but whether the blockholder trades on short-term or long-term *information*. Short-term trading can be based on long-term information—and indeed is more likely to be so if the investor has a large stake. Thus, it is the size of the investor's stake α, rather than her holding period, that is most relevant. In addition to hindering trading one the stake has been acquired, illiquidity also deters block formation to begin with (Kahn and Winton, 1998; Maug, 1998; Edmans, 2009).

Similarly, some empirical studies classify blockholders into "short-term" or "long-term" based on their historic holding periods, and correlate them with short-term or long-term behavior by firms. We view such a classification as misleading for two reasons. First, as discussed above, short-term trading can be based on long-term information and lead to long-term behavior. Second, blockholders are not born short-term or long-term; their holding period is an endogenous choice that depends, among other things, on managerial performance. A blockholder might sell one firm in the short-term, because its manager is prioritizing short-term profits over long-term investment, but hold another firm for the long-term, because it is doing the opposite. The holding period depends, among other things, on firm performance, rather than being an exogenous characteristic of the blockholder.

Separately, Faure-Grimaud and Gromb (2004) have a similar model to above, but where the blockholder, rather than the manager, takes the action (i.e. is a model of voice). The parameter ω is now the possibility that the blockholder suffers a liquidity shock that forces her to sell at $t = 2$ before her action has been fully revealed at $t = 3$—i.e. analogous to β in Section 5.1.3. Unlike the model of Section 5.1.3, her liquidity shock, as well as her trade, are observable to the market maker. As a result, the blockholder can no longer profit by voluntarily selling on information—she only sells if forced to due to the shock. Faure-Grimaud and Gromb thus introduce a separate informed trader who can trade discretionarily—a speculator (such as a hedge fund) who, w.p. γ, observes V at $t = 2$. As in the model of Section 5.1.2, liquidity traders continue to trade $h = \{0, -\phi\}$ at $t = 2$. Thus, their model is similar to this section, but with the manager replaced by the blockholder, and the blockholder replaced by the speculator. They show that greater liquidity (higher ϕ) encourages the speculator to gather information, thus increasing price informativeness. This in turn encourages the blockholder to intervene because, if she suffers a liquidity shock, the sale price will reflect her intervention to a greater extent—similar to the positive effect of liquidity on the manager's effort in the above model.

Finally, Fos and Kahn (2016) consider a standard exit framework, but also add voice. If the manager shirks, the blockholder can exit; alternatively, she can intervene to both restore some of the firm value erosion and reduce the manager's private benefit from

shirking. Just as the threat of exit, rather than only actual exit, can impose discipline on the manager, they show that the threat of voice can do so as well. Specifically, if the blockholder has a large stake or a low cost of intervention, the manager knows that intervention is likely if he shirks. Thus, he is less likely to shirk, and so less intervention is necessary in equilibrium. Just as with exit, fewer actual interventions can actually signal more effective governance through voice.

5.2.3 Additional trading theories

We have used the term "exit" to refer specifically to blockholder trading that improves governance by reflecting the manager's actions in the stock price to a greater degree. Two other theories show how blockholder trading can exert governance but through a different mechanism. Levit (2017) combines both exit and voice. Differing from prior theories, voice involves the blockholder communicating private information to guide the manager's action, in a cheap-talk framework. However, the manager may pursue private benefits rather than following the blockholder's recommendation. The option to exit strengthens voice. If the blockholder can exit when the manager pursues private benefits, she becomes less misaligned with the manager, and so he is more willing to follow her recommendation. Thus, exit improves governance even if the manager is unconcerned with the stock price.

Khanna and Mathews (2012) build on Goldstein and Guembel (2008), where an uninformed speculator (with an initial stake of zero) may manipulate the stock price downward by short selling. Such sales will reduce the stock price, fooling the manager into thinking that his investment opportunities are poor and causing him to disinvest incorrectly; the speculator's short position benefits from inducing this incorrect action. Khanna and Mathews (2012) show that a blockholder with a sufficient stake will have incentives to buy to counteract the speculator's bear raid. Even if such purchases incur trading losses, these are outweighed by the benefits of inducing the correct investment decision if α is sufficiently high. Interestingly, an increase in the blockholder's private information may weaken governance, as it may encourage her to trade on her information to maximize trading profits, rather than counteract the bear raid.

5.3 Costs of blockholders

In addition to creating value through governing through voice or exit, blockholders can also reduce firm value (over and above any personal cost of monitoring and information acquisition). In Burkart et al. (1997), as in other voice theories, intervention is ex post desirable because it ensures that the value-maximizing project is taken. However, the ex ante threat of intervention reduces the manager's incentive to exert effort to find out about potential projects, because he fears that his desired project (which maximizes his private benefits rather than firm value) will not be implemented. Thus, even in an intervention model, the optimal block size can be finite. A similar overmonitoring

result arises in Pagano and Röell (1998), where a founding owner-manager chooses shareholder structure when going public. He wishes to maximize firm value, plus his private benefits, minus the monitoring costs borne by the new blockholder (as she will demand a price discount to offset these costs). However, when making her monitoring decision, the blockholder ignores the founder's private benefits. Thus, the founder again chooses a lower block size.[41]

In Bolton and von Thadden (1998), as in Maug (1998) and Edmans (2009), a larger block α is costly because it reduces free float $1-\alpha$ and thus liquidity. However, the reduction in liquidity is costly for different reasons than in Maug (1998) and Edmans (2009), since the blockholder has no private information and is thus unable to engage in informed trading. Instead, liquidity matters because the firm's shareholders may suffer a liquidity shock requiring them to sell their shares early. Bolton and von Thadden (1998) assume that only the firm's existing shareholders are willing to buy from selling shareholders. (This can be motivated by limited information, e.g. Merton, 1987.) Thus, a larger block reduces the number of small shareholders who might be able to provide liquidity in the event of a shock, which in turn lowers the price that investors are willing to pay to buy the shares to begin with.

The above costs exist even though the blockholder maximizes firm value ex post. Moreover, she can lower firm value if she pursues her own private benefits. Note that private benefits need not be at the expense of either other shareholders, such as prestige from owning a stake in a sports team, or production synergies with another company controlled by the blockholder.[42] However, some private benefits may reduce firm value. First, the blockholder may tunnel corporate resources away from the firm, for example, through inducing it to engage in business relationships with her other companies at unfavorable terms. Second, her voting decisions may be conflicted: a labor union pension fund may vote for labor-friendly directors (Agrawal, 2012), or a mutual fund may side with underperforming management to preserve business ties (Davis and Kim, 2007). Third, the blockholder's large stakes may cause her to be concerned about idiosyncratic risk (unlike diversified shareholders) and induce the firm to forgo risky, value-creating investments (Dhillon and Rossetto, 2015).

Theorists have modeled the implications of private benefit extraction for blockholder structure. Zwiebel (1995) shows that the presence of a majority investor deters other blockholders from forming, as she will prevent them from obtaining private ben-

[41] Unlike in Burkart et al. (1997), in Pagano and Roell (1998) firm value is monotonically increasing in α. Instead, a finite α arises because the founder is maximizing not firm value, but the sum of firm value and private benefits.

[42] Barclay and Holderness (1992) find that block trades that occur at a premium to the post-announcement exchange price (thus implying private benefits of control) also lead to an increase in the stock price. This result suggests that private benefits either are not at the expense of shareholders or are outweighed by the governance benefits.

efits. Thus, large shareholders "create their own space." In Zwiebel (1995), shareholder structure is privately chosen by the blockholders, but in Bennedsen and Wolfenzon (2000), it is chosen by a founding entrepreneur when going public. The founder brings in outside blockholders to dilute his own power and commit to extracting few private benefits, thus allowing him to sell his equity at a higher price. In Dhillon and Rossetto (2015), the initial owner brings in outside blockholders who have stakes smaller than his, and thus will vote for risky, value-creating projects. This in turn increases the price that diversified shareholders are willing to pay for their stake.

5.4 Summary

To summarize, the theoretical literature finds the following:

- A large stake generally improves governance through both voice and exit. In voice models, it overcomes the free-rider problem by increasing the blockholder's incentives to intervene; it also gives her more control rights (e.g. through votes) and thus ability to implement any intervention. In exit models, it increases the blockholder's incentive to gather information and also the amount she can sell if the information turns out to be negative, making the threat of exit more powerful.
- Stock liquidity generally improves governance through both voice and exit. For voice, while it increases the blockholder's ability to sell her stake, rather than monitor, it also increases her ability to buy additional shares at a price that does not incorporate the benefits of intervention, thus increasing intervention incentives. Since blockholders choose to hold small initial stakes, the ability to buy additional shares is more important than the ability to sell her existing holding. For exit, it increases the blockholder's ability to profit by trading on information, and thus her incentive to gather information in the first place. In both models, stock liquidity incentivizes initial block formation. Overall, even though liquidity may encourage "short-term" trading, such trading can support long-term investment.
- Splitting a block between multiple blockholders creates free-rider problems. A greater free-rider problem in monitoring weakens governance through voice, by reducing an individual blockholder's stake and thus share of the gains from intervention. A greater free-rider problem in trading strengthens governance through exit, by increasing competition in trading on information and leading to more information being revealed in prices.
- Splitting a single blockholder's portfolio among multiple firms can weaken both voice and exit by reducing her stake in a given firm. On the other hand, it can strengthen both voice and exit because the price impact of selling a given firm, when the blockholder had other firms that she could have sold instead, is stronger. This both reduces her incentive to cut-and-run (under voice) and increases the threat of selling (under exit).

- Governance through exit is also stronger if the manager has greater concerns for the short-term stock price, and generally weaker if the blockholder has greater concerns for her short-term reputation.
- Blockholders can worsen firm value through a number of channels—they can reduce free-float and thus liquidity, they can over-monitor and erode managerial initiative, and they may pursue their own private benefits at the expense of minority shareholders.

6. THE EVIDENCE

6.1 Empirical strategies with investigations of blockholders

Before turning to the evidence on the relationship between large shareholders and firm characteristics, we discuss strategies for empirical blockholder studies.

The theoretical literature generates two broad sets of empirical predictions about blockholders. Let F denote a firm characteristic, such as profitability, and B, either a blockholder action (for example, the decision to intervene in management or trade a block) or a measure of blockholdings. For the latter, empiricists have used a variety of measures, including the presence of a blockholder, the number of blockholders, the ownership of the largest blockholder, or the total ownership of all blockholders. The first broad set of implications ($I1$) involves the effect of F on B: the firm characteristics that determine the presence, stake size, or actions of a blockholder. Examples include stock liquidity or the magnitude of agency problems. The second set of implications ($I2$) involves the effect of B on F: the impact of a blockholder's presence, stake size, or actions on firm characteristics, such as profitability, firm value, executive compensation, or investment. Naturally, both $I1$ and $I2$ may be moderated by intervening variables. For example, liquidity or the manager's wealth-performance sensitivity may affect a blockholder's ability to impact firm outcomes. Moreover, the greater the likelihood that a blockholder can affect firm outcomes ($I2$), the greater the likelihood that a block may form in the first place ($I1$).

The relationship between blockholders and firms is thus two-way: ownership concentration can be on either side of a regression equation, and in some papers is in fact on different sides of different regressions. This two-way relationship highlights the biggest challenge in testing any theory involving blockholders: Identifying causal effects is difficult and can never be conclusive.

In addition to simultaneity (two-way causality), another major problem is that omitted variables may jointly affect both F and B, since both firm characteristics and ownership concentration are complicated phenomena which likely have multiple causes. Some of these causes are both known and measurable, so we can control for them in empirical analyses. For instance, Section 4 showed that both firm size and firm age appear to influence ownership concentration. However, many of these determinants

are unknown; even if known, they may be difficult to measure (such as management quality). If any of these omitted factors are correlated with both F and B, the resulting coefficient for the independent variable will be biased. Because we do not know what these omitted variables are, we do not even know the direction of the bias. This is a fundamental problem with any observational study and is not limited to studies of blockholders.

The key to addressing simultaneity or omitted variables is to find exogenous variation in the independent variable of interest, in our case either block ownership B or firm characteristics F. Several strategies have been attempted to achieve identification and thus gain a deeper understanding about the determinants and consequences of large shareholders. None is watertight, but we put more faith in some of these strategies than in others.

Instrumental variables. The first approach is to use instrumental variables to identify causation. To be a valid instrument, it must both be relevant (be correlated with the independent variable of interest) and satisfy the exclusion restriction (be uncorrelated with the error term). While the relevance criterion can be tested statistically, the exclusion restriction cannot be because the error term is not observable (Roberts and Whited, 2013). Instead, researchers address the exclusion restriction through economic logic—is it plausible that the instrument affects the dependent variable only through the independent variable of interest and not directly or through any omitted variable? However, it is unlikely that this restriction is satisfied in a blockholder setting (although it may be in other corporate finance settings). Firm characteristics are affected by many factors, not just blockholders; conversely, blockholders are affected by many factors, not just the firm characteristic being studied. Importantly, many of these factors are likely unobservable and thus cannot be controlled for. Why would an instrumental variable have an impact through only the variable that happens to be interest to the researcher? It is possible but unlikely.

One might be tempted to use lagged variables to analyze the relationship between F (B) and lagged B (F), but this will not eliminate reverse causality. For example, changes in blockholdings may rationally occur in anticipation of future changes in F, rather than being their cause. Lagged variables also will not deal with omitted variables that are persistent and impact both current B and future F.

Linking current firm characteristics to the level of future blockholdings may likewise not identify causality from these characteristics to blockholdings: Current blockholdings may cause current firm characteristics and may thus also cause future blockholdings if they are persistent. In contrast, it is less likely (although far from impossible) that a link between firm characteristics and future changes in blockholdings (i.e., blockholder entry or exit) or actions (e.g., intervention) result from reverse causality, because such

events are typically difficult to predict and non-persistent. There is still the problem that omitted variables may drive both firm characteristics and the event in question.

For all of these reasons, we have never seen a credible instrumental variable for blockholders in a static or non-experimental setting. This helps explain why (static) instrumental variables are infrequent in empirical investigations of blockholders.[43]

Natural experiments. A second approach is to use natural experiments. The goal (in our case) is to identify an exogenous event that affects some blockholders or firms (the treated group) but not others (the control group)—thus, the event cannot be a broad-based one that affects all firms (such as certain accounting changes). Even if the event is exogenous, causal identification also requires firms or blockholders to be randomly assigned between treated and control groups, and the event to be unanticipated, which is sometimes not the case for law or accounting changes. Hennessy and Strebulaev (2016) show that the sign and not just the magnitude of the effect can be incorrectly estimated if the event is anticipated; moreover, the bias depends not only on the extent to which the event is anticipated but also on the probability distribution of events.

An example of a desirable natural experiment would be if a court unexpectedly rules that blocks in excess of a certain level would no longer be permitted in some firms (treated) but allowed to continue in other firms (control). Such an event would allow a researcher to conduct an event study of the effect of the court's ruling on firm value, or a difference-in-differences analysis of how a firm variable (e.g. profitability) changes for the control firms compared with the treated firms after the ruling.

The practical problem is that such shocks are exceedingly rare. Atanasov and Black (2016) reviewed over 800 recent papers on corporate governance. Among the terms they searched for were "ownership", "controlling blockholder", "minority shareholder", and "activism." They found only 75 natural experiments, 63 of which were based on legal shocks.[44] The most commonly used shock is Sarbanes–Oxley (20 papers). Other shocks include Korean governance reforms, U.S. dividend tax reforms, and election outcomes. None of these shocks seem immediately applicable to blockholders, and none are used to study outside blockholders.

Our point is that it would be powerful to use natural experiments (or instruments, as considered in the previous section) to study blockholders, but we simply do not

[43] The closest setting to blockholders for which we have seen a valid instrument is Bennedsen et al. (2007), who use the gender of a CEO's first-born child to instrument for CEO succession—i.e. inside blockholders—in Danish family firms. However, Kahn and Whited (2016) explain that the validity of the Bennedsen et al. (2007) conclusions depend crucially on two implicit assumptions—that female CEOs are no different than male CEOs, and that Danish families prefer males to lead firms rather than females.

[44] Shocks are predicated on the subjects not choosing whether they are treated. With individuals as the subject of study, this often necessitates some type of legal change. However, a potential issue is that legal changes are often anticipated.

know of any. We encourage researchers to be on the lookout for such shocks, but to insist on shock-based identification would lead to a dramatic decline in research on blockholders. The methodological servant would become the empirical master. Note that this concern does not necessarily apply to other empirical corporate finance topics (outside of blockholders), where natural experiments and instruments may be more readily available.

Shoe-leather empirics. An alternative is to follow the approach recommended by the distinguished statistician David Freedman—shoe-leather empirics. This approach involves several features. First, it "relies on intimate knowledge of the subject matter to develop meticulous research designs and eliminate rival explanations."[45] It also uses a variety of empirical approaches and considers a wide variety of situations, rather than relying on just one result from one statistical technique. The intuition is that the more varied situations an empirical regularity holds, the less likely it is that it is proxying for an omitted variable. As Freedman (1991, p. 306) argues, the goal is "have we identified an empirical regularity that has some degree of invariance." Thus, finding one source of exogenous variation may not be sufficient for identification. Even if an instrument or natural experiment is internally valid, the external validity may be limited. For example, as Deaton (2010) and Heckman (2010) argue, even a valid instrument for blockholders would only identify the causal effect of the "compliers" (the subset of blockholders that respond to the instrument) on firm policies, not of blockholders in general.

Shoe-leather empirics also highlights that exogenous variation may not be necessary for identification. Researchers can instead use basic economics, institutional knowledge, and conventional statistical investigations to test alternative explanations—that is, posit reasonable alternative hypothesis and investigate whether they are consistent with the evidence and logic. For example, Brav et al. (2008) show that the filing of a 13D by activist hedge funds is associated with subsequent improvements in firm value and operating performance. A barrier to causal interpretation (that is, the hedge funds at least partially caused the increases in value and performance) is that a 13D filing is endogenous: the activist may have acquired the stake because he predicted the improvements. The authors address this alternative explanation by showing that the improvements are stronger when the hedge fund employs hostile tactics; the improvements remain significant even when the hedge fund owned a significant position prior to the 13D (in which case the activist did not change stake much); and the market response to hedge fund exit is significantly lower if the fund had not carried out its stated agenda. In addition

[45] Collier et al. (2010). This comes from the introduction to a collection of essays in honor of David Freedman. The authors continue in their introduction, "When Freedman first enunciated this position, he was met with skepticism, in part because it was hard to believe that a mathematical statistician of his stature would favor 'low-tech' approaches. But the tide is turning." We recommend this collection and the work of David Freedman.

to cross-sectional tests, the authors directly test the alternative explanation by showing that hedge funds do not sell immediately after the stock price increase resulting from a 13D filing, as the alternative explanation would predict. Although none of these tests is individually able to rule out all possible alternative explanations, taken together they narrow the range of plausible alternative explanations. In sum, in addition to natural experiments and instruments, economic logic and direct tests of alternative explanations are ways to address endogeneity concerns.

In addition to endogeneity, another challenge with empirical studies of large shareholders is that blockholder governance can occur through threats, not just through actions. For example, in the voice model of Shleifer and Vishny (1986), jawboning may involve writing private letters to management; in exit theories, the mere threat that a blockholder may sell her shares may be sufficient to induce the manager to change. The problem is that such jawboning or threats typically will be unobservable to outsiders and are thus not amenable to traditional empirical analyses. One alternative is to survey blockholders on their governance mechanisms (McCahery et al., 2016). Although a survey cannot identify the effect of these mechanisms on firm characteristics, it can shed light on which channels blockholders actually employ. Another alternative is to obtain non-public information on blockholder actions, such as private letters to management (Carleton et al., 1998; Becht et al., 2009).

Case studies, which often use institutional knowledge and a broad array of evidence albeit on one firm or a small group of firms, can also provide valuable insights and complement more traditional analyses—for example, by providing direct evidence of specific blockholder actions. One example is Holderness and Sheehan (1991) who study the governance in a corporation where the CEO owns a majority block (Ted Turner of Turner Broadcasting). They identify several organizational innovations that limit the majority owner from acting opportunistically toward minority shareholders. For instance, the firm's articles of incorporation were changed to require supermajority approval of major corporate decisions by a reconstituted board of directors which included named representatives of certain major (albeit minority) outside blockholders. Carleton et al. (1998), Becht et al. (2009), and Dimson et al. (2015) conduct clinical studies, each focusing on one large investor, which allows them to gain private information on that investor's engagement rather than having to rely on public data sources as with large-scale studies. Given that a significant amount of governance is unobservable, this is an important advantage that must be balanced against the typical preference for large-scale datasets.

We also believe it is important to examine blockholders in a wide variety of settings. Some claim that this often merely replicates existing findings. We disagree for two reasons. First, we do not know what the key omitted variables are, but it is reasonable that they change with the setting. Religion may be such a variable. To cite only one possibility, blockholders who are religious and adhere to the Golden Rule ("Do unto

others as you would have them do unto you") may be less likely to expropriate corporate wealth than other blockholders. Given that both the type and intensity of religion vary across countries, if one identifies a common empirical regularity involving blockholders across diverse countries, it is unlikely that the omitted variable of religion is driving the result. In such a case, one has found what Freedman calls "an empirical regularity that has some degree of invariance." The wider the range of a finding, the less likely it is driven by a specific omitted variable. Second, blockholders are heterogeneous and institutional forces are different across countries. Thus, a finding for one blockholder type in one country need not automatically extend to other blockholder types or other countries. Showing that previously-documented results hold in different settings can be a major contribution, as such a finding cannot be extrapolated from prior research. Moreover, showing that previously-documented results do not hold in a new setting does not mean that the original finding was incorrect, but highlights that it depends on the institutional context.

Relatedly, we encourage empiricists to account for blockholder heterogeneity. Indeed, comparative statics analyses from theory models gives predictions on the sources of heterogeneity that may be relevant. For example, Edmans and Manso (2011) predict that blockholders with forward-looking expertise about optimal future investments or strategic choices (such as activists or venture capitalists) will be more effective at voice than exit, and take large stakes; blockholders with backward-looking expertise about the firm's current value based on past managerial decisions (such as mutual funds) will be more effective at exit, and take small stakes. Dasgupta and Piacentino (2015) show that a blockholder's fixed and incentive fees, which are higher in hedge funds than mutual funds, affect their effectiveness in exit—and potentially also voice if there are complementarities.

Heterogeneity comes in several dimensions. One is blockholder type, such as institutions (e.g. hedge funds, mutual funds, public and private pension funds, and non-profit foundations), individuals, families, and corporations. This heterogeneity matters because blockholders may differ in their expertise and preferred governance mechanism (e.g. voice vs. exit), conflicts of interest, and horizons. For example, Edmans et al. (2013) argue that hedge fund activists are more likely to engage in governance through voice than non-hedge fund activists due to their high performance fees, few regulatory constraints (e.g. mutual fund diversification requirements and pension fund "prudent man" rules), and lack of business ties to the firm. They find that low liquidity is more likely to induce hedge funds than other activists to choice voice over exit (conditional on already holding a block). Blockholders can also be insiders or outsiders; if insiders, they can be managers, directors, or both. This heterogeneity matters as the latter are more likely to engage in governance. Blockholders can be domestic or foreign; this matters since foreign blockholders from developed countries may import superior governance practices into target firms in emerging countries (Aggrawal et al., 2011). How

a blockholder obtains her block can also be important. She may have held the block since before the firm went public; accumulated it over time through small open-market purchases; or acquired it intact through a block trade, private placement, or as payment in a stock-based acquisition of another firm. For example, if a blockholder acquired her block at a substantial discount to the exchange price through a private placement (as is often the case), she may be reluctant to challenge management down the road. Barclay et al. (2007) present evidence suggesting this is often the case.

In addition to affecting the consequences of blockholders, heterogeneity also matters because it affects the determinants of blockholders. Hadlock and Schwartz-Ziv (2017) show that these determinants vary significantly across blockholder type—for example, stock liquidity is positively associated with the presence of financial and strategic blockholders, but insignificantly or negatively associated with other blockholder types.

To summarize, our recommendations include the following:

- Acknowledge that blockholders are endogenous. Valid instruments or natural experiments for blockholders are at best rare. Rather than use a tenuous instrument, avoid this avenue except in the rare case in which the exclusion restriction is convincingly satisfied through economic logic. Address endogeneity instead by directly testing alternative explanations.
- Recognize that clean identification is not necessary to make a significant contribution to our understanding of the determinants and consequences of blockholders. Descriptive analyses can be highly illuminating. Studies should be driven by the research question, not the identification strategy or data set—a narrow focus on identification may lead to a focus on identifying narrow questions.
- Understand the institutional details. This is especially true with legal constraints on managers or large shareholders. For instance, most state corporation laws require that any distributions to shareholders be strictly pro rata to shareholders in accordance with their ownership stakes. State laws also generally prohibit managers from favoring some shareholders over other shareholders. Such laws have important implications for studies of blockholder expropriation of minority shareholders, since they mean that such expropriation is more likely in some regions but not others, but are often overlooked.
- Take into account blockholder heterogeneity along several dimensions.
- Do not be tied to any particular methodology: regressions, case studies, surveys, event studies, interviews with blockholders or the firms they govern all have their place depending on the question and the available information.
- Search for robust empirical regularities. If a regularity is found across data bases, specifications, and countries, then alternative explanations become less plausible.
- What ultimately matters is the preponderance of the evidence rather than one narrow finding.

6.2 Evidence on blockholders and general governance

Perhaps the most important evidence about blockholders is their wide prevalence. If blockholders did not add value in the broadest sense of the term, then from a Darwinist perspective they should be rare and dispersed ownership should be the norm. Instead the vast majority of public corporations around the world have large shareholders (see Section 4).

A second piece of evidence is the importance of blockholder identity. If blockholders did not engage in governance, firm value would be unaffected by who owns a particular block. Barclay and Holderness (1991) find that trades of large blocks between investors (insiders or outsiders) lead to a 16% increase in market value. Holderness and Sheehan (1988) show that trades of majority blocks owned by insiders or outsiders similarly raise stock prices. In block trades the concentration of ownership does not change but the identity of the blockholder does. It appears that block trades transfer ownership to superior monitors through either voice or exit.

These broad patterns are consistent with the fundamental property rights discussed earlier in the paper. With private property, owners must to some extent engage in governance. With private property, there is a collocation of wealth effects and decision rights. This gives the owners both the legal power and the incentives to govern. The complete absence of governance is likely to lead to the destruction of corporate value and hence is unlikely to survive in the long run.

6.2.1 Blockholders and firm value

Researchers have extensively studied the relation between ownership concentration and firm value. Before turning to the specific findings, we note that some commentators believe that these inquiries are fundamentally misplaced. Most notably, Demsetz and Lehn (1985) argue that block ownership (in their case managerial ownership) is likely to impact firm value, but also that the value-maximizing ownership concentration will vary by firm. If this were not the case, all firms would have the same concentration or at least be converging on the same ownership concentration. Neither proposition is supported by the evidence. Demsetz and Lehn also argue that there should be no relationship when controlling for the joint determinants of blockholdings and firm value. However, because blockholdings are chosen by the blockholder rather than the firm, the empirically-observed block size is likely to be the one that maximizes the blockholder's payoff rather than firm value.

A second conceptual issue involves the definition of firm value. Existing papers almost without exception use the market value of equity, which is referred to by Holderness (2003) as "exchange value". This measures only the value of the firm available to minority outside shareholders and ignores any private benefits to managers who are shareholders and also to blockholders. The latter is net of monitoring costs, but includes any informed trading profits (see Section 5) that are at the expense of investors

who are not currently shareholders (e.g. liquidity traders who they may sell to in the future). Given that Barclay and Holderness (1989) document that private benefits average 4.3% of the total value of equity (median 1.2%) with a maximum of 56.2%, this omission may be significant if one is trying to measure the impact of block ownership on total firm value.[46] Total firm value, in turn, is closely related to total surplus, which measures the value of the firm to society. This includes its value to all shareholders, plus any rents accruing to other stakeholders (e.g. private benefits accruing to employees who are not shareholders). Both total surplus and exchange value are valid measures in different circumstances. Studying the former allows analysis of whether blockholders create social welfare; the latter analyzes whether blockholders benefit minority shareholders—does the value of monitoring accruing to all shareholders exceed any private benefits that are at minority shareholders' expense?

All of the papers in this section identify correlations and do not claim causality. In the first paper on this topic, Morck et al. (1988) find a nonlinear relation with Tobin's Q first increasing with the stock ownership of the board of directors, then declining from 5% to 25%, and finally slightly increasing. Holderness and Sheehan (1988) find that, compared with matched, diffusely-held firms, firms with majority blockholders exhibit insignificant differences in Tobin's Q. McConnell and Servaes (1990) and Mehran (1995) document no correlation between outside block ownership and firm value; Mehran (1995) also finds no link with return-on-assets. Demsetz and Villalonga (2001) summarize much of the subsequent literature involving United States firms and note the inconsistency in results among the studies.

Wruck (1989) finds that increases in ownership concentration resulting from private sales of equity, which are unlikely to be motivated by information because the purchaser undertakes due diligence, lead to positive (negative) announcement returns for low (moderate) levels of initial concentration. This result is consistent with the concave relationship between block size and firm value predicted by the voice theory of Burkart et al. (1997) and the exit theory of Edmans (2009).

Studying long- rather than short-run returns, Cremers and Nair (2005) find that a portfolio that buys (sells) firms with the highest (lowest) level of takeover vulnerability generates an annualized return of 10–15% only when public pension fund ownership is also high. This finding suggests that outside (blockholder) and internal governance are complements and that this relationship is not immediately capitalized by the market.

Moving to international evidence on the correlation between outside block ownership and firm value, Lins (2003) studies 18 emerging markets and finds that Tobin's Q is positively related to the fraction of decision rights held by non-management blockholders in aggregate. This correlation is particularly strong in countries with low investor

[46] If the block is created by the founding entrepreneur upon an IPO (e.g. in Stoughton and Zechner, 1998), total firm value is also the relevant measure of the wealth to the founding entrepreneur. He will be able to sell the block at a premium that incorporates the private benefits of control.

protection, in which blockholder governance is likely more important. Claessens et al. (2002) analyze eight East Asian economies. When the largest blockholder is a widely held corporation or financial institution (and, thus, an outsider), the market-to-book ratio is increasing in her cash flow ownership and independent of the wedge between her decision rights and cash flow ownership. In contrast, when the largest blockholder is a family or the state, valuations are negatively-related to this wedge. These results suggest that the private benefits of control are low for outside blockholders, relative to insiders.

Turning to the predictions of multiple blockholder theories, Konijn et al. (2011) find a negative correlation between outside blockholder dispersion (proxied by the Herfindahl index) and firm value. Their results support single-blockholder models in which firm value is increasing in the ownership of the largest blockholder. However, their results are inconsistent with the model of Edmans and Manso (2011) in which blockholder dispersion is desirable (up to a point) in situations where exit is an effective governance mechanism.

6.2.2 Blockholders and firm outcomes

Turning from firm value to specific firm outcomes, Holderness and Sheehan (1988) find that, compared to control firms, companies with majority blockholders exhibit insignificant differences in investment, accounting returns, leverage, and the frequency of corporate control transactions. Chhaochharia and Grinstein (2009) find that the board independence requirements of the new NYSE and Nasdaq listing rules, approved by the SEC in 2009, reduced CEO pay. This reduction was smaller for firms with an outside blockholder or high institutional ownership concentration, suggesting that blockholders monitor the level of executive compensation. Core et al. (1999) similarly find that outside blockholders are associated with lower pay levels. Chen et al. (2007) find that independent long-term institutional investors are associated with superior M&A performance and the withdrawal of bad M&A bids, particularly if they have a large stake, but institutions that have business ties, or have held the stock for less than one year, are not.

Cronqvist and Fahlenbrach (2009) disaggregate the data and study the importance of blockholder identity by identifying fixed effects for different classes of outside blockholders. They find significant blockholder fixed effects for various firm variables, such as investment and financial policies, accounting performance, and executive compensation. The effects are strongest for activists, pension funds, and corporations and weakest for banks, money managers, and insurance companies. Because increases in, for example, investment or leverage may be either good or bad for firm value, these results can be consistent with voice, exit, or the costs of blockholders.

Although the above results could stem from blockholders either causing a change in corporate policies through exerting governance or selecting firms based on expected

future changes in corporate policies, Becker et al. (2011) use the density of wealthy individuals in a firm's headquarter state as an instrument for individual blockholders. This assumes that the density of wealthy individuals in a firm's headquarter state impacts the variables of interest, such as firm performance or corporate payouts, only through the individual blockholders at a firm and not through any other means. Blockholders increase firm performance and shareholder payouts, and they reduce investment, cash holdings, executive pay, and liquidity.[47]

Several papers use inclusion in the Russell 2000 vs. Russell 1000 as an instrument for ownership structure, although Appel et al. (2016a) discuss potential methodological issues with particular implementations of this strategy.[48] Crane et al. (2016) use the index in which a firm is included as an instrument for institutional ownership. Their identification arises from the largest firms of the Russell 2000 having greater weights within their index than the smallest firms of the Russell 1000, and they find that the former have higher institutional ownership. Instrumented institutional ownership leads to higher dividend payments, share repurchases and operating performance, and lower CEO pay. The results are not driven by activist investors, providing evidence for governance through exit. Mullins (2014) uses the different methodology of a fuzzy regression discontinuity design. He uses the proprietary market capitalization measure, that Russell uses to determine index assignment, as an instrument for index inclusion. Under this approach, he finds that inclusion in the Russell 1000 (rather than Russell 2000) is associated with higher institutional ownership concentration, higher CEO pay-performance sensitivity, a higher likelihood of subsequent CEO turnover, and lower capital expenditures.

Another identification strategy uses the 2003 mutual fund scandal, where twenty mutual fund families were prosecuted for late trading; the prosecutions were, at least to some extent, random (Zitzewitz, 2006). This caused the funds to suffer large outflows and thus sell their positions. Crane et al. (2017) use this as a shock to institutional investor "cliques"—groups of investors that are part of a network due to common positions in many stocks, which in turn can facilitate information flows and co-ordination. They show that such cliques strengthen governance through voice, by leading to investors voting in a co-ordinated manner, but weaken governance through exit, since they trade less aggressively when selling stocks. These results are consistent with the model of Edmans and Manso (2011).

[47] The negative impact on liquidity is consistent with the negative correlations between ownership concentration and liquidity found by Heflin and Shaw (2000) and Rubin (2007).

[48] These issues predominantly arise from using the actual rankings that Russell assigns to stock within each index, but these rankings are based on Russell's own calculation of market capitalization, which adjusts for free float. Thus, these rankings are endogenously affected by factors such as stock liquidity and inside ownership, which may affect the dependent variable of interest.

Some papers find a negative correlation between blockholders and myopic actions. These results are consistent with the Edmans (2009) model of exit and investment, but they could also be consistent with a voice theory in which myopia is the main agency problem. Dechow et al. (1996) and Farber (2005) find that firms that fraudulently manipulate earnings have lower outside blockholdings. Burns et al. (2010) study institutional ownership (rather than blockholdings) using 13F filings and find that institutional ownership concentration, measured by the Herfindahl index, is negatively correlated with financial restatements. Baysinger et al. (1991) document a positive correlation between institutional ownership concentration and R&D, and Lee (2005) shows a positive link between total blockholder ownership and patents. Atanassov (2013) shows that the presence of an outside blockholder reduces the negative impact of anti-takeover legislation on patent citations. Aghion et al. (2013) find that both total institutional ownership and the ownership by the largest institution (i.e. her block size) are positively associated with citation-weighted patents. To address the endogeneity of institutional ownership, they show that the results continue to hold using S&P 500 index inclusion as an instrument, and are stronger after a 1992 proxy reform that facilitated coordination between investors and thus their ability to govern.

While the above papers study a blockholder's stake in a single firm, some recent papers take into consideration the rest of her portfolio. Fich et al. (2015) study the fraction of the investor's portfolio represented by a firm, as discussed in Section 5.1.1. They define a monitoring institution as one in which her holding in the firm is in the top decile of her overall portfolio, and study the effect of such institutions on target firms during M&A. They find that the holdings of monitoring institutions are associated with higher bid completion rates, higher premiums, and lower acquirer returns, but total holdings of all blockholders and the number of blockholders bear no relation. The results continue to hold when using changes in institutional holdings generated by firms switching between Russell indices when they are reconstituted.

Kempf et al. (2017) study how a blockholder's monitoring of a given firm is affected by exogenous shocks to unrelated firms in her portfolio. They identify such shocks using extreme positive or negative returns to the industry that these other firms are in, and hypothesize that such shocks will distract the blockholder from monitoring the firm in question. They find that firms with distracted shareholders engage in more diversifying acquisitions, and that their acquisitions exhibit lower announcement and three-year returns. Such firms are also more likely to receive option grants on days at which the stock price was the lowest of that month (thus reducing the strike price, since options are typically granted at the money), cut dividends, and fire the CEO upon poor performance.

Azar et al. (2016) investigate the impact of common ownership, whereby an investor holds stakes in multiple firms. Focusing on the airline industry, they find that common ownership is associated with higher ticket prices; the results continue to hold when

using BlackRock's acquisition of Barclays Global Investors as an exogenous shock to common ownership. These findings are consistent with two scenarios. First, common ownership leads to anti-competitive behavior by the jointly held firms, reducing social welfare. Second, common ownership improves governance as predicted by Edmans et al. (2017d). This in turn overcomes managerial preferences for the "quiet life", which may in turn lead to too low prices, and leading the firm to optimize its prices.

Another potential externality is the effect of blockholders on other stakeholders. Cremers et al. (2007) find that institutional blockholders are associated with higher (lower) bond yields if the firm is exposed to (protected from) takeovers. This finding also highlights how blockholders interact with other governance mechanisms. Klein and Zur (2011) show that a 13D filing by an activist hedge fund reduces bond prices by 3.9% upon announcement and an additional 4.5% over the following year. This contrasts the well-documented finding that such activism increases shareholder returns.

6.3 Evidence specific to voice / intervention

Whereas the above results could be consistent with voice or exit, the survey of McCahery et al. (2016) provides evidence on the specific channels of voice that blockholders employ. In order of frequency, they show that blockholders engage in discussions with top management, vote against management, engage in discussions with the board outside of management, propose a specific action to management, and aggressively question management on a conference call. All five of these channels are used by at least 30% of respondents; the first, third, and fourth are examples of the jawboning analyzed by Shleifer and Vishny (1986).

Relatedly, that many blockholders serve as either directors or officers (see Section 4) suggests the value enhancement of blockholders comes at least in part from voice. Directors and officers have the exclusive rights to run a firm (at least under the Anglo-American legal tradition). Almost by definition, these individuals will have a strong voice in the management of the firm if they choose to do so. If they are not interested in influencing firm management, it is unclear why they would hold formal corporate positions that create the possibility of personal liability.

Turning to observational evidence of specific types of activism, Duan and Jiao (2014) show that mutual funds vote against management in proxy proposals, particularly when Institutional Shareholder Services recommends doing so. Cheng et al. (2010) study class action lawsuits. They show that when the lead plaintiff is an institution (such as a public pension fund) rather than an individual, the class action is less likely to be dismissed and has a higher monetary settlement; in addition, the target firm is more likely to increase board independence after the lawsuit. They argue that these results arise, in part, because institutional lead plaintiffs have higher stakes than individual ones. Helwege et al. (2012) find that forced CEO turnover was positively related to the presence of an outside blockholder in 1982–1994 but not in 1995–2006.

A separate set of papers studies the effect of activist events on firm performance. An early literature found little evidence that activism by shareholders in general improves firm performance. Del Guercio and Hawkins (1999) show that shareholder proposals by active pension funds lead to asset sales, restructurings, and layoffs but have no effect on stock or accounting performance. Yermack's (2010) survey concludes that, "the success of institutional investor activism to date appears limited" (p. 117).

6.3.1 Activists

The absence of significant results for shareholders in general may arise, not because activism does not create value, but because the above studies cover blockholders whose expertise does not lie in activism or who face barriers to activism. Diversification requirements hinder mutual funds from acquiring the large positions needed to exercise control,[49] and "prudent man" rules constrain pension funds from acquiring stakes in troubled firms in need of intervention (Del Guercio, 1996). Even if not legally restricted, a blockholder may choose not to engage in activism owing to a conflict of interest. For instance, a fund may lose its contract to manage a firm's pension plan if it opposes management.

Research focusing on blockholders that have both a particular expertise in activism and few barriers to intervention finds more significant effects. In the first paper in this line of research, Holderness and Sheehan (1985) study the initial 13D filings of six controversial investors who are often portrayed in the financial press as corporate raiders. When acquiring a 5% stake in a public firm, a shareholder must file a Schedule 13, which can take one of two forms. If she intends to engage in intervention, she must file a 13D and state in Item 4 the form of intervention she intends to employ; if she intends not to intervene, she can file a 13G, which is shorter and comes with fewer disclosure requirements.[50] They find that these announcements are associated with a positive stock price return that exceeds the increase associated with a 13D filing by a random sample of investors. They also follow the corporate activities of the six for the two years following the initial filings and find that in many instances the controversial investors publicly push for managerial changes at the target firms. These subsequent efforts also tend to associated with a positive stock-price reaction. They conclude that the overall positive returns seem to be related at least in part to such activism as opposed to superior stock picking.

Bradley et al. (2010) show that activist institutions successfully force closed-end funds to open-end, thereby creating value through the elimination of the closed-end fund

[49] Under the Investment Company Act of 1940, a "diversified" mutual fund can, with respect to 75% of its portfolio, have no more than 5% invested in any one security and own no more than 10% of the voting rights in one company.

[50] Blockholders who intend to remain passive still have the option of filing a 13D, but are unlikely to do so due to the benefits of filing a 13G described in Edmans et al. (2013).

discount. Moreover, activism attempts became particularly frequent after the aforementioned 1992 proxy reform that reduced the costs of communication among shareholders, demonstrating that coordination costs are an important determinant of intervention.

An increasing number of papers focus on activist hedge funds. Hedge funds have few business ties or regulatory constraints that hinder activism and few high performance-based fees that induce intervention even if it is costly. Although some hedge funds focus on stock picking, activist hedge funds have particular expertise in intervention. McCahery et al. (2016) and Clifford and Lindsey (2016) find that hedge funds are more willing to engage in activism than are other institutions.

Brav et al. (2008) also study the 13D filings of activist hedge funds but more broadly.[51] They find that 13D filings lead to 7–8% abnormal returns in a (−20, 20) window, consistent with activism creating value. As discussed in Section 6.1, they conduct analyses to reject the alternative hypothesis that the value creation reflects superior stock picking of the activists. In a similar vein, Clifford (2008) finds that, compared with 13G filings, 13D filings by hedge fund activists lead to larger event-study returns and improvements in return-on-assets, implying an additional return to activism over stock picking (before taking into account the costs of activism).

Klein and Zur (2009) focus on confrontational activism and find that hedge fund targets earn 10.2% abnormal returns in a (−30, +30) window surrounding a 13D filing, compared with 5.1% for other activist targets. Greenwood and Schor (2009) show that the abnormal returns to 13D filings stem from activists' ability to force target firms into a takeover, one particular form of intervention. Both announcement and long-term returns to 13D filings are significant for targets that are ultimately acquired but insignificant for targets that remain independent. While these results can be consistent with activists either causing mergers or predicting mergers, Boyson et al. (2017) provide evidence in support of the former. In particular, the results remain robust after removing risk arbitrage, and the likelihood of a takeover bid is six to eight times higher when the hedge fund files a 13D (signaling an active intent) than a 13G (signaling a passive intent). These results are consistent with the model of Corum and Levit (2016), which predicts that activists can successfully pressure incumbent directors to accept takeover bids by credibly threatening a proxy fight. While Greenwood and Schoar (2009) and Boyson et al. (2017) study the likelihood of receiving a takeover bid, Jiang et al. (2016) show that, once a bid has been announced, activist hedge funds block deals with low announcement returns, which potentially signal low value creation, as well as deals in which target management may not be maximizing shareholder value (e.g. going private and friendly deals). In turn, this allows target shareholders to extract greater premia.

Turning to real decisions, Brav et al. (2008) find that 13D filings lead to improvements in total payout, CEO turnover, and operating performance. The improvements

[51] See Brav et al. (2015a) for a comprehensive survey of the impact of hedge fund activism.

in operating performance contrasts conventional wisdom that hedge funds only create value through financial engineering. Even so, they may result from breaching long-term contracts with stakeholders or compromising product quality. Brav et al. (2015b) use Census data to show that the performance improvements instead result from higher plant-level productivity, which in turn stems from higher labor productivity—despite working hours not rising and wages not falling.[52] Productivity also improves in plants sold by the target firm, suggesting that hedge funds encourage the reallocation of assets to buyers who can make better use of them. Clifford and Lindsey (2016) find that blockholder types who are typically associated with activism (e.g., hedge funds as opposed to mutual funds) are associated with greater event study returns to Schedule 13 filings, greater improvements in profitability, and a greater increase in the performance-sensitivity of CEO pay than those that are not.

One critique of activist hedge funds, espoused in particular by Larry Fink (CEO of BlackRock), Martin Lipton (founding partner of the law firm Wachtell, Lipton, Rosen & Katz), and Delaware judges Leo Strine Jr. and Jack Jacobs, is that any improvements are short-term and at the expense of long-run value. Bebchuk et al. (2015) evaluate this hypothesis by studying a five-year window following activist interventions. They find no evidence that the initial positive stock price response to a 13D filing is followed by negative long-run returns; instead, it is subsequently borne out by actual improvements in operating performance. Boyson and Mooradian (2011) show that hedge fund activism is associated with gains in long-term operating performance and short-term stock performance.

Brav et al. (2017b) study the short-termism critique by investigating the impact of hedge funds on innovation. They show that a 13D filing by an activist hedge fund leads to a fall in R&D—but an increase in both the number of future patents and their quality (as measured by citations). This combination of lower input and higher output suggests that hedge funds improve innovation efficiency by refocusing innovation activities. Indeed, the improvement in innovation output is particularly strong in firms that previously had a diverse patent portfolio and subsequently refocused it, and concentrated in technological areas central to the firm's core competencies. The authors provide direct evidence of refocus by showing that target firms subsequently sell patents, particularly those less related to their core competencies, and that the sold patents receive more future citations than their own history and patents at control firms. Similarly, inventors that leave after the 13D filing produce a higher number and quality of future patents with their new firm than in the past, while the ones that stay are more productive than inventors retained by control firms. Thus, just as Brav et al. (2015b) find that hedge

[52] Aslan and Kumar (2016) in turn find that these operating performance improvements have positive effects on the targeted firms' rivals, leading to them responding by improving their own productivity, cost and capital allocation efficiency, as well as product differentiation.

funds lead to an efficient reallocation of plants, Brav et al. find an efficient reallocation of patents and inventors.

Becht et al. (2017) study the effects of hedge fund activism internationally. For the U.S., they find a 7% stock return over a (−20, +20) window surrounding the announcement of the activist's stake, very similar to Brav et al. (2008). This figure is 4.8% and 6.4% for Europe and Asia, suggesting that hedge fund activism is positively received by the market throughout the world. However, the eventual success of activism differs across regions. In the U.S., activists are successful in achieving at least one engagement outcome 61% of the time; this figure is 50% in Europe but only 18% in Asia. Japan is particularly marked by high initial market reactions but few successful eventual outcomes. In all regions, success is more likely when several activists engage together rather than only one.

6.3.2 Index funds

Appel et al. (2016b) study the effect of index funds on governance. Index funds are commonly believed to be the antithesis of governance: they are unable to govern through exit, since they are forced to hold all stocks in proportion to their index weights, and their dispersed ownership gives them few incentives to govern through voice. However, Appel et al. point out that, even though each stock may only represent a small fraction of an index fund's portfolio, it still may be large in dollar or percentage terms; indeed, an index fund is the largest shareholder in many firms. As discussed in Sections 3 and 5.1.1, dollar or percentage ownership (rather than ownership as a fraction of one's portfolio) may be more relevant for certain blockholder actions. Moreover, the inability to govern through exit may increase their incentives to govern through voice. While index funds rarely engage in intervention, they can still govern through voting. Appel et al. use inclusion in the Russell 2000 vs. inclusion in the Russell 1000 as an instrument for ownership by index funds.[53] They find that such ownership is 66% higher for stocks at the top of the Russell 2000 relative to stocks at the bottom of the Russell 1000. An increase in index ownership is associated with more independent directors, a higher likelihood of the firm removing a poison pill and reducing restrictions on shareholders' ability to call special meetings,[54] and a lower likelihood of having dual class shares. Consistent with the idea that index owners govern through voting, index ownership is associated with lower support for management proposals and higher support for governance proposals. Potentially due to these governance improvements, index ownership is

[53] This contrasts the aforementioned papers by Crane et al. (2016) and Mullins (2014) who use Russell index inclusion as an instrument for institutional ownership; the results of those papers may be consistent with either voice or exit.

[54] However, an increase in index ownership is not associated with a reduction in other takeover defenses, such as staggered boards and supermajority voting requirements.

also associated with improvements in return on assets and Tobin's Q. Note that some of these index funds hold less than 5%, but still seem to be engaging in governance.

The governance activities studied by Appel et al. (2016b) are arguably low-cost, where the index fund can apply general principles (e.g. voting against dual class shares, takeover defenses, and non-independent directors) without having to analyze each individual situation. This mitigates any barriers to intervention that arise from the index fund being spread thinly over multiple stocks. In contrast, Schmidt and Fahlenbrach (2017) suggest that index funds are associated with a reduction in high-cost governance activities that may require more bespoke monitoring. The authors focus on firms that switch between the Russell 1000 and 2000 indices to argue that index ownership is associated with lower announcement returns to M&A deals (which require monitoring on a case-by-case basis), appointments of new independent directors (which require analyzing the director's suitability beyond simply recognizing that he is independent), and the CEO being more likely to acquire more power through becoming also Chairman or President (such appointments sometimes occurring off-schedule, i.e. not necessarily at the AGM).[55]

While index funds do not engage in activism themselves, Appel et al. (2016c) hypothesize that their presence catalyzes activism by others due to their large stakes. For example, they can vote with the activist in a proxy fight, or support a restructuring suggested by the activist. They use Russell index inclusion to show that, while index ownership is uncorrelated with the frequency of activist campaigns, it is associated with more aggressive campaigns. In particular, it increases the likelihood of a campaign where the activist seeks board representation—especially in the form of proxy fights, rather than less confrontational ways of obtaining representation—but reduces the likelihood of shareholder proposals, which tend to involve more incremental changes. In addition, index ownership increases the likelihood that activists successfully remove takeover defenses, facilitate the sale of a firm to a third party, and engage in a hostile offer. These empirical regularities are consistent with the interpretation that activist investors may often be the catalyst for corporate change, but they need the voting support of non-activist large shareholders.

These findings imply that the common terminology of index funds as "passive funds" is problematic. First, it is confusing. "Passive" could refer to non-activist, i.e. a fund that does not engage in intervention (other than voting), but such a fund need not be passively managed—it may still take active positions. Second, it is misleading—as Appel et al. (2016b, 2016c) show, even if they are passively managed, they need not be

[55] The authors note that one potential issue is that switching between indices occurs endogenously—governance may affect firm performance, and thus market capitalization and index inclusion. They thus control for changes in market capitalization and initial market capitalization, and show that most of their results continue to hold in a subsample of firms with small changes in market capitalization.

passive in terms of governance. We thus recommend that they be referred to as index funds rather than passive funds. We therefore propose the following taxonomy: activist funds/investors (who primarily engage in voice but may also engage in exit), trading funds/investors (who primarily engage in exit but may still engage in voice through voting), and index funds (who hold the benchmark but still may still engage in voice through voting).

6.3.3 Behind-the-scenes activism

A quite separate reason why early studies of overt activism by blockholders in general need not imply that voice is ineffective is that blockholders may engage in activism in ways unobservable to the econometrician. Carleton et al. (1998) study private letters written to management by TIAA-CREF (a major pension fund) in an attempt to enact corporate governance changes. TIAA-CREF reached agreements with the firm 95% of the time; more than 70% of these cases occurred without shareholder votes. This result indicates that looking at actual shareholder votes may miss a significant amount of activism. However, they find little evidence that such letters increase the short-term stock price, likely because the letters were usually private. Becht et al. (2009) study the Hermes Focus Fund (a UK pension fund that also specializes in activism) and find that "engagement rarely took a public form," instead occurring through communications with executives and sometimes other shareholders. Common objectives included selling non-core assets, replacing the CEO or chairman, and increasing the cash payout to investors. When the fund's engagement objectives were achieved and publicly announced, the mean abnormal $(-3, +3)$ returns were 5.3%, and these returns were higher for confrontational than for collaborative engagements.

While the above papers study behind-the-scenes activism that is explicitly aimed at improving shareholder value, Dimson et al. (2015) study engagements aimed at addressing ESG concerns. They use data on such engagements by an anonymous large institutional investor with a major commitment to responsible investment. Interestingly, while such engagements are aimed at improving stakeholder value, they show that shareholders also benefit. ESG engagements generate a size-adjusted abnormal return of 2.3% over the following year; the returns are 7.1% when the engagements were successful (i.e. achieved their ESG goals). Turning to the channels through which shareholders benefit, they find increases in operating performance and institutional ownership and a reduction in the Bebchuk et al. (2009) entrenchment index.

6.3.4 The determinants of activism

Turning from the effects of activism to the determinants of activism, Norli et al. (2015) use the decimalization of the major United States stock exchanges in 2001 as an exogenous shock to liquidity and show that liquidity increases the frequency of proxy fights and shareholder proposals. The average stake held by the filing shareholder is 9%,

i.e. these filings are typically made by blockholders. Moreover, as predicted by Maug (1998), liquidity encourages activists to acquire additional shares in advance of engaging in activism, contrary to the (unmodeled) arguments of Coffee (1991) and Bhide (1993) that it encourages cutting and running. While Norli et al. (2015) study actual acts of intervention, Edmans et al. (2013) use a 13D filing to measure the threat of activism. They use decimalization to show that liquidity has a positive causal effect on the likelihood of activist hedge funds filing a 13D.

Brav et al. (2008) find that activist hedge funds are more likely to target firms with high operating cash flows, high return-on-assets, low total payout, and high executive compensation. Such firms likely suffer from the agency costs of free cash flow (Jensen, 1986), thus increasing the gains from blockholder intervention. These results are consistent with the theory of Maug (1998), in which a block forms initially only if the gains from intervention are sufficiently high relative to the cost. Brav et al. (2008) and Becker et al. (2011) find that blockholders target smaller firms, where it is easier to acquire a significant percentage stake. Evidence on targets' prior stock price performance is more mixed. Whereas Klein and Zur (2009) find that targets of confrontational activism in the United States previously outperformed the market, Becht et al. (2009) show that targets of the UK Hermes Focus Fund previously underperformed.

6.4 Evidence specific to exit / trading

The survey by McCahery et al. (2016) finds that even long-term institutions frequently engage in exit in response to both dissatisfaction with firm performance and dissatisfaction with governance. Duan and Jiao (2014) show that, even in proxy proposals where Institutional Shareholder Services recommends voting against management—a scenario particularly conducive to voice—mutual funds sometimes choose to exit.

One piece of evidence loosely consistent with exit is the existence of multiple blockholders. Owing to free-rider problems, such a structure is suboptimal for voice, but it improves the efficiency of exit as shown by Edmans and Manso (2011). Table 1 shows that 75% of United States firms have multiple blockholders (defined as a shareholder who owns at least 5%). Using a 10% threshold, Laeven and Levine (2007) find that 34% of European firms have multiple blockholders, Maury and Pajuste (2005) document 48% for Finland, and Western European data made available by Faccio and Lang (2002) yields a figure of 39%. However, the existence of multiple blockholders is also consistent with voice-only theories in which a finite individual stake arises owing to wealth constraints (Winton, 1993) or risk aversion (Admati et al., 1994).

More specific evidence for exit studies the link between blockholders and financial markets. The first set of evidence supports the notion that blockholder trades contain private information. Parrino et al. (2003) show that sales by institutional investors precede CEO turnover and negative long-run returns. Institutions with larger positions sell their shares to a greater extent than those with smaller positions, as in the Edmans

(2009) model where larger blockholders are more informed. Bushee and Goodman (2007) find the private information content of an institutional investor's trade increases in his stake. Brockman and Yan (2009) document that stocks with higher total outside block ownership contain greater firm-specific information. They also recognize the importance of blockholder heterogeneity and show that this result does not hold for employee share ownership plans, which are unlikely to trade on information. Gallagher et al. (2013) find that blockholders who trade frequently generate trading profits, and Yan and Zhang (2009) find that frequent traders are more informed (in terms of their trades predicting future stock returns) than those who rarely trade. Collin-Dufresne and Fos (2015) show that the trades made by 13D filers over the 60 days before the filing date (which must be disclosed in the filing) are highly profitable.

A second strand of research studies the link between blockholders and price informativeness. Gallagher et al. (2013) use Australian data that provide higher-frequency information on institutional investor trades than do 13F filings in the United States, and also allows them to identify blockholders who own below 5%. Institutional investor trading leads to subsequent increases in price efficiency, which the authors in turn link to improvements in future performance. These effects are stronger in the presence of multiple institutional investors. Gorton et al. (2017) similarly find a positive association between the number of blockholders and price informativeness. Boehmer and Kelley (2009) use Granger causality tests to show a causal relationship between total institutional ownership and price efficiency, particularly when there is low ownership concentration (i.e., more institutional owners). Both the volume of trading and the level of institutional holdings in the absence of trading cause greater efficiency; the level of holdings matters, suggesting that the threat of exit increases price informativeness.

Third, a number of papers show that blockholder exit reduces the stock price and that these price declines are permanent and thus likely result from the sale conveying negative information, rather than temporary price pressure effects due to downward-sloping demand curves accommodating a sudden increase in supply. Scholes (1972) and Mikkelson and Partch (1985) find this result for secondary issues, and Holthausen et al. (1990) and Sias et al. (2006) document that institutional trading has a permanent effect on stock prices. Collin-Dufresne and Fos (2015) find that purchasers by eventual 13D filers, over the 60 days before the filing date, increase prices.

Whereas the above papers study the effect of blockholders on financial markets ($I2$), another financial market test relates liquidity to blockholders ($I1$). Fang et al. (2009) use decimalization to show that liquidity causes increases in firm value, and Bharath et al. (2013) show that this effect is stronger for firms with greater block ownership, measured by the share of all blockholders, the share of the largest blockholder, or the number of blockholders. This result supports the idea that blockholders improve firm value ($I2$). It is consistent with liquidity enhancing either exit (Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2011) or voice (Maug, 1998; Faure-Grimaud and Gromb,

2004) (*I*1). Supporting the former interpretation, Bharath, Jayaraman, and Nagar show that the link between firm value and the interaction of liquidity and blockholdings is stronger when the manager has greater equity incentives.[56] This interaction remains strong even in firms where the manager is entrenched and thus voice is less likely to be effective.

Edmans et al. (2013) use decimalization to show that liquidity encourages the acquisition of blocks (either 13D or 13G filings) by activist hedge funds, as in the exit theory of Edmans (2009) and the voice theories of Kyle and Vila (1991), Kahn and Winton (1998), and Maug (1998). Supporting exit theories in particular, the effect of liquidity on block acquisition is stronger when the manager has greater sensitivity to the stock price. Moreover, liquidity increases the likelihood that the hedge fund blockholder files a 13G rather than a 13D.[57] A 13G filing indicates that the blockholder will not be engaging in activism. Thus, it can suggest that the blockholder either is abandoning governance altogether or is governing through the alternative mechanism of exit. Supporting the latter explanation, liquidity is particularly likely to induce a 13G filing (rather than a 13D filing) where the manager has greater sensitivity to the stock price. Moreover, a 13G filing leads to a positive event-study reaction, positive holding period returns for the blockholder, and positive improvements in operating performance, particularly for firms with high liquidity. These authors then extend their analyses to all activists, which include institutions less effective at intervention or trading than hedge funds (e.g., owing to flatter compensation structures). The effect of liquidity on block formation continues to hold, but its effect on the choice of governance mechanism and the consequences of a 13G filing are weaker, again highlighting the importance of blockholder identity.

Roosenboom et al. (2014) study the link between liquidity and blockholder governance in the particular setting of M&A. Liquidity is correlated with lower M&A returns when there is a single blockholder (and governance through voice is most likely) but not when there are multiple blockholders (and governance through exit is most likely).

Dimmock et al. (2016) study a different dimension of liquidity: the capital gains tax liability when selling a stake. Importantly, this liability varies across different investors in the same stock, depending on when they acquired their stake, thereby addressing omitted variables concerns. The authors find that a greater capital gains lock-in increases the likelihood of voting against management (a form of intervention) but reduces the likelihood of exit.

[56] High equity holdings will not induce the CEO to be sensitive to the current stock price if his equity has very long vesting periods, but vesting periods are typically short in practice (see, e.g., Kole, 1997).

[57] Even though liquidity reduces the likelihood of a 13D filing, conditional upon block formation, this effect is outweighed by the positive effect of liquidity on the likelihood of a block being acquired in the first place. Thus, liquidity has an unconditionally positive effect on a 13D filing, as documented in Section 6.3.4.

6.5 Evidence on the costs of blockholders

There are four main approaches to identifying a negative effect of blockholders on firm value; studies using these approaches typically investigate the firm's market value, i.e. to minority shareholders alone. The simplest one is to investigate the correlation between blockholdings and firm value or firm outcomes (such as liquidity) that are likely linked to firm value. Studies using this approach are covered in Section 6.2.

A second approach is to estimate the private benefits of control, i.e., the additional value that blockholders derive from ownership over and above minority shareholders. (Note, however, the earlier caveat that private benefits need not be at the expense of other shareholders and that on balance private benefits can be negative.) Barclay and Holderness (1989) find that negotiated block trades (owned by insiders or outsiders) occur at a 20% premium to the market price, reflecting the private benefits of control. The premium is higher for firms with larger cash holdings and, thus, greater potential for expropriation. Albuquerque and Schroth (2010) study block trades between 10% and 50% where the ownership of the buyer rises from below 20% to above 20%, which they estimate as the threshold required to enjoy private benefits. They estimate private benefits as 10% of the value of the block or 3–4% of the value of the target firm's equity. Private benefits create a deadweight loss, as firm value falls by $1.76 for every $1 of private benefit on average. They also find that block trades increase firm value by 19%, consistent with the finding by Barclay and Holderness (1991) that blockholder identity matters. Thus, the deadweight loss created by private benefit extraction is likely outweighed by the monitoring provided by blockholders.

Third, researchers can study firm outcomes where the blockholder is likely to be misaligned with minority shareholders. Faccio et al. (2011) hypothesize that undiversified large shareholders will be excessively conservative. Although they do not investigate the effect on firm value, they find that the portfolio concentration of the largest shareholder is associated with reduced volatility of return-on-assets, consistent with the model of Dhillon and Rossetto (2015). To identify causality, they study the effect of a block passing to a successor (who is typically less diversified than the previous owner) and the effect of acquiring additional firms to a portfolio (which increases diversification) on the risk-taking of existing firms. Rossetto and Stagliano (2012) show that this association only holds for firms with a single blockholder and not for firms with multiple blockholders. Moreover, the addition of mid-sized blockholders reduces risk, suggesting that such blockholders moderate the large blockholder's risk aversion, as predicted by Dhillon and Rossetto (2015).

While the above results suggest that portfolio concentration reduces firm value, Ekholm and Maury (2014) find that portfolio concentration is positively related with future operational performance and stock returns, suggesting that investors have particularly strong incentives to monitor a stock that occupies a large part of their overall portfolio. The contrasting results can be reconciled by the fact that Ekholm and Maury's

results are particularly strong for small shareholders. Such shareholders are less concerned with idiosyncratic risk and thus lead to excessive conservatism, but more likely to face time or resource constraints in monitoring and thus particularly focus their efforts on their largest holdings.

A fourth approach is to examine the behavior of blockholders. Davis and Kim (2007) study the proxy voting behavior of mutual funds for six shareholder proposals. At the fund family level, funds with more business ties (aggregated across all firms that they invest in) are more likely to vote with management. However, at the individual firm level, funds are no more likely to vote with the management of a client than a non-client. Ashraf et al. (2012) document similar results on executive compensation proposals, with two years of data after controlling for fund family heterogeneity. In contrast, using a nine-year panel that allows for more stringent controls for unobserved heterogeneity, and examining a wider set of proposals, Cvijanovic et al. (2016) find that fund-firm business ties significantly encourage voting with management, particularly for close votes. Consistent with their model, their results suggest that managers pressure mutual fund blockholders to vote with them on close proposals. Agrawal (2012) finds that pension funds affiliated with the AFL-CIO labor union become significantly less opposed to directors once the union no longer represents a firm's workers. Because opposition by AFL-CIO pension funds is negatively associated with valuations, this result suggests that they vote for directors who protect workers' interests at the expense of shareholders.

6.6 Summary

To summarize, the empirical literature finds the following:

- Blockholders report that they frequently exert governance through both exit and various forms of voice (e.g. voting, private discussions with management or the board, and open confrontation with management). Importantly, many forms of governance occur behind the scenes and are typically unobservable to outsiders.
- Blockholder identity matters. Trades of blocks between investors are associated with increases in firm value, likely because they transfer ownership to superior monitors through either voice or exit.
- Evidence on the correlation between firm value and block size is mixed. Some papers find no relationship, others find a concave relationship. Moreover, the correlation also depends on blockholder identity and other governance mechanisms.
- Blockholders are generally correlated with lower executive pay levels, higher investment, and lower accounting fraud. Certain blockholders are associated with higher profitability and superior M&A outcomes. The strongest effects are documented for activist hedge funds—their acquisition of a 5% stake is associated with a short-term stock price rise that is not later reversed, and increased operating performance, labor productivity, a reoptimization of a firm's asset and patent portfolio, CEO turnover, payout, innovation, and the likelihood and terms of being acquired.

- Blockholders have superior information than other investors and their trades have a permanent impact on the stock price. Blockholders are associated with greater price informativeness, likely because their trading incorporates their private information into prices.
- Institutional ownership may have a positive causal effect on dividends, share repurchases, and patents. Index funds may have a positive causal effect on governance where general principles can be applied but not where bespoke monitoring is required. They may also encourage other investors to engage in more aggressive forms of activism.
- Adding other firms to a blockholder's portfolio may have a negative causal effect on her quality of monitoring, but also increase investment by reducing her risk aversion. Exogenous additions of same-industry holdings to the portfolio can lead to anti-competitive behavior.
- Stock liquidity has a positive causal impact on the likelihood of block formation, and on blockholder activism through shareholder proposals and proxy fights. Consistent with exit models, stock liquidity has a positive causal impact on firm value, particularly for firms with blockholders and high CEO stock-based compensation, and even if the block formed is by a trading rather than activist investor.
- Blocks typically trade at a premium to minority stakes, likely resulting from private benefits of control. Blockholders may vote for their own interests rather than other shareholders, and (potentially suboptimally) reduce firm risk if not mitigated by other shareholders.

7. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

The role of blockholders in corporate governance has given rise to a rich and varied literature, covering many topics in financial economics and beyond. Theoretical models examine topics such as the free-rider problem, informed trading and market microstructure, strategic information transmission, the trade-off between the ex-post costs and ex-ante benefits of monitoring, the role of managerial and blockholder incentives, the effect of multiple blockholders and multiple firms in a blockholder's portfolio, and the threat of governance in addition to actual acts of governance. Empirical studies have linked blockholders to both corporate finance outcomes (such as firm value, profitability, leverage, investment, and risk-taking) and financial market variables (such as liquidity and price informativeness), analyzed the market reaction to block trades, and estimated the private benefits of control. Identifying causal effects for either the consequences or determinants of blockholders is particularly challenging, and a number of approaches have been employed.

There are many potential avenues for future research. We have previously mentioned some of them at different points in this article, but here we collate them together with additional ideas:

- Study the dollar value of a block or the concentration of the block in the investor's portfolio. Sections 3 and 5.1.1 show that both measures can be relevant, depending on the setting.
- Study blockholders with stakes below 5%. There is no theoretical justification for the commonly-used threshold of 5%. Blockholders with smaller percentage stakes may still have strong incentives to govern, particularly if these stakes are large in dollar terms or as a proportion of the blockholder's portfolio.
- Take blockholder heterogeneity seriously. This involves not only considering different blockholder categories (individuals vs. institutions, active vs. passive, domestic vs. foreign) but also how they obtained their blocks (block trades, private placements, block accumulations, payment in a merger); different types of governance (exit vs. voice; within voice, different types of activism such as voting, private letters to management, and public confrontation); different institutional arrangements (different countries or alternative governance mechanisms in place); and different situations (e.g. a takeover situation versus a disagreement on dividend policy). Considering heterogeneity will help us understand which types of activism are successful, under which circumstances, and by which blockholders.
- Consider settings beyond the United States. As alluded to above, the institutional framework (including disclosure rules, the ability of blockholders to act in concert or have privileged access to management, stock liquidity, and voting arrangement) likely differs across countries. Thus, findings in the United States do not naturally extend to other countries and so studying other countries—even if the results end up being the same as in the United States—is valuable.
- Continue to search for valid instruments for blockholders. Due to the difficulty of identifying causal effects—even a question as fundamental as the impact of blockholder on firm value remains unanswered. However, clean identification should not be a requirement for future empirical research because it will be too narrowing. The importance of the research question and the underlying economics are more important than the econometrics. We can learn a great deal from correlations as long as the researchers are up-front about not making causal statements. In addition, endogeneity can be addressed by economic, rather than through purely econometric, means—for example, directly investigating alternative explanations through cross-sectional tests (an example is the Brav et al., 2008, paper discussed earlier).
- Consider interactions. At least four types of interactions may be of interest. The first is interactions between different blockholders. These may be different blockholders of the same type (Crane et al., 2017 study institutional investor "cliques", who are part of a network due to shared holdings in many firms) or different blockholder types (e.g. activists and index funds as in Appel et al. (2016c) or activists and trading funds as in Gantchev and Jotikasthira, 2017). In particular, while some studies focus on the effect of a single large blockholder, additional smaller block-

holders may have a moderating effect (Rossetto and Stagliano, 2012). Research should take into account all blockholders. In addition to affecting the behavior of other blockholders, a particular blockholder may affect their presence. Hadlock and Schwartz-Ziv (2017) show that small blocks (particularly financial institutions) are positively associated with the likelihood of observing other blockholders, but larger blocks (particularly non-financial institutions) display a negative association. The second is interactions between different blockholder governance mechanisms, such as exit and voice, or different channels of voice. Do they reinforce each other, or do they conflict? The third is interactions between blockholders and non-blockholder governance mechanisms such as the board (Cohn and Rajan, 2013), shareholder rights (Cremers and Nair, 2005), laws (Atanassov, 2013), or takeovers (Corum and Levit, 2016). In particular, a manager's contract is both a governance mechanism in itself and also affects the effectiveness of exit. It is typically taken as exogenous but may be jointly determined with blockholdings. The fourth is interactions between firms held by the same blockholder. Such common ownership can either improve governance due to greater price informativeness (Edmans et al., 2017d), or weaken governance by spreading the blockholder too thinly (Admati et al., 1994) or inducing anti-competitive behavior (Azar et al., 2016).

- Consider effects on stakeholders other than shareholders. For example, Cremers et al. (2007) and Klein and Zur (2011) show how blockholders affect bond prices, and Brav et al. (2015b) study their impact on workers. Dimson et al. (2015) study engagements targeted at improving ESG performance, rather than shareholder value directly.
- Consider the link between blockholders and financial markets. Blockholders have traditionally been considered a corporate finance topic, but recent exit theories have highlighted how blockholders affect and are affected by financial markets. This gives rise to a whole range of new questions linking corporate finance to asset pricing.[58] Future theories might incorporate more complex microstructure features—such as multiple trading rounds or predatory trading (e.g., Brunnermeier and Pedersen, 2005)—that have so far been analyzed in pure-trading models in which firm value is exogenous and thus trading has no effect on governance. Future empirical studies might investigate variables typically analyzed in the microstructure literature, such as trading volume, price informativeness, and information asymmetry—and how they shape and are shaped by blockholder behavior.
- Consider agency problems at the blockholder level. Many blockholders are agents who may have objectives other than shareholder value maximization. A blockholder who is an individual may well act differently than a blockholder that is a nonprofit. A blockholder who is single may act differently than a blockholder who has a large

[58] See Bond et al. (2012) for a survey on the link between financial markets and a corporate finance.

family and owns a block in an old family firm. On the theoretical side, although existing papers focus on the private benefits of control, studying how private benefits affect the effectiveness of governance through voice or exit would be interesting. Empirically, gathering data on blockholder agency problems (e.g., the alignment of the blockholder with her target firm's performance, her concern for fund flows, and her ownership of other firms with business ties) is a potentially fruitful avenue.

- Understand that private benefits can be negative; that is, blockholders may incur net costs that other shareholders do not incur. Understand also that private benefits need not reduce the wealth of other shareholders.
- Consider the evolution of blockholder governance—for example, in the identity of blockholders (e.g. the increasing importance of both activist hedge funds at one extreme, and index funds at the other) and the practices that they employ (e.g. borrowing shares to separate voting rights from cash flow ownership, as analyzed theoretically by Brav and Mathews, 2011 and empirically by Hu and Black, 2007). What blockholders were doing 30 years ago is different from what they are doing today. Today, they are considerably more active and willing to contest management. We expect this evolution or change to continue. Documenting how it changes will be important.

Overall, even though the literature on blockholders and corporate governance is over 30 years old, many new and exciting strands have recently been developed as a result of data entrepreneurship and the study of a new governance channel. These strands are still in their infancy, and there is substantial scope for future research to investigate not only channels of blockholder governance in and of themselves, but how they interact with other governance mechanisms. We hope that this review will help stimulate this research going forward and look forward to learning from it.

APPENDIX A. PROOFS

Proof of Eq. (3). The prices set by the market maker are given by Bayes' rule as follows:

Q	P
$(0,0)$	$\overline{V}$
$(0,-\phi)$	$\underline{V}+\frac{\beta\tau}{\beta\tau+(1-\tau)(1-\beta)}\Delta=\underline{V}+\widehat{\chi}_1\Delta$
$(-\phi,-\phi)$	$\underline{V}$

(13)

If nobody sells, the market maker knows that the blockholder has monitored and sets $P=\overline{V}$. If it sees two sell orders, it knows that the blockholder has not monitored and sets $P=\underline{V}$. If it sees a single sell order, it does not know whether it stems from liquidity traders (in which case the blockholder has monitored) or the blockholder (in which case she has not). Thus, it sets an intermediate price of $\underline{V}+\widehat{\chi}_1\Delta$. This price

exceeds the true value of an unmonitored firm, $\underline{V}$, and provides the incentive to cut and run.

If the blockholder cuts and runs, w.p. $\beta \in [0, 1]$ liquidity traders also sell and so she is fully revealed and receives $\underline{V}$, but w.p. $1-\beta$ they do not sell and so she is camouflaged and receives $\underline{V} + \widehat{\chi}_1 \Delta$. Thus, her payoff is now

$$(\alpha - \phi)\,\underline{V} + \phi\left[\beta \underline{V} + (1-\beta)\left(\underline{V} + \widehat{\chi}_1 \Delta\right)\right],$$

which simplifies to Eq. (3).

Turning to the comparative statics, the derivative of (3) with respect to β is given by:

$$\phi\Delta \times \left(\frac{\widehat{\tau}\left[\beta^2(1-2\widehat{\tau}) + \beta[2(\widehat{\tau}-1)] + 1 - \widehat{\tau}\right]}{(\beta\widehat{\tau} + (1-\widehat{\tau})(1-\beta))^2}\right).$$

The roots of the numerator are given by

$$\beta^* = \frac{\sqrt{1-\widehat{\tau}}\left(\sqrt{1-\widehat{\tau}} \pm \sqrt{\widehat{\tau}}\right)}{1-2\widehat{\tau}}.$$

The root between 0 and 1 is always

$$\beta^* = \frac{\sqrt{1-\widehat{\tau}}\left(\sqrt{1-\widehat{\tau}} - \sqrt{\widehat{\tau}}\right)}{1-2\widehat{\tau}},$$

since when $\widehat{\tau} < 0.5$, the numerator and denominator are positive, and when $\widehat{\tau} > 0.5$, both are negative. Thus, for $\beta < \beta^*$, (3) is increasing in β and for $\beta > \beta^*$, it is decreasing.

Proof that $c_1^* < \alpha\Delta$. Note that the RHS of (4) is increasing in c_1^*, while the LHS is independent of c_1^*. Furthermore, at $c_1^* = \alpha\Delta$, we have

$$\alpha\Delta < \alpha\Delta + \phi\frac{\beta\,(1-\beta)\,F\,(\alpha\Delta)}{\beta F\,(\alpha\Delta) + (1 - F\,(\alpha\Delta))\,(1-\beta)}\Delta.$$

Therefore, the solution to (4) must satisfy $c_1^* < \alpha\Delta$.

Proof of Eq. (5). If she retains her stake, the market maker knows that she has monitored, and so sets $P = \overline{V}$. If she sells, this can either stem from the blockholder monitoring (w.p. $\widehat{\tau}$) and suffering a liquidity shock (w.p. β), or not monitoring (w.p. $1-\widehat{\tau}$). The price is thus given by

$$P\left(b = -\phi\right) = \underline{V} + \frac{\beta\widehat{\tau}}{\beta\widehat{\tau} + 1 - \widehat{\tau}}\Delta = \underline{V} + \widehat{\chi}_2\Delta.$$

If the blockholder monitors, w.p. $(1-\beta)$ she suffers no shock and retains her entire α shares. W.p. β, she suffers a shock and is forced to sell ϕ for $\underline{V}+\widehat{\chi}_2\Delta$; she retains the remaining $(\alpha-\phi)$. Her payoff is thus given by

$$(1-\beta)\,\alpha\overline{V}+\beta\left[(\alpha-\phi)\,\overline{V}+\phi\left(\underline{V}+\widehat{\chi}_2\Delta\right)\right]-c.$$

If she cuts and runs, her payoff is

$$(\alpha-\phi)\,\underline{V}+\phi\left(\underline{V}+\widehat{\chi}_2\Delta\right),$$

leading to Eq. (5).

Turning to the comparative statics, note that the derivative of the LHS of (5) with respect to $F(c_2^*)$ is given by:

$$\frac{-\beta}{(\beta F(c_2^*)+1-F(c_2^*))^2}<0,$$

and therefore it is decreasing in c_2^*. Furthermore, the LHS is increasing in α and decreasing in ϕ and β, while the RHS is independent of all three parameters. Therefore, since the RHS is increasing in c_2^*, then c_2^* is increasing in α, and decreasing in ϕ and β.

Proof of Eq. (6). The pricing function is similar to (13) and as follows:

d	P
$\frac{\phi}{2}$	$\overline{V}$
$-\frac{\phi}{2}$	$\underline{V}+\widehat{\tau}\Delta$
$-\frac{3\phi}{2}$	$\underline{V}$

. (14)

If $d=\frac{\phi}{2}$ $(-\frac{3\phi}{2})$, the blockholder must have bought (sold) and so $P=\overline{V}$; $d=-\frac{\phi}{2}$ is uninformative. If the blockholder monitors and buys, w.p. $\frac{1}{2}$ liquidity traders sell and so she is camouflaged. Her payoff is thus given by

$$\alpha\overline{V}+\frac{\phi}{4}(1-\widehat{\tau})\,\Delta-c.$$

If she does not monitor and sells, w.p. $\frac{1}{2}$ liquidity traders do not sell and she is camouflaged. Her payoff is thus given by

$$\alpha\underline{V}+\frac{\phi}{4}\widehat{\tau}\Delta.$$

Comparing these payoffs yields the threshold in (5).

To prove that the trading effect depends on $F(\alpha\Delta) \lessgtr \frac{1}{2}$, note that the RHS of

$$\alpha\Delta = c_4^* + \frac{\phi}{2}\left(F\left(c_4^*\right) - \frac{1}{2}\right)\Delta$$

is increasing in c_4^*. Thus, if $F(\alpha\Delta) > \frac{1}{2}$, then

$$\alpha\Delta < \alpha\Delta + \frac{\phi}{2}\left(F(\alpha\Delta) - \frac{1}{2}\right)\Delta,$$

so $c_4^* < \alpha\Delta$. Alternatively, if $F(\alpha\Delta) < \frac{1}{2}$,

$$\alpha\Delta > \alpha\Delta + \frac{\phi}{2}\left(F(\alpha\Delta) - \frac{1}{2}\right)\Delta,$$

implying $c_4^* > \alpha\Delta$. Finally, if $F(\alpha\Delta) = \frac{1}{2}$, then clearly $c_4^* = \alpha\Delta$.

Proof of Eq. (7). The blockholder's payoff comes from two sources. The first is her expected $t = 1$ net trading profits. Imposing the equilibrium condition $\tau = \widehat{\tau}$, these are given by

$$\begin{aligned}&\tau\frac{\phi}{4}(1-\tau)\Delta + (1-\tau)\frac{\phi}{4}\tau\Delta - \tau E\left[c|c < c_4^*\right]\\ &\quad = (1-\alpha)\frac{\nu\tau(1-\tau)}{2}\Delta - \tau E\left[c|c < c_4^*\right].\end{aligned}$$

Her gross trading profits are thus $\frac{1}{2}\nu\tau(1-\tau)\Delta$ per share owned by liquidity traders. They will rationally anticipate expected trading losses of the same amount, and thus will be willing to sell to the blockholder at $t = 0$ for

$$P_0 = \underline{V} + \tau\Delta - \frac{1}{2}\nu\tau(1-\tau)\Delta \tag{15}$$

per share. This gives rise to the second source of the blockholder's payoff: her ability to buy shares at $t = 0$ for a price below their fundamental value of $\underline{V} + \tau\Delta$. This source is given by

$$\alpha\left(\underline{V} + \tau\Delta - P_0\right) = \alpha\frac{1}{2}\nu\tau(1-\tau)\Delta.$$

Thus, her total payoff is given by

$$\begin{aligned}&(1-\alpha)\frac{1}{2}\nu\tau(1-\tau)\Delta - \tau E\left[c|c < c_4^*\right] + \alpha\frac{1}{2}\nu\tau(1-\tau)\Delta\\ &\quad = \frac{1}{2}\nu\tau(1-\tau)\Delta - \tau E\left[c|c < c_4^*\right].\end{aligned}$$

The maximization problem is complicated by the $E\left[c|c<c_4^*\right]$ term, which will depend on the specific functional form of $F(c)$. However, recall the model is isomorphic to one in which the monitoring cost c is constant and τ is the probability of monitoring in a mixed strategy equilibrium, which is the formulation in Maug (1998). In this case, the expected monitoring cost $E\left[c|c<c_4^*\right]$ simply equals c. Rewriting the expression for total payoff replacing $E[c|c<c_4^*]$ with c and taking the derivative yields

$$\frac{1}{2}\nu(1-2\tau)\Delta = c \iff \tau = \frac{1}{2} - \frac{c}{\Delta\nu}.$$

To determine the optimal α, note that the share prices (for a given equilibrium τ^*) are

Q	P
$(0,0)$	$\underline{V}+\Delta$
$(0,-\phi)$	$\underline{V}+\Delta\tau^*$
$(-\phi,-\phi)$	$\underline{V}$

Note that α^* must be such that the blockholder is indifferent between monitoring and not buying, and not monitoring and selling ϕ. The blockholder's payoff from monitoring and buying is

$$\alpha\overline{V}+\frac{\phi}{2}(\overline{V}-\frac{1}{2}(\overline{V}+\underline{V}+\Delta\tau^*))-c=\alpha\overline{V}+\frac{\phi}{4}\Delta(1-\tau^*)-c=\alpha\overline{V}+\frac{\nu(1-\alpha)}{4}\Delta(1-\tau^*)-c.$$

Her payoff from not monitoring and selling

$$\alpha\underline{V}+\frac{\phi}{2}(\frac{1}{2}(P(0,-\phi)+P(-\phi,-\phi))-\underline{V})=\alpha\underline{V}+\frac{\phi}{4}\Delta\tau^*=\alpha\underline{V}+\frac{\nu(1-\alpha)}{4}\Delta\tau^*.$$

The equilibrium α^* equates these two payoffs, i.e.

$$\alpha^*\overline{V}+\frac{\nu(1-\alpha^*)}{4}\Delta(1-\tau^*)-c=\alpha^*\underline{V}+\frac{\nu(1-\alpha^*)}{4}\Delta\tau^*.$$

Plugging in $\tau^*=\frac{1}{2}-\frac{c}{\Delta\nu}$ and rearranging yields

$$\alpha^*=\frac{c}{2\Delta-c}.$$

What happens in the core model where the monitoring cost is observable? For comparability, let the average cost be unchanged. Now, the blockholder has an additional reason for choosing a low α (over and above the case where c is fixed): it leads to monitoring for a lower range of monitoring costs, and thus reduces the expected monitoring cost $E\left[c|c<c_4^*\right]$ (in addition to the frequency τ with which the monitoring cost is borne). Thus, the blockholder chooses an even lower α than with a fixed monitoring cost, and it remains the case that liquidity improves governance.

Proof of Eq. (11). If the manager works, the blockholder never sells, regardless of whether she is informed. W.p. $1-\beta$, liquidity traders do not sell either, and so $P = \underline{V} + \widehat{\chi}_5\Delta$; w.p. β they sell and so $P = \underline{V} + \widehat{\tau}\Delta$. The manager's payoff is thus given by:

$$(1-\omega)\,\overline{V} + \omega\left(\underline{V} + \frac{\Delta}{2}\left(\widehat{\chi}_5 + \widehat{\tau}\right)\right) - c.$$

If the manager shirks, firm value is given by $\underline{V}$. If the blockholder is informed (w.p. γ), she sells; if liquidity traders also sell (w.p. $\frac{1}{2}$), then $Q = (-\phi, -\phi)$ and $P = \underline{V}$. If the blockholder is uninformed, and liquidity traders do not sell, then $Q = (0, 0)$ and $P = \underline{V} + \widehat{\chi}_5\Delta$; in all other cases, $Q = (0, -\phi)$ and $P = \left(\underline{V} + \widehat{\tau}\Delta\right)$. The manager's payoff is thus given by

$$(1-\omega)\,\underline{V} + \omega\left(\frac{1}{2}\gamma\,\underline{V} + \frac{1}{2}(1-\gamma)\left(\underline{V} + \widehat{\chi}_5\Delta\right) + \frac{1}{2}\left(\underline{V} + \widehat{\tau}\Delta\right)\right).$$

Comparing these payoffs yields Eq. (11).

Turning to the comparative statics, we first start by demonstrating that $\frac{\partial c_5^*}{\partial \gamma}$ is increasing in ω. The threshold is given by the value of c_5^* that satisfies

$$g_1(c_5^*, \omega, \gamma) \equiv (1-\omega)\,\Delta + \frac{1}{2}\omega\gamma\,\frac{F\left(c_5^*\right)}{F\left(c_5^*\right)\gamma + \left(1 - F\left(c_5^*\right)\right)(1-\gamma)}\Delta - c_5^*,$$

where the dependence on Δ is suppressed for notational convenience. Thus, by the implicit function theorem, we have $\frac{\partial c_5^*}{\partial \gamma}$ given by

$$\frac{\partial c_5^*}{\partial \gamma} = -\frac{\frac{1}{2}\omega\Delta\frac{2F(c_5^*)(1-F(c_5^*))(1-\gamma)}{(F(c_5^*)\gamma+(1-F(c_5^*))(1-\gamma))^2}}{\frac{1}{2}\omega\gamma\,\Delta\frac{(1-\gamma)f(c_5^*)}{(F(c_5^*)\gamma+(1-F(c_5^*))(1-\gamma))^2} - 1}.$$

The numerator is positive. Furthermore, for stable equilibria (one of which always exists), the denominator is negative. To see this, a stable equilibria is one in which the line defined by $h(c_5^*) = (1-\omega)\,\Delta + \frac{1}{2}\omega\gamma\frac{F(c_5^*)}{F(c_5^*)\gamma+(1-F(c_5^*))(1-\gamma)}\Delta$ intersects the 45-degree line from above. For such equilibria, $h'(c_5^*) < 1$, implying that the denominator of $\frac{\partial c_5^*}{\partial \gamma}$ is negative. Therefore, for these equilibria, $\frac{\partial c_5^*}{\partial \gamma} > 0$.

Alternatively, this expression can be written as

$$\frac{\partial c_5^*}{\partial \gamma} = \frac{\omega\Delta F(c_5^*)(1-F(c_5^*))(1-\gamma)}{(F(c_5^*)\gamma + (1-F(c_5^*))(1-\gamma))^2 - \frac{1}{2}\omega\gamma\,\Delta(1-\gamma)f(c_5^*)}.$$

Then, since the numerator is increasing and the denominator is decreasing in ω, for stable equilibria, the response of the threshold to changes in γ becomes more sensitive as ω increases, completing the proof.

Proof that c_5^* is increasing in ϕ with endogenous information acquisition. The threshold c_5^* satisfies

$$\begin{aligned}
&g_2(c_5^*, \phi) \\
&\equiv (1-\omega)\,\Delta + \frac{1}{2}\omega\gamma^*(c_5^*,\phi)\frac{F\left(c_5^*\right)}{F\left(c_5^*\right)\gamma^*(c_5^*,\phi) + \left(1-F\left(c_5^*\right)\right)\left(1-\gamma^*(c_5^*,\phi)\right)}\Delta - c_5^* \\
&= (1-\omega)\,\Delta + \omega\frac{\phi}{4g}\frac{F\left(c_5^*\right)^2\left(1-F\left(\widehat{c}\right)\right)}{\frac{\phi}{2g}F\left(\widehat{c}\right)^2\left(1-F\left(\widehat{c}\right)\right) + \left(1-F\left(c_5^*\right)\right)\left(1-\frac{\phi}{2g}F\left(\widehat{c}\right)\left(1-F\left(\widehat{c}\right)\right)\right)}\Delta - c_5^* \\
&= (1-\omega)\,\Delta + \omega\frac{\phi F\left(c_5^*\right)^2}{4g - 2\phi F\left(\widehat{c}\right) + 4\phi F\left(\widehat{c}\right)^2}\Delta - c_5^*,
\end{aligned}$$

where $\gamma^*(c_5^*)$ is defined as in (12). To derive $\frac{\partial c_5^*}{\partial \phi}$, we again can apply the implicit function theorem. We have

$$\frac{\partial c_5^*}{\partial \phi} = -\frac{\omega\Delta\frac{4gF(c_5^*)^2}{\left(4g-2\phi F(\widehat{c})+4\phi F(\widehat{c})^2\right)^2}}{\omega\Delta\frac{f(c_5^*)\left(2\phi F(c_5^*)(4g-\phi F(c_5^*))\right)}{\left(4g-2\phi F(\widehat{c})+4\phi F(\widehat{c})^2\right)^2} - 1}.$$

The numerator is positive, and again, for stable equilibria, the denominator will be negative. Thus, $\frac{\partial c_5^*}{\partial \phi} > 0$.

APPENDIX B. MODELING TECHNIQUES

This section is a simple overview of the different modeling options available to researchers wishing to write a blockholder theory, and the advantages and disadvantages of each. It also provides a list of papers that use each technique, so the interested reader can analyze the relevant model to learn more (Table 9).

To make it very clear, the goal of this section is *not* to give the impression that modelers have flexibility over what inputs to incorporate to generate the desired result. Rather, tractability is particularly valuable to make the intuition, mechanisms, and empirical implications of a model transparent, and so our goal is to demonstrate various techniques that can be used to achieve tractability. In particular, it demonstrates the limitations of certain simple approaches (e.g. some approaches to modeling trading may not allow the blockholder's trade to be solved endogenously), but in many cases, this limitation is not crucial to the model's main purpose and so it is outweighed by the benefit of simplicity. Similarly, in many cases, the specifics of the modeling setup will not affect the underlying economics, and so the researcher should aim for the most tractable model possible. However, in some cases they may, and the researcher should discuss the robustness of the model's results to different frameworks. Any non-robustness need not automatically be a weakness of the model but may instead be a strength, as

Table 9 Classification of blockholder theories by modeling technique. This table only considers models where the blockholder trades, since the goal is to demonstrate the different ways in which trading can be modeled

Model	Governance	Players[a]	Blockholder's trading motive	Price formation	Initial block size
Shleifer and Vishny (1986)	Voice	1 firm, 1 blockholder	Acquire enough shares to have control rights to intervene	Blockholder trade is observable; small shareholders perfectly infer private information on intervention gains	Exogenous
Admati et al. (1994)	Voice	Multiple firms, 1 blockholder	Diversify risk. No private information	Blockholder trade is observable; small shareholders perfectly infer ex post monitoring level	Exogenous
Maug (1998)	Voice	1 firm, 1 blockholder, liquidity traders	Profit on private information on whether she has monitored	Kyle (1985): market maker observes total order flow	Private Optimum
Kahn and Winton (1998)	Voice	1 firm, 1 blockholder, speculators who may acquire information, liquidity traders	Profit on private information on whether she has monitored	Glosten and Milgrom (1985): market maker observes whether order is sell or buy	Social optimum
Bolton and von Thadden (1998)	Voice	1 firm, many investors (any of which may end up becoming a monitoring blockholder)	Either to satisfy a liquidity shock, or acquire enough shares to have an incentive to monitor. No private information	Patient investors (who have not suffered a liquidity shock) offer a competitive price at which they will buy any number of shares from selling investors	Social optimum

Table 9 (*continued*)

Model	Governance	Players	Blockholder's trading motive	Price formation	Initial block size
Faure-Grimaud and Gromb (2004)	Voice	1 firm, 1 blockholder, 1 speculator, liquidity traders	Satisfy a liquidity shock	Market maker observes individual trades but not trader identity	Social optimum
Admati and Pfleiderer (2009)	Exit – effort	1 firm, 1 blockholder	Satisfy a liquidity shock or profit on private information on firm value	Blockholder trade is observable but not fully revealing due to possibility of liquidity shock	Exogenous
Edmans (2009)	Exit – investment	1 firm, 1 blockholder, liquidity traders	Profit on private information on firm value	Kyle (1985): market maker observes total order flow	Firm value, social, and private optima
Edmans and Manso (2011)	Voice and exit – effort	1 firm, multiple blockholders, liquidity traders	Profit on private information on firm value	Kyle (1985): market maker observes total order flow	Firm value, social, and private optima
Khanna and Mathews (2012)	Trading	1 firm, 1 blockholder, 1 uninformed speculator, liquidity traders	Profit on private information on firm value or counteract manipulation by speculator	Kyle (1985): market maker observes total order flow	Exogenous
Goldman and Strobl (2013)	Exit – effort and investment	1 firm, 1 blockholder, liquidity traders	Profit on private information on firm value	Kyle (1985): market maker observes total order flow	Exogenous

Table 9 (*continued*)

Model	Governance	Players	Blockholder's trading motive	Price formation	Initial block size
Song (2015)	Voice and exit – investment	1 firm, multiple blockholders, liquidity traders	Profit on private information on firm value	Kyle (1985): market maker observes total order flow	Exogenous
Dasgupta and Piacentino (2015)	Exit – effort	1 firm, 1 blockholder, blockholder's end investors	Profit on private information on firm value	Blockholder trade is observable but not fully revealing due to possibility of liquidity shock	Exogenous
Fos and Kahn (2016)	Voice and exit – effort	1 firm, 1 blockholder	Voice: Acquire enough shares to have control rights to intervene. Exit: Profit on private information on firm value	Blockholder trade is observable but not fully revealing due to possibility of liquidity shock	Private optimum
Edmans et al. (2017d)	Voice or exit – effort	Multiple firms, 1 blockholder	Satisfy a liquidity shock or profit on private information on whether she has monitored (voice) / firm value (exit)	Blockholder trade is observable but not fully revealing due to possibility of liquidity shock	Firm value, social, and private optima
Levit (2017)	Voice – communi-cation and trading	1 firm, 1 blockholder	Satisfy a liquidity shock or profit on private information on firm value	Blockholder trade is observable but not fully revealing due to possibility of liquidity shock	Exogenous

[a] All models feature small shareholders. If "liquidity traders" are specified, then these small shareholders sometimes suffer liquidity shocks, and the model also features a market maker. If not specified, then these small shareholders do not suffer liquidity shocks and thus trade discretionarily. They play no role in the model except sometimes to set prices equal to expected value.

it generates empirical predictions as to the situations in which the model's implications will be strongest.

Trading. There are three standard ways to model trading in blockholder models. In the first two, the blockholder is able to profit from her private information; in the third, her trades are fully revealing.

First, the blockholder's trade is directly observable, but not fully revealing because a sale may also result from the blockholder suffering a privately-observed liquidity shock. This is the approach taken by Admati and Pfleiderer (2009) and others, and illustrated in the model of Section 5.1.3. One potential advantage is that it leads to interesting interactions between firms when the blockholder owns a portfolio of firms, since any liquidity shock is at the portfolio level. A potential disadvantage is that such models do not allow an analysis of the effect of liquidity on governance, since there are no liquidity traders or liquidity parameter in such models.[59]

Second, the blockholder's trades are unobservable and camouflaged by the presence of liquidity traders. In turn, there are three ways to model this camouflage. The first is the standard Kyle (1985) setup, where the market maker observes total order flow (the sum of trades by the blockholder and liquidity traders), but not individual components. Examples include Maug (1998) and Edmans (2009). While this is the most standard setup, one potential complication is that, in models where liquidity trader demand is discrete, there may be a multiplicity of potential equilibria. For example, in the model of Section 5.1.4, where liquidity traders sell ϕ or 0, the blockholder's trades are given by $b_1 - b_0 = \phi$ but the precise values of (b_0, b_1) are indeterminate. In some cases (e.g. Maug, 1998), we can assume symmetric trading strategies without loss of generality, but this may not always be the case.

Standard models using the Kyle setup typically feature binary liquidity trader demand, which is simplest but has the same limitation as the first approach, that the blockholder's trade is restricted to discrete amounts. Unlike the first approach, the Kyle setup can also accommodate continuous liquidity trader demand, which allows for the blockholder's trade to also be continuous, and in particular vary with other factors such as block size. Allowing trade to depend on block size may be particularly important in a blockholder trading model, rather than a general informed trading model. The original formulation in Kyle (1985) features normal liquidity trader demand and thus requires

[59] The frequency of the liquidity shock β and the required sale upon a shock ϕ cannot be interpreted as liquidity parameters: while a higher ϕ allows the blockholder to sell more on information and a higher β allows her to profit more on such sales, they also increase the blockholders' losses when suffering a shock. Indeed, since the market maker breaks even, the blockholder's profits under no shock equal her losses under a shock. Thus, her expected trading profits are zero, independent of ϕ and β, whereas liquidity typically increases expected trading profits. Separately, liquidity is a characteristic of a stock, whereas ϕ and β are characteristics of the blockholder.

normal firm value to be tractable. In many blockholder models, binary firm value allows for maximum clarity, and so the model is not tractable with normal liquidity trader demand. (However, see Edmans and Manso, 2011 for a blockholder model with normal liquidity trader demand and normal firm value that uses the standard Kyle setup). Edmans (2009) and Song (2015) introduces exponential liquidity trader demand which allows for the blockholder's trade to be solved endogenously when firm value is binary. This approach is demonstrated in Appendix B.1.

The second is the model of Glosten and Milgrom (1985), where the market maker observes whether an order is a sell or a buy, but not who the order comes from. Thus, it sets separate bid and ask prices conditional on the direction of the order, but cannot condition the price on trader identity. This approach is used in Kahn and Winton (1998). This model has some advantages. First, it can accommodate more general distributions for liquidity trader demand than the Kyle (1985) setup (which typically requires binary, normal, or exponential demand). Second, it assumes that the market maker observes every trade, rather than only the aggregate order flow, and so is arguably a more realistic description of the trading process. Third, it is tractable, because the market maker's price depends only on the direction of the order, and not its volume.[60] However, the third advantage gives rise to a potential disadvantage: since prices are indeed independent of volume, the blockholder is not concerns with price impact—she would trade infinite amounts if possible. Thus, as in many informed trading models, it is necessary to impose exogenous restrictions on amounts that she can trade, and so trade cannot depend on block size.

Third, arguably the simplest setup is for the market maker to observe individual trades, but not the identity of each trader, as in Faure-Grimaud and Gromb (2004) and the model of Section 5.1.2; it is also used in non-blockholder models such as Dow and Gorton (1997). In this case, solving for the blockholder's trading strategy is simple—it is automatic that she needs to match the orders of liquidity traders to avoid being fully revealed. As a result, this approach is only tractable when liquidity trader demand is discrete. The blockholder's trade is then restricted to discrete amounts, and so her trade will not depend on factors such as block size: she has to match liquidity trader demand regardless of her block size. This framework often reduces to the Kyle (1985) model with discrete liquidity trader demand but avoids the problem of multiple equilibria. Note that some models adopting the Kyle (1985) framework with discrete liquidity trader demand assume that the blockholder matches the liquidity trader's demand and

[60] In the original Glosten and Milgrom (1985) model, traders can only trade one unit, and so the price is automatically independent of trading volume. Kahn and Winton (1998) extend the model to allowing traders to trade different amounts (up to a limit) and assume that the price that the market maker sets is independent of the trading volume and only depends on its direction. This approach is also used in Admati and Pfleiderer (1989) and Easley and O'Hara (1992).

do not consider the possibility of other equilibria; this third framework addresses this multiplicity issue.

This third framework has many similarities to Glosten and Milgrom (1985). One difference is that, in Glosten and Milgrom (1985) a trader (in either direction) is *either* the blockholder *or* a liquidity trader. Thus, a trade is never fully revealing (since the trader is unknown), and so both the bid and ask prices are non-trivial. This is somewhat similar to the model of Section 5.1.3 where the blockholder's trade is fully observed and the blockholder is *either* trading discretionarily *or* due to a liquidity shock. In the third framework, both the blockholder and the liquidity trader trade simultaneously. As a result, many order flows are fully revealing: for example, in Eq. (13), order flow $(0, 0)$ fully reveals that the blockholder did not sell, and $(-\phi, -\phi)$ fully reveals that she did. Thus, in many cases, there is only one non-trivial price that needs to be solved for ($(0, -\phi)$ in Eq. (13)), simplifying the model.

Third, if the blockholder's trade is not motivated by the desire to earn informed trading profits, we can dispense with both liquidity trades and liquidity shocks. There are a number of potential motives to trade other than private information. First, in Shleifer and Vishny (1986), the blockholder wishes to buy additional shares as she requires a minimum threshold to intervene. While the blockholder has private information (in this case, on the gains from intervention), she is unable to profit from it, as selling shareholders rationally infer her private information. Second, in Admati et al. (1994), the blockholder is risk-averse and wishes to trade to diversify her risk. Third, in Bolton and von Thadden (1998) and Faure-Grimaud and Gromb (2004), the blockholder's trades are motivated by liquidity needs. Unlike in the model of Section 5.1.3, she never has private information and so a sale is fully revealing of a liquidity shock.

The action. In voice models, the action (that affects firm value) is undertaken by the blockholder, and typically improves firm value but imposes a cost on her.[61] There are two ways to model this action. The first is for the blockholder not to have any private information on its benefit Δ or cost c. In this case, if the blockholder pursued a pure strategy, the action would be perfectly predictable and priced in. As a result, she would not earn any informed trading profits. To generate the possibility of informed trading profits, she must pursue a mixed strategy, as in Kahn and Winton (1998) and Maug (1998).

An alternative is to give the blockholder private information, either on the cost of intervention (as in Edmans et al., 2017d) or on noise trader demand (as in Kyle and Vila, 1991). The blockholder plays a pure strategy: a threshold strategy where the action depends on whether this privately-observed parameter is above or below a threshold.

[61] A quite separate voice action is studied by Levit (2017), where voice involves the blockholder communicating private information to guide the manager's action, in a cheap-talk framework.

However, since the market does not observe this parameter, her strategy appears as a mixed strategy, and so the blockholder again can earn informed trading profits.

In exit models, the action is undertaken by the manager. There are two potential actions. One is a standard effort action which, similar to the blockholder action in a voice model, improves firm value but imposes a cost on the manager. Again, this can be modeled in two ways: either the manager pursues a mixed strategy, or he has private information. This private information may be on the cost of working / private benefit from shirking (as in Dasgupta and Piacentino, 2015 and Edmans et al., 2017d) or on the value destroyed by shirking (as in Admati and Pfleiderer, 2009 and Fos and Kahn, 2016). The second is an investment action which does not impose a cost on the manager, but improves long-run value at the expense of short-term earnings, as in Edmans (2009).[62] For low short-term earnings to reduce the stock price, it is necessary to introduce low-type firms, which deliver low short-term earnings and low fundamental value.

Block size. Blockholder models typically generate predictions relating block size to underlying parameters, to generate empirical predictions. There are three approaches to determining block size. The first is the block size that maximizes firm value. This is hypothetically interesting as it leads to maximum governance, but is unlikely to be observed empirically. The second is the social optimum that maximizes total surplus—firm value minus monitoring costs (trading profits are at the expense of liquidity traders so do not feature). This is the approach taken by Burkart et al. (1997), Kahn and Winton (1998), and Faure-Grimaud and Gromb (2004). This optimum is likely to be chosen upon an initial public offering, but may not persist thereafter. The third is the private optimum that maximizes the blockholder's payoff, which is the approach taken by Maug (1998), Edmans (2009), Edmans and Manso (2011),[63] and Fos and Kahn (2016).

B.1 Exponential liquidity trader demand

Most corporate finance applications of the Kyle model use binary firm value and thus cannot solve for trading volumes endogenously; they therefore must restrict them to exogenous amounts that are then necessarily independent of initial holdings. Edmans (2009) introduces exponential liquidity trader demand, which allows for the blockholder's trade to be solved in closed form in a model with binary firm value; this framework has since been used by Song (2015). We refer the reader to Edmans (2009)

[62] The blockholder's action could similarly be modeled as an investment decision, rather than only an effort decision. We are unaware of any papers that do so at present, but this is a potential area for future research.

[63] These two papers also solve for the firm value and social optima.

for proofs. Now, the liquidity trade is given by

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

where $\lambda = \frac{1}{\nu(1-\alpha)}$. The mean liquidity trade is $\frac{1}{\lambda}$, so λ is inversely related to liquidity (similar to the Kyle, 1985 model where "λ" reflects price impact). As in the model of Section 5.1, liquidity is increasing in a liquidity parameter ν and free float $(1-\alpha)$. In an exit model, the probability that $V = \overline{V}$ will depend on the manager's effort threshold; since the goal of this section is to demonstrate the effect of exponential liquidity trader demand on the blockholder's trading volumes, we model the probability that $V = \overline{V}$ as being drawn by Nature and set it to $\frac{1}{2}$ as this substantially simplifies the expressions.

There is one additional complication: when liquidity trader demand is continuous, the blockholder has an incentive to sell a small amount if uninformed (whereas, with discrete h, an uninformed blockholder does not trade since selling a small amount would be fully revealing). Intuitively, since she sells zero if she knows that $V = \overline{V}$, she will wish to sell a strictly positive amount if she is uninformed: no news should lead her to sell more than good news. Solving for this amount is feasible, but would further complicate the model. We thus model the blockholder as always having a signal, and instead the investigation effort γ affects the precision of the signal. This contrasts with the model in Section 5.2 where γ represents the probability of having a perfect signal on V.

Specifically, the blockholder has signal $s \in \{\underline{s}, \overline{s}\}$, where

$$\Pr\left(\overline{s}|\overline{V}\right) = \Pr\left(\underline{s}|\underline{V}\right) = \frac{1}{2} + \frac{1}{2}\gamma$$
$$\Pr\left(\underline{s}|\overline{V}\right) = \Pr\left(\overline{s}|\underline{V}\right) = \frac{1}{2} - \frac{1}{2}\gamma.$$

The posterior probabilities that $V = \overline{V}$ are given by

$$\Pr\left(\overline{v}|\overline{s}\right) = \frac{1+\gamma}{2}$$
$$\Pr\left(\overline{v}|\underline{s}\right) = \frac{1-\gamma}{2}.$$

If $\gamma = 0$, the blockholder's signal is uninformative and the posterior equals the prior, $\widehat{\tau}$; if $\gamma = 1$, the blockholder knows V with certainty. As before, investigation of γ costs her $\frac{1}{2}g\gamma^2$.

If the blockholder observes $s = \underline{s}$, she now sells

$$\underline{b} = \min\left(\frac{1}{\lambda}, \alpha\right).$$

Absent short-sales constraints, she would sell $\frac{1}{\lambda}$ as this optimizes the trade-off between selling more to profit more from her information, and selling less to avoid revealing her information. This amount is increasing in liquidity ν and free-float $(1-\alpha)$ as both increase liquidity trading. However, due to short-sale constraints, she cannot sell more than α. As a result, her monitoring effort is given by

$$\gamma = \frac{\underline{b}\Delta}{4g} \tag{16}$$

and the market maker sets prices

$$\begin{cases} P = \underline{V} + \frac{1-\gamma}{2}\Delta = \underline{V} + \widehat{\chi}_l\Delta & \text{if } d \le 0 \\ P = \underline{V} + \frac{1+e^{-\lambda\underline{b}}+\gamma\left(1-e^{-\lambda\underline{b}}\right)}{2\left(1+e^{-\lambda\underline{b}}\right)}\Delta = \underline{V} + \widehat{\chi}_h\Delta & \text{if } d > 0. \end{cases} \tag{17}$$

Thus, the blockholder's monitoring effort (17) is linear in $\underline{b}$, the amount that she expects to sell upon a bad signal $\underline{s}$. In turn, the maximum salve volume $\underline{b}$ is given by

$$\underline{b} = \alpha^* = \frac{\nu}{\nu+1}.$$

Since γ is linear in $\underline{b}$, it is maximized at $\alpha = \alpha^*$. Thus, for $\alpha < \alpha^*$, a larger initial stake raises the amount that the blockholder can sell upon negative information, and thus her incentives to become informed to begin with. Simply put, the benefits of information are higher as the blockholder can make more use of it.

The advantage of this setup is that the blockholder's trade depends not only on market liquidity but also on block size. This is because liquidity trader demand is not discrete. As a result, the blockholder does not need to match discrete liquidity trader demands, and so her trade can depend continuously on block size; in turn, monitoring effort depends on block size. A disadvantage is that, if the model is extended to allow for purchases, an upper bound must be placed on the maximum purchase that the blockholder can make—see the Internet Appendix of Edmans (2009).

We now turn to expected prices. If $V = \overline{V}$, the firm has a $\frac{1}{2} + \frac{1}{2}\gamma$ probability of emitting signal $\overline{s}$, in which case the blockholder does not sell and $P = \underline{V} + \widehat{\chi}_h\Delta$. It has a $\frac{1}{2} - \frac{1}{2}\gamma$ chance of emitting $\underline{s}$, in which the blockholder sells. If $h \le \underline{b}$ (w.p. $1 - e^{-\lambda\underline{b}}$), then $d \le 0$ and $P = \underline{V} + \widehat{\chi}_l\Delta$, else $\underline{V} + \widehat{\chi}_h\Delta$. The expected stock price of a good firm is

$$E\left[P|\overline{V}\right] = \frac{1}{2}\left(\gamma^2\frac{1-e^{-\lambda\underline{b}}}{1+e^{-\lambda\underline{b}}} + 1\right) = \underline{V} + \widehat{\chi}_{\overline{V}}\Delta$$

This price is increasing in $\widehat{\chi}_{\overline{V}}$, which in turn is affected by block size α as follows:

$$\frac{\partial \widehat{\chi}_{\overline{V}}}{\partial \alpha} = \underbrace{\frac{\gamma^2 \lambda e^{-\lambda\alpha}}{\left(1+e^{-\lambda\alpha}\right)^2}}_{\textit{trading effect}} + \underbrace{\frac{\gamma^2 \frac{\alpha\lambda}{1-\alpha} e^{-\lambda\alpha}}{\left(1+e^{-\lambda\alpha}\right)^2}}_{\textit{camouflage effect}} + \underbrace{\gamma^2 \frac{1-e^{-\lambda\alpha}}{1+e^{-\lambda\alpha}} \frac{\partial \gamma^2}{\partial \alpha}}_{\textit{effort effect}}.$$

The "trading effect" is the direct impact of α. It is positive if and only if $\alpha < \alpha^*$, since an increase in α raises the amount sold by the blockholder upon negative information. Simply put, if the blockholder trades more, her trading (or non-trading) impounds more information into prices.

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

The "effort effect" operates indirectly through α affecting γ. This effect is positive if and only if $\frac{\partial \gamma}{\partial \alpha} > 0$, that is, $\alpha < \alpha^*$. Increased investigation effort leads to the blockholder receiving a more informative signal, and so her trades convey greater information about V. Overall, if $\alpha < \alpha^*$, all three effects are positive, and so an increase in α raises market efficiency. By similar intuition to Section 5.2, this in turn increases managerial effort.

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