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Information flows, organizational structure, and corporate governance

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I am grateful to David Denis (Editor), Doron Levit, and Andrey Malenko for valuable feedback.

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This survey provides an overview of theoretical and empirical research on information flows in corporations. It highlights key frictions preventing effective information flows and discusses how organizational structure and corporate governance can alleviate these frictions, focusing on three broad topics: 1) organizational design, such as the choice between centralized and decentralized decision-making; 2) composition and decision-making process of the board of directors; and 3) communication among shareholders and between shareholders and management in the context of shareholder activism. The goal of the survey is to draw connections between theoretical and empirical work and point out directions for future research.

Keywords: information flows, communication, organizational design, corporate governance, allocation of authority, centralized decision-making, delegation, board of directors, shareholder activism

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Abstract

This survey provides an overview of theoretical and empirical research on information flows in corporations. It highlights key frictions preventing effective information flows and discusses how organizational structure and corporate governance can alleviate these frictions, focusing on three broad topics: 1) organizational design, such as the choice between centralized and decentralized decision-making; 2) composition and decision-making process of the board of directors; and 3) communication among shareholders and between shareholders and management in the context of shareholder activism. The goal of the survey is to draw connections between theoretical and empirical work and point out directions for future research.

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1 Introduction

1 Effective corporate decision-making requires information. However, relevant information is dispersed among multiple agents and is not concentrated in the hands of decision-makers. For example, the CEO deciding whether to expand production of a product needs information of the product manager about the anticipated demand for the product; moreover, the CEO may need information from the managers of other divisions to allocate resources between multiple divisions and products most efficiently. Likewise, the headquarters approving a corporate loan needs the information of the local bank branch officer about the characteristics of the borrower and the local economy. Another example is the board deciding whether to support an acquisition proposed by the CEO: the board's decision reflects the information of multiple board members, who may have expertise in different areas, as well as the information provided by the CEO. Finally, shareholders of the firm may possess valuable information that they may want to communicate to the management and incorporate into corporate decisions.

In all these examples, information may not be perfectly shared between informed parties and decision-makers. First, communication can be imperfect due to physical, geographical, and cultural barriers. Furthermore, efficient communication can be prevented by misalignments in interests: the product manager may overstate the demand for his product due to career concerns, and the CEO may overstate the expected merger synergies given his empire-building incentives. Imperfect communication, in turn, may decrease the incentives of agents to collect information in the first place, exacerbating inefficiencies.

2 How do the firm's organizational structure and corporate governance affect information production and use? Are centralized or decentralized companies more efficient? When should the headquarters delegate authority to divisional managers, and when should the board delegate authority to the CEO? How should the board be structured to enhance information flows among directors and between the board and the CEO? What strategy should an activist investor pursue to communicate his views effectively to other shareholders and management? The goal of this survey is to review a growing theoretical and empirical literature that aims to answer these questions and to highlight the areas that are underexplored.

The survey is organized as follows. Section 2 discusses the impediments to information flows inside firms, both due to technological and geographical constraints and, importantly, due to agency conflicts among parties. The theoretical framework presented in this section serves as the basis for many subsequent implications for organizational design and corporate governance. Section 3 then discusses the related literature on the role of organizational

design and allocation of authority for information flows inside the firm.[1] Section 4 surveys the literature that studies the implications for firms' corporate governance practices, focusing on the board of directors and shareholder activism. For each of these topics, I first discuss the relevant theoretical literature, and then present the empirical evidence focusing on both established and missing links to the theoretical frameworks. Finally, Section 5 outlines several potential directions for future research.

2 Impediments to information flows within firms

3

Communication between agents in the organization can be imperfect for two complementary reasons. The first is that information is inherently complex, and geographical, technological, and cultural barriers make it difficult and costly to convey efficiently. According to Dewatripont and Tirole (2005, p.1218), the sender of information "must expend time, attention, and other resources to communicate her knowledge effectively. Because the same message may convey different meanings to different receivers, the sender must address the receiver's knowledge (absorptive capacity, language, perspective)."

The second important reason is that the interests of the informed "sender of information" and the interests of the "receiver of information" are often misaligned. Whenever information is soft and non-verifiable, such misalignment of interests may discourage the sender from truthfully communicating his information, leading the receiver to mistrust what the sender is saying. In what follows, I present the basic framework of communication of non-verifiable information between an informed but biased sender and an uninformed receiver, focusing on the following questions. What does the quality of communication depend on? How much information can be communicated? And how efficient is the decision-making?

2.1 How conflicts of interest impede communication

This section introduces the basic "cheap talk" model of communication from a seminal paper by Crawford and Sobel (1982). Suppose there are two players: an informed agent (sender) and an uninformed principal (receiver). The principal needs to choose an action, and the payoffs from his decision depend on the unknown state θ. The agent privately observes the state and communicates with the principal by sending her a message. Information is non-

[1] These questions are closely related to many other issues studied in organizational economics. Comprehensive coverage of this topic is beyond the scope of this survey (see Gibbons and Roberts (2012) for an exhaustive overview).

verifiable (talk is "cheap"), so the agent can misreport.[2] The principal then takes action $a \in \mathbb{R}$, and the payoffs of the principal and the agent are, respectively:

$$\begin{aligned} U^P(a,\theta) &= -(a-\theta)^2, \\ U^A(a,\theta,b) &= -(a-(\theta+b))^2. \end{aligned}$$

Hence, the principal's optimal action is θ, whereas the agent's optimal action is $\theta + b$, and b reflects the conflict of interest between the two. For simplicity, I will present the solution for a uniform distribution of the state, $\theta \sim U[0,1]$. However, the assumptions of a uniform state, continuous actions, and quadratic payoffs are made for simplicity and are not material for the key insights and comparative statics.[3] The assumption that the principal is uniformed about the state has also been relaxed in several studies discussed below.

This setup can capture many different applications, for example:

1. The divisional manager (agent) proposes a project to the headquarters (principal), which decides how much to invest (a). The expected cash flows from the project depend on state θ, and the divisional manager wants to overinvest ($b > 0$). A special case is a local bank branch officer proposing a loan to the headquarters for approval.

2. The CEO (agent) has information about the value of a potential acquisition, and the board (principal) decides on the price (a) to offer for the target. Both the CEO and the board would like to offer a higher price if the target's stand-alone value and synergies are higher (higher θ), but the CEO has empire-building incentives, leading to $b > 0$.

3. A shareholder activist (agent) proposes a change in strategy to the manager (principal). While both care about shareholder value, they have different preferences due to private benefits of the manager or potential short-termism of the activist.

How effective is communication? The general insight is that unless preferences are fully aligned (i.e., $b = 0$), communication is not entirely efficient and some information is lost. Intuitively, if communication were efficient and the agent could always convince the

[2] In addition to cheap talk, the literature has modeled communication as disclosure of verifiable information (e.g., Verrechia, 1983) or as Bayesian persuasion, where the sender commits to an information disclosure policy (Kamenica and Gentzkow, 2011). While most papers surveyed in subsequent sections consider a cheap talk setting, a few rely on these alternative models as well.

[3] See Crawford and Sobel (1982) for a setup with a general distribution of the state and general payoff functions U^P, U^A. The literature has also analyzed settings with binary actions and/or binary states.

manager that the state is θ, the principal would take action $a = \theta$. But then the agent would have incentives to misreport and claim that the state is $\theta + b$.

Instead, communication is typically partially effective, with some information being conveyed, but some of it being lost. In particular, all equilibria have a "partition" structure, where the agent can only credibly convey that the state lies in some interval $[\theta_{i-1}, \theta_i]$, $i = 1$, ..., N. Such an equilibrium is illustrated in Figure 1: for all states in the interval $[\theta_{i-1}, \theta_i]$, the agent sends the same message m_i, and the principal takes the same action $a(m_i)$, which is his expectation of the state given the agent's message, i.e.,

$$a_i = \mathbb{E}[\theta | m_i] = \frac{\theta_{i-1} + \theta_i}{2}.$$

Note that the principal's action is unbiased but is not fully informed, and hence inefficient. The principal's and agent's expected utility in this equilibrium are, respectively,

$$\begin{aligned} EU^P &= -\sigma^2 \\ EU^A &= -\left(\sigma^2 + b^2\right), \end{aligned}$$

where σ^2 is the residual variance, which decreases in N, the number of partitions.

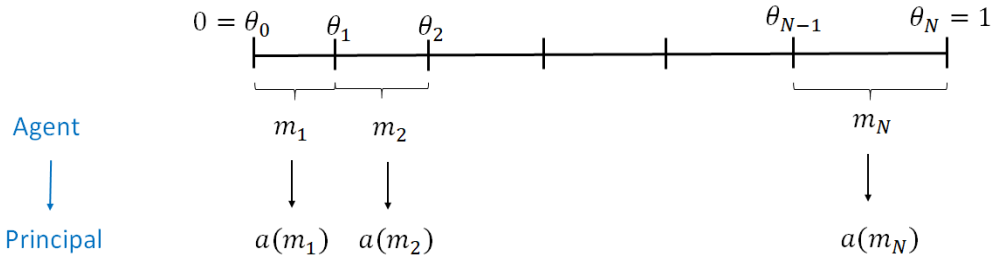

Figure 1. Equilibrium in a cheap talk game. The figure illustrates the equilibrium of a cheap talk game in which the agent sends a message about the state $\theta \in [0, 1]$ to the principal. The agent's message is m_i and the principal's response to this message is action $a(m_i)$.

While there are typically multiple equilibria of this type corresponding to different values of N, with N ranging from 1 to some maximum number of partitions $n(b)$,[4] the literature

[4]In particular, even if there are equilibria with some information transmission ($N > 1$), there also always exists an uninformative (so called "babbling") equilibrium with $N = 1$, where no information is conveyed. Intuitively, if the agent's messages are uncorrelated with the state (e.g., if he always sends the same message), then the principal optimally ignores anything the agent says, but then the agent has no incentive to deviate and make his messages informative.

usually focuses on the equilibrium that features the most efficient communication ($N = n(b)$) because it is preferred by both parties. The key property is that as the conflict of interest becomes stronger, communication becomes less efficient, in the sense that $n(b)$ decreases and the expected utility of both the principal and the agent decreases as well. Once b exceeds a certain cutoff, the only possible equilibrium is where no information is conveyed, i.e., $n(b) = 1$. On the other hand, if b becomes infinitely small, $n(b)$ approaches infinity, so communication becomes perfectly efficient.

4 **Summary.** Overall, conflicts between informed agents and decision-makers are an important impediment to communication, leading to information loss and less efficient decision-making. Moreover, if we now think about agents' incentives to acquire information, there can be a further loss in efficiency: knowing that their information will not be used by decision-makers, agents may exert less effort to become informed, exacerbating the problem.

One way to alleviate these inefficiencies is to align the interests of the agent and the decision-maker. The literature has focused on two key mechanisms to accomplish this. One is to delegate control to the agent, so that he becomes the decision-maker himself. This solution has important implications for the firm's organizational structure (such as whether it should be centralized or decentralized) and corporate governance (such as how much control to give to the CEO). The second mechanism is to strategically change the preferences of the principal to move them closer to those of the agent. For example, in the case of board-CEO communication, this can be accomplished by making the board less independent and more CEO-friendly. Of course, both mechanisms also entail a cost: decision-makers become more biased, which creates a different source of inefficiency. This trade-off between bias and information loss is at the core of many implications discussed below.

3 Organizational design and information flows

The way firms are organized – whether decision-making is centralized or decentralized, who has authority over which decisions, how many hierarchical layers there are – has important effects on the way information flows within the firm and on agents' incentives to produce information. This section first reviews the literature that studies these questions from the theoretical perspective (Section 3.1) and then discusses the empirical evidence on the link between organizational structure and information acquisition and use (Section 3.2).

3.1 Theoretical literature

The discussion of the theoretical literature is organized as follows. Section 3.1.1 takes the quality of agents' information as given and asks how organizations should be structured to make efficient use of this information. Section 3.1.2 focuses on the role of organizational design for agents' incentives to invest in information acquisition. The papers surveyed in both of these sections focus on inefficiencies in communication and information acquisition due to misaligned incentives between parties. Finally, Section 3.1.3 abstracts from incentive issues and discusses other theories of organizational structure, which focus on direct (e.g., technological or geographical) information processing and communication frictions.

3.1.1 Allocation of authority and efficient use of information

When should decision-making be centralized, with decision-making authority concentrated at upper organizational levels, and when should it be decentralized, with authority delegated to lower levels? A large theoretical literature studies this question. The broad trade-off emphasized in this literature is the following. Delegating authority to lower-level managers allows for a more effective use of these managers' information, which tends to be more local and specialized. In contrast, under centralized decision-making, this information would need to be communicated to upper organizational layers and would often be lost due to communication frictions. However, delegation also has a disadvantage: delegating authority to lower-level managers may not effectively implement the headquarters' objective, either because the managers' interests are different from those of the headquarters, or because of the headquarters' need to coordinate decisions across multiple divisions.

An influential paper by Dessein (2002) focuses on misaligned preferences as the key factor driving both the costs and benefits of delegation. It considers a setting similar to that in Section 2.1 and compares the quality of decision-making under two organizational structures: (1) the principal (e.g., headquarters) retains decision-making authority and communicates with a biased agent (e.g., divisional manager) prior to making the decision; and (2) the principal delegates authority to the agent, who thus becomes the decision-maker. Consistent with the general trade-off described above, the pros and cons of delegating authority are the following. If the principal retains authority, she takes decisions that are unbiased from her perspective but that do not fully utilize the agent's information. If she delegates authority, the agent's decisions are biased but fully utilize his information. As the conflict of interest between the parties becomes stronger, the principal is worse off under both organizational

structures: under centralization, there is more information loss in communication, whereas under delegation, the agent's decisions are farther from what the principal would pick.

6 Which allocation of authority gives the principal the highest payoff? Dessein (2002) shows that when the conflict of interest is sufficiently large, the centralized structure is superior. Intuitively, as the agent's bias increases, the principal's loss from delegation is unlimited, whereas her loss from keeping authority is limited: the worst she can do is make an uninformed unbiased decision. In contrast, if the conflict of interest is small enough, then delegation is superior. Overall, delegation should be more likely in situations when the agent's informational advantage is large relative to his bias. In addition, it should be more likely when the principal is more risk-averse, because in this case, the inefficiency from information loss is particularly costly for her.

7 Harris and Raviv (2005) analyze the optimal allocation of authority when not only the agent, but also the principal is informed and has information that is complementary to the agent's information. In such situations, efficient decisions should be based on the combined information of the two parties. As a consequence, delegation and centralization have an additional cost and benefit, respectively: under delegation, the principal's information needs to be communicated to the agent and may get lost in the process, whereas under centralized decision-making, the principal's information is used efficiently. Harris and Raviv (2005) show that for delegation to be optimal, the agent's information has to be sufficiently more valuable than the principal's. They thus predict that projects such as entering a new geographical market are more likely to be approved at the centralized level compared to projects such as expansion in one's country territory: the division manager's information is likely to be relatively more important for the latter type of projects.

Dynamic decisions

The insights in Dessein (2002) and Harris and Raviv (2005) apply to decisions that are static, such as choosing the scale of an investment project or the offer price for a target. However, many corporate decisions deal with the optimal timing of taking an action. Examples include the timing of a new product launch or the timing of shutting down a local bank branch. Grenadier, Malenko, and Malenko (2016) analyze the choice between centralized and decentralized decision-making for such real option decisions and show that the implications are different from those for static decisions. For static decisions, such as choosing the scale of a project, the key driver of the optimal allocation of authority is the *magnitude* of the

agent's bias, whereas the direction of the bias (e.g., whether the agent is biased towards larger or smaller investments) does not matter. In contrast, the key driver for timing decisions is the *direction* of the bias, i.e., whether the agent is biased towards early or late exercise of the real option. Grenadier et al. (2016) show that if the agent has a bias towards delay (e.g., if the local bank branch manager is biased towards a later shutdown of the branch due to personal costs of relocation), communication between the agent and principal is efficient. As a result, centralized decision-making is *always* superior to delegation. In contrast, if the agent is biased towards early exercise (e.g., if a divisional manager is biased towards an earlier investment into a divisional project due to empire-building incentives), communication is inefficient and delegating control can be optimal. The reason is the asymmetric nature of time: while the principal can always choose to exercise the real option at a point later than the present, he cannot do the reverse, i.e., exercise at a point earlier than the present. The inability to go back in time gives the principal implicit commitment power to follow the agent's advice and makes communication between them effective. In addition, the asymmetric nature of time has predictions for the informativeness of option exercise decisions in centralized organizations: the agent's information is likely to explain more variation in the timing of option exercise for decisions with a late exercise bias (e.g., shutting down a bank branch) than for those with an early exercise bias (e.g., launching a new product).

Multi-divisional firms

8 Decisions on centralization vs. delegation are more complicated in firms with multiple divisions: in such firms, information is dispersed and needs to be communicated not only vertically (i.e., between the headquarters and a lower-level manager) but also horizontally (i.e., across multiple divisional managers). Moreover, it may be important to coordinate decisions across divisions: such coordination is often crucial on issues related to production, pricing, and marketing. Alonso, Dessein, and Matouschek (2008) and Rantakari (2008) study the optimal allocation of authority in such a setting. A general conclusion in this literature is that centralized firms are more efficient at coordinating decisions across divisions, whereas decentralized firms are typically more efficient at adapting decisions to the individual circumstances of each division. However, there are important subtleties related to horizontal and vertical information flows, which are worth discussing.

The focus in Alonso, Dessein, and Matouschek (2008) and Rantakari (2008) is on the trade-off between coordination and adaptation: the stronger is the extent of coordination

and synchronizing across divisions, the harder it is to adapt decisions to the local conditions of each division. Such a trade-off is often faced by firms operating in multiple regions: for example, coordinating product design across regions can help the firm achieve economies of scale and reduce costs, but comes at the expense of revenue because products are less tailored to the local tastes of consumers. Regional managers are likely to be well-informed about local tastes, but they are also biased towards maximizing the profits of their own divisions, rather than the value of the entire firm. This creates a conflict between each regional manager and the headquarters and thus impedes vertical information flows under centralization. In addition, it creates a conflict between regional managers, impeding communication between them (horizontal information flows) under decentralization.

The key predictions emerging in this setting are as follows. First, there should be a positive association between the need for coordination and the degree of centralization. Second, as shown in Alonso et al. (2008), this positive association only arises if regional managers are sufficiently biased towards maximizing the profits of their divisions. In contrast, if their incentives are relatively aligned with overall firm value maximization, then the firm should be decentralized even if the need for coordination is very strong.

Other papers in this literature derive additional insights about the trade-off between adaptation to local conditions and coordination between divisions. Rantakari (2008) shows how asymmetric organizational structures, where some divisions are centralized and others are decentralized, arise when divisions are asymmetric in the weights they place on adaptation vs. coordination. Alonso et al. (2015) highlight that the optimal organizational structure depends on whether production decisions of different divisions are complements or substitutes. Dessein and Santos (2006) also study the trade-off between adaptation and coordination, but focus on technological constraints to communication and assume away incentive problems. Gibbons, Matouschek, and Roberts (2013) provide a survey of the broader literature.

Internal capital markets and capital budgeting

The question of coordination across divisions is tightly linked to the literature on internal capital markets, which asks another important question: how are scarce resources, such as capital, production capacity, or human capital, allocated across multiple business units? The theoretical literature on internal capital markets typically takes the organizational structure as given. In particular, it considers centralized decision-making and asks how asymmetric information and conflicts of interest affect the allocation of resources, focusing on issues such

as rent-seeking activities of divisional managers, "socialist" preferences of the headquarters, and cross-subsidization of weak divisions by the strong ones (e.g., Milgrom, 1988; Milgrom and Roberts, 1988; Rajan, Servaes, and Zingales, 2000; Scharfstein and Stein, 2000). Because this literature typically abstracts from questions of allocation of authority and the choice between centralization and delegation, this survey does not present its detailed overview. Comprehensive surveys of both theoretical and empirical research in this area are provided by Stein (2003) and Gertner and Scharfstein (2012).

Another related strand of the literature is on capital budgeting: this literature studies the process of allocating capital as the solution to a mechanism design problem. It includes Antle and Eppen (1985) and Harris and Raviv (1996, 1998) in the context of a single division; Harris, Kriebel, and Raviv (1982) and Bernardo, Cai, and Luo (2004) in the context of multiple divisions; and Malenko (2019) in a dynamic context. Unlike these papers, which study optimal contracts, the focus of this survey is on incomplete contracts, in which only the allocation of authority is contractible.[5]

3.1.2 Allocation of authority and information acquisition

9 The papers described in Section 3.1.1 focus on communication and efficient use of information. In addition, organizational structure can affect agents' incentives to produce information. In two influential papers, Aghion and Tirole (1997) and Stein (2002) show that delegating authority to the agent can encourage the agent to acquire more information.

In Aghion and Tirole (1997), the firm has access to three projects. It is known that one project brings a large negative payoff to both the principal (e.g., headquarters) and agent (e.g., divisional manager). It is also known that two other projects bring non-negative payoffs to both parties, but the parties may rank them differently. Without any information, all projects look identical. Both the principal and agent first exert costly effort to acquire private information about the projects; their signals are substitutes. Next, the party without authority (e.g., agent under a centralized structure) proposes a project to the party that has authority, and that party can either rubberstamp the proposed project choice or overrule it.

The first key insight of Aghion and Tirole (1997) is the distinction between *real* and *formal authority*: even if the principal has formal authority but is less informed relative to the agent, the agent often has real authority. To see this, suppose the agent is informed

[5] The question of dynamic allocation of authority in an optimal contracting framework is also studied by Chen (2022).

and the principal is completely uninformed. Then, the agent will propose his preferred project and the principal will rubberstamp it, effectively giving the agent complete real authority. Intuitively, by overruling the agent, the principal risks picking the project with a large negative payoff, whereas rubberstamping the agent's choice brings the principal a non-negative payoff. Thus, information becomes the source of real authority.

The second key insight is that delegating formal authority to the agent gives him stronger incentives to become informed. This is because if the principal retains authority and is partly informed himself, she will sometimes overrule the agent's proposed project. But then acquiring information is less valuable to the agent since his research efforts can be wasted. Of course, delegation of authority also entails a cost: like in the papers described in Section 3.1.1, the agent's decisions are not always aligned with the principal's preferred choice. This trade-off implies that decisions are more likely to be centralized if the principal is sufficiently informed: since the agent's and principal's signals are substitutes, the marginal benefit of encouraging the agent's information acquisition is then low. This prediction is similar to the prediction of Harris and Raviv (2005) discussed above, although the mechanism is different.

10 **Hard vs. soft information**. Stein (2002) also studies how the allocation of authority affects information acquisition, but emphasizes the difference between non-verifiable (soft) and verifiable (hard) information: by assumption, hard information can be credibly conveyed across organizational layers, whereas soft information cannot. This difference leads to very different implications for organizational design. If information is soft, then a decentralized structure encourages more information acquisition by the divisional manager. The reason is similar to that in Aghion and Tirole (1997): having decision-making authority reassures the divisional manager that he can act on the information he has produced. In contrast, if information is hard, then information acquisition incentives are stronger under a centralized structure. Intuitively, by acquiring hard information, divisional managers become their own advocates: if they can produce positive information about their division's projects, they can credibly pass it on to their superiors and convince them to increase their capital budgets. Thus, Stein (2002) predicts that as information becomes harder, centralization becomes more likely. A good example is small-business lending: a lot of information about small businesses is likely to be soft, especially in case of relationship-based lending, which gives decentralized banks an advantage. However, as credit scoring models (which provide hard information) become more sophisticated and widely adopted, the comparative advantage of small decentralized banks in this area may decrease.

Summary. Overall, the literature surveyed in Sections 3.1.1 and 3.1.2 shows that when information is soft, decentralization both encourages information acquisition by lower-level managers and more efficiently utilizes the information they acquire. At the same time, decentralization comes at a cost: the interests of lower-level managers may differ from those of the headquarters, and centralized firms may be more efficient at coordinating the actions of multiple divisions and allocating resources across them.

3.1.3 Technological constraints to information flows

In the papers discussed in Sections 3.1.1 and 3.1.2, the loss of information occurs because of conflicts between agents and incentive problems (i.e., incentives to misreport information or underinvest in its acquisition). A related strand of the literature points out that costs of communication and information processing would arise without any incentive problems and even if all agents work as a team. In particular, it takes time and effort for agents to absorb and process information; it also takes time and effort to convey information efficiently. These costs of processing and communicating information are likely to decrease as information technologies become more sophisticated, suggesting that organizational design should change in response to technological developments. This section discusses two influential papers in this line of work, Bolton and Dewatripont (1994) and Garicano (2000), which both focus on the trade-off between information processing costs and communication costs (see Garicano and Van Zandt (2013) for a broad survey of this literature).

11 Bolton and Dewatripont (1994) posit that to reduce the costs of information processing, agents can specialize in processing particular types of information. Such specialization, however, requires agents to communicate with each other, which involves communication costs. When the benefits of specialization outweigh the costs of communication, it is optimal for multiple agents to work as a team within one firm, but to economize on communication costs, the firm should have a centralized structure. In particular, to avoid the unnecessary duplication in communication, communication should take a pyramidal form, with each agent sending information to at most one other agent (his direct superior). Bolton and Dewatripont (1994) predict that a reduction in communication costs due to technological developments should result in flatter organizations, with a smaller number of hierarchical layers.

Garicano (2000) shows that it is efficient to organize the firm as a "knowledge-based hierarchy," where knowledge about the easiest and most common tasks is accumulated at lower levels of the organization, whereas knowledge about more difficult tasks is accumulated

at higher levels. In such a structure, lower-level employees ("production workers") only acquire the basic knowledge necessary to produce and, when facing a problem they cannot solve, refer it to the next layer of the organization, formed by specialist "problem solvers." By adding layers of problem solving, the firm economizes on information acquisition costs but increases the costs of communication. Garicano (2000) predicts that developments in information technology will generally make organizations "flatter" by reducing the number of layers of workers with specialized knowledge. However, the effects on the scope of decision-making by lower-level workers are more ambiguous: if technological developments primarily decrease the costs of acquiring information, their scope of decision-making will increase, whereas if technologies primarily decrease the costs of communication, their scope of decision-making will decrease and they will rely even more on specialized workers.

3.2 Empirical evidence

This section provides an overview of the empirical evidence that is most relevant to the theories described in Section 3.1. For a more comprehensive review of this related literature, see an excellent survey by Liberti and Petersen (2019).

3.2.1 The importance of communication frictions

12 The key premise of the literature surveyed above is that frictions in communicating and transmitting information are non-negligible and have first-order effects on corporate decisions. The empirical literature provides convincing evidence that this is indeed the case. For example, Mian (2006) examines the role of geographical and cultural distance between a foreign bank's headquarters and local branches and shows that as distance increases, foreign banks are less likely to lend based on soft information, consistent with increased costs of communicating such information. Using the introduction of new airline routes as a shock to the travel time between headquarters and plants, Giroud (2013) finds that proximity to headquarters increases plant-level investment and productivity, concluding that proximity facilitates information flows within firms. Qian, Strahan, and Yang (2015) posit that communication costs between parties are likely to be lower if they have had a longer relationship with each other. In line with this idea, they show that when the head of the bank branch and the loan officer have worked together for a longer time, the bank places a greater weight on the loan officer's recommendations (as measured by the officer's internally produced rating of the borrower). Moreover, the rating becomes a better predictor of loan outcomes, con-

sistent with the idea that the loan officer's incentives to produce accurate information are stronger when information is not lost in communication. Hertzberg, Liberti, and Paravisini (2010) and Berg, Puri, and Rocholl (2020) focus on agency conflicts between loan officers and headquarters due to loan officers' career concerns and volume-based incentives, respectively, and conclude that such conflicts distort information production and transmission.

3.2.2 Effect of organizational structure on information production and use

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Even more closely related to the topics of this survey are papers studying the effects of organizational design on communication and information production. Several papers emphasize the role of hierarchical distance. For example, Liberti and Mian (2009) observe the hierarchical level at which a given loan is approved by using data from a big bank in Argentina. They find that greater hierarchical distance between the loan approving officer and the information collecting agent is associated with lower reliance on soft information. Skrastins and Vig (2019) analyze plausibly exogenous changes to the organizational design of a large bank in India and show that adding layers of hierarchical distance reduces loans to small borrowers and increases contract standardization. Berger et al. (2005) find that large banks in the US are more willing to lend to firms with better accounting records and those located closer to the bank. They conclude that large banks rely less on soft information, likely because of the need to transmit information across several organizational layers. Canales and Nanda (2009) find that banks in Mexico in which branch managers are given greater authority are more likely to lend to smaller firms and firms that rely more on soft information.

Distinguishing between mechanisms. Combined, this evidence convincingly shows that smaller hierarchical distance and decentralized decision-making increases the reliance on soft information. However, as Section 3.1 suggests, there are several mechanisms that can explain this effect. The first mechanism works through *information acquisition* incentives: greater authority given to the agent can increase the agent's incentives to collect information (as in Aghion and Tirole (1997) and Stein (2002); see Section 3.1.2). Qian, Strahan, and Yang (2015) and Liberti (2018), who directly measure the quality of information that is produced, find evidence consistent with this channel. Qian, Strahan, and Yang (2015) exploit a plausibly exogenous decentralization reform in Chinese banks that shifted authority over lending decisions from committees to individual loan officers. The authors find that following the reform, banks not only place a greater weight on loan officers' internally generated ratings of borrowers, but these ratings also better predict loan outcomes, suggesting an improvement

in rating quality. Liberti (2018) examines a related change in the organizational design of a large bank in Argentina and concludes that loan officers with greater authority exert more effort in producing information about borrowers, as measured by borrower survey data.

The second mechanism consistent with the above evidence works through *communication frictions*: smaller hierarchical distance between the sender and receiver of information (e.g., information collecting agent and the agent approving the lending decision) reduces communication frictions, allowing to use soft information more effectively. Moreover, this can happen for two distinct reasons: a reduction in communication frictions caused by agency conflicts (such as those described in Section 3.1.1 and explored by Dessein (2002) and Harris and Raviv (2005)) and a reduction in direct communication frictions (such as those described in Section 3.1.3 and explored by Bolton and Dewatripont (1994) and Garicano (2000)). In future work, it would be useful to understand if the communication friction channel plays a role in addition to the information acquisition channel, and if yes, distinguish between these two types of communication frictions. The latter could be potentially done by studying how the results depend on the alignment of interest between the parties.

3.2.3 What determines firms' organizational structure?

While the papers discussed in Section 3.2.2 study how the firm's organizational design affects information production and use, another strand of the empirical literature considers organizational design as the left-hand side variable. This allows to study whether firms' decisions between centralization and delegation are consistent with the predictions of theories described in Section 3.1. I overview these papers next.

Delegating to avoid the loss of agent's information

In the papers discussed in Section 3.1.1, the key benefit of delegating authority to the agent is that it prevents the loss of the agent's information that can occur due to communication frictions. While in those papers, communication frictions come from agency conflicts between the agent and principal, this insight is more general and applies to any type of frictions, e.g., those due to geographical or cultural distance. Thus, other things equal, greater communication frictions should be associated with more delegation. In line with this prediction, Huang et al. (2017) find that state-owned-enterprises in China are more likely to be decentralized if their distance to the government is greater, and especially if communication costs (as measured by smaller road density) are larger. The second prediction is that

delegation should be more likely when the agent is relatively more informed relative to the principal (e.g., Dessein, 2002; Harris and Raviv, 2005). Consistent with it, the survey of top executives by Graham, Harvey, and Puri (2015) shows that executives delegate less when they are more knowledgeable (namely, have a finance background or longer tenure) and are more likely to delegate decisions for which they need the most informational input from inside the firm. In addition, Acemoglu et al. (2007) measure how informed the principal is by the amount of public information about the firm's technology and find that firms are more likely to delegate when public information is scarcer.

Delegation in dynamic environments and in multi-divisional firms

The evidence regarding the extensions of Dessein (2002) to either the dynamic environment or to multi-divisional firms is more limited. To my knowledge, there is no empirical work that examines delegation of real options decisions (as in Grenadier et al., 2016) and relatively scarce evidence on multi-divisional firms. In particular, the literature on multi-divisional firms (e.g., Alonso, Dessein, and Matouschek, 2008; Rantakari, 2008) highlights the trade-off between adaptation to local conditions and coordination between divisions. The former favors delegation, whereas the latter typically favors centralization. In line with this prediction, Dessein, Lo, and Minami (2021) examine the authority of lower-level managers in one of the largest world retailers and find that tasks requiring substantial coordination between departments (e.g., marketing, customer service, and e-commerce) are relatively more likely to be centralized.[6] In addition, Dass, Nanda, and Wang (2013) study mutual funds' organizational structures and show that centralized (sole-managed) funds outperform decentralized (team-managed) funds in market timing, but underperform them in security selection. This is broadly consistent with the adaptation vs. coordination trade-off because individual managers in team-managed funds typically specialize in one asset class, which facilitates security selection. In contrast, as the paper points out, a market timing strategy requires reallocating investments across asset classes and hence involves substantial coordination.

Delegating to encourage information acquisition

Delegation not only helps avoid communication frictions and use the agent's information efficiently, but it can also encourage the agent's information acquisition (Aghion and Tirole, 1997; Stein, 2002). Recall, however, that Stein (2002) predicts an opposite result when in-

[6] Their paper also tests several additional predictions about the role of local volatility, which this survey does not cover for brevity.

formation is hard (rather than soft): centralized firms are then more efficient at encouraging information acquisition. Interestingly, empirical research has not yet found evidence consistent with this prediction. Paravisini and Schoar (2015) perform a randomized controlled trial, which shows that the introduction of credit scores increases the decentralization of the loan production process. Similarly, Liberti, Seru, and Vig (2016) find that an unexpected introduction of the credit registry for a subset of borrowers in Argentina leads to more delegation of lending decisions for the affected borrowers. Since the introduction of credit scores and credit registry increases the amount of hard information, these results seem inconsistent with Stein (2002). As Liberti, Seru, and Vig (2016) point out, one potential reason is that such hardening of information not only increases the benefits of delegation (which is the focus of Stein (2002)) but also decreases its costs. In particular, greater availability of hard information could make it easier for headquarters to monitor lower-level officers, decreasing the costs of delegation from biased decision-making. Overall, this evidence highlights the need for more research on the role of hard vs. soft information for delegation decisions.

Firms as knowledge-based hierarchies

Relatively little empirical research has explored how organizational design is affected by the trade-off between information processing and communication costs, discussed in Section 3.1.3. Consistent with the predictions of Garicano (2000), Bloom et al. (2014) find that while technologies improving communication increase centralization and shift authority towards the top of the organization, technologies that enhance information processing empower production workers and plant managers. Bias et al. (2022) show that when firms go public, they transform into more hierarchical organizations with smaller departments. The authors hypothesize that, in line with Garicano (2000), such changes in organizational structure can help firms economize on knowledge acquisition (e.g., providing training to the employees), which can be helpful for IPO firms to make their human capital more easily replaceable.

4 Corporate governance and information flows

An important aspect of organizational design is corporate governance. How should authority be allocated between management, shareholders, and the board of directors? How should boards be structured? How can shareholders effectively convey their views to management and influence corporate actions? A growing literature in financial economics builds on the insights developed in the previous sections to study these questions. This section provides an

overview of this literature, focusing on two main aspects: the board of directors (Section 4.1) and the interactions between shareholders and management, including shareholder activism (Section 4.2). Each section starts with a discussion of the theoretical literature and then presents the relevant empirical evidence, focusing on the links between the two.

4.1 Board of directors

The board has ultimate decision-making authority over corporate matters. However, in practice, the board delegates authority over many decisions to the CEO. Moreover, in many firms, the structure of the board (e.g., lack of truly independent directors) can make the board beholden to the CEO, effectively giving the CEO authority over decision-making. How does such delegation of authority affect the quality of corporate decisions? How should boards be structured to improve information flows and increase firm value?

4.1.1 Theoretical literature

Information flows between the board and manager

14 The insights from the theories discussed in Section 3.1.1 directly apply to the interaction between the board and the CEO. The board is the principal that is supposed to represent shareholders' interests and maximize firm value. The CEO is the agent, who is often more informed than the board, but may also have a bias relative to the shareholders and the board. From this perspective, the implications of Dessein (2002) and Harris and Raviv (2005) discussed in Section 3.1.1 suggest that the board should delegate authority on those decisions for which the CEO's informational advantage is large relative to his bias, as well as on decisions for which the CEO is sufficiently more informed compared to the board.

An important question, however, is whether the board has commitment power to delegate decisions to the CEO. In many cases it does not, i.e., the board can ex-post overrule and reverse the CEO's decisions. One way for the board to commit to delegating authority is through weak corporate governance: having a less independent board, making the CEO the chairman, or giving the CEO dual-class shares. The downside, however, is that delegation will not be limited to particular decisions (for which the benefits of the CEO's informational advantage dominate the costs stemming from his bias) but will apply to all decisions of the firm, even those for which delegation is suboptimal.

In addition, there are several unique features of the board-CEO setting, which are explored in theories I cover in this section. First, note that Dessein (2002) and Harris and Raviv

(2005) compare two specific structures: the unbiased principal (board) retaining authority, and the unbiased principal delegating full authority to the agent (manager). These structures can be thought of as two extreme cases of board composition – a fully independent and a fully captured board, respectively. In reality, board composition is typically somewhere in between these two extremes and hence is an additional instrument of choice.

Chakraborty and Yilmaz (2017) build on Harris and Raviv (2005), but focus on board composition, which they model as the weight the board puts on maximizing shareholders' vs. manager's interests. For a supervisory board (i.e., the board that has decision-making authority but gets advice from the manager), there is a similar trade-off as in Dessein (2002) and Harris and Raviv (2005): if the board is more closely aligned with the manager, communication between them is more efficient, but the board's decisions are more biased from shareholders' view. As a result, if the conflict between shareholders and manager is very small (large), the board should be fully aligned with the manager (shareholders), whereas for intermediate levels of conflict, the optimal board alignment is intermediate. In addition, Chakraborty and Yilmaz (2017) analyze purely advisory boards: their only function is to provide advice to the manager who has decision-making authority (such advisory boards are common in small firms, including early-stage startups, which may not have a formal board). Interestingly, a purely advisory board should not always be perfectly aligned with the manager, even though that would maximize information flows between them. The intuition is that a board whose preferences are misaligned with the manager can only communicate coarse information to him (see Section 2.1), and such noisy advice effectively performs a monitoring role, inducing the manager to pursue his agenda more cautiously.

Most boards are not purely advisory: the board both advises the CEO, but also monitors him. Several papers (Adams and Ferreira, 2007; Baldenius et al., 2014; and Levit, 2020) study the dual advisory and monitoring roles of the board and show that their interaction has important implications. Adams and Ferreira (2007) consider a board that optimally chooses its monitoring intensity, which determines the likelihood that it will monitor vs. advise. Under monitoring, the board retains authority over project choice, whereas under advising, the CEO has authority but receives advice about projects from the board. More independent boards are assumed to have lower costs of monitoring and hence, other things equal, choose to monitor more. A key assumption is that prior to picking its monitoring vs. advising intensity, the board may receive information from the CEO, and this information improves the quality of board advice. This assumption is reasonable given that many directors have

full-time jobs at other firms and, while having general expertise, rely on managers for firm-specific information. In this context, the CEO who decides whether to share information with the board faces a trade-off: while this improves the board's advice, it also increases the board's monitoring effectiveness, so an informed board will monitor more. Adams and Ferreira (2007) conclude that because of this conflict between the advisory and monitoring roles, it may be optimal to have a less independent, i.e., more manager-friendly board, so as to induce the manager to share information.

The interaction between the two roles of the board also arises in Levit (2020), who concludes that they can either conflict or complement each other. In his paper, the board first advises the CEO by communicating information about the project, and then, after the CEO makes his decision, the board may intervene and partly reverse the CEO's decision at a cost (which can be thought of as the cost of monitoring). Levit (2020) shows that if the board's intervention is sufficiently costly for the CEO, then its monitoring role enhances its advising effectiveness. Intuitively, the CEO wants to avoid the board's intervention, and the best way to avoid it is to listen to the board's advice. However, if the board's intervention is not too costly for the CEO, the board's ability to intervene is detrimental to its advisory role (as in Adams and Ferreira, 2007). This is because the CEO's decisions are then even more biased than without the possibility of intervention, as it increases the board's cost of reversing his decision. This, in turn, effectively increases the ex-ante conflict between them, worsening communication and undermining the board's advice. In such cases, the board would benefit from giving up its monitoring role and delegating full authority to the CEO.

Baldenius, Melumad, and Meng (2014) examine the interplay between the allocation of authority (as in Dessein, 2002) and board composition, i.e., choosing a more monitor-heavy vs. advisory-heavy board. Under centralization, the board makes decisions, whereas under delegation, the CEO makes decisions unless the board is successful at monitoring (in which case, the CEO is forced to make the shareholder-preferred decision). The paper studies how the two tools can be used simultaneously to optimize the trade-off between information loss and biased decision-making, and shows that the relation between the CEO's bias and optimal board structure is non-monotonic.

Summary and other studies. Overall, the literature surveyed above concludes that more management-friendly boards – those that are more aligned with the CEO, monitor less, and intervene less – generally enhance information flows between the board and the CEO and are thus more effective in their advisory role. This, however, is in conflict with the board's

monitoring role, and the optimal board structure balances these two conflicting priorities.[7] Other related papers on information flows between the board and the CEO include Baldenius, Meng, and Qiu (2019), who examine the interaction between board composition and CEO equity incentives; Baldenius, Meng, and Qiu (2021), who analyze constrained delegation; Jiang and Laux (2022), who focus on differences in beliefs between the board and the CEO; and Song and Thakor (2006) and Levit (2012), who study directors' career concerns.

Board as a collective body and information flows among directors

The papers discussed so far focus on interactions between the board and the manager. For this reason, they mostly consider the board as a single agent, modeling the degree of board independence and manager-friendliness in a reduced form way. A growing theoretical literature considers the board as a collective decision-making body, emphasizing that information flows among directors and their ability to coordinate and resolve potential collective action problems are critical to effective board functioning.

The closest to the literature surveyed earlier is Harris and Raviv (2008), who study the allocation of control between outside and inside directors in a setting similar to Harris and Raviv (2005). Each outsider (insider) has preferences identical to those of other outsiders (insiders), so information is fully shared among directors of the same type, and the focus is on communication between the two groups. Differently from earlier papers, outsiders are not endowed with information. Instead, each of them decides whether to exert costly effort to become informed, leading to a free-rider problem. The larger the number of outsiders, the stronger is the extent of free-riding. On the other hand, keeping their effort levels fixed, a larger number of outsiders increases the combined information produced by the board, so their optimal number balances these two effects. Raheja (2005) also studies communication between outside and inside directors, but in a setting where insiders compete with each other to be promoted to the CEO position. Such competition motivates insiders to reveal their information to outsiders, which determines their optimal proportion on the board.

Several other papers (Warther, 1998; Malenko, 2014; and Chemmanur and Fedaseyeu, 2018) highlight a different aspect of collective decision-making by the board: according to

[7] Two recent studies highlight that the above conclusion does not always hold: having a more management-friendly board can actually impede information flows. In Aghamolla and Hashimoto (2021), this happens because the board uses the information communicated by the CEO not only to advise him, but also to decide whether to fire him. In Gregor and Michaeli (2021), the difference is driven by the nature of communication: their paper studies communication in the form of Bayesian persuasion with costly information acquisition by the receiver, while the papers described so far focus on cheap talk.

anecdotal evidence, directors frequently face groupthink and pressure for conformity, making them reluctant to dissent against other board members. One particular reason why dissent can be costly is the influence of the CEO: directors who oppose the CEO without support from other directors often face retaliation by the CEO and may have to resign.

In Warther (1998) and Chemmanur and Fedaseyeu (2018), directors have noisy private information about the CEO's ability and decide whether to voice their opposition and vote to fire him. If the CEO is supported by the majority and not fired, dissenting directors incur a cost. As the papers show, this leads to a coordination failure: even if the majority of directors have negative signals and would have fired the CEO were they deciding on their own, the board collectively fails to do so. Warther (1998) predicts the following dynamics: in most cases, the board operates with little dissent and votes are unanimous in favor of management. Once, however, unfavorable information reaches a critical level, there is a bandwagon effect: one director steps forward announcing his dissent, and other directors follow him. While Warther (1998) take board composition (two outsiders and the CEO) as given, Chemmanur and Fedaseyeu (2018) study the optimal board size and mix between insiders and outsiders. A larger board size increases the coordination problem but also increases the aggregate amount of information available to the board, a trade-off related to that in Harris and Raviv (2008). The trade-off in adding insider directors is that they have superior information about the CEO, but also a larger cost of dissenting against him.

Malenko (2014) points out that based on anecdotal evidence, directors typically vote by open, rather than secret, ballot. This fact might appear puzzling: pressure for conformity and costs of dissent are likely to be higher under open ballet. The paper shows that open ballot can nevertheless be optimal because it encourages directors to share their information with other directors *prior* to the vote. The trade-off between more effective pre-vote communication and greater conformity during the vote means that the optimal choice between open and secret ballot depends on factors such as the nature of directors' information (e.g., objective evidence or differences of opinion) and diversity in their private interests. The model predicts that under open ballot voting, directors' votes will be mostly unanimous, but there will be active dissent and disagreements in pre-vote discussions, including those that take place outside the board meeting and in executive sessions of outside directors.

A few other papers focus on director diversity, an increasingly important governance issue whose costs and benefits are not fully understood. How does board diversity affect information production by directors, communication between them, and the efficiency of decisions?

If all directors maximize shareholder value and diversity means that their information comes from diverse sources (e.g., due to different backgrounds and expertise), then diversity is clearly beneficial: directors will perfectly share information with each other, and a diverse board will produce more combined information than a non-diverse board. But what if diversity means that directors have *diverse preferences* (biases), which are not fully aligned with those of shareholders? Malenko (2014) and Ljungqvist and Raff (2021) show that such diversity can be beneficial as well, i.e., a diverse board can dominate a non-diverse, fully unbiased board. The mechanism in Malenko (2014) is that diversity in directors' private interests encourages directors to overcome the costs of communicating their information and expressing dissent and try harder to convince others of their position. This is because a stronger bias towards a particular decision makes it more costly for a director to not speak up and argue in favor of this decision. The benefit of diversity in Ljungqvist and Raff (2021) is that it encourages directors to engage in more information acquisition. Intuitively, when directors' information is not precise, diversity in their interests induces them to push for their own agendas and disregard the (noisy) information, leading to inefficient deadlock. Since deadlock is costly for all parties, directors have stronger ex-ante incentives to generate more precise information, which will allow them to reach consensus ex-post.[8]

4.1.2 Empirical evidence

This section overviews the empirical literature that is most closely related to the topics of this survey. In line with the structure of Section 4.1.1, I first discuss evidence on information flows between the board and management, and then evidence on interactions among directors. The surveys by Adams, Hermalin, and Weisbach (2010) and Coles, Daniel, and Naveen (2022) provide more comprehensive discussions of the empirical literature on boards.

Information flows between the board and manager

The literature concludes that the board's advisory role is important for corporate outcomes and also affects board composition (e.g., Coles, Daniel, and Naveen, 2008; Linck, Netter, and Yang, 2008; Harford and Schonlau, 2013; Dass et al., 2014). Moreover, in line with the theories discussed in Section 4.1.1 (e.g., Adams and Ferreira, 2007), several papers highlight the tension between the board's advisory and monitoring roles. In particular, Field, Lowry, and Mkrtchyan (2013) show that busy directors are common in newly public

[8] Donaldson, Malenko, and Piacentino (2020) also highlight how board diversity can lead to deadlock and, e.g., retain a CEO that all directors believe is bad, but do not focus on information flows among directors.

firms despite their potentially weak monitoring capability and conclude that they positively contribute to firm value given the strong advising needs of such firms. Masulis, Wang, and Xie (2012) find evidence of both stronger advising and weaker monitoring by foreign independent directors in US firms, and Faleye, Hoitash, and Hoitash (2011) show that when a majority of independent directors serve on at least two of the three principal monitoring committees, improved monitoring comes at a significant cost of weaker strategic advising. Coles et al. (2022) focus on connected directors and find that their advising benefits in complex firms are high enough to compensate for their weaker monitoring. Finally, Adams (2010) provides complementary evidence on the dual roles of the board by relying on a large survey of directors in Sweden. She finds that directors with a stronger personal relationship with management perceive their role to be more advisory. In addition, directors who provide advice are more likely to feel that they receive sufficient information from management.

Combined, this evidence is consistent with the key ideas in the theoretical literature: directors who are better at monitoring are less likely to effectively communicate with the CEO and will get less information from him, which can weaken their advisory role. At the same time, as Section 4.1.1 highlights, the interaction between the two roles can be more subtle: they can sometimes complement, rather than conflict with each other (Levit, 2020), and the optimal mix between advisory and monitoring directors may depend on the CEO's bias in a non-monotonic way (Baldenius et al. 2014). Given that these theoretical papers are relatively recent, the empirical literature is yet to test their predictions.

Interactions among directors

The lack of data on the inner workings of the board has for a long time made it challenging to study interactions among directors. In recent years, however, some of these data have become available. Schwartz-Ziv and Weisbach (2013) analyze board minutes of 11 Israeli business companies and use them to evaluate the assumptions and predictions of theoretical models. By examining which issues are discussed at board meetings and how actively directors participate in board discussions, they conclude that boards play both supervisory (i.e., monitoring) and managerial (i.e., advisory) roles, with a greater focus on supervision, and that they can be characterized as active monitors. In addition, in line with the predictions of Warther (1998), Malenko (2014), and Chemmanur and Fedaseyeu (2018), 97% of directors' votes in their sample are unanimous. However, they also observe active disagreement in pre-vote discussions, which is consistent with Malenko (2014) since votes were conducted by

open ballot. Schwartz-Ziv (2017) further explores the board minutes data to study the role of gender diversity. By exploiting within-board variation in director attendance, she concludes that the presence of female directors changes boardroom dynamics: boards are more active when at least three directors of each gender are in attendance, and the presence of a critical mass of directors of their gender is especially important for female directors.

Jiang, Wan, and Zhao (2016) take advantage of the disclosure requirements in China, mandating that the votes of independent directors be publicly disclosed. By comparing the votes of different directors for the same proposal within the same firm, they can filter out the effects of unobserved time-varying firm-level heterogeneity. The authors conclude that directors' career concerns lead them to vote against management and that such dissent is rewarded in the marketplace. Kang et al. (2022) examine individual directors' votes in Korea (which has a disclosure requirement similar to that in China) and show that directors are more likely to dissent against management if they are dissimilar to other directors with respect to tenure and industry experience. They also find that the presence of female directors is associated with increased likelihood of board dissent.

While in the US, the votes of individual directors are not observed, firms are required to disclose if one of the directors leaves the board due to a disagreement. Agrawal and Chen (2017) use this regulatory requirement to analyze what causes conflicts in the boardroom.[9] They conclude that such conflicts typically arise due to power struggles between board factions and top management, and reflect agency problems or disagreements over strategy. Board disputes are more likely to involve directors who are venture capitalists, consultants, and investment bankers, and are less likely to involve directors who are CEOs of other firms.

Combined, this evidence suggests an important role of board diversity, which appears to be associated with more active board discussions and greater dissent. These results are broadly consistent with Ljungqvist and Raff (2021) and Donaldson et al. (2020), who predict a greater likelihood of ex-post disagreement and deadlock on a more diverse board, and with Malenko (2014), who predicts more active communication on a more diverse board. Overall, however, there is room for more research on how board diversity affects boardroom dynamics. I discuss this and a few other research directions in this area in Section 5.

[9] See also Dewally and Peck (2010), who study directors' public resignations from the perspective of their career concerns.

4.2 Shareholder engagement and activism

Interactions between shareholders and management is another important aspect of corporate governance. Many investors have information and views that they try to convey to management, either through direct engagement or through voting, which is often advisory in nature. According to the survey by McCahery, Sautner, and Starks (2016), 63% of surveyed institutional investors have engaged in discussions with management, and such engagements are used more frequently than any other mechanism, including voting against management and selling shares. Communication is also a key part of shareholder activism campaigns: 48% of campaigns in the sample of Brav et al. (2008) involved only communication with management, without more aggressive tactics. Moreover, if such communication is unsuccessful and the activist turns to more confrontational actions, he needs to persuade other shareholders to support him, so communication among shareholders is important as well.

What determines how effective these information flows are? How are they affected by the firm's ownership structure, the incentives of the manager, and the firm's governance system? This section reviews the growing literature that studies these questions.

4.2.1 Theoretical literature

Communication from shareholders to management

Consider a shareholder (e.g., a long-term institutional blockholder or a hedge fund activist) who has relevant information about the firm's strategy that she would like to communicate to the manager. When will the shareholder be effective in conveying her information? The arguments of Section 2.1 suggest that such communication can be ineffective because of potential conflicts of interest, e.g., if the manager has private benefits from certain decisions. What can make shareholder-management communication more effective? What are the effects of the firm's ownership structure and corporate governance system?

Levit (2019, 2020) takes into account that in addition to discussions with management, shareholders have two additional means of influence. The first is taking a more confrontational approach, such as launching a public activist campaign and/or proxy fight ("intervention"). The second is selling shares ("exit"). How do these additional channels of influence affect communication between the shareholder and manager? Levit shows that if intervention is sufficiently costly for the manager, then the threat of intervention improves the shareholder's ability to communicate her views. Intuitively, the manager has stronger

incentives to follow the shareholder's advice to avoid costly intervention, and this, in turn, decreases the effective conflict between them and improves communication. However, Levit (2020) highlights that this conclusion is reversed if intervention is sufficiently more costly for the shareholder herself than for the manager (e.g., because the manager is entrenched or other shareholders are difficult to coordinate). In this case, the manager takes actions that are even more biased than without the threat of intervention, which increases the effective conflict between them and hinders communication (see Section 4.1.1 for more details).[10]

As for the threat of exit, Levit (2019) shows that it has two opposing effects on communication. On the one hand, by choosing not to exit and, instead, run a public campaign, the shareholder credibly signals that she has very positive information about her proposed strategy. This strong positive signal encourages the manager to respond to the shareholder's demands, both because the manager cares about shareholder value, and because it is now more likely that other shareholders will support the campaign. Since the manager becomes more responsive to the shareholder's advice, communication between them improves. However, there is also a counteracting effect: the ability to exit decreases the shareholder's incentives to launch a campaign if the manager is unresponsive, which can in turn make the manager less responsive and hurt communication. The paper predicts that this "cut and run" effect is more likely to dominate if the shareholder's proposal is relatively safe.

Kakhbod et al. (2022) also study the effectiveness of shareholder communication, but focus on engagements by multiple shareholders and the role of the firm's ownership structure. They point out that in addition to conflicting interests (i.e., preferences), which have been the focus of this survey so far, shareholders and managers may also have different opinions (i.e., beliefs) about what is best for the firm. Because differences in beliefs become less pronounced as more shareholders share their information, shareholders' engagement decisions are complements: the engagement of each individual shareholder is more effective when more other shareholders engage with management as well. As a result, a limited shareholder base can prevent effective engagement. However, trading in financial markets naturally leads to a limited shareholder base because investors who most disagree with management do not become shareholders in the first place. For these reasons, as the authors show, the presence of passive (index) funds, who invest in the firm regardless of whether they agree or disagree with management, can be particularly beneficial to enhance shareholder engagement.

[10] Song (2017) also studies a sequential process in which private intervention is followed by public intervention and/or exit. However, in his model, the activist does not know more information than the manager, so there is no meaningul communication between them.

In addition to direct engagements, shareholders can communicate their views to management via nonbinding (advisory) voting. The majority of proposals submitted by shareholders via Rule 14a-8, as well as say-on-pay votes in the US, are nonbinding: the board/management is not obligated to act on the vote, even if there is majority support for a certain action. In this sense, the key goal of nonbinding voting is to convey shareholders' views and information.[11] Levit and Malenko (2011) conclude that conflicts of interest between shareholders and management generally prevent nonbinding voting from effectively conveying shareholders' views. Intuitively, each shareholder understands that the manager will be reluctant to implement a proposal he dislikes, and will only do so if there is overwhelming evidence that the proposal is value-increasing, i.e., if it receives overwhelming support from other shareholders. This realization, the authors show, induces each shareholder to vote for the proposal regardless of her private signal. The paper shows that nonbinding votes are more effective in aggregating shareholders' views if there is market discipline, e.g., an activist who can reverse the manager's decision if she believes it is not in shareholders' best interests. Then, in equilibrium, nonbinding voting becomes effectively binding with an endogenously determined voting threshold that depends on firm-specific characteristics.

The papers described so far focus on interactions between shareholders and management and do not separately consider the role of the board. Cohn and Rajan (2013) analyze the joint interactions between an activist, board, and manager. In their paper, the activist has relevant information that he shares with the manager and the board. The activist pushes for change if the manager's chosen project is inconsistent with the activist's information about the optimal project choice, and the board, which has formal authority, decides whose side to take. The paper shows that when managers have reputational concerns, then internal (i.e., by the board) and external (i.e., by the activist) governance can either complement or substitute each other: if the activist's information is noisy but improves, the board becomes less vigilant, whereas if her information is sufficiently precise and improves even further, the board becomes more vigilant. Note that the issues of imperfect communication do not arise in Cohn and Rajan (2013): the activist's signal is assumed to be perfectly observed by all parties. Exploring the joint interactions between these three players in the presence of imperfect strategic communication could be an interesting direction for future research.

[11] This distinguishes nonbinding voting from regular, binding, voting, in which the outcome of the vote determines the decision (such as voting for M&A deals or contested director elections). While aggregation of shareholders' information in binding voting is important and has been studied in the literature, I do not cover it in this survey, since its focus is on communication. See Brav, Malenko, and Malenko (2022) for a survey of shareholder voting, including studies of information aggregation in binding voting.

Communication and coordination among shareholders

Several papers study information flows in the context of shareholder activism focusing on interactions between shareholders. In Pi (2021), the activist has private information that is relevant for other shareholders deciding whether to support his campaign. The paper shows that the activist can credibly signal his ability to add value by limiting the size of his coalition with other activists. Doidge, Dyck, and Yang (2021) analyze activism by "investor collective action organizations" (ICAOs) and point out that members of the ICAO benefit from sharing information with each other, since it allows them to coordinate their trading and activism decisions and increase their trading profits. As a result, a larger ICAO increases average firm value but harms market liquidity due to more informed trading. Brav, Dasgupta, and Mathews (2021) examine parallel intervention by multiple activist funds and show that funds' concerns about attracting flows have a positive effect on their incentives to engage, especially when funds' block size is smaller. In their paper, funds' activism provides information to potential fund investors, rather than to other activists. Bhattacharya (1997) views a proxy contest as a political campaign, in which an activist of unknown type tries to solicit the votes of the pivotal shareholder.[12] Overall, these papers make important progress in studying collaboration among shareholders, but the overall topic is still underexplored, and I discuss several further directions for research in this area in Section 5.

Information flows from management to shareholders

While the papers surveyed so far focus on information flows from shareholders to management and/or other investors, a few papers focus on information flows from management to shareholders. In Levit (2017), the board of the target in a takeover has superior knowledge about the value of the target and advises its shareholders on whether to accept the offer. The board's ability to resist a takeover is thus determined by whether it can convince the shareholders that the offer is not in their best interests. Interestingly, the paper shows that having a board that is biased against the takeover can increase shareholder value, even if the board's recommendations will in equilibrium be uninformative and ignored by shareholders. Corum (2022) models an activist's negotiations with the manager who is privately

[12] In a more general context, Caillaud and Tirole (2007) study a proposal sponsor trying to convince a group to support his proposal when group members need to incur costs to understand his reports. They adopt a mechanism design approach and show that the optimal mechanism features selective communication to key group members, whose support then sways others' votes. More distantly related are papers on informed blockholders governing via voice or exit, in which investors in the market learn the blockholder's information from his actions (see Edmans and Holderness (2017) and Dasgupta, Fos, and Sautner (2021) for surveys).

informed about the project proposed by the activist, and studies what information is conveyed by the manager rejecting the activist's demands. In particular, the paper explores the activist's choice between demanding that his proposal be implemented right away ("action settlement") vs. demanding a seat on the board ("board settlement"). It points out that, unlike in an action settlement, the activist is likely to learn information about the project if he joins the board following a board settlement, and this, in turn, has key implications for the activist's strategy and its success.

The questions covered in this section are also related to two other important topics that have been extensively studied: (1) firms' disclosure to financial markets more broadly and (2) financial markets providing information to managers and affecting real decisions via information embedded in prices (the "feedback effect"). Since excellent surveys have been written on these topics (see, e.g., Verrecchia (2001) and Goldstein and Yang (2017) on disclosure; and Bond, Edmans, and Goldstein (2012) on feedback effects), they are not covered in this survey. Instead, this survey focuses on information flows between the firm's shareholders and management in the context of shareholder activism and voting.

4.2.2 Empirical evidence

Following the structure of Section 4.2.1, this section first discusses the evidence on communication between shareholders and management, and then interactions among shareholders.

Communication between shareholders and management

As noted earlier, private communication between shareholders and management is widespread (e.g., McCahery, Sautner, and Starks, 2016; Brav et al., 2008). Although such engagements are not publicly disclosed, several papers have been able to examine them in depth by focusing on specific institutional shareholders that were willing to share information with the researchers. For example, Carleton, Nelson, Weisbach (1998) study the private correspondence (letters and faxes) between TIAA-CREF and its portfolio companies; Becht et al. (2009) observe the letters, memos, minutes, and recordings of telephone conversations between the Hermes UK Focus Fund and the companies it targeted; and Dimson, Karakas, and Li (2015) and Hoepner et al. (2022) each analyze ESG engagements by a large institutional investor committed to responsible investing. These papers show that private communication is often quite extensive, involving multiple meetings and phone calls with top management and lower-level management (e.g., Becht et al., 2009) and requiring sub-

stantial time and resources (e.g., Hoepner et al., 2021). The evidence is also consistent with such communication often being successful: shareholders frequently reach an agreement with management, and successful engagements are followed by positive abnormal returns around the announcement date of the change (Becht et al., 2009), improved operating performance and governance (Dimson et al., 2015), and lower downside risks (Hoepner et al., 2021).

Dey, Starkweather, and White (2022) analyze plausibly exogenous variation in shareholder-manager communication due to proxy advisors' voting guidelines: ISS strongly encourages firms that receive less than 70% of say-on-pay voting support to engage with their shareholders. The paper finds that firms below the 70% cutoff substantially increase their engagement efforts relative to firms above the cutoff, and that such firms align their compensation and disclosure changes to the concerns raised by shareholders during engagement.

Several papers highlight the role of engagement by multiple shareholders. Dimson, Karakas and Li (2015) find that engagements by the asset manager are more successful when it collaborates with other investors. Doidge et al. (2019) and Dimson, Karakas, and Li (2021) examine coordinated engagement efforts by multiple investors (within, respectively, a Canadian ICAO and an international network of long-term investors) and conclude that coordination enhances shareholder engagement. This evidence is broadly consistent with the complementarity in shareholder engagement predicted by the theory of Kakhbod et al. (2022). In addition, Doidge et al. (2019) find that the formation of the ICAO is accompanied by stronger positive abnormal returns in firms in which its members' stakes are higher (consistent with Doidge et al., 2021), and Dimson, Karakas, and Li (2021) show that engagements featuring a two-tier structure, with one lead investor and several supporting investors, are particularly likely to be successful.

While the above papers mostly study private communication campaigns that do not proceed to further stages, a few other papers focus, in line with Levit (2019, 2020)'s theoretical work, on the sequential decision of the activist to first engage in private communication and then, if communication is unsuccessful, follow up with a more confrontational approach. Gantchev (2013) models hedge fund activist campaigns as a sequential process, which starts with the activist communicating his demands to management shortly after filing Schedule 13D. The paper estimates the costs of each stage of this sequential process and concludes that demand negotiations is the second most expensive stage, with the proxy contest stage being most expensive. Aiken and Lee (2020) focus on communication between the activist and management that takes place before the 13D disclosure and find that early communica-

tion is used in 25% of campaigns in their sample. Bebchuk et al. (2020) analyze settlements between activists and target firms' boards, which can be thought of as outcomes of private negotiations and communication shortly before the more confrontational stage (proxy contest) takes place. They find that such settlements tend to specify changes in board composition, rather than a commitment to specific operational or leadership changes. Moreover, board settlements are more likely when information asymmetry is higher and hence the activist has higher benefits from waiting and letting the activist's appointed directors to learn information about the best course of action, consistent with the theory of Corum (2022).

Given the evidence of extensive shareholder communication with management, an important question is when such communication is effective. For example, how is the effectiveness of communication related to the threat of intervention and/or exit (as in Levit, 2019) and the firm's ownership structure (as in Kakhbod et al., 2022)? Aiken and Lee (2020) find that early communication is more likely to be used by hedge funds and when the activist has specific demands for the target. As the authors point out, these findings are broadly in line with Levit (2019, 2020)'s prediction that communication is more effective when the threat of intervention is more credible. Of course, the fact that private communication is unobserved and that the most effective communication campaigns will not be followed by a 13D filing complicates the inferences and makes it harder to test Levit's predictions. To avoid such selection effects, it is important to have the data on all communication campaigns, including failed ones, such as in Carleton et al. (1998) or Becht et al. (2009). However, even with data on both failed and successful engagements, it may still be difficult to infer the effectiveness of communication per se. Suppose, for example, that private engagements by an activist are more likely to succeed when there is a more credible threat of intervention (e.g., Carleton et al. (1998) find that TIAA-CREF reaches an earlier settlement when the firm's insider ownership is lower, which is likely to be associated with a greater threat of intervention). One way to interpret this evidence is in line with Levit (2019, 2020): management is more responsive to the activist's demands because communication by the activist is more effective when the threat of intervention is higher. However, there is also another interpretation, which does not rely on information flows between the two: management is more responsive simply because it faces a greater punishment otherwise. Distinguishing between these two explanations is difficult, but is important to understand whether management actually learns valuable information from its investors or simply gives in to their demands.

Index funds. Engagement by index funds has become increasingly common in recent

years.[13] Azar et al. (2021) study the Big Three index fund families and find that they focus their engagement efforts on large firms with high carbon emissions, and that their ownership is associated with subsequent reductions in emissions. Gormley et al. (2021) analyze engagements of the Big Three on board gender diversity and conclude that they are successful in increasing diversity and promoting women to key board positions. It would also be interesting to explore index fund engagement from the perspective of theoretical models. For example, does engagement by the Big Three promote engagement by other investors, as in Kakhbod et al. (2022)? And, given that index funds cannot use the threat of exit but can use the threat of intervention (through their voting power), can Levit (2019)'s predictions be tested by comparing engagement by index funds to that by actively managed funds?

Nonbinding voting. Finally, as noted in Section 4.2.1, nonbinding voting is another form of communication from shareholders to management. In his survey on nonbinding voting, Ferri (2012) points out that while prior to Enron and Worldcom scandals, nonbinding votes were mostly ignored by management (e.g., Karpoff, 2001), this has recently changed: nonbinding votes have become more effective, often prompting management to implement the changes desired by shareholders. This trend is broadly consistent with the predictions of Levit and Malenko (2011) because in recent years, firms have faced a greater threat from activist investors and proxy advisors for ignoring shareholders' votes. Moreover, as Aggarwal, Erel, and Starks (2015) highlight, aggregate public opinion on governance issues (as reflected in media coverage and surveys) can also play the role of the activist investor in Levit and Malenko (2011) and can thereby enhance the effectiveness of nonbinding votes.

Communication among shareholders

The evidence in several recent papers suggests that communication among shareholders is another important aspect of the shareholder activism process. Foroughi (2018) and He and Li (2022) examine hedge fund activist campaigns and emphasize the role of prior connections between investors. Foroughi (2018) focuses on connections through prior co-investments in activists' targets, whereas He and Li (2022) focus on educational ties. These papers conclude that funds connected to the activist are more likely to increase their ownership in the target prior to the campaign and to support the activist during the campaign, consistent with connections enhancing information flows between activists and other investors. Wong (2020)

[13] For example, according to BlackRock's Investment Stewardship Report, in 2021, BlackRock engaged with more than 2,350 companies, corresponding to 68% of the value of its equity assets.

studies the formation of informal wolf packs, which he identifies as groups of investors that accumulate shares in the target prior to 13D filing. The trading behavior he documents is consistent with the lead activist recruiting other investors to join the campaign before it becomes public, but in an informal way, so as to circumvent securities regulations of formal "groups" of investors. Artiga Gonzalez and Calluzzo (2019) examine clustered activism, when multiple activists simultaneously target the same firm. They find that clustering is more frequent among geographically proximate activists, in line with the hypothesis that activists prefer to cluster when their costs of communicating with each other are lower. A few other papers find evidence of explicit coordination and collaboration between shareholders in their engagement campaigns, which naturally involves communication between them. These papers include Dimson, Karakas, and Li (2015, 2021) and Doidge et al. (2019) discussed above. In general, this literature concludes that collaboration and communication among investors enhances shareholder activism and engagement.

Finally, He (2021) and Lee (2021) examine dissidents' efforts in persuading other shareholders to support them during proxy contests. He (2021) shows that when the dissident is the first to make a presentation to investors (before the incumbent management does so), the dissident's likelihood of winning is substantially higher. One interesting potential reason for this result, proposed by the paper, is the first-mover advantage due to limited investor attention. Lee (2021) finds that greater solicitation expenses by the dissident are associated with greater chances of the dissident earning board seats. In addition, this relationship is stronger when investors are less sophisticated, and fewer investors search for proxy statements on their own when proxy solicitation expenses are higher. The paper concludes that proxy solicitation provides valuable information to shareholders.

5 Conclusion and directions for future research

Overall, the literature discussed in this survey focuses on the following important themes. First, communication is often imperfect, both because of agency conflicts and because of technological, geographical, cultural, and social barriers. Second, information acquisition is costly, so to have incentives to collect it, agents need to be confident that this information will be used in their interests. These two frictions imply that the decision-making process and allocation of authority between parties has important effects on both the quality of information that is collected and the amount of information that is communicated and used

in corporate decisions. In turn, this implies that the optimal decision-making process and allocation of control will depend on factors that affect the costs of collecting information, the costs and frictions in its transmission, and the extent of agency conflicts. This has important implications for three aspects of organizational design and corporate governance: (1) the organizational structure and allocation of authority across the hierarchy; (2) the composition and decision-making process of the board of directors; and (3) the ability of shareholders to convey their views to management and influence corporate decisions.

In the rest of this section, I discuss several directions for future research, building on the discussions in Sections 3 and 4. Following the structure of this survey, I organize them around the same three topics: organizational design, boards, and shareholder activism.

Organizational design

Theoretical literature on organizational design and information flows is well-developed. In contrast, while the empirical literature has been growing, it has been limited due to two key challenges: 1) obtaining the data on organizational structures and developing measures of the allocation of authority; 2) challenges related to identification, e.g., finding exogenous variation in organizational structure. Several papers have successfully overcome these challenges, but more research is needed. Potential directions worth exploring are the following.

First, several patterns in the data (e.g., greater reliance on hard information in larger hierarchies, which has been documented in several studies) are consistent with both direct communication frictions such as technological or geographical constraints, and with indirect, agency-related frictions described in Section 2.1. While empirical research does not typically distinguish between direct and agency-related communication frictions, distinguishing between them is important because they may have very different implications. For example, technological improvements, such as the increased use of web conferencing tools like Zoom, can solve the issue of geographical constraints, but are unlikely to alleviate communication frictions arising from agency conflicts.

Second, most of the literature has focused on banks. Banks indeed provide a useful setting to study information flows in organizations because it is easy to identify the menu of projects (loan applications) and the quality of projects (performance of loans), and because there is heterogeneity in the amount of hard vs. soft information about these projects. At the same time, banks are unique in many ways, so expanding empirical research to other industries not only can help establish external validity, but can also potentially offer new

insights. In the context of the financial industry, mutual funds could be another good setting with well-defined projects (investments in securities), observed quality of those projects, and variation in the amount of information asymmetry and soft vs. hard information about them (see Dass, Nanda, and Wang (2013) described in Section 3.2).

Finally, as noted in Section 3.2, the empirical literature has not yet explored (1) the allocation of authority over timing (i.e., real option) decisions, and has presented limited evidence about (2) the trade-off between adaptation and coordination in multi-divisional firms and (3) organizational design from the perspective of firms as knowledge-based hierarchies. These questions could be interesting avenues for future empirical research.

Board of directors

There are at least two broad underexplored questions related to the topics of this survey. One is studying how boards and their decision-making process should be structured to enhance information flows between directors and between directors and management. While there is some theoretical and empirical work in this area (see Section 4.1), more research, as well as establishing tighter links between theory and empirical evidence, would be useful.

- For example, what factors cause coordination and communication frictions among directors, such as those highlighted in Warther (1998), Malenko (2014), and Chemmanur and Fedaseyeu (2018)? This question is partly examined by Coles, Daniel, and Naveen (2020), who study the extent of common board service by directors and conclude that it decreases coordination and communication costs, but can also encourage excessive conformity and groupthink. While their paper is based on aggregate board data, exploring board minutes and the votes of individual directors (as in the papers discussed in Section 4.1.2) could provide additional evidence on these questions.

- It is also important to better understand the effect of board diversity on communication and group dynamics. This includes, among other things, further connecting existing theoretical and empirical research on this topic. For example, empirical studies are yet to test whether board diversity encourages information acquisition, as predicted by Ljungqvist and Raff (2021). Likewise, theoretical papers do not study the role of a critical mass of directors of a certain type, emphasized by Schwartz-Ziv (2017).

- Also underexplored are the effects of policies and norms that determine how board meetings are run: for example, which directors speak first, who sets the agenda, which

voting protocols are used, and whether the CEO is always present. Studying these questions is challenging because the board's decision-making process is rarely observed, but even modest advancements in this area, including small sample research or survey evidence, would be useful and help inform further theoretical research on these topics.

Second, research has focused on information flows within the board and between the board and the CEO. However, directors also interact with other informed stakeholders, and such interactions are understudied.

- One key category of informed stakeholders are lower-level managers and employees: according to the NACD survey, almost 75% of public company directors make at least annual on-site visits to offices or operations of the company (NACD, 2013). "Often, I want to hear what lower level management and employees in the field think about issues," commented one director in the survey. Unlike the CEO, who may be reluctant to share information with independent directors given that their key role is to evaluate his performance (e.g., Adams and Ferreira, 2007), lower-level managers and employees do not have similar concerns and may be a valuable source of information. Theoretical and empirical work on information flows between independent directors and these other stakeholders is scarce (see Raheja (2005) for theoretical and Hoitash and Mkrtchyan (2022) for empirical work), making this a fruitful direction for future research.
- Another type of informed stakeholders interacting with the board are activist investors. For example, the investor collective action organization studied by Doidge et al. (2019) regularly requests to meet with independent directors, without management present. While the interests of investors and independent directors are relatively aligned, which limits communication frictions between them, such a strategy also adds an additional layer of communication between independent directors and managers about the activist's requests. Hence, the overall effectiveness of such a strategy vis-à-vis direct engagement with management is not obvious and would be interesting to explore.

Shareholder activism

Directly related to the last point is a broader question of the optimal strategy of an activist who has valuable information about the firm and wants to convince the board, shareholders, and management to implement his suggestions. Which of these parties should the activist approach first? Should his communication with these parties be private or public? How

does the activist's optimal persuasion strategy depend on the firm's ownership structure? Another closely related topic is the collaboration and interactions between multiple activist investors. What factors determine the optimal number of collaborating activists, their relative size, and the allocation of responsibilities between them? As the discussion in Section 4.2 suggests, while the literature has made some progress in answering these questions, they remain understudied both theoretically and empirically.

Another underexplored question is the effect of trading in financial markets on information flows between shareholders and firms. Informed shareholders not only communicate their information to management or incorporate it into their voting decisions, but also trade on this information. Shareholders' views and beliefs affect their positions in the firm, and their positions, in turn, affect the quality of subsequent engagement. Moreover, the mere process of engaging with management is likely to provide shareholders with valuable information they can trade on. The literature on these questions is relatively scarce (see, e.g., Meirowitz and Pi (2022) and Kakhbod et al. (2022) for theoretical work and Becht, Franks, and Wagner (2021) and Li, Maug, and Schwartz-Ziv (2022) for empirical work).

Finally, it is useful to understand the role of information intermediaries in the context of shareholder-manager relationships. They include proxy advisory firms, which advise shareholders on how to vote; proxy solicitors, which are used by activists and management to solicit shareholders' votes; and investor relations firms, which help companies communicate with investors and the media. While there is a large and growing literature studying proxy advisors (see Brav et al. (2022) for a survey), the role of other information intermediaries has not been extensively explored.[14]

[14]See Bethel and Gillan (2002) and Lee (2021) on the use of proxy solicitors and Karolyi et al. (2020) on investor relations firms.

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