Beyond the Ballot: Shareholder Engagement and Governance Dynamics*

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Abstract

This paper studies how private engagement and public voting jointly shape shareholder governance. Using data on large asset managers' pay-related engagements and say-on-pay votes, we show that both channels respond to disagreement between investors and boards, and that engagement predicts lower future CEO compensation and less subsequent dissent. We develop and estimate a structural model in which engagement and voting are interacting governance channels that determine what investors and boards learn and how CEO pay evolves. The model shows why votes can be misleading in isolation: support for management can reflect concerns resolved through prior engagement, rather than shareholder passivity. It also allows us to evaluate recent regulatory initiatives that may restrict engagement or voting. Our counterfactuals show that restrictions on one channel shift investor activity toward the other, but substitution is incomplete: engagement allows richer information exchange, while voting also disciplines management.

Keywords: shareholder engagement; proxy voting; communication; institutional investors; say-on-pay; executive compensation; corporate governance

JEL codes: D71, D82, D83, G23, G34, G38, K22

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1 Introduction

Corporate governance is shaped not only by who holds formal decision rights, but also by how information and views are communicated before those rights are exercised. In modern corporations, a central governance question is how investors convey information and concerns to boards and managers.

Voting provides one channel. Its communication role is especially clear for advisory votes, such as say-on-pay, because they do not directly determine policy but instead convey shareholder views to the board. A common view is that shareholder votes aggregate investors' dispersed information and preferences, allowing boards to learn where shareholders stand. But voting is a coarse form of communication. While a dissenting vote reveals disagreement, it says little about the source of the investor's concerns or what changes would address them.[1] Nor does it allow the board to explain its own information and constraints before shareholders decide how to vote.

Engagement provides another channel. Survey evidence suggests that institutional investors rely on private discussions with management more frequently than on voting against management (McCahery et al., 2016).[2] Through engagement, investors can communicate concerns, discuss specific policy changes, and learn the board's perspective, while boards gain insight into investors' views on executive compensation, governance, and other strategic issues (PwC, 2023). This channel is more precise and more flexible than voting, but it is also costly and selective: investors do not engage with every firm or every issue (Heath et al., 2026), and do so only when the benefits justify the costs.

Recent regulatory developments have made these costs especially important. The February 2025 SEC guidance increased the potential disclosure and compliance costs that large shareholders may face when engaging with firms, including on executive compensation and director elections.[3] These developments raise a broader question: what does private engage-

[1] According to FW Cook, an executive compensation consulting firm, "The SOP vote records how shareholders reacted to the pay decisions and rationale presented in the proxy, yet it does not explain why . . . Direct engagement is often the best real-time way to understand how those shareholders reached their vote."

[2] In a survey of 143 large institutional investors, 63% report engaging in direct discussions with management, compared with 53% reporting voting against management (McCahery et al., 2016). More recent survey evidence suggests that investors increasingly view engagement and voting as integrated parts of the stewardship process (Nilsson et al., 2026). See Section 2.1 for details.

[3] See, e.g., Gibson Dunn & Crutcher (2025), The Passive/Aggressive Investor.

ment do as a governance tool when it operates alongside voting? If engagement becomes more costly, investors may change how they vote, which in turn can affect what boards learn and the policies they choose.

This paper studies engagement and voting as two connected channels of shareholder governance. Using data from two large asset managers and a structural model, we show that engagement is central to understanding what observed votes mean and how corporate policies change. A vote in support of management can reflect concerns resolved through prior engagement rather than limited monitoring. Similarly, what appears to be a board response to a vote may partly reflect a response to private engagement. We use the model to evaluate recent regulatory initiatives that may restrict engagement or voting. Our counterfactuals show that when one channel is restricted, investors rely more on the other, but this substitution is incomplete because the two channels play different governance roles.

Our engagement data come from public stewardship disclosures by BlackRock and Vanguard over 2019–2025. These disclosures identify portfolio companies with which the stewardship team engaged in each year and, importantly, specific topics of engagement. We use this topic-level information to identify engagements related to executive compensation and connect such engagements to the investor's subsequent say-on-pay votes and to later compensation outcomes.

We focus on executive compensation for three reasons. First, it is subject to regular shareholder votes, giving investors a recurring channel to express support or dissent. Second, compensation is a measurable corporate policy, which allows us to study how engagement and voting relate to subsequent policy changes. Third, executive pay is a common topic of investor engagement: about half of the engagements in our sample include compensation. Because BlackRock and Vanguard also disclose other engagement topics, we can use non-pay engagement to help separate the compensation-specific mechanism from broader investor attention. The data therefore allow us to link private engagement, public voting, and subsequent policy adjustments within the same governance issue: executive compensation.

Our reduced-form empirical analysis documents several new patterns that motivate the model. First, engagement is systematically related to the investor's voting behavior. Engagement on executive pay is more likely when CEO compensation is high and firm performance is weak, and the same variables also predict the investor's vote against management on say-on-pay. Even after controlling for these variables, engagement and voting dissent are positively associated, consistent with both actions responding to common underlying concerns. In contrast, an investor who engaged in the prior year is less likely to dissent the following year. These dynamics are consistent with engagement helping investors and boards resolve disagreement before it appears in later votes.

Importantly, pay engagement predicts lower future CEO compensation, even after controlling for firm performance, voting outcomes, and investor by CEO-spell fixed effects: CEO pay is about 5% to 7% lower in the year after pay engagement. This pattern is consistent with investors engaging when they view pay as excessive and boards adjusting compensation in response to information conveyed through engagement.

Finally, we use the February 2025 SEC guidance as a shock to the cost of engagement. The guidance raises the potential cost of engagement for investors with stakes above 5%, because crossing that threshold can subject them to more onerous reporting requirements.[4] We therefore compare the change in pay engagement at the 5% threshold before and after the guidance and find that it falls sharply for holdings above 5% relative to those below 5%. This decline is consistent with the guidance increasing the cost of private engagement and provides an important source of identification in our structural estimation.

Taken together, these findings suggest that engagement, voting, and compensation are linked through a dynamic process of communication and learning that responds to changes in the cost of engagement. Understanding these interactions motivates our structural model.

In the model, an investor and the board may disagree about the appropriate level of CEO compensation because they receive different information about CEO quality and fit with the firm. Both observe public performance but also receive private signals. The board observes the firm from the inside, while a large institutional investor evaluates the firm alongside many other portfolio companies. This broader perspective may give the investor useful information about CEO ability, pay practices, and performance relative to peers (Musto et al., 2025).

In each period, compensation is determined through bargaining between the board and the CEO based on the board's beliefs about CEO quality. Before voting on the say-on-pay proposal, the investor decides whether to engage with the board—that is, communicate pri-

[4]Investors above 5% may file the shorter-form Schedule 13G if they qualify as passive holders, meaning they are not seeking to influence control of the company; otherwise, they must file the more onerous Schedule 13D. The 2025 guidance clarified that certain forms of engagement may jeopardize Schedule 13G eligibility.

vately and exchange information. Engagement allows both parties to learn from one another, but is costly. The investor therefore engages when compensation is sufficiently high relative to her assessment of CEO quality. The same perceived mismatch also makes the investor more likely to vote against the say-on-pay proposal. We assume that voting dissent weakens the CEO's bargaining power in subsequent compensation negotiations. Voting therefore affects future pay through two separate channels: an informational channel, as the board learns from the investor's vote and the aggregate tally, and a disciplinary channel, through the direct effect of dissent on bargaining power. Engagement, conversely, operates through information exchange but has no analogous disciplinary effect. The interaction is dynamic: engagement and voting today affect what the board learns and how it adjusts pay, and those pay adjustments in turn shape future engagement and voting.

Information reaches the board through both engagement and votes, but in different ways. Engagement gives the board precise information through direct communication with the investor. When engagement does not occur, the board can still draw limited inferences from that choice: no engagement is a favorable signal about the investor's assessment of CEO quality. The investor's vote provides additional information, but is a coarser signal than direct engagement: a vote against management indicates that pay is too high relative to the investor's assessment, but does not reveal the full information behind that assessment. The board also observes the aggregate say-on-pay vote tally, which provides a broader signal of shareholder views. Together, public performance, private engagement, the investor's vote, and the aggregate vote tally determine how the board updates its beliefs and sets pay.

The model's predictions match the reduced-form patterns we document. Engagement and dissent are more likely to occur together when compensation appears high relative to the investor's assessment of CEO quality, generating a positive contemporaneous relation between them. In contrast, engagement is negatively related to subsequent dissent, as disagreement is resolved over time. Both engagement and dissent also predict lower subsequent compensation, reflecting the information conveyed by both actions and, for dissent, an additional disciplinary effect on CEO pay.

The model also has broader implications for interpreting voting outcomes. Because voting records are often used to measure shareholder monitoring, repeated support for management may be interpreted as evidence of limited monitoring or a pro-management bias. Our model shows that such support may instead reflect concerns that were raised and resolved through prior engagement. In addition, because engagement and dissent often occur together in response to the same underlying concerns, what appears to be a board response to a vote may partly reflect its response to engagement. Thus, both the information conveyed by a vote and the board's response to it depend on whether engagement preceded it.

We estimate the model by simulated method of moments, matching the observed relations among engagement, voting, firm performance, and compensation. An important source of identification comes from the 2025 SEC guidance. Because the guidance raises engagement costs for shareholders above 5%, we use the change in engagement around the threshold after the SEC shock to help identify the engagement-cost parameters. How CEO pay responds to performance, engagement, and voting is informative about the remaining parameters and allows us to separate the informational and disciplinary effects of voting.

We use the estimated model to conduct several policy counterfactuals. We first quantify the broader governance effects of the 2025 SEC guidance, which raised the potential costs of engagement, and then consider a regime in which engagement is unavailable altogether.

These counterfactuals show that restricting engagement affects governance through several channels, with effects that differ substantially across firms. First, at firms where the restriction deters engagement, concerns that would otherwise have been communicated remain unresolved, leading to higher subsequent compensation. This effect is strongest initially and fades over time, as some of the missing information is gradually revealed, in part through subsequent votes. Second, at firms where investors would not have engaged even without the restriction on engagement, compensation instead falls. As engagement becomes more costly, the absence of engagement is no longer as favorable a signal about investor views as it was before, leading to lower pay at these firms.

The two effects largely offset in the aggregate, so a small average effect on compensation can mask substantial and opposing effects across firms. This heterogeneity is important for policy evaluation and highlights the value of the structural model. Reduced-form evidence based on average pay outcomes would miss these offsetting effects, even though pay changes substantially at many individual firms. Thus, evaluating regulations that restrict shareholder governance using only average downstream outcomes can be misleading.

The counterfactuals also show that restrictions on engagement affect voting. Investors whose engagement is deterred become more likely to vote against management in subsequent periods. Some favorable votes observed when engagement is available would therefore turn into dissent if engagement were restricted. Thus, observed voting outcomes partly reflect whether investors had the opportunity to resolve concerns through engagement.

The increased dissent among investors whose engagement is deterred highlights a benefit of engagement for management: concerns can be resolved privately rather than expressed publicly through dissenting votes. Importantly, we find that this additional dissent does not fully replace the information lost from engagement. Even though these investors vote against management more often, boards remain less informed because votes convey only a coarse signal of investor views. Consistent with this, following the SEC shock, the CEO of the Society for Corporate Governance observed, "This season companies found it harder to know what their major investors were thinking."[5]

Another counterfactual we analyze is the elimination of say-on-pay voting, motivated by the SEC's May 2026 proposal to exempt a broad set of public companies from say-on-pay requirements.[6] We find that eliminating voting leads investors to engage more, especially those who would have otherwise dissented. This substitution toward engagement preserves much of the information lost when voting is removed, so the board becomes only somewhat less informed. But engagement cannot replace the disciplinary role of voting. At firms where investors would otherwise have dissented, pay rises substantially once those votes no longer reduce CEO bargaining power, despite the large increase in engagement.

Overall, our results highlight two broader implications. First, private communication is an important part of shareholder governance: it affects what boards learn, how disagreement is resolved, and the policies firms choose. Second, engagement and voting are closely connected governance channels with distinct roles. How one channel is used affects how the other operates, and voting outcomes are difficult to interpret in isolation from the engagement that preceded them.

[5]See "BlackRock, Vanguard scale back company talks as new guidance bites," *Reuters*, September 19, 2025. Relatedly, a review of the 2026 proxy season notes that the SEC guidance, together with other developments, "shifted more of the burden onto issuers and steadily increased the risk borne by the board." See "2026 Proxy Season Review," *Harvard Law School Forum on Corporate Governance*, July 29, 2026.

[6]See "Executive Compensation Disclosure Changes," *Harvard Law School Forum on Corporate Governance*, June 3, 2026.

Related literature. We bridge the literature on shareholder engagement and the literature on shareholder voting by studying engagement and voting as jointly determined channels of investor communication. The engagement literature examines the determinants of engagement, its role in information transmission between shareholders and firms, and how it affects corporate outcomes.[7] The voting literature studies how votes aggregate shareholder information, convey dissatisfaction, and affect firm decisions even when they are nonbinding.[8] A particularly relevant strand studies say-on-pay voting and shows that say-on-pay regulation and voting outcomes can affect subsequent compensation policies (Ferri and Maber, 2013; Ertimur et al., 2013; Iliev and Vitanova, 2019; Denis et al., 2020; Barry, 2026; see Ferri and Göx, 2018, for a review). We connect the engagement and voting literatures by showing that these two channels are dynamically linked: they respond to common concerns, but engagement also changes later voting behavior. This matters because voting outcomes are often used to measure shareholder monitoring and board responsiveness. Our results show that voting outcomes and subsequent board responses cannot be fully interpreted without accounting for engagement.[9]

We use a structural framework to quantify these interactions and their implications. This approach connects our work to quantitative studies of the incentives and costs of shareholder engagement, including Lewellen and Lewellen (2022), who measure investors' incentives to engage, and Heath et al. (2026), who estimate a discrete-choice model of which portfolio firms institutional investors choose to engage with. Relative to these papers, our framework emphasizes the informational role of engagement and jointly models engagement and voting. A growing structural literature studies different forms of shareholder influence, including shareholder voting (Matvos and Ostrovsky, 2010; Blonien et al., 2025; Zachariadis et al., 2025; Barry, 2026; Barry et al., 2026) and blockholder governance (Gantchev, 2013; Albuquerque

[7]For determinants of engagement, see Doidge et al. (2019), Dey et al. (2024), Heath et al. (2026), Bebchuk and Hirst (2019), and Aggarwal et al. (2025). For engagement as a channel of information transmission, see Kakhbod et al. (2023) and Becht et al. (2026). For effects on corporate outcomes, see Dimson et al. (2015), Dimson et al. (2026), Azar et al. (2021), Hoepner et al. (2024), and Musto et al. (2025).

[8]For studies of votes as aggregating shareholder information or conveying shareholder dissatisfaction, see, e.g., Maug and Rydqvist (2009), Levit and Malenko (2011), Iliev and Lowry (2015), Del Guercio et al. (2008), and Cai et al. (2009). For effects on firm decisions, see, e.g., Ertimur et al. (2011), Cuñat et al. (2012), and Aggarwal et al. (2019).

[9]Related work studies exempt solicitations (Woidtke et al., 2026) and pre-vote disclosure of voting intentions (Fahlenbrach et al., 2026), which involve public communication among shareholders. We instead study private communication between shareholders and boards.

and Schroth, 2015; Johnson and Swem, 2021; Albuquerque et al., 2022). These papers do not consider engagement, which is the focus of our study, or how it interacts with voting to affect corporate outcomes. Finally, our model relates to structural and quantitative work on learning about CEO ability and its implications for compensation and turnover (Taylor, 2010, 2013; Pan et al., 2015; Page, 2018; Celentano and Mello, 2024; Lyman, 2024). In our setting, this learning process is shaped by shareholder engagement and voting.

More generally, our paper contributes to the literature on how different channels of shareholder influence interact. One strand studies the interaction between voice and exit, where trading can substitute for or complement voice (e.g., Maug, 1998; Kahn and Winton, 1998; Edmans and Manso, 2011). We focus on two forms of voice, engagement and voting, the two most commonly reported channels of influence among institutional investors (McCahery et al., 2016). For passive asset managers in particular, exit is largely unavailable as a governance tool. Related theoretical and empirical work studies how private shareholder negotiations and communication interact with intervention and more confrontational forms of activism (Carleton et al., 1998; Becht et al., 2009; Cohn and Rajan, 2013; Gantchev, 2013; Bebchuk et al., 2020; Levit, 2019, 2020; Corum, 2023). We instead study engagement and routine shareholder voting as two recurring channels of investor-board communication, focusing on how the information conveyed through each depends on the other.[10]

2 Institutional background and data

2.1 Stewardship and shareholder engagement

Institutional investors can exercise shareholder voice privately through engagement and publicly through voting. Engagement consists of direct interactions with portfolio firms, including meetings, calls, and written communication with managers or directors. Investors use these interactions to convey information, preferences, and concerns about policies that affect long-term firm value, including executive pay (Edmans et al., 2023).

Survey evidence supports the view that private engagement is a central part of insti-

[10]Shareholder voice can also interact with governance mechanisms inside the firm. Fos (2017), Fos et al. (2018), and Gantchev et al. (2019) show that the threat of shareholder opposition or intervention can affect firm behavior even when no vote or intervention is observed ex-post. Malenko et al. (2026) show that stronger shareholder voice strengthens the bargaining position of minority blockholder-appointed directors, keeping tunneling proposals off board agendas before any vote takes place.

tutional stewardship. McCahery et al. (2016) survey 143 large institutional investors and find that 63% report direct discussions with management and 45% report private discussions with directors outside management's presence, compared with 53% reporting voting against management and 16% submitting shareholder proposals. They interpret this pattern as consistent with investors using private discussions as an important channel of shareholder voice, alongside more public forms of intervention. Consistent with this view, Michelle Edkins, then BlackRock's global head of corporate governance and responsible investment, described private engagement as having "a fair degree of traction with management," allowing investors to raise concerns without dictating how management should address them.

Practitioner guidance emphasizes that engagement serves as a "two-way communication" channel (BDO, 2026). In this exchange, shareholders can hear directors' perspectives on firm-specific circumstances and constraints, while "directors can learn about shareholders' priorities and their concerns about the company" (PwC, 2023). Similarly, EY encourages boards to "listen, learn, share" through engagement, emphasizing that "voting outcomes alone may not tell the full story. A negative vote does not reveal what drove that voting decision, just as a positive vote doesn't expose emerging concerns that could impact a future vote." (Ernst & Young, 2023, 2026). The 2025 SEC guidance has shifted this balance: as some investors have become more cautious about proactive outreach, EY recommends that compensation committees encourage management to "proactively raise executive pay as an agenda item for engagement discussions" (Ernst & Young, 2026).

Moreover, engagement is not separate from voting: Glass Lewis' 2025 Investor Stewardship Survey reports that 88% of respondents describe their voting and engagement as fully or partially integrated, and that most view further integration as a medium-to-high priority (Nilsson et al., 2026). This close connection motivates our focus on engagement and voting as jointly determined channels of shareholder voice, rather than as separate governance tools.

2.2 Data

The empirical analysis requires three main data objects. First, we need an observed corporate policy. Second, we need investor engagement about that same policy. Third, we need an observable voting decision that gives investors a second, public channel through which to express disagreement over the policy. Combining these three objects allows us to study the dual roles of engagement and voting in shareholder voice.

We focus on executive pay as the corporate policy in our analysis. Compensation is both observed annually and voted on annually through say-on-pay.[11] Importantly, say-on-pay votes are advisory rather than binding, making them a natural setting to study voting as communication rather than direct control. These votes are also ex-post: shareholders vote at the annual meeting on executive compensation disclosed for the prior fiscal year, rather than on a proposed compensation package for the coming year. Thus, the vote does not mechanically revise current pay, but instead creates a public measure of dissent that can affect future pay-setting and board-shareholder interactions.

Moreover, executive pay is a particularly information-sensitive policy, as the compensation committee updates compensation in response to new signals about CEO ability, including those coming directly from shareholders (e.g., Taylor, 2013; Barry, 2026). Our mechanisms and model, however, are not inherently limited to compensation. The same logic applies to any recurring board policy for which investors can both engage and cast votes as connected ways to convey information to the firm.

2.2.1 Shareholder engagement

Engagement has historically been difficult to observe because it typically takes place privately and is not subject to mandatory public disclosure. In recent years, however, large asset managers have increasingly disclosed their stewardship activity in public stewardship reports, allowing us to measure this otherwise private channel of shareholder voice.

We hand-collect these reports to construct our measures of engagement. They list portfolio companies with which the stewardship team engaged, but differ in how much they reveal about the content of those interactions. While some asset managers only identify the companies they engaged with, BlackRock and Vanguard report engagement topics at the portfolio-company level. We therefore center our analysis on BlackRock and Vanguard, whose disclosures allow us to distinguish compensation-related engagement from other stewardship activity.[12] Their engagement and voting decisions are economically important be-

[11] The Dodd-Frank Act requires public companies to hold a non-binding shareholder vote on executive compensation at least once every three years, and a separate vote at least once every six years on whether say-on-pay should occur every one, two, or three years. In practice, most firms hold say-on-pay votes annually.

[12] Figure A.1 in the appendix provides examples of BlackRock's and Vanguard's engagement disclosures.

cause BlackRock and Vanguard are two of the largest diversified shareholders.

We construct the engagement panel by matching companies named in stewardship reports to U.S. public firms, using BlackRock data from 2020–2025 and Vanguard data from 2019–2025. The resulting institution-firm-CEO-year panel records whether each investor engaged on executive pay, as well as on other topics such as board issues, firm risk, and shareholder rights. These additional engagement measures allow us to distinguish compensation-specific effects from broader stewardship activity.

Our engagement data are most similar to Heath et al. (2026), who study engagement by a broader set of asset managers and focus on the determinants of engagement, and Aggarwal et al. (2025), who study the Big Three and emphasize target selection and the lack of association between engagement and firm outcomes. Relative to these papers, the topic-level detail in our BlackRock and Vanguard data allows us to isolate engagement on a specific issue—executive compensation—and trace the full sequence from engagement to voting to the corresponding corporate policy.

2.2.2 Other data

We combine the engagement data with several standard datasets. ExecuComp provides CEO compensation. The main compensation variable used in the analysis is the ratio of total expected pay (TDC1) to assets. This aligns with the model, in which compensation and performance are measured on the same asset-scaled basis. We also report specifications using the natural logarithm of total pay for robustness.

Compustat provides accounting variables used to describe firm fundamentals, such as performance and firm size. The core firm performance variable used in the analysis is return on assets (ROA), measured as the ratio of the firm's annual earnings to assets.

On the voting side, we use Institutional Shareholder Services (ISS) Company Vote Results and Mutual Fund Vote Records to identify say-on-pay proposals and voting outcomes. For each firm-year, our key voting variables are: (i) whether Vanguard dissents on the say-on-pay proposal, (ii) whether BlackRock dissents on the say-on-pay proposal, and (iii) other

BlackRock lists more detailed topics, with a focus on topics relating to the board of directors, executive compensation, shareholder rights, and environmental and social issues. Vanguard, on the other hand, simply discloses whether they engaged on "board composition and effectiveness," "board oversight of strategy and risk," "executive pay," and "shareholder rights."

shareholders' aggregate dissent on the say-on-pay proposal.

We also merge institutional ownership and holdings data (i.e., data from 13F filings). These variables measure the institution's stake in the firm, including the percentage of shares owned, the dollar value of the position, and the firm's weight in the institution's portfolio.

2.3 Summary statistics

Table 1 reports summary statistics for the analysis sample (Table A.1 defines the empirical variables and lists their sources). The merged data contain 20,709 institution-firm-CEO-years: 9,563 for BlackRock and 11,146 for Vanguard. BlackRock reports some form of engagement in 37.6% of its institution-firm-years and pay engagement in 19.4%. Vanguard reports engagement in 29.2% of institution-firm-years and pay engagement in 13.5%. Pay engagement is therefore an important part of stewardship activity, though less frequent than some other topics, such as engagement about the board of directors.

Voting against management on say-on-pay is much rarer than engagement: BlackRock votes against management in 3.4% of observations and Vanguard does so in 2.1%. These frequencies are useful for the model: engagement is common enough to study directly, but infrequent enough that it is naturally modeled as a costly action. Voting against management is less frequent, consistent with survey evidence that institutional investors rely more often on private discussions than on votes against management (McCahery et al., 2016).

The firm-year panel contains 11,158 observations. Average CEO pay is about \$5.84 million, average assets are about \$5 billion, and average ROA is 4.5%. Overall say-on-pay dissent averages 9.1%. The sample therefore contains meaningful variation in both the policy outcome and shareholder opposition to that policy.

3 Reduced-form evidence

This section reports a set of reduced-form results that document the main empirical patterns in the data. In particular, the analysis shows how engagement, voting, and pay move together within investor-firm relationships, and these patterns motivate the dynamic model developed below. Section 4.3 returns to these patterns after introducing the model.

3.1 The relation between engagement and voting

Table 2 studies the determinants of engagement on executive pay. All specifications, including those below on voting and pay, include institution-by-CEO-spell fixed effects and institution-by-year fixed effects. We include institution-by-CEO-spell fixed effects as they hold constant the stewardship relationship between the investor and a given firm-CEO pair.[13]

Engagement is more likely when CEO pay is high and less likely when ROA is high. Engagement is also negatively related to lagged engagement, consistent with the idea that engagement is costly and that a recent engagement may reduce the benefit of engaging in subsequent years. Lagged votes against management predict a higher probability of subsequent engagement, suggesting that voting and engagement are connected dynamically rather than operating as isolated governance tools.

Table 3 turns to the determinants of voting against management on say-on-pay. Like engagement, votes against management are more likely when CEO pay is high and less likely when ROA is high. Contemporaneous pay engagement is strongly positively associated with a dissenting vote, consistent with both actions responding to common concerns or information. At the same time, lagged engagement is negatively related to subsequent dissenting votes in specifications that do not also condition on lagged voting. This pattern is consistent with engagement sometimes substituting for later public dissent, though the reduced-form estimates do not separately identify information transmission, discipline, and selection.

3.2 Engagement, voting, and subsequent compensation

Table 4 relates these governance actions to future compensation. In Panel A, the dependent variable is the ratio of total pay to assets, and in Panel B, it is log total pay.

Lagged engagement predicts lower subsequent CEO pay, and the estimate remains negative after controlling for lagged voting, aggregate shareholder support, ROA, and lagged ROA. The magnitude is economically meaningful: the Panel A coefficients imply that pay/assets is 0.013 to 0.018 percentage points lower in the year after pay engagement, or about 5% to 7% of the sample mean of 0.24%.

Lagged votes against management also predict lower future pay, with coefficients of 0.025

[13] This is consistent with the model, in which engagement and voting decisions evolve over the course of a CEO's tenure. Results are very similar if we instead use firm fixed effects in the reduced-form analysis.

to 0.041 percentage points of assets, about 10% to 17% of mean pay/assets. The aggregate vote tally—the share of other shareholders voting against management—is also negatively related to subsequent pay. Panel B shows that the negative relation between engagement and subsequent pay is robust when compensation is measured using log total pay. The reduced-form estimates therefore suggest that both private engagement and public dissent contain information about later compensation changes.

Because proxy advisor recommendations predict say-on-pay votes (Ertimur et al., 2013; Malenko and Shen, 2016; Shu, 2024), we also test whether our results are robust to controlling for ISS recommendations. Column (6) of Table 4 adds the lagged ISS recommendation, using the imputed recommendations of Zytnick (2025). In both panels, the coefficient on lagged engagement remains negative and significant after adding this control. In our main pay/assets specification, the coefficient on the ISS recommendation is close to zero, while the coefficient on the lagged aggregate vote tally remains negative and similar in magnitude, so we retain the aggregate tally as our measure of outside shareholder views.[14]

Dynamic effects of engagement on compensation. Figure 1 provides a more direct look at the timing of compensation around engagement. The figure plots coefficients from a lead-lag regression of pay/assets on pay-engagement indicators, with the engagement year normalized to zero, fixed effects for institution-by-CEO-spell and year, and log assets as a control. The decline is concentrated after engagement. Pay is not meaningfully lower in the two years before engagement but falls sharply afterward: the coefficient is about -0.020 percentage points of assets one year after engagement and -0.015 two years after, about 9% and 7% of mean pay/assets. Panel B shows the same pattern for log total pay.

The timing helps interpret the reduced-form results. Engagement is associated with high pay contemporaneously and with lower pay afterward. This sequence is what one would expect if investors engage when compensation appears high relative to their information and boards subsequently adjust pay in response, a mechanism we formalize in the model.

[14] Appendix Table A.3, Panel C, shows that when we replace the aggregate tally with the ISS recommendation, the recommendation predicts subsequent pay. Together with Column (6) of Table 4, this suggests that the two measures capture related information about outside shareholder views. Table A.3 also shows that controlling for the ISS recommendation leaves the main patterns in the blockholder engagement and voting-against results in Tables 2 and 3 unchanged.

3.3 Other types of engagement

Table A.2 compares pay engagement with overall engagement and engagement on non-compensation topics. This exercise helps distinguish our compensation-specific mechanism from broader investor attention or stewardship activity. The results show that non-pay engagement does not exhibit the same relation as pay engagement with either later say-on-pay dissent or subsequent compensation outcomes.[15] These findings are also consistent with Aggarwal et al. (2025), who find that index-induced increases in Big Three engagement across all topics are not followed by clear changes in CEO compensation or propensities to vote against management. The difference is informative: broad engagement averages across many issues, only some of which are related to executive pay. Our main analysis therefore uses topic-level disclosures to isolate engagement specifically about executive compensation and match it to the corresponding voting and compensation outcomes.

3.4 The 2025 SEC guidance shock

On February 11, 2025, the SEC staff revised its interpretation of the beneficial-ownership reporting rules. Investors holding more than five percent of a firm may use the short-form Schedule 13G only if they are not seeking to change or influence control of the issuer; investors with such intent generally must instead file the more onerous Schedule 13D. The guidance clarified that pressuring management can jeopardize this eligibility; examples include recommending changes to executive compensation and conditioning director support on adoption of the recommendation.[16] The guidance therefore raised the expected legal and compliance cost of engagement, especially for investors above the five-percent threshold. BlackRock and Vanguard paused at least some company meetings while assessing how to preserve their Schedule 13G eligibility.[17]

[15] The "any engagement" measure includes pay-related engagement as a subset, so it is not a clean measure of unrelated stewardship activity: investors engage on pay in about 50% of engagements. This helps explain why the pay/assets coefficient using "any engagement" (column 1 in Panel B) is also negative, although only marginally significant and smaller in magnitude than for pay engagement. When compensation is measured using log total pay, the coefficient is no longer statistically significant (column 5 in Panel B), and the voting results do not show the same dynamic pattern as for pay engagement (Panel A).

[16] SEC Division of Corporation Finance, "Exchange Act Sections 13(d) and 13(g) and Regulation 13D-G Beneficial Ownership Reporting," Questions 103.11–103.12, updated February 11, 2025.

[17] Ross Kerber, "BlackRock, Vanguard scale back company talks as new guidance bites," *Reuters*, September 19, 2025.

Figure 2 provides initial evidence of a decline in pay engagement after the guidance. Engagement is strongly seasonal, with activity concentrated around the spring proxy season, so we compare each quarter with the same quarter in prior years. Engagement declines sharply in Q1 and Q2, when pay-related engagement is typically most active, and remains substantially lower in Q3. Across Q1 and Q2, engagement falls by about 39 percent relative to 2023 and 2024. Because the decline occurred during the proxy season, compensation decisions for the following year at firms where investors would otherwise have engaged were likely made without the information those engagements would have conveyed. Engagement picks up again in Q4, returning to roughly its level in prior years.[18] Overall, engagement is about 28 percent lower in 2025 than in 2023 and 2024.

This aggregate evidence is consistent with the guidance reducing engagement, but does not isolate its effect from other potential changes in stewardship during 2025. For sharper identification, we exploit the five-percent threshold built into the guidance. We ask whether the difference in engagement around the five-percent threshold changed after February 2025. This difference-in-discontinuities design accounts for the tendency of investors to engage more at larger ownership stakes even before the guidance, as well as for common changes over time.

Table 5 provides the estimating equation and implementation details. It reports a 6 to 13.6 percentage point decline in pay engagement above the threshold after the guidance, statistically significant across specifications. This pattern is consistent with the guidance raising engagement costs precisely where Schedule 13G eligibility becomes relevant.

The 2026 compensation and voting data needed to estimate the downstream effects of the SEC guidance are not yet available. Even once they become available, reduced-form analysis using this shock is unlikely to capture its full effects on pay and voting for two reasons. First, these effects are likely to be diluted because only a subset of exposed firm-investor pairs changed their engagement decisions.[19] Second, as we show in the model and estimation, increasing engagement costs changes boards' inferences from non-engagement,

[18] The later recovery coincided with greater clarity about the guidance. In May 2025, Commissioner Uyeda offered some reassurance that ordinary engagement could continue, while more forceful pressure could still entail higher reporting costs. See Remarks at the "SEC Speaks" Conference 2025.

[19] For example, multiplying the 6 to 13.6 percentage point decline in engagement by the 0.013 to 0.018 percentage point reduction in subsequent pay associated with engagement yields an intent-to-treat (ITT) pay increase of only 0.0008 to 0.0024 percentage points of assets.

affecting pay even when the observed engagement decision does not change and potentially generating offsetting effects across firms. We therefore use the structural model in Section 6.2 to quantify these downstream effects and address both issues.

Summary. Taken together, the reduced-form evidence documents a strong dynamic relation between pay engagement, voting, and compensation. These patterns are informative, but should not be interpreted as causal. Engagement and voting are endogenous choices: investors engage and cast dissenting votes when they have concerns about pay, performance, or governance, and firms may respond to the same underlying information that drives investor actions. The regressions thus document the empirical patterns the model must explain, but do not separate selection from information transmission and discipline. We use the model to make this distinction and quantify how engagement and voting affect pay.

4 Model

This section develops a dynamic model of blockholder engagement and say-on-pay voting that provides a unified framework for interpreting the empirical patterns documented in Section 3. The board and blockholder learn about CEO ability over time. The blockholder can engage with the board and share information at a cost. In addition, each period, the blockholder votes for or against the CEO's compensation package. Voting can both reveal information about the blockholder's assessment of the CEO and discipline compensation by reducing the CEO's bargaining power. The model characterizes engagement and voting decisions and how they jointly affect board learning and future compensation.

4.1 Setup

There are three players: the board, the CEO, and a blockholder. The horizon is infinite, and time is discrete, indexed by $t = 0, 1, ...$ All players discount future payoffs at rate $r > 0$.

The CEO has uncertain ability with prior distribution $\theta \sim N(\mu_0, \sigma_0^2)$. We assume that this ability is time-varying and evolves according to a first-order autoregressive process:

$$\theta_{t+1} - \mu_0 = \rho(\theta_t - \mu_0) + \nu_t, \qquad \nu_t \sim N\Big(0,\ (1-\rho^2)\,\sigma_0^2\Big), \tag{1}$$

where $\rho \in (0, 1]$ governs the persistence of CEO ability and the innovation variance is set so that the unconditional (stationary) variance of θ_t equals σ_0^2. The case $\rho = 1$ corresponds to constant CEO ability: $\theta_t = \theta_0$ for all t, where $\theta_0 \sim N(\mu_0, \sigma_0^2)$.

Conditional on θ_t, the firm generates a publicly observable cash flow (e.g., earnings) of $A_t y_t$, where A_t denotes the firm's total book assets in period t:

$$y_t = \theta_t + \varepsilon_t, \tag{2}$$

where $\varepsilon_t \sim N(0, \sigma_\varepsilon^2)$. The firm pays out all earnings net of CEO compensation as dividends, so the book value of assets A_t remains constant over time.

Over time, the board and the blockholder gradually learn information about CEO ability. The board receives information through internal firm processes, while the blockholder receives information through external monitoring and analysis, including by observing performance and governance outcomes across firms in her portfolio. This information is different from the board's: whereas the board primarily observes its own firm, a large institutional investor holds stakes across many firms simultaneously, allowing it to form broader benchmarks for evaluating CEO ability and firm performance.[20]

In particular, every period, the board observes a private signal

$$s_t = \theta_t + \epsilon_t, \tag{3}$$

where $\epsilon_t \sim N(0, \sigma_\epsilon^2)$, and the blockholder observes a private signal

$$z_t = \theta_t + u_t, \tag{4}$$

where $u_t \sim N(0, \sigma_u^2)$.

At the beginning of each period t, the CEO and the board bargain over total CEO compensation (wage), W_t, based on the board's information about CEO ability at the end of period $t-1$, which is the information available at the beginning of period t. We assume that the CEO and the board always observe the same information and therefore have common

[20] For example, using survey evidence from public-company executives, Musto et al. (2025) conclude that the Big Three convey valuable information to boards by leveraging an informational advantage derived from low-cost access to almost all boards and management and from "their private engagement with thousands of other companies."

beliefs about CEO ability. Bargaining concerns compensation in the current period only. The CEO's outside option is to leave the firm for one period and obtain utility zero, while the board's outside option is to obtain cash flow zero for one period. Let γ_t denote the bargaining power of the CEO and $1 - \gamma_t$ the bargaining power of the board in period t. As specified below, γ_t equals a baseline level of CEO bargaining power, γ_b, potentially adjusted in response to the most recent voting outcomes.

Then, the CEO's compensation in period t is

$$W_t = \gamma_t A_t \mathbb{E}_{t-1}[y_t] = \gamma_t A_t \mathbb{E}_{t-1}[\theta_t], \tag{5}$$

where $\mathbb{E}_{t-1}$ denotes expectation conditional on the board's information at the end of period $t-1$. Equivalently, the asset-scaled wage, $w_t \equiv \frac{W_t}{A_t}$, is given by

$$w_t = \frac{W_t}{A_t} = \gamma_t \, \check{\mu}_t^\theta, \tag{6}$$

where $\check{\mu}_t^\theta \equiv \mathbb{E}_{t-1}[\theta_t]$ denotes the board's predictive assessment of CEO ability for period t. Applying the AR(1) law of motion to $\mu_{t-1}^\theta \equiv \mathbb{E}_{t-1}[\theta_{t-1}]$, the posterior mean of CEO ability in period $t-1$ conditional on the board's information at the end of period $t-1$, we get

$$\check{\mu}_t^\theta = \mathbb{E}_{t-1}[\theta_t] = \rho \, \mu_{t-1}^\theta + (1-\rho)\, \mu_0. \tag{7}$$

When CEO ability is constant, i.e., $\rho = 1$, $\check{\mu}_t^\theta = \mu_{t-1}^\theta$.

The blockholder owns share $\alpha > 0$ of the firm and therefore, her payoff in period t is

$$\alpha A_t (y_t - w_t). \tag{8}$$

The blockholder can influence future CEO compensation through two channels: engagement with the board and voting. Engagement allows the blockholder and the board to communicate and share information privately, but requires the blockholder to incur cost (per unit of assets) C_t, drawn from a distribution specified below. If engagement occurs, the blockholder and the board share all information they each accumulated up to that point.

The blockholder's second channel of influence is voting. At the end of each period, the shareholder meeting takes place at which the blockholder and other shareholders vote for or against the CEO's compensation package in a say-on-pay vote. The vote at the end of period t concerns the compensation W_t paid during that period. This reflects the practice of say-on-pay voting, in which shareholders vote on a compensation package that has already been determined, rather than on a future compensation package.

Let $V_t \in \{0, 1\}$ denote the blockholder's vote on the compensation package chosen by the board. We assume that the blockholder votes "for" ($V_t = 1$) if and only if the difference between the wage that the board pays to the CEO, w_t, and the wage that the blockholder would pay given her own assessment of CEO ability at the time of the vote, $m^{\theta}_{t,V}$, under the firm's baseline bargaining environment, γ_b, is below some stochastic threshold Δ_t:

$$V_t = 1\left\{w_t - \gamma_b m^{\theta}_{t,V} \le \Delta_t\right\}. \tag{9}$$

Thus, the blockholder's vote reveals some of her information about CEO ability, as captured in $m^{\theta}_{t,V}$, to the board. The threshold Δ_t can be interpreted as the cost of dissenting from management: the higher Δ_t is, the less likely the blockholder is to vote against, even when she perceives the CEO to be overpaid.

Note that for simplicity, we abstract from strategic voting, i.e., voting intended to manipulate the board's beliefs. Instead, (9) is a reduced-form voting rule that links the blockholder's vote to the perceived mismatch between CEO compensation and CEO ability. This assumption is natural for the large, stewardship-oriented asset managers in our empirical setting. Their voting is disciplined by fiduciary obligations, publicly disclosed voting rationales and guidelines, and repeated interactions across many portfolio firms. These features create strong reputational incentives to cast credible votes throughout their portfolios.[21] While we adopt a reduced-form model of voting, we solve for the blockholder's optimal engagement strategy from first principles.

We assume that the blockholder's engagement and dissent costs (C_t, Δ_t) are publicly

[21] In a fully strategic model, the blockholder would prefer the board to hold a lower assessment of CEO ability regardless of her private information. A board anticipating such manipulation could discount the blockholder's vote, potentially making it uninformative. We abstract from this manipulation channel. Consistent with our interpretation, dissenting blockholder votes and aggregate say-on-pay opposition are informative about subsequent company performance in the data, supporting the assumption that boards can learn from voting outcomes.

observed and drawn from a joint lognormal distribution:

$$\begin{pmatrix} \log C_t \\ \log \Delta_t \end{pmatrix} \sim N\left(\begin{pmatrix} (\beta^E)' X_t \\ (\beta^V)' X_t \end{pmatrix}, \begin{pmatrix} \sigma_e^2 & \rho_{ev}\sigma_e\sigma_v \\ \rho_{ev}\sigma_e\sigma_v & \sigma_v^2 \end{pmatrix} \right), \tag{10}$$

where X_t is a set of firm covariates at time t, specified in the model estimation section, and $\rho_{ev} \in [-1, 1]$ measures the conditional correlation between the engagement-cost and dissent-cost shocks, after accounting for X_t. When $\rho_{ev} > 0$, the correlation captures common time-varying factors that make the investor more reluctant to voice concerns through either engagement or voting, for example, because of concerns about damaging its relationship with management or provoking retaliation (Davis and Kim, 2007; Cvijanović et al., 2016).

Other shareholders also vote on the say-on-pay proposal, and we denote by $\pi_t \in (0, 1)$ the fraction of other shareholders, excluding the blockholder, that vote in favor of the CEO compensation package. We assume that the aggregate vote tally of other shareholders satisfies

$$\kappa\left(\eta_t - \bar{\eta}\right) = \theta_t - \mu_0 + \bar{\varepsilon}_t, \tag{11}$$

where $\bar{\varepsilon}_t \sim N\left(0, \sigma_{\bar{\varepsilon}}^2\right)$, and $\eta_t = \log \frac{\pi_t}{1-\pi_t}$.[22] Parameter κ captures the inverse sensitivity of shareholder support to CEO ability. Thus, the aggregate vote tally of other shareholders provides an additional noisy signal about CEO ability.

Finally, we specify the CEO's bargaining power, γ_t, as

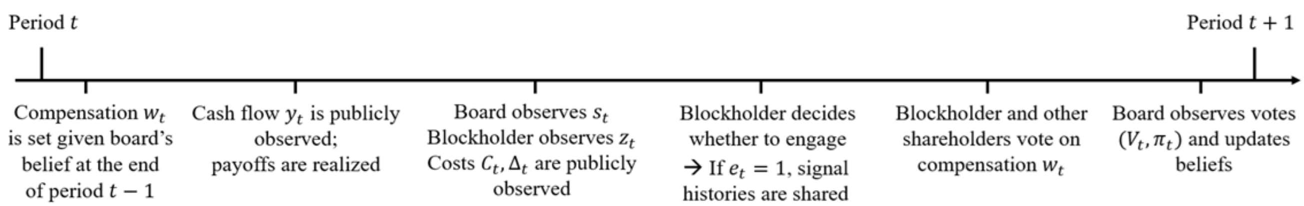
$$\gamma_t = \gamma_b - g_V(1 - V_{t-1}) - g_\pi(1 - \pi_{t-1}). \tag{12}$$

The CEO's bargaining power equals the baseline level γ_b, reduced in response to dissent in the most recent shareholder vote. The parameter γ_b can be interpreted as capturing the strength of corporate governance: lower values of γ_b correspond to stronger governance and a more independent board, while higher values correspond to greater CEO influence over compensation decisions. Parameters g_V and g_π capture the extent to which dissenting say-on-pay votes increase the board's toughness in its subsequent negotiations with the

[22] In the empirical implementation, π_t is measured using shareholder votes excluding the blockholder's own vote. The logit transformation implies that $\eta_t = \log \frac{\pi_t}{1-\pi_t} \in (-\infty, \infty)$. Parameter $\bar{\eta}$ captures the average logarithmic vote tally in the data, corresponding to the average level of say-on-pay support.

CEO. The resulting pressure may arise from direct shareholder scrutiny, recommendations by proxy advisors, media attention, and directors' reputational concerns. For example, the two major proxy advisors, ISS and Glass Lewis, scrutinize how the board responds to low say-on-pay support in the previous year when making their recommendations for the next annual meeting and may recommend against compensation committee members if the board fails to adequately address shareholders' concerns.[23]

Thus, a shareholder vote has two roles. The first is communication: shareholder votes transmit information from the blockholder and other shareholders to the board, thereby affecting future executive compensation through belief formation. The second role is bargaining: shareholder votes affect the negotiating power of the board vis-á-vis the CEO.



The timing of events in each period is described in the figure and in more detail in Appendix B.1. We do not model either the board's decision to replace the CEO or the CEO's decision to leave the firm. When estimating the model, we account for CEO turnover by assuming that the CEO departs exogenously with a constant probability λ each period. For purposes of solving the model, this is equivalent to replacing the discount rate r with the effective discount rate $\frac{r+\lambda}{1-\lambda}$.

4.2 Analysis

4.2.1 Beliefs and learning

We assume that players' beliefs are summarized by normal distributions. Let

$$\theta_t \sim N(m_t^{\theta}, \nu_{\theta,t}^2) \tag{13}$$

[23]See ISS, U.S. 2026 Proxy Voting Guidelines Benchmark Policy Recommendations, p. 15; and Glass Lewis, U.S. 2026 Benchmark Policy Guidelines, p. 23. See also "Shareholder Engagement Responses to Adverse Say-on-Pay Votes," *Harvard Law School Forum on Corporate Governance*, August 17, 2026, which notes that "while SEC rules only require a non-binding advisory vote, in practice these entities provide an enforcement mechanism."

denote the blockholder's belief about CEO ability at the time of making the engagement decision in period t, and

$$\theta_t \sim N(\mu_t^\theta, \sigma_{\theta,t}^2) \tag{14}$$

denote the board's belief about CEO ability at the end of period t, after the engagement decision and after the voting outcome is observed.

The blockholder's and the board's beliefs evolve as these players observe public cash flows, private signals, engagement decisions, and voting outcomes. When engagement occurs, the board and the blockholder share all accumulated private information. When engagement does not occur, the board learns about the blockholder's information from the blockholder's decision not to engage and from the blockholder's vote at the shareholder meeting.

The state of the economy is summarized by the beliefs of the board and the blockholder about CEO ability and the CEO's bargaining power. Let

$$x_t = \left(m_t^\theta, \nu_{\theta,t}^2, \mu_{t-1}^\theta, \sigma_{\theta,t-1}^2, \gamma_t, C_t, \Delta_t\right) \tag{15}$$

denote the state vector at the time of the blockholder's engagement decision in period t.

The evolution of beliefs follows Bayesian updating. Because the blockholder's engagement and voting decisions are discrete (binary) actions, the board's posterior beliefs are no longer normal. To preserve tractability, we use a normal approximation for posterior beliefs throughout the model. The appendix derives the corresponding Bayesian updating formulas and the evolution of the state vector across different engagement and voting outcomes.

4.2.2 Blockholder's decisions

The blockholder can influence future compensation decisions through two channels: engagement with the board and voting on the CEO's compensation package.

Voting. Consider first the blockholder's voting decision, where $V_t = 1$ ($V_t = 0$) denotes the blockholder's vote in favor (against) the say-on-pay proposal. Under (9), the blockholder votes against when CEO compensation is sufficiently high relative to her assessment of CEO ability at the time of the vote, $m_{t,V}^\theta$. This assessment depends on whether engagement occurs, because engagement reveals the board's private signal to the blockholder. Thus, if there is no engagement in period t, the blockholder's vote is given by

$$V_t = 1\left\{w_t - \gamma_b m_t^\theta \leq \Delta_t\right\}, \tag{16}$$

and if there is engagement at time t, the blockholder's vote is given by

$$V_t = 1\left\{w_t - \gamma_b \hat{m}_t^\theta \leq \Delta_t\right\}, \tag{17}$$

where

$$\hat{m}_t^\theta \equiv \left(\frac{1}{\nu_{\theta,t}^2} + \frac{1}{\sigma_\epsilon^2}\right)^{-1}\left(\frac{m_t^\theta}{\nu_{\theta,t}^2} + \frac{s_t}{\sigma_\epsilon^2}\right) \tag{18}$$

is the blockholder's updated belief after engaging and learning the board's signal s_t.

Engagement. Next, consider the engagement decision. Let $e_t = 1$ ($e_t = 0$) denote the blockholder's decision to engage (not engage) in period t. Let $J(x_t)$ be the value function of the blockholder per unit of the firm's book assets. Then:[24]

$$J(x_t) = \alpha\left(y_t - \gamma_t\,\check{\mu}_t^\theta\right) + \max_{e_t \in \{0,1\}}\left[-C_t e_t + \frac{1}{1+r}\mathbb{E}\left[J(x_{t+1})\,|x_t, e_t\right]\right]. \tag{19}$$

Engagement allows the blockholder to communicate information directly to the board, but requires paying engagement cost C_t. The benefits of engagement are larger when the blockholder's assessment of CEO ability is sufficiently below the board's current belief, since in this case communication is more likely to reduce future compensation. Conversely, when the blockholder's assessment is close to or above the board's belief, the benefits of engagement are smaller. The equilibrium engagement strategy is thus characterized by a cutoff rule. In particular, the blockholder's optimal engagement decision is

$$e_t = 1\left\{m_t^\theta \leq \bar{D}_t\right\} \tag{20}$$

for some endogenous threshold $\bar{D}_t = \bar{D}\left(\nu_{\theta,t}^2, \mu_{t-1}^\theta, \sigma_{\theta,t-1}^2, C_t, \Delta_t, \gamma_t\right)$.

Together, the engagement and voting rules determine how the blockholder's information

[24] Given that we model the blockholder's voting in a reduced-form way, this equation does not have any terms related to voting.

affects the board's beliefs and, through this channel, future compensation decisions. In addition, a negative vote by the blockholder lowers next-year compensation by weakening the CEO's bargaining power in the subsequent compensation negotiation.

4.2.3 Equilibrium notion

An equilibrium consists of (1) pay-setting by the board; (2) engagement and voting strategies of the blockholder; and (3) belief updating rules for the board and the blockholder, such that:

(i) the CEO's compensation satisfies Nash bargaining between the board and the CEO,

(ii) the blockholder's engagement decision maximizes her continuation value,

(iii) the blockholder's voting decision follows the voting rule described above,

(iv) beliefs are updated according to Bayesian updating rules, using the normal approximation for posterior beliefs described above and formalized in Appendix B.2.

Past engagement decisions, voting outcomes, and realized signals affect future actions and compensation decisions only through their effects on the board's and blockholder's current beliefs about CEO ability and on the CEO's bargaining power, all of which are summarized by the state vector (15). The evolution of the state vector under different engagement and voting outcomes is derived in Appendix B.2.3.

4.3 Mechanisms and interpretation of the empirical patterns

The model provides a framework for interpreting the empirical relations between engagement, voting, compensation, and firm performance documented in Section 3.

Tables 2 and 3 document several contemporaneous relations between CEO compensation, engagement, and voting behavior. First, higher CEO compensation is associated with a greater likelihood of engagement on executive pay. In the model, engagement becomes more attractive when the blockholder perceives a larger gap between compensation and CEO ability, because communication with the board is then more likely to induce future compensation adjustments (Eq. (20)). Second, higher CEO compensation is also associated with a greater probability of voting against say-on-pay, consistent with the model's assumption that the blockholder is more likely to dissent when compensation appears high relative to her assessment of CEO ability (Eq. (16)–(17)).

Table 2 also shows that lower contemporaneous firm performance, measured by ROA, predicts greater engagement activity. In the model, poor performance y_t implies a higher likelihood that the blockholder receives a sufficiently negative private signal of CEO ability relative to the board. Because engagement occurs when the blockholder's belief is sufficiently below the board's belief, negative performance makes engagement more likely on average.

Table 3 further shows that engagement and voting against are positively related contemporaneously, even after controlling for CEO pay and public performance. This relation is natural in the model because both actions are more likely when the blockholder's private assessment of CEO ability is sufficiently pessimistic relative to the board's beliefs.

The model also helps interpret the dynamic patterns in engagement and voting behavior documented in Tables 2 and 3. First, engagement is negatively related to past engagement (Table 2). In the model, engagement facilitates information sharing between the blockholder and the board, reducing informational differences between them. Because CEO ability is persistent, recent engagement decreases the incremental informational benefit of engaging again in the near future. Second, engagement predicts lower future dissenting votes (Table 3). In the model, engagement transmits information to the board and induces compensation adjustments, thereby reducing future disagreement between the blockholder's assessment and the compensation package proposed by the board. At the same time, past votes against compensation positively predict future engagement (Table 2). Intuitively, a dissenting vote reveals disagreement between the blockholder's assessment and the board's beliefs, increasing the likelihood that future private information held by the blockholder is sufficiently negative relative to the board's assessment to justify direct engagement.

Finally, the model helps explain the relation between governance actions and future compensation. Figure 1 and Table 4 show that engagement on executive pay predicts lower future CEO pay. In the model, engagement occurs when the blockholder's private assessment of CEO ability is sufficiently pessimistic relative to the board's belief, so information revealed through engagement leads the board to update downward and reduce future pay. Table 4 shows that voting against also predicts lower future compensation. Consistent with this pattern, in the model, a dissenting vote conveys that the blockholder views compensation as excessive relative to CEO ability and also directly reduces the CEO's bargaining power in the next compensation negotiation. Voting therefore affects future compensation through both learning and discipline. Finally, Table 4 shows that firm performance positively predicts compensation, which is natural in the model because realized performance is informative about CEO ability and affects the board's posterior beliefs.

We next estimate the model to quantify these mechanisms and evaluate their implications for board learning and compensation dynamics.

5 Identification and estimation

This section explains how we identify and estimate the model's structural parameters. In particular, we show how the reduced-form evidence in Section 3 can be used to discipline the model. Further details are provided in Appendix C.

5.1 Identification

We first describe the calibrated parameters held fixed in the identification argument (Section 5.1.1). Section 5.1.2 shows how engagement and voting behavior identify investors' action costs and policy rules. Section 5.1.3 then shows how compensation outcomes identify the parameters governing information and discipline, conditional on those policy rules.

5.1.1 Calibrated parameters

In the model, CEO ability evolves independently of the governance choices, and agents observe two public signals of ability: ROA and the aggregate say-on-pay tally of other shareholders. The realizations of these signals are unaffected by the blockholder's engagement and voting decisions. We can therefore use these processes to estimate the parameters governing the evolution of CEO ability and the informativeness of the public signals in a first step, and then estimate the remaining structural parameters.

CEO ability follows the AR(1) process in equation (1), with persistence ρ, unconditional mean μ_0, and unconditional variance σ_0^2. ROA, $y_t = \theta_t + \varepsilon_t$, provides one noisy public signal of current ability. The aggregate tally provides the second signal through equation (11), which rescales the observed log odds of support into ability units with noise variance $\sigma^2_{\bar{\varepsilon}}$.[25] Because ability continues to evolve, the board never learns it perfectly, and information revealed through engagement depreciates at a rate governed by ρ.

We estimate the parameters governing the CEO ability process and the precision of the two public signals by maximum likelihood, using the Kalman filter to evaluate the likelihood of the observed signal histories. Appendix C provides details, and Panel A of Table 7 reports the calibrated values. We normalize all variances by the estimated σ_0^2, while μ_0 is pinned down by mean profitability. We also set the blockholder's discount rate to $r = 0.05$ and calibrate the exogenous CEO separation hazard λ from the data.[26]

5.1.2 Choice probabilities and action costs

The blockholder engages when the value of sharing her information exceeds her realized engagement cost, and votes against when the pay wedge exceeds her realized voting threshold. Section 4 left the covariates of the cost distribution in equation (10) unspecified; for estimation, we parameterize the costs as

$$\log C_{icft} = \mu_C + \beta^E_{BR}\,\mathrm{BR}_i + \beta^E_5\,\mathrm{above5}_{icft} + \beta_{\mathrm{post}}\,\mathrm{post}_t + \beta_{\mathrm{SEC}}\left(\mathrm{post}_t \times \mathrm{above5}_{icft}\right) + \varepsilon^e_{icft}, \quad (21)$$

$$\log \Delta_{icft} = \mu_\Delta + \beta^V_{BR}\,\mathrm{BR}_i + \beta^V_5\,\mathrm{above5}_{icft} + \varepsilon^v_{icft}, \quad (22)$$

where $(\varepsilon^e_{icft}, \varepsilon^v_{icft})$ are mean-zero jointly normal shocks with variances σ_e^2 and σ_v^2 and correlation ρ_{ev}, as specified in equation (10). The indices i, c, f, t index investor, CEO, firm, and year, BR_i indicates BlackRock, $\mathrm{above5}_{icft}$ indicates an ownership stake above five percent, and post_t indicates 2025, so that β_{SEC} captures the incremental engagement cost imposed by the 2025 SEC guidance on large holders.

The unconditional engagement and vote-against frequencies discipline the two cost intercepts, while variation across investor identity, across the five percent ownership threshold, and around the 2025 regulatory change disciplines the observable cost shifters. More generally, variation in the observed covariates maps out how engagement and voting probabilities

[25] We define $\eta_t = \log(\pi_t/(1-\pi_t))$ using the support of other shareholders, excluding the blockholder's own vote, and center it at its sample mean $\bar{\eta}$. We then choose κ to satisfy $\kappa^2\,\mathrm{Var}(\eta) = \sigma_0^2 + \sigma^2_{\bar{\varepsilon}}$, so that $\kappa(\eta_t - \bar{\eta})$ is expressed in the same units as CEO ability.

[26] We regress next-period CEO turnover on lagged engagement and lagged vote-against with firm and year fixed effects and find economically and statistically small coefficients, supporting the assumption that separation is exogenous to the governance actions we model.

respond to changes in costs, disciplining the dispersion parameters σ_e and σ_v. These parameters are also influenced by variation in the endogenous benefits of engagement and dissent, which enter the corresponding choice rules in payoff units. Finally, the joint distribution of engagement and voting disciplines the cost correlation ρ_{ev}. The key moment is the probability of voting against conditional on engagement, which captures the extent to which the latent costs of the two actions co-move. Appendix C provides the formal identification argument and maps each targeted moment to the parameter it primarily disciplines.

5.1.3 Information and discipline

To illustrate the identification of the model's key parameters, we consider a two-period version of the model. In period $t-1$, the board and blockholder observe their signals, and the blockholder chooses whether to engage and how to vote. In period t, the board sets pay using the information carried forward from period $t-1$.[27] The identification argument is constructive: conditional on these policy rules and the resulting selection into engagement and dissent, the compensation moments identify the information and discipline parameters in sequence. This sequencing is only for the identification argument; in estimation, we estimate all non-calibrated structural parameters jointly.

Recall from Section 4 that pay is based on the board's predictive belief, $w_t = \gamma_t \check{\mu}_t^\theta$ in (6), and that the bargaining share γ_t responds to lagged individual and aggregate dissent through g_V and g_π in (12).

We consider five moments and show that they identify the parameters $(\gamma_b, \sigma_\epsilon, \sigma_u, g_V, g_\pi)$ in turn. Let m_1 denote average pay/assets and m_2 the coefficient on ROA in the pay-for-performance regression. The engagement and voting moments, m_3 and m_4, are the OLS coefficients on lagged engagement and lagged vote-against in a common regression of pay/assets on both variables, five controls, CEO-spell fixed effects, and investor-by-year fixed effects. The tally moment, m_5, is the OLS coefficient on the lagged log odds of aggregate support in a separate regression of pay/assets on the lagged tally, ROA, lagged engagement, and lagged vote-against, with the same fixed effects.[28] In the two-period benchmark, holding

[27] We condition on the engagement and voting policy functions of Section 5.1.2, including their thresholds and the selection they induce, and hold the calibrated state and signal processes fixed.

[28] The five controls in the common engagement and voting specification are standardized log dollar holdings, institutional ownership, the blockholder's ownership stake, log assets, and CEO tenure. The simulator applies the same OLS specifications to simulated pay and governance choices, holding the observed firm

the other regressors and the selection induced by the policy rules fixed, these regression coefficients reduce to the model-implied pay responses characterized below.

Consider first firms with no blockholder dissent and with aggregate support at its centering value. In this case, variation in compensation comes only from the board's posterior belief about CEO ability. The mean level of compensation at t therefore identifies the board's bargaining weight, γ_b. In particular,

$$\underbrace{m_1}_{\text{average pay/assets}} = \gamma_b \, \mathbb{E}[\check{\mu}_t^\theta], \tag{23}$$

where $\check{\mu}_t^\theta$ is the board's posterior mean of CEO ability carried into the compensation decision. Because the unconditional mean of this posterior is pinned down by the calibrated ability process, variation in γ_b scales compensation without changing the information structure.

Conditional on γ_b, the sensitivity of compensation to ROA identifies the precision of the board's private signal. We measure pay-for-performance as the coefficient from a regression of pay/assets on ROA. In the two-period benchmark, this is the coefficient from regressing pay at t on ROA at $t-1$ and satisfies

$$\underbrace{m_2}_{\text{pay-for-performance coefficient}} = \gamma_b \rho K_y, \tag{24}$$

with $K_y = \frac{1/\sigma_\varepsilon^2}{1/P + 1/\sigma_\varepsilon^2 + 1/\sigma_\epsilon^2}$, where P is the board's prior variance and K_y is the weight the board places on public profitability when updating its belief about CEO ability. A noisier private board signal, corresponding to a larger σ_ϵ^2, causes the board to rely more heavily on ROA, increasing K_y and therefore the pay-performance slope.

The pay response to engagement then identifies the precision of the blockholder's information. Let P_E and $\mu_{t-1}^{B,-E}$ denote the board's variance and mean immediately before receiving the blockholder's signal. For a given selected signal realization, the belief revision induced by engagement is $\Delta\mu_{t-1}^E = K_z(z_{t-1} - \mu_{t-1}^{B,-E})$. Thus, in the two-period model,

$$\underbrace{m_3}_{\text{coefficient on lagged engagement}} = \gamma_b \rho \, \mathbb{E}\left[\Delta\mu_{t-1}^E \mid E_{t-1} = 1\right], \tag{25}$$

characteristics and aggregate tally fixed.

with

$$\Delta\mu_{t-1}^{E} = K_z(z_{t-1} - \mu_{t-1}^{B,-E}) \quad \text{and} \quad K_z = \frac{P_E}{P_E + \sigma_u^2}.$$

A noisier blockholder signal lowers K_z and reduces the information transmitted through engagement. Conditional on γ_b and σ_ϵ^2, the engagement–pay response therefore identifies σ_u^2.

Voting differs because dissent both conveys information and has a disciplinary effect. A vote against reveals that the blockholder's valuation crossed the voting threshold, but it also directly lowers the CEO's bargaining share through g_V. Let $\Delta\mu_t^D$ denote the posterior-mean difference induced by a vote against. In the two-period benchmark, holding the other regression covariates and aggregate support at $\bar{\pi}$ fixed, the OLS coefficient m_4 reduces to the adjusted difference in next-period pay following a vote against rather than support:

$$\underbrace{m_4}_{\text{coefficient on lagged vote-against}} = \underbrace{\gamma_b\rho\,\Delta\mu_t^D}_{\text{information}} - \underbrace{g_V\,\check{\mu}_{t+1}^{\theta,D}}_{\text{discipline}}. \tag{26}$$

The information component is implied by σ_u^2 and the voting policy, so the remaining pay response identifies g_V. The distinction is especially transparent when voting follows engagement: the board has already observed the blockholder's signal, so the subsequent vote contains no additional private information and its pay response is purely disciplinary.

The aggregate tally plays a similar role. The OLS coefficient m_5 on the lagged aggregate tally combines the information it conveys about CEO ability with its disciplinary effect g_π on CEO bargaining power. The calibrated tally-signal process determines the information component, while the disciplinary effect is linear in g_π by (12). Conditional on the information component, the remaining pay response to the aggregate tally thus identifies g_π.

In the two-period benchmark, these moments uniquely identify $(\gamma_b, \sigma_\epsilon, \sigma_u, g_V, g_\pi)$.[29] We target the corresponding moments in the dynamic model, where the simulator reproduces the same regressions and selection induced by engagement and voting, while all non-calibrated parameters are estimated jointly. Appendix C.3 maps each moment to the parameter it primarily disciplines.

[29]The monotonicity results above imply that the five moments can be inverted sequentially, yielding unique identification in the two-period benchmark.

5.2 Estimation

We estimate the fifteen structural parameters by simulated method of moments, minimizing

$$Q(\Theta) = \left(\hat{m}^{\text{sim}}(\Theta) - \hat{m}^{\text{data}}\right)' W \left(\hat{m}^{\text{sim}}(\Theta) - \hat{m}^{\text{data}}\right), \tag{27}$$

where W is the regularized inverse of the variance–covariance matrix of the data moments, constructed from moment-specific influence functions and clustered by firm–CEO-spell.

The estimator conditions on the realized public history. For each CEO spell, we draw ability paths from $p(\theta_{1:T} \mid y_{1:T})$ by forward filtering and backward sampling and cache antithetic pairs. At each candidate Θ, we solve the blockholder's dynamic problem and simulate engagement, voting, and pay by combining these paths with draws of the board and blockholder private signals and the engagement and voting cost shocks, while holding fixed observed profitability, the aggregate tally, ownership, investor identity, and CEO tenure. Reusing all simulation draws across candidate parameter vectors implements common random numbers, and averaging across replications integrates over latent ability conditional on the observed profitability history. Appendix C provides further details on the sampler, simulation, observed tally, and weighting matrix.

Model fit. Table 6 compares the observed and simulated moments. The model closely matches the engagement and voting frequencies and their cross-sectional and regulatory variation: all ten choice moments are within 1.6 standard errors of their data counterparts. It also matches the pay response to voting, the aggregate-tally coefficient, and the longer-run response to engagement.

The lack of fit is concentrated in three pay moments. The model understates mean pay/assets, overstates the negative pay response to engagement, and overstates the pay-for-performance coefficient. Mean pay and pay-for-performance create a direct tradeoff because γ_b governs both the level of compensation and the pass-through from beliefs to wages: raising γ_b improves the fit of mean pay but further increases a pay-for-performance slope that is already too steep. The signal precisions help disentangle these two margins. A more precise board signal makes compensation less sensitive to ROA, while a noisier blockholder signal weakens the compensation response to engagement. These moments therefore separately discipline the board's and blockholder's information. The model's remaining difficulty in jointly matching them reflects tension within the compensation block, rather than a failure to capture the governance dynamics that are our main focus.

6 Structural estimates and policy counterfactuals

6.1 Estimated parameters

Panel A of Table 7 reports the parameters calibrated before the structural estimation. CEO ability is persistent, with $\rho_\theta = 0.866$, and has an unconditional standard deviation of 9.677 percentage points. After normalizing this standard deviation to one, the innovation standard deviation is 0.501 and the noise in the ROA signal is 1.130, so ROA is informative but noisy. The aggregate tally is a much noisier signal of ability, with a normalized noise standard deviation of 10.173, and therefore receives relatively little informational weight. The calibrated blockholder stakes average 3.4 percent below the five percent threshold and 10.5 percent above it, and enter the blockholder's flow payoff in (19).

Panel B reports the structural estimates. The private-information estimates imply that the board is relatively well informed. The estimated standard deviation of the noise in the board's signal is $\sigma_\epsilon = 0.864$, implying a noise variance of 0.75. Because the prior variance of CEO ability is normalized to one, the board's signal is more precise than the prior. The blockholder's signal has a noise standard deviation of $\sigma_u = 1.182$, or a noise variance of 1.40. The board's signal is therefore about 1.9 times as precise as the blockholder's signal.

The discipline estimates imply sizable effects of dissenting votes on CEO bargaining power. A dissenting vote by the blockholder lowers the CEO's bargaining share by about 12.6 percent relative to its baseline value γ_b, while a 10 percentage point increase in dissent among other shareholders lowers it by about 1.8 percent of γ_b.

The estimated model closely matches the large difference in how often the two governance channels are used. The engagement rate is 16.1 percent in the data and 16.3 percent in the simulation, while the vote-against rate is 2.1 percent in both. The estimates also imply lower engagement costs for BlackRock than for Vanguard.

Quasi-experimental identification from the 2025 SEC guidance. The February 2025 SEC guidance analyzed in Section 3.4 provides quasi-experimental variation in engagement costs. The estimates imply that, prior to 2025, blockholders above the five percent threshold face lower engagement costs. The SEC guidance substantially offsets this cost advantage. Equation (21) captures the baseline difference through β_5^E and the 2025 change through a common 2025 shifter, β_{post}, and an incremental shifter, β_{SEC}, for pairs above the five percent threshold. The SMM targets the 2025 changes in engagement above and below the threshold, so β_{SEC} is disciplined by the same difference-in-differences comparison as in the reduced-form analysis in Table 5. The model closely reproduces this variation: engagement above the five percent threshold falls by 4.7 percentage points relative to engagement below it in the data and by 4.8 percentage points in the model.

6.2 Effects of the 2025 SEC guidance

As discussed in Section 3.4, reduced-form analysis would be unlikely to capture the full effects of the SEC shock on pay and voting. We therefore use the estimated model to quantify these effects and separate them according to how engagement responds to the shock.

Specifically, we re-solve and re-simulate 2025 with $\beta_{\text{SEC}} = 0$ in Eq. (21), holding the realizations of all other model shocks fixed, and compare engagement choices with and without the SEC shock. Among firm-investor pairs above the five percent threshold, which we refer to as *exposed pairs*, we classify those that engage without the SEC shock but not with it as *compliers*, those that engage in both simulations as *always-takers*, and those that engage in neither as *never-takers*. Table 8 reports the effects on next-year pay and dissent within each group, as well as the resulting intent-to-treat effect across all exposed pairs.

Compliers account for 5.3 percent of exposed pairs. For them, the guidance prevents an engagement that would otherwise have conveyed unfavorable information about CEO quality. As a result, their next-year pay rises by 0.051 percentage points of assets, or 37.6 percent relative to its counterfactual level without the SEC shock. Always-takers are unaffected because engagement occurs in both scenarios.

Panel B shows that the higher pay among compliers also affects subsequent voting outcomes. Because compensation is now higher relative to the investor's assessment of CEO quality, dissent rises by 0.93 percentage points, or 45 percent relative to its counterfactual level. Thus, concerns that would otherwise have been communicated through private engagement instead show up in the subsequent public vote.

Importantly, never-takers are affected even though they do not engage in either scenario. The higher engagement cost makes the absence of engagement a less favorable signal about the investor's assessment of the CEO. As a result, the board's belief about CEO quality is lower than in the no-shock counterfactual, so pay falls by 1.7 percent relative to its counterfactual level, which in turn reduces subsequent dissent. Because never-takers are a much larger group than compliers, making up 81 percent of exposed pairs, these opposing effects across groups nearly cancel in the aggregate: the intent-to-treat effect is a 0.2 percent decline in pay and zero for dissent.

Thus, despite a large difference-in-differences effect on engagement, the shock has almost no average effect on pay or voting. A null average effect of the guidance does not imply that engagement is unimportant; it masks large offsetting effects across groups. This distinction is important for evaluating regulatory changes that restrict governance interventions by large investors, since average effects can obscure substantial heterogeneity across affected firms. The counterfactuals below show that this logic extends beyond the effects of the SEC shock.

6.3 Counterfactuals: removing engagement and voting

We next use the estimated model to study what happens when either engagement or voting is removed entirely. Both counterfactuals are motivated by recent regulatory initiatives: eliminating engagement takes the 2025 SEC guidance shock to its limit by making engagement prohibitively costly, while eliminating voting is motivated by the SEC's May 2026 proposal to exempt a broad set of public companies from say-on-pay requirements.

These counterfactuals allow us to compare the roles of engagement and voting and how one channel responds when the other is unavailable. Table 9 removes engagement while retaining voting, and Table 10 removes voting while retaining engagement. Both tables follow the same structure. Panel A re-simulates the baseline sample and separates investor-firm pairs that would and would not have used the eliminated channel, to show how the effects differ across pairs. Panel B imposes the change permanently starting with the 2025 annual meeting and follows the same pairs forward for three years, to trace the dynamics.[30]

[30]For Panel B in both tables, we use the same realizations of exogenous shocks in the baseline and counterfactual paths. When voting is removed, we re-solve the blockholder's problem to determine the optimal engagement decision under the new regime. When engagement is removed, we assume that voting continues to follow the same threshold rule, so changes in outcomes reflect changes in information and pay, rather than changes in the voting rule itself.

Each table reports changes in three outcomes: pay, use of the remaining governance channel, and board information. Board information captures how much the board learns about CEO ability, measured as the share of the variance of ability tracked by the board's beliefs.

6.3.1 Eliminating engagement

Panel A of Table 9 removes engagement from the baseline years. As in the SEC guidance experiment, the effects differ strongly depending on whether the investor would otherwise have engaged. For investor-firm pairs where engagement would have occurred (would-be engagers), next-year pay rises by 23.5 percent because unfavorable information that would have been communicated through engagement no longer reaches the board. This information loss is large: board information falls by 9.6 percentage points on average, a 16% decrease.

For pairs that would not have engaged, pay falls by 3 percent through the same "no governance as certification" mechanism identified in the SEC experiment. Once engagement is unavailable, the absence of engagement no longer provides a favorable signal about the investor's views. The opposing pay effects across the two groups again nearly offset each other. The small aggregate effect on compensation therefore masks both large opposing pay effects and a sharp information loss among would-be engagers.

Panel B shows how these effects evolve over time when engagement is removed permanently starting with the 2025 annual meeting. For would-be engagers, the pay increase is largest in the first post-ban year, at 31.7 percent, and falls to 4.6 percent by the third year, as the board gradually learns from public performance, its own signals, and subsequent votes.[31]

Dissent among would-be engagers is 25 percent higher in the first post-ban year, showing that removing engagement induces greater reliance on subsequent voting. The increase in dissent does not restore the information lost from engagement. Votes are binary and convey only a coarse signal of investor views, so boards remain less informed despite the substitution toward voting: for would-be engagers, board information is 2.3 percent lower on average over the post-ban years.[32] As in Panel A, the effects on dissent are heterogeneous, with opposite

[31] Aggregate pay is about 0.4 percent lower in every post-ban year. The sign reflects composition: the gain for the pairs that would have engaged is slightly outweighed by the loss of certification from non-engagement for everyone else. The net effect remains roughly stable over time because the impact of each missed engagement fades, while the permanent ban suppresses a new set of engagements each year.

[32] The table also reports effects in the ban year. Pay is unaffected because the say-on-pay vote concerns compensation already awarded. Dissent among would-be engagers falls by 14.3 percent. This decline

effects for pairs that would not have engaged. In the aggregate, dissent falls slightly even though substitution toward voting is large where engagement would have occurred.[33]

6.3.2 Eliminating voting

We next consider the reverse counterfactual, banning say-on-pay voting while allowing investors to adjust their engagement decisions. Table 10 shows substantial substitution toward engagement when voting is removed. In Panel B, engagement rises by 8.5 percentage points in the year of the ban (16.3 percent relative to the no-ban scenario) and remains elevated thereafter. The rise in engagement in the ban year provides the clearest evidence of substitution because compensation for that year has already been set and cannot respond to the removal of voting. The substitution is especially large among would-be dissenters, where engagement rises by 45 percent over the following three years. However, engagement also rises among other pairs because, with voting unavailable in the future, the value of not engaging today falls: the investor can no longer rely on a later dissenting vote to express concerns.

This substitution largely preserves the information that voting would have conveyed. In the aggregate, board information is essentially unchanged (up 0.19 percentage points across all pairs in Panel A). The reason is that engagement is the richer information channel: additional engagement offsets almost all of the information lost from removing voting. Any information loss is concentrated among would-be dissenters, for whom board information falls by 1.4 percentage points in Panel A and 0.9 percentage points in the year of the ban in Panel B, before largely recovering within a year. This asymmetry distinguishes the two governance channels: engagement can substitute for the information in a vote, whereas voting provides only a coarse substitute for engagement.

Engagement cannot, however, replace the disciplinary role of voting. For would-be dissenters, next-year pay rises by 23 percent in Panel A and 30 percent in the first post-ban year in Panel B. Engagement preserves most information conveyed by the vote, so this increase is driven primarily by eliminating discipline: dissent no longer reduces CEO bargaining power.

reflects the two-way nature of engagement: it allows the blockholder to learn the board's signal before voting, increasing the dispersion of her belief and thus the probability of a rare dissenting vote. Removing engagement eliminates this effect. We focus on the subsequent increase in dissent as the economically relevant substitution toward voting.

[33] For example, in the first post-ban year, would-be engagers are 13 percent of pairs and thus contribute +0.09 percentage points to aggregate dissent, against −0.12 from non-engagers.

Pay among non-dissenters remains largely unchanged (0.3 percent lower in Panel A and unchanged in Panel B). This is because the "no governance as certification" mechanism is quantitatively negligible for voting. For pairs that do not engage and would have voted in favor, the absence of engagement already provides a strong positive signal about the investor's assessment, so the favorable vote itself conveys little additional information.[34] For these pairs, removing voting therefore leaves the board's beliefs essentially unchanged. As a result, pay rises only for would-be dissenters, and since their share is small, the aggregate pay effect is close to zero. This contrasts with the engagement ban, which removes the favorable inference conveyed by non-engagement and therefore lowers pay for non-engagers.

7 Conclusion

This paper studies communication between investors and boards through private engagement and public voting. Using new data linking large asset managers' compensation-related engagements, say-on-pay votes, and CEO compensation, we show that the two channels are dynamically connected and both predict future compensation.

We develop a dynamic structural model that rationalizes these patterns and allows us to evaluate recent regulatory developments affecting shareholder voice. Motivated by the SEC's 2025 guidance that raised the potential costs of engagement and its 2026 proposal that would exempt many firms from say-on-pay voting, we study counterfactual restrictions on both channels. When one channel is limited, investors rely more on the other, but this adjustment does not fully compensate: the two channels play distinct roles, with engagement providing detailed two-way communication and voting also exerting discipline.

Our framework highlights why voting records are an incomplete measure of shareholder governance. They capture observed dissent but miss private communication that may have changed board beliefs, resolved concerns, and reduced subsequent dissent. Accounting for engagement therefore changes both the interpretation of observed votes and the evaluation of policies that affect shareholder voice.

[34] In other words, the no-engagement cutoff is more informative than the favorable-vote cutoff. Intuitively, the effective hurdle for dissent is higher than for engagement, consistent with engagement being much more common in the data and in the estimated model (16 percent vs. 2 percent).

References

Aggarwal, D., Litov, L. P., and Rajgopal, S. (2025). Big Three (dis)engagements. *Journal of Law and Economics, forthcoming.*

Aggarwal, R., Dahiya, S., and Prabhala, N. R. (2019). The power of shareholder votes: Evidence from uncontested director elections. *Journal of Financial Economics*, 133(1):134–153.

Albuquerque, R., Fos, V., and Schroth, E. (2022). Value creation in shareholder activism. *Journal of Financial Economics*, 145(2):153–178.

Albuquerque, R. and Schroth, E. (2015). The value of control and the costs of illiquidity. *Journal of Finance*, 70(4):1405–1455.

Azar, J., Duro, M., Kadach, I., and Ormazabal, G. (2021). The Big Three and corporate carbon emissions around the world. *Journal of Financial Economics*, 142(2):674–696.

Barry, J. W. (2026). Shareholder voice and executive compensation. Working paper.

Barry, J. W., Pinnington, J., and Zhao, L. (2026). Information and preferences in shareholder voting. *Working paper.*

BDO (2026). 2026 shareholder meeting agenda: Proxy season guide.

Bebchuk, L. A., Brav, A., Jiang, W., and Keusch, T. (2020). Dancing with activists. *Journal of Financial Economics*, 137(1):1–41.

Bebchuk, L. A. and Hirst, S. (2019). Index funds and the future of corporate governance: Theory, evidence, and policy. *Columbia Law Review.*

Becht, M., Franks, J., Mayer, C., and Rossi, S. (2009). Returns to shareholder activism: Evidence from a clinical study of the Hermes UK Focus Fund. *Review of Financial Studies*, 22(8):3093–3129.

Becht, M., Franks, J., and Wagner, H. F. (2026). The benefits of access: Evidence from private meetings with portfolio firms. *Journal of Finance*, 81(2):739–789.

Blonien, P., Crane, A. D., Crotty, K., and De Angelis, D. (2025). The quality of advice in shareholder voting. *Working paper.*

Cai, J., Garner, J. L., and Walkling, R. A. (2009). Electing directors. *Journal of Finance*, 64(5):2389–2421.

Carleton, W. T., Nelson, J. M., and Weisbach, M. S. (1998). The influence of institutions on corporate governance through private negotiations: Evidence from TIAA-CREF. *Journal of Finance*, 53(4):1335–1362.

Celentano, F. and Mello, A. (2024). Why do firms often not have a CEO succession plan? *Working paper.*

Cohn, J. B. and Rajan, U. (2013). Optimal corporate governance in the presence of an activist investor. *Review of Financial Studies*, 26(4):985–1020.

Corum, A. A. (2023). Activist settlements. *Working paper.*

Cuñat, V., Giné, M., and Guadalupe, M. (2012). The vote is cast: The effect of corporate governance on shareholder value. *Journal of Finance*, 67(5):1943–1977.

Cvijanović, D., Dasgupta, A., and Zachariadis, K. E. (2016). Ties that bind: How business connections affect mutual fund activism. *Journal of Finance*, 71(6):2933–2966.

Davis, G. F. and Kim, E. H. (2007). Business ties and proxy voting by mutual funds. *Journal of Financial Economics*, 85(2):552–570.

Del Guercio, D., Seery, L., and Woidtke, T. (2008). Do boards pay attention when institutional investor activists "just vote no"? *Journal of Financial Economics*, 90(1):84–103.

Denis, D. K., Jochem, T., and Rajamani, A. (2020). Shareholder governance and CEO compensation: The peer effects of say on pay. *Review of Financial Studies*, 33(7):3130–3173.

Dey, A., Starkweather, A., and White, J. T. (2024). Proxy advisory firms and corporate shareholder engagement. *Review of Financial Studies*, 37(12):3877–3931.

Dimson, E., Karakaş, O., and Li, X. (2015). Active ownership. *Review of Financial Studies*, 28(12):3225–3268.

Dimson, E., Karakaş, O., and Li, X. (2026). Coordinated engagements. *Journal of Finance, forthcoming.*

Doidge, C., Dyck, A., Mahmudi, H., and Virani, A. (2019). Collective action and governance activism. *Review of Finance*, 23(5):893–933.

Edmans, A., Gosling, T., and Jenter, D. (2023). CEO compensation: Evidence from the field. *Journal of Financial Economics*, 150(3):103718.

Edmans, A. and Manso, G. (2011). Governance through trading and intervention: A theory of multiple blockholders. *Review of Financial Studies*, 24(7):2395–2428.

Ernst & Young (2023). How directors can optimize shareholder engagement in 2023. National Association of Corporate Directors.

Ernst & Young (2026). Seven questions boards should ask after the 2026 proxy season. Harvard Law School Forum on Corporate Governance, August 25, 2026.

Ertimur, Y., Ferri, F., and Muslu, V. (2011). Shareholder activism and CEO pay. *Review of Financial Studies*, 24(2):535–592.

Ertimur, Y., Ferri, F., and Oesch, D. (2013). Shareholder votes and proxy advisors: Evidence from say on pay. *Journal of Accounting Research*, 51(5):951–996.

Fahlenbrach, R., Rudolf, N., and Wegerich, A. (2026). Leading by example: Can one universal shareholder's voting pre-disclosure influence voting? *Working paper*.

Ferri, F. and Göx, R. F. (2018). Executive compensation, corporate governance, and say on pay. *Foundations and Trends in Accounting*, 12(1):1–103.

Ferri, F. and Maber, D. A. (2013). Say on pay votes and CEO compensation: Evidence from the UK. *Review of Finance*, 17(2):527–563.

Fos, V. (2017). The disciplinary effects of proxy contests. *Management Science*, 63(3):655–671.

Fos, V., Li, K., and Tsoutsoura, M. (2018). Do director elections matter? *Review of Financial Studies*, 31(4):1499–1531.

Gantchev, N. (2013). The costs of shareholder activism: Evidence from a sequential decision model. *Journal of Financial Economics*, 107(3):610–631.

Gantchev, N., Gredil, O. R., and Jotikasthira, C. (2019). Governance under the gun: Spillover effects of hedge fund activism. *Review of Finance*, 23(6):1031–1068.

Heath, D., Macciocchi, D., and Ringgenberg, M. C. (2026). The economics of investor engagement. *Working paper*.

Hoepner, A. G., Oikonomou, I., Sautner, Z., Starks, L. T., and Zhou, X. Y. (2024). ESG shareholder engagement and downside risk. *Review of Finance*, 28(2):483–510.

Iliev, P. and Lowry, M. (2015). Are mutual funds active voters? *Review of Financial Studies*, 28(2):446–485.

Iliev, P. and Vitanova, S. (2019). The effect of the say-on-pay vote in the United States. *Management Science*, 65(10):4505–4521.

Johnson, T. L. and Swem, N. (2021). Reputation and investor activism: A structural approach. *Journal of Financial Economics*, 139(1):29–56.

Kahn, C. and Winton, A. (1998). Ownership structure, speculation, and shareholder intervention. *Journal of Finance*, 53(1):99–129.

Kakhbod, A., Loginova, U., Malenko, A., and Malenko, N. (2023). Advising the management: A theory of shareholder engagement. *Review of Financial Studies*, 36(4):1319–1363.

Levit, D. (2019). Soft shareholder activism. *Review of Financial Studies*, 32(7):2775–2808.

Levit, D. (2020). Words speak louder without actions. *Journal of Finance*, 75(1):91–131.

Levit, D. and Malenko, N. (2011). Nonbinding voting for shareholder proposals. *Journal of Finance*, 66(5):1579–1614.

Lewellen, J. and Lewellen, K. (2022). Institutional investors and corporate governance: The incentive to be engaged. *Journal of Finance*, 77(1):213–264.

Lyman, N. (2024). Reputation, entrenchment, and dynamic managerial incentives. *Working paper*.

Malenko, N., Masulis, R. W., and Wang, Q. (2026). How shareholder voice shapes board agendas. *Working paper*.

Malenko, N. and Shen, Y. (2016). The role of proxy advisory firms: Evidence from a regression-discontinuity design. *Review of Financial Studies*, 29(12):3394–3427.

Matvos, G. and Ostrovsky, M. (2010). Heterogeneity and peer effects in mutual fund proxy voting. *Journal of Financial Economics*, 98(1):90–112.

Maug, E. (1998). Large shareholders as monitors: Is there a trade-off between liquidity and control? *Journal of Finance*, 53(1):65–98.

Maug, E. and Rydqvist, K. (2009). Do shareholders vote strategically? Voting behavior, proposal screening, and majority rules. *Review of Finance*, 13(1):47–79.

McCahery, J. A., Sautner, Z., and Starks, L. T. (2016). Behind the scenes: The corporate governance preferences of institutional investors. *Journal of Finance*, 71(6):2905–2932.

Musto, D. K., Tucker, A. M., and Yavuz, B. I. (2025). Control rights or wrongs? Active versus index governance. *Working paper*.

Nilsson, R., Leofanti, E., and Timmer, D. (2026). Stewardship survey report. Glass Lewis memorandum, posted on the Harvard Law School Forum on Corporate Governance, April 16, 2026.

Page, T. B. (2018). CEO attributes, compensation, and firm value: Evidence from a structural estimation. *Journal of Financial Economics*, 128(2):378–401.

Pan, Y., Wang, T. Y., and Weisbach, M. S. (2015). Learning about CEO ability and stock return volatility. *Review of Financial Studies*, 28(6):1623–1666.

PwC (2023). Director-shareholder engagement: Getting it right. Harvard Law School Forum on Corporate Governance, June 5, 2023.

Shu, C. (2024). The proxy advisory industry: Influencing and being influenced. *Journal of Financial Economics*, 154:103810.

Taylor, L. A. (2010). Why are CEOs rarely fired? Evidence from structural estimation. *Journal of Finance*, 65(6):2051–2087.

Taylor, L. A. (2013). CEO wage dynamics: Estimates from a learning model. *Journal of Financial Economics*, 108(1):79–98.

Woidtke, T., Bhattarai, D., Blank, B., Liu, T., and Schumann-Foster, K. (2026). Is there power outside the proxy? Evidence from exempt solicitations. *Working paper*.

Zachariadis, K., Cvijanović, D., and Groen-Xu, M. (2025). Freeriders and underdogs: Participation in corporate voting. *Working paper*.

Zytnick, J. (2025). Imputing proxy advisor recommendations. *Journal of Empirical Legal Studies*, 22(4):525–543.

Figure 1. Dynamic relation between CEO pay and engagement

This figure displays coefficients β_τ from a lead-lag distributed-lag regression

$$y_{ift} = \alpha_{ife} + \gamma_t + \sum_{\tau \in \{-2,-1,+1,+2\}} \beta_\tau \cdot \text{engagement}_{i,f,e,\,t-\tau} + \varepsilon_{ift},$$

where α_{ife} is an institution $\times$ CEO-spell fixed effect, γ_t is a year fixed effect, and $\beta_0 \equiv 0$ by normalization (the engagement year is the reference). In Panel A the dependent variable is pay/assets, CEO total pay as a percentage of lagged firm assets, with log assets included as a control; in Panel B it is log CEO total pay. Bars are 95% confidence intervals based on standard errors clustered at institution $\times$ firm.

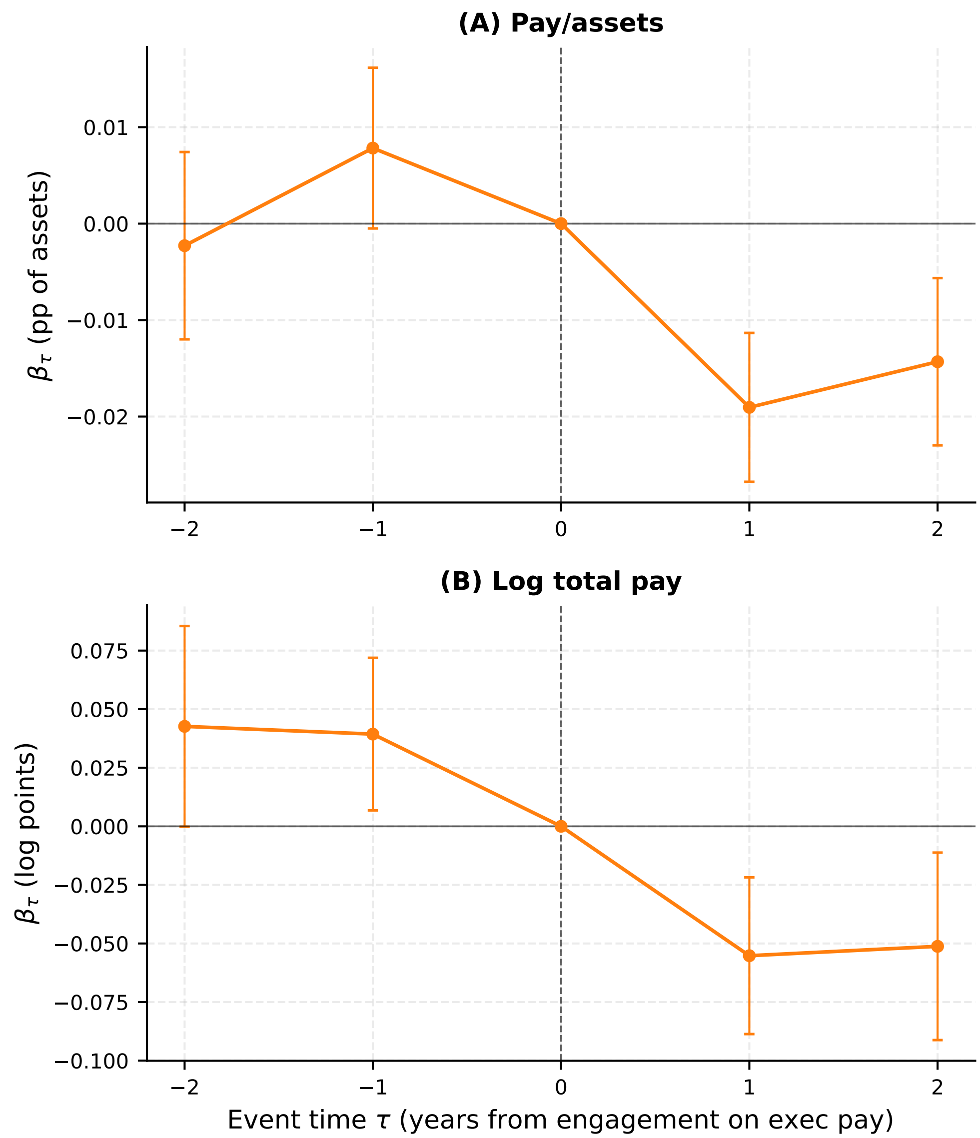


Figure 2. Engagement around the February 2025 SEC guidance

This figure plots pay-related engagement spells by BlackRock and Vanguard combined, by the quarter in which the spell's first interaction occurs, classified against the February 11, 2025 guidance date. Blue bars are the pre-guidance seasons; orange bars are spells begun under the guidance; the gray bar is the 106 spells begun in 2025 before February 11. Season totals are 1,162, 1,121 and 807, a reduction of 28 percent on 2024.

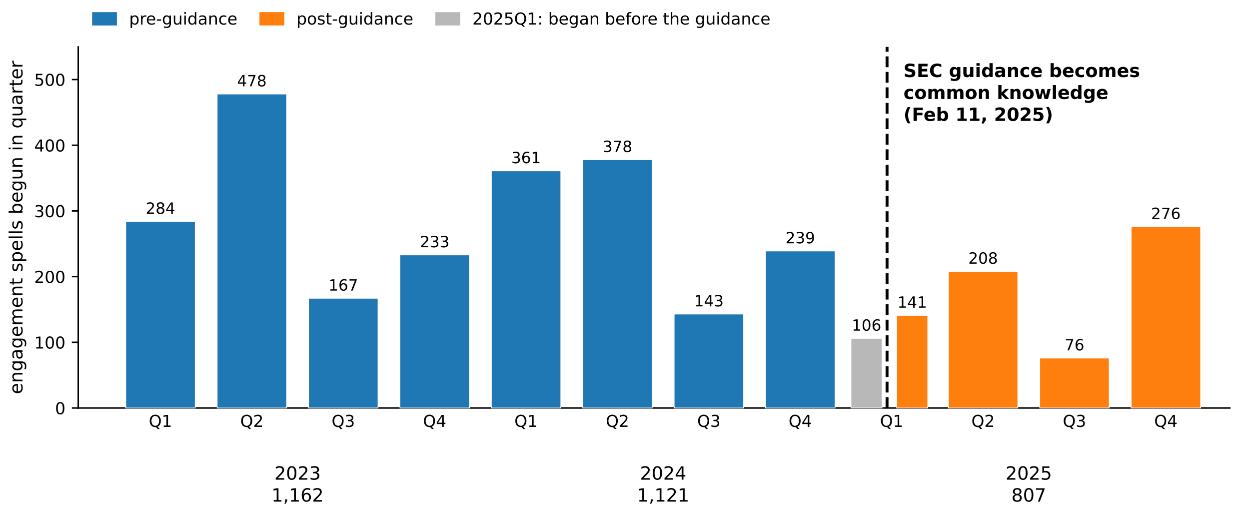


Table 1. Summary Statistics

This table presents summary statistics for the estimation sample. The sample is S&P 1500 firms with ExecuComp compensation data matched to ISS Voting Analytics say-on-pay voting records. BlackRock engagement data cover 2020 to 2025 and Vanguard engagement data cover 2019 to 2025. The first two panels are at the institution–firm–year level, separately for BlackRock and Vanguard. Engagement and voting variables are indicators, so only the number of observations and the mean are reported. Engagement indicators equal one if the institution engages with the firm on the listed topic in a given year; vote against equals one if the institution votes against the firm's say-on-pay proposal. Holdings variables are expressed in percent. The firm-level panel keeps one observation per firm–year; vote against overall is the percentage of all shares voted against.

		(1) N	(2) Mean	(3) Std dev	(4) 25th	(5) 50th	(6) 75th
BlackRock							
Any engage	$\{0,1\}$	9,563	0.376				
Engage (pay)	$\{0,1\}$	9,563	0.194				
Engage (board)	$\{0,1\}$	9,563	0.318				
Engage (risk)	$\{0,1\}$	9,563	0.250				
Engage (shareholder)	$\{0,1\}$	9,563	0.250				
Vote against	$\{0,1\}$	9,563	0.034				
Log dollar holdings	log $ mil	9,563	6.053	1.768	5.210	6.081	7.062
Share equity	%	9,563	10.324	4.220	7.302	9.450	14.274
Share AUM	%	9,563	0.050	0.204	0.005	0.013	0.034
Vanguard							
Any engage	$\{0,1\}$	11,146	0.292				
Engage (pay)	$\{0,1\}$	11,146	0.135				
Engage (board)	$\{0,1\}$	11,146	0.242				
Engage (risk)	$\{0,1\}$	11,146	0.213				
Engage (shareholder)	$\{0,1\}$	11,146	0.077				
Vote against	$\{0,1\}$	11,146	0.021				
Log dollar holdings	log $ mil	11,146	5.950	1.886	4.882	5.959	7.225
Share equity	%	11,146	9.298	2.841	7.742	9.529	11.027
Share AUM	%	11,146	0.052	0.208	0.004	0.011	0.038
Firm-level							
Vanguard engage	$\{0,1\}$	11,158	0.135				
BlackRock engage	$\{0,1\}$	11,158	0.166				
Either engage	$\{0,1\}$	11,158	0.241				
Both engage	$\{0,1\}$	11,158	0.059				
Vote against overall	%	11,158	9.134	11.754	2.784	5.264	9.545
Log total pay	log $ mil	11,158	1.765	1.100	1.279	1.883	2.428
Pay/assets	%	11,158	0.256	0.290	0.052	0.143	0.337
Return on assets (ROA)	%	11,158	4.581	7.222	0.924	3.744	8.465
Log assets	log $ mil	11,158	8.543	1.702	7.385	8.453	9.610

Table 2. Determinants of Engagement on Executive Pay

This table estimates linear probability models of the determinants of engagement on executive pay. Observations are at the institution–firm–year level, with one observation per institution × firm × CEO pair in each year. The dependent variable is an indicator equal to one if the institution engages the firm on executive pay in year t. Pay/assets is CEO total pay as a percentage of lagged firm assets. Lagged engagement (pay) and lagged vote against are indicators for the institution engaging the firm on executive pay and voting against the firm's say-on-pay proposal in year $t-1$. Controls include log dollar holdings, the position's share of the institution's AUM, the institution's ownership stake, log assets, and CEO tenure. All continuous variables are standardized to mean zero, unit variance, so coefficients measure the change in the probability of engagement per one standard deviation. All specifications include institution × CEO-spell and institution × year fixed effects. Standard errors are clustered at the institution–firm level. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.	Engagement					
Pay/assets	0.033***	0.039***	0.035***	0.043***	0.039***	0.040***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
ROA		-0.024***	-0.024***	-0.025***	-0.026***	-0.027***
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Lagged engagement (Pay)			-0.126***		-0.140***	-0.141***
			(0.013)		(0.013)	(0.013)
Lagged vote against				0.200***	0.238***	0.231***
				(0.030)	(0.030)	(0.030)
Lagged pay/assets						0.016**
						(0.008)
Observations	13,745	13,745	13,745	13,745	13,745	13,745
R-squared	0.463	0.465	0.473	0.469	0.479	0.480
Adj. R-squared	0.276	0.278	0.289	0.284	0.297	0.298
Institution × CEO-spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	0.162	0.162	0.162	0.162	0.162	0.162

Table 3. Determinants of Voting Against Executive Pay

This table estimates linear probability models of the determinants of voting against the firm's say-on-pay proposal. Observations are at the institution–firm–year level, with one observation per institution × firm × CEO pair in each year. The dependent variable is an indicator equal to one if the institution votes against the say-on-pay proposal in year t. Pay/assets is CEO total pay as a percentage of lagged firm assets. Engagement (pay) is an indicator for the institution engaging the firm on executive pay in year t; lagged engagement (pay) and lagged vote against are the corresponding indicators for year $t-1$. Controls include log dollar holdings, the position's share of the institution's AUM, the institution's ownership stake, log assets, and CEO tenure. All continuous variables are standardized to mean zero, unit variance, so coefficients measure the change in the probability of voting against per one standard deviation. All specifications include institution × CEO-spell and institution × year fixed effects. Standard errors are clustered at the institution–firm level. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.	Vote against					
Pay/assets	0.044***	0.048***	0.046***	0.045***	0.043***	0.043***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
ROA		-0.016***	-0.014***	-0.014***	-0.014***	-0.014***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Engagement (Pay)			0.051***	0.049***	0.056***	0.056***
			(0.006)	(0.006)	(0.006)	(0.006)
Lagged engagement (Pay)				-0.019***	-0.010*	-0.010**
				(0.005)	(0.005)	(0.005)
Lagged vote against					-0.144***	-0.145***
					(0.017)	(0.017)
Lagged pay/assets						0.002
						(0.005)
Observations	13,745	13,745	13,745	13,745	13,745	13,745
R-squared	0.396	0.399	0.408	0.409	0.425	0.425
Adj. R-squared	0.185	0.189	0.201	0.203	0.223	0.223
Institution × CEO-spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	0.021	0.021	0.021	0.021	0.021	0.021

Table 4. Determinants of Executive Pay

This table estimates how engagement and voting relate to subsequent CEO pay. Observations are at the institution–firm–year level, with one observation per institution × firm × CEO pair in each year. In Panel A the dependent variable is the ratio of total pay (TDC1) to lagged assets, or CEO total pay as a percentage of lagged firm assets; in Panel B it is log CEO total pay. Lagged engagement (pay) and lagged vote against are indicators for the institution engaging the firm on executive pay and voting against the firm's say-on-pay proposal in year $t-1$. Lagged aggregate share against is the share of other shareholders voting against the say-on-pay proposal in year $t-1$, excluding the institution's own vote, and lagged ISS against rec. is the (imputed) ISS recommendation on the say-on-pay proposal from Zytnick (2025). Controls include log dollar holdings, the position's share of the institution's AUM, the institution's ownership stake, lagged log assets, and CEO tenure. All continuous regressors are standardized to mean zero, unit variance, so coefficients measure the change in pay per one standard deviation. All specifications include institution × CEO-spell and institution × year fixed effects. Standard errors are clustered at the institution–firm level. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Panel A. Pay/assets

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.	Pay/assets					
Lagged engagement (Pay)	-0.018***		-0.015***	-0.015***	-0.013***	-0.013***
	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)
Lagged vote against		-0.041***	-0.036***	-0.038***	-0.026*	-0.025*
		(0.012)	(0.012)	(0.012)	(0.013)	(0.013)
ROA				0.036***	0.036***	0.036***
				(0.003)	(0.003)	(0.003)
Lagged ROA				-0.005**	-0.006**	-0.006**
				(0.003)	(0.003)	(0.003)
Lagged aggregate share against					-0.005**	-0.005*
					(0.002)	(0.003)
Lagged ISS against rec.						-0.001
						(0.010)
Observations	13,745	13,745	13,745	13,745	13,745	13,743
R-squared	0.866	0.866	0.866	0.871	0.871	0.871
Adj. R-squared	0.819	0.819	0.819	0.825	0.826	0.826
Institution × CEO-spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	0.244	0.244	0.244	0.244	0.244	0.244

Panel B. Log total pay

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.	Log total pay					
Lagged engagement (Pay)	-0.057***		-0.048***	-0.047***	-0.038**	-0.035**
	(0.018)		(0.017)	(0.017)	(0.017)	(0.017)
Lagged vote against		-0.154***	-0.141**	-0.143***	-0.089	-0.075
		(0.056)	(0.055)	(0.055)	(0.063)	(0.063)
ROA				0.051***	0.051***	0.052***
				(0.010)	(0.010)	(0.010)
Lagged ROA				-0.002	-0.004	-0.004
				(0.009)	(0.009)	(0.009)
Lagged aggregate share against					-0.024**	-0.003
					(0.011)	(0.016)
Lagged ISS against rec.						-0.091**
						(0.046)
Observations	13,745	13,745	13,745	13,745	13,745	13,743
R-squared	0.801	0.801	0.802	0.802	0.802	0.803
Adj. R-squared	0.732	0.732	0.732	0.733	0.733	0.733
Institution × CEO-spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	8.750	8.750	8.750	8.750	8.750	8.750

Table 5. The 2025 SEC guidance and pay engagement: Difference-in-discontinuities

This table estimates the change after the February 2025 SEC guidance in the discontinuity in pay engagement at the five-percent ownership threshold. The dependent variable is an indicator for whether investor i engaged firm f on executive compensation in year t. The running variable is the investor's March ownership stake less five percent, and $Post$ indicates 2025. The local linear estimating equation is

$$Engage^{Pay}_{ift} = \tau\big(Above5_{ift} \times Post_t\big) + \beta Above5_{ift} + \\ \delta_0 r_{ift} + \delta_1\big(r_{ift} \times Above5_{ift}\big) + \Gamma' X_{ift} + \mu_{icf} + \lambda_{it} + \varepsilon_{ift}.$$

Here μ_{icf} are investor–firm–CEO-spell fixed effects and λ_{it} are investor-by-year fixed effects. The coefficient τ is the difference-in-discontinuities estimate. This is the appropriate estimator because the guidance changed the cost of engagement only for holdings above five percent and only after the guidance. Comparing the post-guidance discontinuity with its pre-guidance value removes stable differences in engagement at the reporting threshold, while investor-by-year fixed effects absorb common changes in engagement during 2025. Under the identifying assumption that the discontinuity would not otherwise have changed in 2025, τ therefore isolates the guidance shock rather than a cross-sectional threshold difference or a common time shock. The local columns require common support in the contemporaneous March window and the pre-determined December window and use triangular-kernel weights; the full sample column uses uniform weights. Running-variable slopes are common across periods and interacted with the side of the threshold. Controls are log dollar holdings, institutional ownership, lagged log pay, ROA, and log market capitalization, standardized by side and interacted with side. All columns include investor–firm–CEO-spell and investor-by-year fixed effects. Standard errors, clustered by firm, are in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

	(1)	(2)	(3)	(4)
Bandwidth:	2.5pp	5pp	10pp	All firms
Above 5%	0.129*	0.070	0.093**	0.092**
	(0.068)	(0.054)	(0.042)	(0.038)
Above 5% × Post	-0.136***	-0.090**	-0.065**	-0.060**
	(0.050)	(0.036)	(0.030)	(0.027)
Observations	2,191	6,307	11,232	12,881
R-squared	0.532	0.501	0.468	0.448
Institution × CEO-spell FE	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Table 6. Model fit: observed versus simulated moments

Rows (1)–(10) report engagement and voting moments; Δ_{2025} is the change from the pre-2025 period to 2025. Rows (11)–(17) report pay over assets and coefficients from the common pay specification with CEO-spell and investor $\times$ year fixed effects. Observed-moment standard errors appear in parentheses, and t is the simulated-minus-observed difference divided by that standard error.

Panel A. Engagement and voting frequencies

		Observed	Simulated	Diff	t
(1)	$P(\text{engage})$	0.161 (0.005)	0.163	0.002	0.39
(2)	$P(\text{eng} \mid \geq 5\%) - P(\text{eng} \mid <5\%)$, pre-2025	0.110 (0.012)	0.105	-0.006	-0.46
(3)	$P(\text{eng} \mid \text{BR}) - P(\text{eng} \mid \text{VG})$	0.061 (0.006)	0.061	-0.000	-0.02
(4)	$\Delta_{2025} P(\text{eng} \mid <5\%)$	0.000 (0.018)	0.009	0.009	0.51
(5)	$\Delta_{2025} P(\text{eng} \mid \geq 5\%) - \Delta_{2025} P(\text{eng} \mid <5\%)$	-0.047 (0.017)	-0.048	-0.001	-0.08
(6)	AR(1) of engagement	-0.133 (0.013)	-0.113	0.020	1.54
(7)	$P(\text{against})$	0.021 (0.002)	0.021	0.000	0.04
(8)	$P(\text{against} \mid \text{engage})$	0.073 (0.006)	0.076	0.003	0.53
(9)	$P(\text{against} \mid e, \text{BR}) - P(\text{against} \mid e, \text{VG})$	0.025 (0.011)	0.022	-0.003	-0.29
(10)	$P(\text{against} \mid e, \geq 5\%) - P(\text{against} \mid e, <5\%)$	-0.074 (0.049)	-0.056	0.018	0.37

Panel B. Pay level, performance, and responses to governance

		Observed	Simulated	Diff	t
(11)	Mean pay/assets (pp)	0.237	0.204	-0.033	-5.93
		(0.006)			
(12)	Δw engagement ($t-1$)	-0.015	-0.043	-0.028	-6.99
		(0.004)			
(13)	Δw vote ($t-1$)	-0.047	-0.047	0.000	0.00
		(0.014)			
(14)	Δw vote ($t-1$) | not engaged	-0.055	-0.059	-0.003	-0.16
		(0.021)			
(15)	Pay-for-performance coefficient	0.005	0.011	0.005	9.60
		(0.001)			
(16)	Vote-tally coefficient	0.010	0.008	-0.002	-0.87
		(0.002)			
(17)	Δw engagement ($t-2$)	-0.020	-0.026	-0.006	-0.84
		(0.007)			

Table 7. Calibrated and estimated parameters

Panel A reports the parameters calibrated before the structural SMM and held fixed during estimation. ρ_θ, σ_0, and σ_ε are estimated from the ability–profitability process, $\sigma_\nu = \sqrt{1-\rho_\theta^2}$ is implied, and $\sigma_{\bar{\varepsilon}}$ governs noise in the aggregate vote signal. σ_0 is reported in percentage points; the remaining standard deviations are normalized by σ_0. Panel B reports the SMM estimates by model block. The information parameters and the cost levels and scales are normalized by σ_0^2. γ_b, g_V, and g_π are in pay-over-assets units; g_V and g_π are also reported as shares of γ_b.

Panel A. Parameters calibrated before structural estimation

Parameter	Interpretation	Value
CEO ability and the public signal		
ρ_θ	AR(1) persistence of ability	0.866
σ_0	unconditional sd of ability (pp)	9.677
σ_ε	public-signal (profitability) noise, normalized	1.130
σ_ν	implied AR(1) innovation, normalized	0.501
Aggregate vote signal		
$\sigma_{\bar{\varepsilon}}$	aggregate tally noise, normalized	10.173
Blockholder stake		
$\alpha_{<5\%}$	mean stake, below the 5% threshold	0.034
$\alpha_{\geq 5\%}$	mean stake, at or above 5%	0.105

Panel B. Parameters estimated by SMM

Parameter	Interpretation	Estimate
Engagement and voting frequencies		
μ_C	engagement cost intercept	-4.370
β_{BR}^E	engagement cost, BlackRock	-1.999
β_5^E	engagement cost, stake $\geq$5%	-1.743
β_{post}	engagement cost, post-2025	-0.697
β_{SEC}	engagement cost, post-2025 $\times$ $\geq$5%	1.545
σ_e	engagement cost-shock sd	4.276
μ_Δ	vote cost intercept	-0.960
β_{BR}^V	vote cost, BlackRock	-0.531
σ_v	vote cost-shock sd	1.682
ρ_{ev}	cost shock correlation	0.453
Private information		
σ_ϵ	board private signal sd	0.864
σ_u	blockholder private signal sd	1.182
Bargaining power and discipline		
γ_b	baseline bargaining share	0.039
g_V	share lost to a vote against (12.6% of γ_b)	0.00488
g_π	share lost to weak tally support (17.7% of γ_b)	0.00685

Table 8. The 2025 SEC engagement-cost shock: forward pay and forward voting

The treatment is the incremental SEC engagement-cost shock for above-5% pairs in 2025: the shock arm retains the fitted SEC cost, while the no-shock arm removes it. Compliers engage only without the shock, always-takers engage in both states, and never-takers engage in neither. Columns (3)–(4) report the mean shock-minus-no-shock outcome difference within each group, in levels and relative to the group's no-shock mean. These are group-specific average effects of the SEC shock, not treatment effects of engagement itself. Column (5) multiplies each level effect by the group's share. The all-exposed row is the intent-to-treat effect (ITT): the average effect of the SEC shock across all above-5% pairs, irrespective of their engagement response, and equals the sum of the group contributions. Panel A reports compensation at $t+1$ in percentage points of assets. Panel B reports dissent at $t+1$ after carrying both end-of-2025 states forward under a common no-shock continuation regime.

Panel A. Effect on compensation ($t+1$)

	(1)	(2)	(3)	(4)	(5)
			Treatment effect		
Group	Share	No-shock pay/assets	pp	%	Contribution to ITT (pp)
Compliers	5.3%	0.1361	+0.0511	+37.6%	+0.0027
Always-takers	13.6%	0.1365	+0.0000	+0.0%	+0.0000
Never-takers	81.0%	0.2334	−0.0039	−1.7%	−0.0031
All exposed	100.0%	0.2150	−0.0004	−0.2%	−0.0004

Panel B. Effect on blockholder dissent ($t+1$)

	(1)	(2)	(3)	(4)	(5)
			Treatment effect		
Group	Share	No-shock dissent	pp	%	Contribution to ITT (pp)
Compliers	5.3%	2.066%	+0.932	+45.1%	+0.050
Always-takers	13.6%	2.652%	+0.000	+0.0%	+0.000
Never-takers	81.0%	2.610%	−0.061	−2.4%	−0.050
All exposed	100.0%	2.587%	+0.000	+0.0%	+0.000

Table 9. Counterfactual effects of eliminating engagement

This table reports counterfactual effects of eliminating engagement. All entries are the no-engagement or ban outcome minus the corresponding benchmark or no-ban outcome; percentage changes relative to that comparison outcome appear in parentheses. Panel A re-simulates the baseline without engagement. Would-be engagers are pairs that engage in the benchmark, groups are redefined in each baseline year, pay and dissent are measured at $t+1$, and board information is measured at the end of t; the benchmark-mean row reports outcome levels in the benchmark simulation. Panel B imposes a permanent engagement ban at $t = 2025$, fixes groups according to their no-ban engagement choice at t, and follows those pairs through $t+3$ using common future innovations across regimes; its row for t reports contemporaneous effects. Pay effects are in percentage points of assets and dissent effects are in percentage points. Board information is $1 - \text{MSE}(\widehat{\theta}^B, \theta)/\text{Var}(\theta)$, where $\widehat{\theta}^B$ is the board's end-of-meeting posterior mean and θ is the CEO's true type, and therefore measures the board's ability to track the true type. Panel A contains 292,900 matched pair-years, of which 16.1% are would-be engagers; Panel B contains 48,860 pairs, of which 13.3% are would-be engagers.

Panel A. Eliminating engagement in the baseline sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Pay			Dissent			Board information		
Unit of effect:	pp of assets			pp			pp of ability variation tracked		
Group:	Would-be engagers	Non-engagers	All pairs	Would-be engagers	Non-engagers	All pairs	Would-be engagers	Non-engagers	All pairs
Average treatment effect	+0.031 (+23.5%)	−0.007 (−3.0%)	−0.001 (−0.2%)	+0.440 (+17.1%)	−0.234 (−11.5%)	−0.125 (−5.9%)	−9.612 (−16.6%)	−0.388 (−0.6%)	−1.336 (−2.0%)
Benchmark mean	0.132	0.217	0.204	2.577	2.039	2.126	57.830	66.926	66.751

Panel B. Dynamic effects of an engagement ban

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Pay			Dissent			Board information		
Unit of effect:	pp of assets			pp			pp of ability variation tracked		
Group:	Would-be engagers	Non-engagers	All pairs	Would-be engagers	Non-engagers	All pairs	Would-be engagers	Non-engagers	All pairs
t (ban imposed)		—		−1.183 (−14.3%)	+0.000 (+0.0%)	−0.158 (−7.4%)	−9.695 (−15.4%)	−0.461 (−0.6%)	−1.234 (−1.7%)
$t+1$	+0.043 (+31.7%)	−0.008 (−3.4%)	−0.001 (−0.4%)	+0.645 (+25.0%)	−0.144 (−5.5%)	−0.039 (−1.5%)	−2.500 (−3.6%)	−0.865 (−1.1%)	−1.018 (−1.3%)
$t+2$	+0.018 (+11.7%)	−0.004 (−1.7%)	−0.001 (−0.4%)	+0.369 (+13.7%)	−0.116 (−4.3%)	−0.051 (−1.9%)	−1.302 (−1.8%)	−0.898 (−1.2%)	−0.935 (−1.2%)
$t+3$	+0.008 (+4.6%)	−0.002 (−0.9%)	−0.001 (−0.3%)	+0.184 (+6.5%)	−0.047 (−1.6%)	−0.016 (−0.6%)	−1.171 (−1.6%)	−0.854 (−1.1%)	−0.885 (−1.1%)
Average $t+1$ to $t+3$	+0.023 (+15.1%)	−0.004 (−2.0%)	−0.001 (−0.4%)	+0.400 (+14.7%)	−0.102 (−3.8%)	−0.035 (−1.3%)	−1.658 (−2.3%)	−0.873 (−1.1%)	−0.946 (−1.2%)

Table 10. Counterfactual effects of eliminating voting

This table reports counterfactual effects of eliminating say-on-pay voting. The counterfactual removes individual votes, the aggregate vote tally from the board's and blockholder's information sets, and individual and aggregate dissent from CEO bargaining power. All entries are the no-voting outcome minus the corresponding benchmark outcome; percentage changes relative to the benchmark appear in parentheses. Panel A re-simulates the baseline without voting. Would-be dissenters are pairs that vote against in the benchmark, groups are redefined in each baseline year, pay and engagement are measured at $t+1$, and board information is measured at the end of t; the benchmark-mean row reports outcome levels in the benchmark simulation. Panel B eliminates voting permanently at $t = 2025$, fixes groups according to their benchmark dissent choice at t, and follows those pairs through $t+3$ using common future innovations across regimes; its row for t reports contemporaneous effects. Pay effects are in percentage points of assets and engagement effects are in percentage points. Board information is $1 - \text{MSE}(\widehat{\theta}^B, \theta)/\text{Var}(\theta)$, where $\widehat{\theta}^B$ is the board's end-of-meeting posterior mean and θ is the CEO's true type, and therefore measures the board's ability to track the true type. Panel A contains 292,900 matched pair-years, of which 2.2% are would-be dissenters; Panel B contains 48,860 pairs, of which 2.1% are would-be dissenters.

Panel A. Eliminating voting in the baseline sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Pay			Engagement			Board information		
Unit of effect:	pp of assets			pp			pp of ability variation tracked		
Group:	Would-be dissenters	Non-dissenters	All pairs	Would-be dissenters	Non-dissenters	All pairs	Would-be dissenters	Non-dissenters	All pairs
Average treatment effect	+0.014 (+22.6%)	−0.001 (−0.3%)	−0.000 (−0.2%)	+5.258 (+38.7%)	+1.998 (+12.1%)	+2.070 (+12.6%)	−1.440 (−2.0%)	+0.244 (+0.4%)	+0.187 (+0.3%)
Benchmark mean	0.061	0.207	0.204	13.598	16.468	16.404	71.821	65.805	66.751

Panel B. Dynamic effects of eliminating voting

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Pay			Engagement			Board information		
Unit of effect:	pp of assets			pp			pp of ability variation tracked		
Group:	Would-be dissenters	Non-dissenters	All pairs	Would-be dissenters	Non-dissenters	All pairs	Would-be dissenters	Non-dissenters	All pairs
t (SOP eliminated)		—		+8.478	+2.026	+2.163	−0.943	+0.321	+0.278
				(+16.3%)	(+16.2%)	(+16.2%)	(−1.2%)	(+0.5%)	(+0.4%)
$t+1$	+0.016	+0.000	+0.000	+5.877	+2.314	+2.389	−0.159	+0.113	+0.104
	(+29.8%)	(+0.0%)	(+0.2%)	(+53.3%)	(+16.7%)	(+17.3%)	(−0.2%)	(+0.1%)	(+0.1%)
$t+2$	+0.004	−0.000	+0.000	+4.624	+2.418	+2.465	−0.123	+0.042	+0.037
	(+4.8%)	(−0.0%)	(+0.0%)	(+45.3%)	(+18.3%)	(+18.7%)	(−0.2%)	(+0.1%)	(+0.0%)
$t+3$	+0.002	−0.000	−0.000	+3.902	+2.566	+2.594	−0.065	+0.027	+0.025
	(+1.7%)	(−0.1%)	(−0.0%)	(+37.2%)	(+19.6%)	(+19.9%)	(−0.1%)	(+0.0%)	(+0.0%)
Average $t+1$ to $t+3$	+0.007	−0.000	+0.000	+4.801	+2.433	+2.483	−0.115	+0.061	+0.055
	(+9.4%)	(−0.0%)	(+0.0%)	(+45.4%)	(+18.2%)	(+18.6%)	(−0.1%)	(+0.1%)	(+0.1%)

A Appendix: Additional figures and tables

Figure A.1. Examples from engagement reports

This figure displays how BlackRock and Vanguard disclose their engagements. Panel A shows BlackRock (engagement disclosure for 2025Q1-Q4) and Panel B shows Vanguard (disclosure for 2025Q4).

Panel A: BlackRock 2025 Engagement summary

Company Name	Sector	Total engagement Count	Business Oversight/Risk Management	Corporate Strategy (Disclosure/Governance)	Cybersecurity and Data Privacy	Executive Management and Succession Planning	Sustainability Reporting	Technology Deployment and Governance/Disclosure	Other Governance Issues	Board Commitments/Attendance	Board Composition	Board Effectiveness and Director Qualifications	Board Independence	Governance Structure	Compensation & Remuneration	Biodiversity	Climate Risk Management	Deforestation/Land Use	Waste	Water	Other company impacts on the environment	Business Ethics and Integrity	Community Relations	Freedom of Association	Health and Safety	Human Rights	Indigenous Peoples Rights	Supply Chain	Talent and Culture	Other Social/Human Capital Issues	Last Engagement Date
10X GENOMICS INC	Health Care	1	1	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29-May-25
3D SYSTEMS CORPORATION	Industrials	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13-May-25
3M CO	Industrials	2	1	2	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14-Oct-25

Panel B: Vanguard 2025Q4 Engagement summary

Company name	Board composition and effectiveness	Board oversight of strategy and risk	Executive pay	Shareholder rights
A. O. Smith Corp.	•			•
AbbVie Inc.	•	•		

Table A.1. Variable Definitions

This table defines the main variables used in the analysis. Engagement variables are constructed from BlackRock and Vanguard stewardship and engagement reports; voting variables come from ISS Voting Analytics; holdings come from 13F filings; compensation comes from ExecuComp; firm characteristics come from Compustat. Lagged variables are one-year lags within the institution–firm–CEO panel. In the regressions, continuous variables are standardized to mean zero, unit variance.

Variable	Source	Description
Engagement		
Any engage	Stewardship reports	Indicator equal to one if the institution reports engaging the firm on any topic in the fiscal year. Constructed from BlackRock and Vanguard stewardship and engagement reports.
Engage (Pay)	Stewardship reports	Indicator equal to one if the institution reports engaging the firm on executive compensation in the fiscal year.
Engage (board/risk/shareholder)	Stewardship reports	Indicator equal to one if the institution reports engaging the firm on board composition or effectiveness (board), oversight of firm risk (risk), shareholder rights (shareholder) in the fiscal year.
Voting		
Vote against	ISS Voting Analytics	Indicator equal to one if the institution votes against the firm's say-on-pay proposal. Fund-level votes are aggregated within the institution; the institution is coded as voting for if any of its funds votes for.
Vote against overall (%)	ISS Voting Analytics	Percentage of all shares voted that oppose the say-on-pay proposal.
Log-odds support	ISS; 13F	$\log(\pi/(1-\pi))$, where π is the share of other shareholders voting for the say-on-pay proposal, excluding the institution's own shares voted.
Holdings		
Log dollar holdings	13F	Log of the dollar value of the institution's position in the firm (shares held times price), from 13F filings.
Ownership stake (%)	13F	The institution's holdings as a percentage of the firm's shares outstanding. Labeled share equity in the summary statistics.
Share AUM (%)	13F	The position's dollar value as a percentage of the institution's total 13F equity portfolio.

Variable	Source	Description
Compensation and firm characteristics		
Pay/assets	ExecuComp; Compustat	CEO total compensation (TDC1) as a percentage of lagged total assets.
Log total pay	ExecuComp	Log of CEO total compensation (TDC1).
ROA	Compustat	Income before extraordinary items divided by lagged total assets.
Lagged log assets	Compustat	Log of lagged total assets.
CEO tenure	ExecuComp	Fiscal year minus the year the executive became CEO; the first year the executive appears as CEO is used when the start year is missing.

Table A.2. Other Types of Engagement

This table tests whether engagement on topics other than executive pay predicts say-on-pay voting and CEO pay. Observations are at the institution–firm–year level. Panel A studies voting against the firm's say-on-pay proposal. Panel B studies CEO compensation: columns 1–4 use pay/assets, and columns 5–8 use the natural logarithm of total pay. The specifications mirror the corresponding full voting and pay specifications in the main tables, with the same controls, fixed effects, and standard-error clustering. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Panel A: Voting against executive pay

	(1)	(2)	(3)	(4)
Dep. var.	Vote against			
Lagged engagement (Any)	-0.007*			
	(0.003)			
Lagged engagement (Board)		-0.004		
		(0.004)		
Lagged engagement (Firm risk)			-0.004	
			(0.004)	
Lagged engagement (Shareholder rights)				-0.000
				(0.004)
Observations	13,745	13,745	13,745	13,745
R-squared	0.411	0.411	0.411	0.411
Adj. R-squared	0.205	0.205	0.205	0.205
Institution × CEO-spell FE	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean dep. var.	0.021	0.021	0.021	0.021

Panel B: Executive pay

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. var.	Pay/assets				Log total pay			
Lagged engagement (Any)	-0.006*				-0.009			
	(0.003)				(0.016)			
Lagged engagement (Board)		-0.006*				-0.014		
		(0.003)				(0.019)		
Lagged engagement (Firm risk)			-0.004				0.019	
			(0.003)				(0.016)	
Lagged engagement (Shareholder rights)				-0.001				0.011
				(0.004)				(0.018)
Observations	13,745	13,745	13,745	13,745	13,745	13,745	13,745	13,745
R-squared	0.871	0.871	0.871	0.871	0.802	0.802	0.802	0.802
Adj. R-squared	0.826	0.826	0.826	0.826	0.733	0.733	0.733	0.733
Institution × CEO-spell FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	0.244	0.244	0.244	0.244	8.750	8.750	8.750	8.750

Table A.3. Robustness to ISS recommendations

This table examines robustness to the ISS say-on-pay recommendation, using the imputed recommendations of Zytnick (2025). Column (1) of Panel A repeats column (5) of Table 2; column (1) of Panel B repeats column (5) of Table 3; and column (1) of Panel C repeats column (5) of Table 4. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Panel A. Engagement on executive pay

	(1)	(2)	(3)	(4)
Dep. var.	Engagement			
Pay/assets	0.039***	0.040***	0.016**	0.016**
	(0.008)	(0.008)	(0.008)	(0.008)
ROA	-0.026***	-0.026***	-0.016***	-0.016***
	(0.005)	(0.005)	(0.005)	(0.005)
Lagged engagement (Pay)	-0.140***	-0.154***	-0.133***	-0.150***
	(0.013)	(0.013)	(0.013)	(0.013)
Lagged vote against	0.238***	0.156***	0.239***	0.133***
	(0.030)	(0.032)	(0.030)	(0.032)
Lagged ISS against rec.		0.120***		0.155***
		(0.018)		(0.019)
ISS against rec.			0.244***	0.261***
			(0.017)	(0.018)
Observations	13,745	13,743	13,743	13,741
R-squared	0.479	0.483	0.498	0.504
Adj. R-squared	0.297	0.302	0.323	0.331
Institution × CEO-spell FE	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean dep. var.	0.162	0.162	0.162	0.162

Panel B. Vote against on executive pay

	(1)	(2)	(3)	(4)
Dep. var.	Vote against			
Pay/assets	0.043***	0.043***	0.025***	0.025***
	(0.007)	(0.007)	(0.006)	(0.006)
ROA	-0.014***	-0.014***	-0.006**	-0.006**
	(0.003)	(0.003)	(0.002)	(0.002)
Engagement (Pay)	0.056***	0.057***	0.026***	0.024***
	(0.006)	(0.006)	(0.006)	(0.006)
Lagged engagement (Pay)	-0.010*	-0.009*	-0.008*	-0.011**
	(0.005)	(0.005)	(0.005)	(0.005)
Lagged vote against	-0.144***	-0.139***	-0.136***	-0.151***
	(0.017)	(0.018)	(0.015)	(0.016)
Lagged ISS against rec.		-0.007		0.023***
		(0.008)		(0.008)
ISS against rec.			0.200***	0.203***
			(0.013)	(0.013)
Observations	13,745	13,743	13,743	13,741
R-squared	0.425	0.425	0.505	0.506
Adj. R-squared	0.223	0.223	0.332	0.333
Institution × CEO-spell FE	Yes	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean dep. var.	0.021	0.021	0.021	0.021

Panel C. Pay/assets

	(1)	(2)	(3)
Dep. var.		Pay/assets	
Lagged engagement (Pay)	-0.013***	-0.013***	-0.013***
	(0.004)	(0.004)	(0.004)
Lagged vote against	-0.026*	-0.025*	-0.029**
	(0.013)	(0.013)	(0.013)
ROA	0.036***	0.036***	0.036***
	(0.003)	(0.003)	(0.003)
Lagged ROA	-0.006**	-0.006**	-0.005**
	(0.003)	(0.003)	(0.003)
Lagged aggregate share against	-0.005**	-0.005*	
	(0.002)	(0.003)	
Lagged ISS against rec.		-0.001	-0.013**
		(0.010)	(0.006)
Observations	13,745	13,743	13,743
R-squared	0.871	0.871	0.871
Adj. R-squared	0.826	0.826	0.826
Institution × CEO-spell FE	Yes	Yes	Yes
Institution × Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Mean dep. var.	0.244	0.244	0.244

B Appendix: Model details and derivations

B.1 Detailed timeline

- At the beginning of the period, the CEO and the board bargain over compensation w_t based on information available to them at the end of period $t-1$.

- Cash flow y_t is realized and publicly observed. Shareholders of the firm obtain combined utility $A_t(y_t - w_t)$ (with the blockholder obtaining utility $\alpha A_t (y_t - w_t)$), while the CEO obtains utility $W_t = A_t w_t$.

- The board observes private signal s_t, the blockholder observes private signal z_t, and all players observe the blockholder's engagement and dissent costs, C_t and Δ_t.

- The blockholder decides whether to engage with the board. If engagement occurs ($e_t = 1$), the board learns the blockholder's current and past private signals, and the blockholder learns the board's current and past private signals. (Note that in equilibrium, past board signals are already revealed through the history of the board's compensation decisions.)

- The shareholder meeting takes place, and the blockholder votes in favor of or against the CEO's compensation w_t paid out in this period.

- The board observes the blockholder's vote V_t and the aggregate vote tally of other shareholders π_t. Period t ends and beliefs are updated.

B.2 Belief updating and state evolution

This section first derives the evolution of the board's and the blockholder's beliefs over CEO ability, and then summarizes the evolution of the state. Because CEO ability follows the AR(1) process

$$\theta_{t+1} - \mu_0 = \rho \left(\theta_t - \mu_0\right) + \nu_t, \qquad \nu_t \sim N\left(0, \left(1-\rho^2\right)\sigma_0^2\right),$$

belief updating combines two operations: a *measurement update*, in which a player incorporates newly observed signals about θ_t into her current belief, and a *prediction (time-update)* *step*, in which the player projects her belief about θ_t forward to θ_{t+1} using the AR(1) law of motion. Specifically, if a player's belief about θ_t is $N(m, v)$, then her one-period-ahead predictive belief about θ_{t+1} is

$$N\left(\mu_0 + \rho\,(m - \mu_0)\,,\ \rho^2 v + \left(1 - \rho^2\right)\sigma_0^2\right). \tag{28}$$

We denote the mean and variance of the board's one-period-ahead predictive belief by $\check{\mu}_t^\theta$ and $\check{\sigma}_{\theta,t}^2$, respectively. That is, if the board's posterior at the end of period $t-1$ is $\mathcal{N}\left(\mu_{t-1}^\theta, \sigma_{\theta,t-1}^2\right)$, its predictive belief about ability θ_t is $\mathcal{N}\left(\check{\mu}_t^\theta, \check{\sigma}_{\theta,t}^2\right)$ with

$$\check{\mu}_t^\theta \ \equiv\ \mu_0 + \rho\left(\mu_{t-1}^\theta - \mu_0\right) \ =\ \rho\,\mu_{t-1}^\theta + (1-\rho)\,\mu_0, \qquad \check{\sigma}_{\theta,t}^2 \ \equiv\ \rho^2\sigma_{\theta,t-1}^2 + \left(1-\rho^2\right)\sigma_0^2. \tag{29}$$

B.2.1 Blockholder's belief updating

By the time of the engagement decision in period $t+1$, the blockholder observes public cash flow y_{t+1}, private signal z_{t+1}, aggregate vote tally in the previous period η_t, and compensation w_{t+1}. Since CEO compensation is determined by the board's posterior belief at the end of period t and the CEO's bargaining power, γ_{t+1}, which is known by the blockholder, observing w_{t+1} allows the blockholder to infer the board's private signal s_t, regardless of whether engagement occurs in period t. However, if engagement occurs in period t, the blockholder learns s_t directly during engagement, already in period t (which may affect her vote in period t; see eq. (16)–(17)). Hence, regardless of whether engagement occurred, the blockholder eventually observes the same information by the time of the engagement decision in period $t+1$.

The new information splits by date. The board's signal s_t and the aggregate vote tally are signals about θ_t; the cash flow $y_{t+1} = \theta_{t+1} + \varepsilon_{t+1}$ and the private signal $z_{t+1} = \theta_{t+1} + u_{t+1}$ are signals about θ_{t+1}. (The blockholder's belief $(m_t^\theta, \nu_{\theta,t}^2)$ already incorporates y_t and z_t, both observed before the period-t engagement decision.) Conditional on Gaussian beliefs and signals, posterior beliefs remain normal, and the blockholder's belief evolves in three steps.

Step 1 — measurement update on θ_t (signals s_t and the vote tally).

$$\frac{1}{\tilde{\nu}_t^2} = \frac{1}{\nu_{\theta,t}^2} + \frac{1}{\sigma_\epsilon^2} + \frac{1}{\sigma_{\bar{\varepsilon}}^2}, \tag{30}$$

$$\tilde{m}_t = \tilde{\nu}_t^2 \left(\frac{m_t^\theta}{\nu_{\theta,t}^2} + \frac{s_t}{\sigma_\epsilon^2} + \frac{\kappa(\eta_t - \bar{\eta}) + \mu_0}{\sigma_{\bar{\varepsilon}}^2} \right). \tag{31}$$

Step 2 — AR(1) prediction to θ_{t+1}.

$$\bar{\nu}_{t+1}^2 = \rho^2 \, \tilde{\nu}_t^2 + \left(1 - \rho^2\right) \sigma_0^2, \qquad \bar{m}_{t+1} = \mu_0 + \rho \left(\tilde{m}_t - \mu_0\right). \tag{32}$$

Step 3 — measurement update on θ_{t+1} (signals y_{t+1} and z_{t+1}). This yields the belief of the blockholder in the engagement decision in $t+1$:

$$\frac{1}{\nu_{\theta,t+1}^2} = \frac{1}{\bar{\nu}_{t+1}^2} + \frac{1}{\sigma_\varepsilon^2} + \frac{1}{\sigma_u^2}, \tag{33}$$

$$m_{t+1}^\theta = \nu_{\theta,t+1}^2 \left(\frac{\bar{m}_{t+1}}{\bar{\nu}_{t+1}^2} + \frac{y_{t+1}}{\sigma_\varepsilon^2} + \frac{z_{t+1}}{\sigma_u^2} \right). \tag{34}$$

B.2.2 Board's belief updating

Recall that the board and the CEO always observe the same information. For simplicity, we refer to it as simply the board's learning. We consider two cases: when engagement does and does not occur in period t.

Engagement occurs in period t. If engagement occurs in period t, the board learns the blockholder's information at the time of engagement. The blockholder's information by the time engagement takes place is summarized by $\left(m_t^\theta, \nu_{\theta,t}^2\right)$ and includes the blockholder's accumulated information by the beginning of period t, her private signal z_t, and her inference from the public cash flow y_t. In addition, the board observes its own private signal s_t (which gets shared with the blockholder during engagement) and, later, the aggregate vote tally η_t. The blockholder's vote in this case does not contain any additional information beyond what the board learns during engagement. The board's posterior belief at the end of period t is therefore given by

$$\sigma_{\theta,t}^2 = \frac{1}{\frac{1}{\nu_{\theta,t}^2} + \frac{1}{\sigma_\epsilon^2} + \frac{1}{\sigma_{\bar{\bar{\varepsilon}}}^2}}, \tag{35}$$

$$\mu_t^\theta = \sigma_{\theta,t}^2 \left(\frac{m_t^\theta}{\nu_{\theta,t}^2} + \frac{s_t}{\sigma_\epsilon^2} + \frac{\kappa\left(\eta_t - \bar{\eta}\right) + \mu_0}{\sigma_{\bar{\bar{\varepsilon}}}^2} \right). \tag{36}$$

Engagement does not occur in period t. This case is more complex for two reasons: first, the information in the blockholder's vote is no longer redundant, and second, the board also learns from the absence of engagement. To explain the intuition, we first characterize the evolution of the board's beliefs abstracting from its learning through the blockholder's binary engagement and voting decisions. In this case, if engagement does not occur in period t, the board updates its beliefs using public cash flow y_t, its own private signal s_t, and the aggregate vote tally η_t. All three are signals about θ_t, whereas the board's prior $\mathcal{N}\left(\mu_{t-1}^\theta, \sigma_{\theta,t-1}^2\right)$ is a belief about θ_{t-1}. The board therefore first predicts forward to θ_t using the predictive operator above and then incorporates the period-t signals:

$$\sigma_{\theta,t}^2 = \frac{1}{\dfrac{1}{\check{\sigma}_{\theta,t}^2} + \dfrac{1}{\sigma_\varepsilon^2} + \dfrac{1}{\sigma_\epsilon^2} + \dfrac{1}{\sigma_{\bar{\bar{\varepsilon}}}^2}}, \tag{37}$$

$$\mu_t^\theta = \sigma_{\theta,t}^2 \left(\frac{\check{\mu}_t^\theta}{\check{\sigma}_{\theta,t}^2} + \frac{y_t}{\sigma_\varepsilon^2} + \frac{s_t}{\sigma_\epsilon^2} + \frac{\kappa(\eta_t - \bar{\eta}) + \mu_0}{\sigma_{\bar{\bar{\varepsilon}}}^2} \right). \tag{38}$$

This posterior is presented for intuition only; we next characterize how belief updating works once the board also updates from the blockholder's actions – voting and engagement.

Learning from engagement and voting. We next incorporate learning from the blockholder's endogenous engagement and voting decisions. The idea is that when the blockholder does not engage, the board learns that the blockholder's assessment of CEO ability is insufficiently negative to justify the engagement cost. Similarly, the blockholder's vote reveals information about the blockholder's assessment of CEO ability relative to the compensation paid to the CEO. Thus, even in the absence of direct communication through engagement, the board can learn from the blockholder's endogenous actions.

To solve for the board's learning from V_t and e_t, we need to find the joint distribution of the board's belief about CEO ability and its belief about the belief of the blockholder. Note that $\left(\nu^2_{\theta,t}, \mu^\theta_{t-1}, \sigma^2_{\theta,t-1}, C_t, \Delta_t, \gamma_t\right)$ is common knowledge.

Unlike the updating in (37)–(38) (which is based on normal public cash flows, private signals, and aggregate vote tallies), engagement and voting decisions are discrete (binary) signals. As a result, posterior beliefs are no longer normal. To preserve tractability, we use a Laplace-style approximation and summarize the informational difference between the board and the blockholder using a single normally distributed signal. Specifically, suppose the blockholder's additional private information can be represented by signal

$$\zeta_t = \theta_t + \upsilon_t,$$

where $\upsilon_t \sim N(0, \sigma^2_{\upsilon,t})$, and ζ_t and $\sigma^2_{\upsilon,t}$ are chosen so that the posterior belief generated by this signal matches the blockholder's posterior belief $(m^\theta_t, \nu^2_{\theta,t})$. Because the blockholder's belief m^θ_t already incorporates the period-t cash flow y_t, which the board also observes directly, we construct ζ_t relative to the board's predictive belief *after* incorporating y_t (but before incorporating s_t).[35] Let $(\check{m}_t, \check{v}_t)$ denote the board's predictive belief updated with the period-t cash flow y_t:

$$\check{v}_t = \left(\frac{1}{\check{\sigma}^2_{\theta,t}} + \frac{1}{\sigma^2_\varepsilon}\right)^{-1}, \qquad \check{m}_t = \check{v}_t \left(\frac{\check{\mu}^\theta_t}{\check{\sigma}^2_{\theta,t}} + \frac{y_t}{\sigma^2_\varepsilon}\right). \tag{39}$$

Conditional on the interim prior $\theta_t \sim \mathcal{N}(\check{m}_t, \check{v}_t)$, matching the posterior generated by ζ_t to $\left(m^\theta_t, \nu^2_{\theta,t}\right)$ gives

$$\sigma^2_{\upsilon,t} = \frac{1}{\dfrac{1}{\nu^2_{\theta,t}} - \dfrac{1}{\check{v}_t}} = \frac{\nu^2_{\theta,t}\,\check{v}_t}{\check{v}_t - \nu^2_{\theta,t}}, \qquad \zeta_t = \sigma^2_{\upsilon,t}\left(\frac{m^\theta_t}{\nu^2_{\theta,t}} - \frac{\check{m}_t}{\check{v}_t}\right). \tag{40}$$

We also record the identity

$$\check{v}_t + \sigma^2_{\upsilon,t} = \frac{\check{v}_t^2}{\check{v}_t - \nu^2_{\theta,t}}.$$

Recall that the blockholder engages when $m^\theta_t \le \bar{D}_t$, and votes against the compensation package when $\gamma_t \check{\mu}^\theta_t - \gamma_b m^\theta_t > \Delta_t$. As we show below, the informational content of the vote

[35] Matching against the raw predictive prior instead would have led to double-counting y_t once the board recombines ζ_t with its own signals.

can be described by the following three cases.

1. The blockholder votes against the compensation package.

2. The blockholder votes in favor and the constraint (45) binds.

3. The blockholder votes in favor and the constraint (46) binds.

For each engagement and voting outcome, let $\left(\tilde{\mu}_t^\theta, \tilde{\sigma}_{\theta,t}^2\right)$ denote the mean and variance of the board's posterior after learning from the blockholder's engagement and voting decisions (which occurs after the public performance signal y_t is realized), but before incorporating the board's private signal s_t and the aggregate vote tally η_t.

1. The blockholder votes against the compensation package. Suppose the blockholder does not engage and votes against the compensation package. The lack of engagement implies that

$$m_t^\theta = \nu_{\theta,t}^2 \left(\frac{\check{m}_t}{\check{v}_t} + \frac{\zeta_t}{\sigma_{\upsilon,t}^2} \right) \geq \bar{D}_t \iff \zeta_t \geq \sigma_{\upsilon,t}^2 \left(\frac{\bar{D}_t}{\nu_{\theta,t}^2} - \frac{\check{m}_t}{\check{v}_t} \right) \equiv a_t,$$

The vote against implies

$$\gamma_t \check{\mu}_t^\theta - \gamma_b m_t^\theta \geq \Delta_t \iff \zeta_t \leq \sigma_{\upsilon,t}^2 \left(\frac{\gamma_t \check{\mu}_t^\theta - \Delta_t}{\gamma_b \nu_{\theta,t}^2} - \frac{\check{m}_t}{\check{v}_t} \right) \equiv b_t.$$

The board's interim prior is $\theta_t \sim \mathcal{N}(\check{m}_t, \check{v}_t)$, and it now learns $a_t \leq \zeta_t \leq b_t$ with $\zeta_t = \theta_t + \upsilon_t$. Denoting by ϕ, Φ the density and cdf of the standard normal, the posterior mean is

$$\tilde{\mu}_t^\theta = \mathbb{E}[\theta_t \mid e_t = V_t = 0] = \check{m}_t + \sqrt{\check{v}_t - \nu_{\theta,t}^2}\, \frac{\phi(\alpha_t) - \phi(\beta_t)}{\Phi(\beta_t) - \Phi(\alpha_t)}, \tag{41}$$

where

$$\alpha_t = \frac{\bar{D}_t - \check{m}_t}{\sqrt{\check{v}_t - \nu_{\theta,t}^2}}, \tag{42}$$

$$\beta_t = \frac{\dfrac{\gamma_t \check{\mu}_t^\theta - \Delta_t}{\gamma_b} - \check{m}_t}{\sqrt{\check{v}_t - \nu_{\theta,t}^2}}. \tag{43}$$

The posterior variance, $\tilde{\sigma}^2_{\theta,t} = \mathrm{Var}\left(\theta_t \mid e_t = V_t = 0\right)$, is

$$\tilde{\sigma}^2_{\theta,t} = \nu^2_{\theta,t} + \left(\check{v}_t - \nu^2_{\theta,t}\right)\left[1 + \frac{\alpha_t\phi(\alpha_t) - \beta_t\phi(\beta_t)}{\Phi(\beta_t) - \Phi(\alpha_t)} - \left(\frac{\phi(\alpha_t) - \phi(\beta_t)}{\Phi(\beta_t) - \Phi(\alpha_t)}\right)^2\right]. \tag{44}$$

Next, suppose the blockholder votes in favor. The lack of engagement implies

$$\zeta_t \geq \sigma^2_{\upsilon,t}\left(\frac{\bar{D}_t}{\nu^2_{\theta,t}} - \frac{\check{m}_t}{\check{v}_t}\right), \tag{45}$$

and the vote in favor implies

$$\zeta_t \geq \sigma^2_{\upsilon,t}\left(\frac{\gamma_t\check{\mu}^\theta_t - \Delta_t}{\gamma_b\nu^2_{\theta,t}} - \frac{\check{m}_t}{\check{v}_t}\right). \tag{46}$$

Both are lower bounds on ζ_t, so the larger one binds, giving the two subcases below.

2. The blockholder votes in favor and the constraint (45) binds. Then the information from the positive vote is redundant. The posterior mean is

$$\tilde{\mu}^\theta_t = \mathbb{E}[\theta_t \mid e_t = 0] = \check{m}_t + \sqrt{\check{v}_t - \nu^2_{\theta,t}}\,\frac{\phi(\tilde{\alpha}_t)}{1 - \Phi(\tilde{\alpha}_t)}, \tag{47}$$

where

$$\tilde{\alpha}_t = \frac{\bar{D}_t - \check{m}_t}{\sqrt{\check{v}_t - \nu^2_{\theta,t}}}. \tag{48}$$

The posterior variance is

$$\tilde{\sigma}^2_{\theta,t} = \mathrm{Var}(\theta_t \mid e_t = 0) = \nu^2_{\theta,t} + \left(\check{v}_t - \nu^2_{\theta,t}\right)\left[1 + \frac{\tilde{\alpha}_t\phi(\tilde{\alpha}_t)}{1 - \Phi(\tilde{\alpha}_t)} - \left(\frac{\phi(\tilde{\alpha}_t)}{1 - \Phi(\tilde{\alpha}_t)}\right)^2\right]. \tag{49}$$

3. The blockholder votes in favor and the constraint (46) binds. Then the information from the lack of engagement is redundant. The posterior mean is

$$\tilde{\mu}^\theta_t = \mathbb{E}[\theta_t \mid V_t = 1] = \check{m}_t + \sqrt{\check{v}_t - \nu^2_{\theta,t}}\,\frac{\phi(\hat{\alpha}_t)}{1 - \Phi(\hat{\alpha}_t)}, \tag{50}$$

where

$$\hat{\alpha}_t = \frac{\dfrac{\gamma_t \check{\mu}_t^\theta - \Delta_t}{\gamma_b} - \check{m}_t}{\sqrt{\check{v}_t - \nu_{\theta,t}^2}}. \tag{51}$$

The posterior variance is

$$\tilde{\sigma}_{\theta,t}^2 = \mathrm{Var}(\theta_t \mid V_t = 1) = \nu_{\theta,t}^2 + \left(\check{v}_t - \nu_{\theta,t}^2\right)\left[1 + \frac{\hat{\alpha}_t \phi(\hat{\alpha}_t)}{1 - \Phi(\hat{\alpha}_t)} - \left(\frac{\phi(\hat{\alpha}_t)}{1 - \Phi(\hat{\alpha}_t)}\right)^2\right]. \tag{52}$$

B.2.3 Evolution of the state

We can now characterize the evolution of the state vector (15). The blockholder's belief $(m_t^\theta, \nu_{\theta,t}^2)$ evolves according to (30)–(34), and the non-belief components $(C_t, \Delta_t, \gamma_t)$ evolve according to (10) and (12) in all cases. It therefore remains to characterize the evolution of the board's end-of-period belief $(\mu_t^\theta, \sigma_{\theta,t}^2)$, which directly follows from the derivations above:

Case 1: Engagement in period t. If engagement occurs,

$$\begin{aligned}
\sigma_{\theta,t}^2 &= \frac{1}{\frac{1}{\nu_{\theta,t}^2} + \frac{1}{\sigma_\epsilon^2} + \frac{1}{\sigma_{\bar{\bar{\varepsilon}}}^2}}, \\
\mu_t^\theta &= \sigma_{\theta,t}^2 \left(\frac{m_t^\theta}{\nu_{\theta,t}^2} + \frac{s_t}{\sigma_\epsilon^2} + \frac{\kappa\left(\eta_t - \bar{\eta}\right) + \mu_0}{\sigma_{\bar{\bar{\varepsilon}}}^2}\right).
\end{aligned}$$

Case 2: No engagement in period t. If engagement does not occur,

$$\sigma_{\theta,t}^2 = \frac{1}{\dfrac{1}{\tilde{\sigma}_{\theta,t}^2} + \dfrac{1}{\sigma_\epsilon^2} + \dfrac{1}{\sigma_{\bar{\bar{\varepsilon}}}^2}},$$

$$\mu_t^\theta = \sigma_{\theta,t}^2 \left(\frac{\tilde{\mu}_t^\theta}{\tilde{\sigma}_{\theta,t}^2} + \frac{s_t}{\sigma_\epsilon^2} + \frac{\kappa(\eta_t - \bar{\eta}) + \mu_0}{\sigma_{\bar{\bar{\varepsilon}}}^2}\right),$$

where $\left(\tilde{\mu}_t^\theta, \tilde{\sigma}_{\theta,t}^2\right)$ are the posterior moments derived above (after the realization of y_t and the blockholder's actions, but before incorporating s_t and aggregate vote tally).[36] In particular:

[36] Because these moments are obtained from the interim prior $(\check{m}_t, \check{v}_t)$, they already incorporate the period-t cash flow y_t, and hence y_t does not re-enter the update above (paralleling the engagement case, in which the board updates from the blockholder's belief and adds only s_t and η_t).

Case 2a: No engagement, blockholder votes against in period t. Then $\left(\tilde{\mu}_t^{\theta}, \tilde{\sigma}_{\theta,t}^2\right)$ are given by (41) and (44).

Case 2b: No engagement, blockholder votes in favor in period t, and (45) binds. Then $\left(\tilde{\mu}_t^{\theta}, \tilde{\sigma}_{\theta,t}^2\right)$ are given by (47) and (49).

Case 2c: No engagement, blockholder votes in favor in period t, and (46) binds. Then $\left(\tilde{\mu}_t^{\theta}, \tilde{\sigma}_{\theta,t}^2\right)$ are given by (50) and (52).

C Appendix: Estimation details

C.1 First-stage estimation of the state and signal processes

The ability process and the public signal form a linear Gaussian state space: equation (1) is the state equation and ROA $y_t = \theta_t + \varepsilon_t$ is the measurement equation. We estimate the persistence ρ, the unconditional variance σ_0^2, and the public-signal noise σ_ε^2 by maximum likelihood on the profitability panel, evaluating the likelihood with the Kalman filter, and set the level μ_0 to match mean profitability. The rescaling of the aggregate say-on-pay tally into ability units in equation (11) and its noise variance $\sigma_{\bar{\varepsilon}}^2$ are calibrated from the observed joint distribution of tallies and profitability, so the tally's information content is fixed before the structural estimation. All variances used in the structural stage are normalized by the estimated σ_0^2, so ability has unit unconditional variance; Panel A of Table 7 reports the calibrated values.

The exogenous CEO separation hazard λ is set to the empirical separation rate. To support treating separation as exogenous to the governance actions in the model, we regress next-period CEO turnover on lagged engagement and lagged vote-against with firm and year fixed effects; the coefficients are economically and statistically small.

C.2 Simulation and implementation of the estimator

The estimator conditions on the realized public history of each CEO spell. We construct the profitability-conditioned smoothing distribution $p(\theta_{1:T} \mid y_{1:T})$ and draw ability paths by forward filtering and backward sampling: the Kalman filter constructs the filtered distributions given the observed profitability history, and the backward pass draws a complete ability trajectory from their joint smoothing distribution. The observed aggregate tally is held fixed and processed as a public signal by the agents inside the model, but it is not included a second time in the conditioning set of the sampler. Because the state-space parameters are fixed in the first stage, we cache antithetic pairs of conditional ability paths and reuse the same paths at every candidate parameter vector.

At each candidate Θ, we solve the blockholder's dynamic problem on the discretized state and simulate the panel. The simulation holds fixed observed profitability, the aggregate tally, ownership, investor identity, and CEO tenure. For each replication, we take one cached ability path and draw four objects: the board's private signal, the blockholder's private signal, and the engagement and voting cost shocks. Agents update beliefs and choose engagement and voting according to the solved policy rules, which generates the simulated compensation path; every other input is data. Simulated moments average the replications, and fixing all draws across candidate parameter vectors implements common random numbers, so the objective is smooth in Θ up to the simulation design.

The weighting matrix W in equation (27) is the regularized inverse of the variance–covariance matrix of the data moments. Each targeted moment is expressed through its influence function, the influence functions are aggregated within firm–CEO-spell clusters, and their outer product estimates the moment covariance; regularization guards against near-singularity induced by closely related moments. Because the same clustering is used for the data moments and the weighting matrix, moments estimated less precisely in the data receive proportionally less weight in the objective.

C.3 Targeted moments and identification map

Table A.4 lists the targeted moments and the parameter each primarily disciplines. The frequency block works as follows. The unconditional engagement and vote-against rates pin down the cost intercepts μ_C and μ_Δ. The engagement and voting gaps between BlackRock and Vanguard pin down the investor shifters β^E_{BR} and β^V_{BR}, and the engagement gap across the five percent ownership threshold pins down β^E_5. The 2025 changes in engagement below and above the threshold separate the common regime shifter β_{post} from the incremental SEC exposure β_{SEC}.[37] Variation in the endogenous benefits of acting, measured in payoff units, disciplines the scales σ_e and σ_v, and the joint distribution of engagement and voting, in particular voting conditional on engagement, disciplines the cost correlation ρ_{ev}.

The pay block follows the sequence derived in Section 5.1.3: the pay level isolates γ_b, the pay-performance slope then isolates σ_ϵ^2, the engagement response isolates σ_u^2, and the individual- and aggregate-dissent responses isolate g_V and g_π once their information components are fixed. In the dynamic model all parameters are estimated jointly, so this ordering describes the source of identification rather than the estimation procedure.

[37] The estimation targets a simpler unconditional analogue of the difference-in-discontinuities design in Section 3.4. In Table 6, moment (4), the 2025 change below five percent, identifies β_{post}; moment (5), the change in the above-minus-below gap, identifies β_{SEC}, with the pre-guidance gap targeted separately. Both pool all pairs using the pre-annual-meeting engagement flag. DiDisc instead localizes around five percent and removes the smooth ownership gradient with side-specific slopes. We prefer DiDisc for causal inference; the unconditional comparison is a timing-matched structural target at the conservative end of the DiDisc estimates.

Table A.4. Target moments and sources of identification

This table lists the moments targeted by the simulated method of moments estimation and, for each, the parameter or block it primarily disciplines. Moments are numbered as in Table 6. The cost entry is deliberately block-level: the engagement and voting frequencies and gaps identify the action-cost block Θ_C jointly, and we do not claim that each cost parameter is pinned down by a moment of its own. All parameters are estimated jointly, so the map describes the dominant source of variation for each moment rather than an exclusive one.

	Moment	Disciplines
(1)	$P(\text{engage})$	Θ_C (jointly)
(2)	$P(\text{eng} \mid \geq 5\%) - P(\text{eng} \mid <5\%)$, pre-2025	
(3)	$P(\text{eng} \mid \text{BR}) - P(\text{eng} \mid \text{VG})$	
(4)	$\Delta_{2025} P(\text{eng} \mid <5\%)$	
(5)	$\Delta_{2025} P(\text{eng} \mid \geq 5\%) - \Delta_{2025} P(\text{eng} \mid <5\%)$	
(6)	AR(1) of engagement	σ_ϵ^2, σ_u^2 (over-identifying)
(7)	$P(\text{against})$	Θ_C (jointly)
(8)	$P(\text{against} \mid \text{engage})$	
(9)	$P(\text{against} \mid e, \text{BR}) - P(\text{against} \mid e, \text{VG})$	
(10)	$P(\text{against} \mid e, \geq 5\%) - P(\text{against} \mid e, <5\%)$	
(11)	Mean pay/assets (pp)	γ_b
(12)	Δw engagement $(t-1)$	σ_u^2
(13)	Δw vote $(t-1)$	g_V
(14)	Δw vote $(t-1)$ | not engaged	g_V (over-identifying)
(15)	Pay-for-performance coefficient	σ_ϵ^2
(16)	Vote-tally coefficient	g_π
(17)	Δw engagement $(t-2)$	σ_u^2 (over-identifying)