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Struck by Luck: Noisy Capability Cues and CEO Dismissal

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Abstract: A board's key decision to dismiss or retain a current CEO is associated with complexity and uncertainty because CEO ability is not directly observable. Instead, boards must rely on capability cues when evaluating the ability of the CEO. However, capability cues are frequently noisy, encompassing both informative cues about CEO ability and luck factors from which nothing about the ability of the CEO can be inferred. Expanding on the behavioral theory of boards, we theorize that boards fail to perfectly distinguish between informative cues and luck factors and misattribute luck factors to CEO ability. Thus, we conjecture that boards are less likely to dismiss CEOs when capability cues appear more favorable due to luck factors. Using cognitive abilities and the decision context as contingency factors, we further argue that this effect is attenuated by director experience but accentuated by pressure from misinformed institutional investors. Exploiting a regression discontinuity design to test for causal impacts of luck factors, our results support our hypotheses.

Keywords: CEO dismissal; Behavioral corporate governance; Noisy capability cues; Luck

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INTRODUCTION

Do boards dismiss the CEO for bad luck? One of the primary tasks of boards is assessing the current CEO's ability to steer the company forward (Boivie, Bednar, Aguilera, & Andrus, 2016; Haleblian & Rajagopalan, 2006) and consequently deciding whether to retain or dismiss the CEO. These high-stakes strategic decisions should be made particularly carefully, given their significant performance implications (Hilger, Mankel, & Richter, 2013; Shen & Cannella Jr, 2002). However, evaluating CEOs is a complex task because their abilities are not directly observed by boards. Instead, boards rely on capability cues, such as firm performance, as contextual signals that could reasonably be construed as reflections of overall ability (Chatterjee & Hambrick, 2011). The extant literature suggests that boards dismiss the CEO when capability cues induce negative beliefs about the ability of the CEO (Fredrickson, Hambrick, & Baumrin, 1988; Haleblian & Rajagopalan, 2006). In line with this, the literature consistently finds that CEOs are more likely to be dismissed when firm performance is lower (Berns, Gupta, Schnatterly, & Steele, 2021; Berns & Klarner, 2017; Hilger et al., 2013; Withers, Lee, Bermiss, & Boivie, 2023).

Capability cues are frequently noisy, encompassing both informative cues about CEO ability and luck factors from which nothing about the ability of the CEO can be inferred. The prevailing view in the literature is that decision makers consider informative cues and ignore nondiagnostic luck factors in their evaluation (Graffin, Boivie, & Carpenter, 2013; Greve, 2003). However, parsing informative cues from luck factors is difficult when boards evaluate the CEO. In this paper, building upon the behavioral theory of boards (e.g., van Ees, Gabrielsson, & Huse, 2009), we examine how the use of noisy capability cues may yield biased dismissal decisions by CEOs. Underlying this logic is the fundamental assumption of bounded rationality in organizational decision-making, i.e., board members dealing with uncertainty by reducing complexity and

structuring information (Simon, 1947; van Ees et al., 2009). If boards fail to filter out luck factors in their dismissal decisions, this has important implications for CEOs, who are subject to excessive employment risk and compromising incentive structures. Consequently, this may exert both direct and indirect ripple effects on subsequent firm performance.

We conceptualize boards as information-processing groups (e.g., Boivie, Withers, Graffin, & Corley, 2021; Dalton & Dalton, 2011; Pavićević, Haleblian, & Keil, 2022), which are boundedly rational due to the ambiguity and uncertainty associated with strategic decisions (Cyert & March, 1963; Schwenk, 1984). Thus, we assume that boards are facing information processing constraints when evaluating the CEO. We theorize that boards base their evaluation primarily on noisy capability cues without perfectly filtering out luck factors. Consequently, boards misattribute luck factors to CEO ability, which potentially results in erroneous inferences and dismissal decisions when capability cues misrepresent the CEO's ability. In particular, we conjecture that boards are less likely to dismiss CEOs when capability cues appear more favorable due to luck factors.

We further theorize how cognitive abilities and the decision context, the "two blades of the scissors" characterizing bounded rationality (Simon, 1947; Simon, 1990), moderate the tendency of boards to misattribute luck factors to CEO ability. We focus on decision-making experience and decision-making pressure as key manifestations of cognitive ability and decision context, which have been suggested to alter decision-making quality (Hambrick, Finkelstein, & Mooney, 2005; Pavićević et al., 2022; Phillips-Wren & Adya, 2020). We expect that the tendency to dismiss CEOs due to luck factors is less pronounced under higher levels of task experience of board members, allowing for superior information processing and thus better isolation of the informative component of capability cues. Finally, we hypothesize that inaccurate processing of board information is accentuated when the decision context is characterized by external pressure from

institutional shareholders, resulting in dismissal decisions by boards being more strongly influenced by luck factors.

To empirically investigate whether boards fail to filter out all luck factors from capability cues in their CEO dismissal decisions, we use a regression discontinuity design (RDD). RDDs have emerged as one of the most credible nonexperimental strategies for understanding the causal effect of a treatment variable (Bastardoz, Jacquart, & Antonakis, 2022; Cattaneo, Idrobo, & Titiunik, 2019; Imbens & Lemieux, 2008; Lee & Lemieux, 2010). Under the assumption that the assignment of units around a threshold into treatment and control is as good as random, the local causal effect of the treatment on an outcome of interest can be estimated (Cattaneo et al., 2019). Although the value of RDDs has been highlighted in management research (Hill, Johnson, Greco, O'Boyle, & Walter, 2021) and in particular the need to account for endogeneity (Hamilton & Nickerson, 2003), RDDs in strategy (and management) research are still relatively rare (Reinwald, Zaia, & Kunze, 2022).[1]

We utilize the firm's relative return with respect to the S&P 500 index—a salient and unambiguous benchmark over which CEOs have no discretion—as a noisy capability cue observed by boards. Our treatment variable is an indicator of whether the firm managed to outperform the S&P 500 index. While the information on whether the relative return is positive or negative may be salient for boards and other stakeholders, it is, conditional on the relative return itself, uninformative regarding CEO ability. Leveraging the properties of RDDs, we focus on the threshold area where it is as good as random whether the relative return is either barely positive or negative.[2] In other words, the information about a barley underperformance or a barely

[1] Some notable exceptions include Reinwald, Zaia, and Kunze (2022), Flammer (2015), Flammer and Bansal (2017), and Tian, King, and Smith (2023).
[2] Several studies in decision research have employed a similar methodological approach (Gauriot & Page, 2019; Lefgren, Platt, & Price, 2015; Meier, Flepp, Meier, & Franck, 2022; Meier, Flepp, & Franck, 2023).

outperformance of the S&P 500 index is a result of luck factors outside the CEO's control and should thus not be incorporated into the process of boards updating their beliefs about a CEO's ability.

Based on our theoretical conjecture, we expect that boards will consider this luck factor, i.e., the conditionally uninformative capability cue of having barely outperformed the S&P 500 index, in their CEO dismissal decisions. Consequently, if barely outperforming the S&P 500 index negatively affects the dismissal probability of CEOs compared to barely underperforming the S&P 500 index, this suggests that boards update their beliefs about the CEO's ability due to luck factors. Indeed, we find that boards of firms that barely outperformed the S&P 500 index in the previous year are less likely to dismiss their CEO than are boards of firms that barely underperformed the S&P 500 index. This result supports our main hypothesis. Moreover, consistent with our moderation hypotheses, we show that the influence of luck factors on dismissal decisions is weaker for experienced boards but stronger for boards facing concentrated institutional shareholders.

Our study makes several important contributions. First, we advance the behavioral theory of boards and corporate governance (Haleblian & Rajagopalan, 2006; van Ees et al., 2009) by theorizing and providing empirical evidence that boards' CEO dismissal decisions are influenced by luck factors. Second, we contribute to the group information processing of boards by showing how cognitive abilities and the decision context moderate the main effect (Boivie et al., 2016; Khanna, Jones, & Boivie, 2014; Pavićević et al., 2022). We find that prior board experience with directors mitigates but pressure from the decision context accentuates boards' tendency to consider luck factors. Finally, the study provides important implications for board decision-making and for firms in general, highlighting that even the most consequential decisions are susceptible to cognitive distortions.

THEORETICAL BACKGROUND AND HYPOTHESES

At the apex of the modern corporation, the board of directors holds the highest legal authority within the organization (Boivie et al., 2016). Acknowledged as a critical governance control mechanism, the board of directors is confronted with highly complex tasks (Forbes & Milliken, 1999). Because boards engage in ongoing monitoring, resource provision, and intervention during critical events such as CEO dismissals and consequently influence firm strategy, management selection, and financial performance (Boivie et al., 2016), these tasks demand informed judgments and a deep understanding of the focal firm and its environment (Khanna et al., 2014; Makri, Lane, & Gomez-Mejia, 2006).

The board of directors can be viewed from a group information processing perspective (e.g., Boivie et al., 2016; Pavićević et al., 2022; Seo, 2017) involving gathering, sharing, and analyzing task information for task resolution (e.g., Dreu, Nijstad, & van Knippenberg, 2008; Hinsz, Tindale, & Vollrath, 1997). Information processing refers to a series of interconnected processes that take place when information is received, altered, and subsequently utilized to generate some form of output (Boivie et al., 2016; Hinsz et al., 1997). Numerous studies affirm that the quality of group decisions is significantly influenced by how information is processed within these groups (Lu, Yuan, & McLeod, 2012; Mesmer-Magnus & DeChurch, 2009).

Taking on the lens of behavioral boards (van Ees et al., 2009), we assume that directors are boundedly rational and limited in their ability to gather and process information (Cyert & March, 1963; Simon, 1947). Bounded rationality acknowledges that individuals often face limitations in terms of time, information, and cognitive capacity when making decisions. Decision makers must work within the constraints of their cognitive abilities and the decision context (Simon, 1947; Simon, 1990). To the extent that its members are boundedly rational, these limitations can result

in suboptimal decisions of boards by causing individuals to rely on incomplete information and simplified decision strategies.

Most of the decisions of boards involve complex evaluation tasks of the environment and the agents involved. One primary information processing task is evaluating the CEO and deciding whether to retain or dismiss him or her. CEO dismissals are costly and represent key punctuated events that are characterized as infrequent yet highly consequential (Boivie et al., 2016). A CEO dismissal represents a disruption that induces uncertainty and has direct and indirect costs and performance implications (Schepker, Kim, Patel, Thatcher, & Campion, 2017; Shen & Cannella Jr, 2002; Worrell, Davidson III, & Glascock, 1993). Due to the consequential nature of CEO dismissals, accurate information processing is essential for boards making such material group decisions. Due to the consequential nature of CEO dismissals, accurate information processing is essential for boards (Boivie et al., 2016; Hinsz et al., 1997).

At the core of this task is a sense-making process in which causal attributions for organizational outcomes are formed (Meindl, Ehrlich, & Dukerich, 1985; Pfeffer, 1977). The board's dismissal decision follows a three-stage process in which the board assesses firm performance, forms attributions of performance and updates its belief in the CEO's ability, and subsequently dismisses the CEO if he or she is seen as ineffective (Haleblian & Rajagopalan, 2006). The interpretation stage, which involves attributing performance and forming accurate beliefs regarding a CEO's ability, is challenging because the true inherent ability of a CEO remains unobservable, and CEO performance is often ambiguous and difficult to evaluate (March, 1984). Thus, to evaluate the CEO, boards resort to capability cues for individual performance (Hilger et al., 2013).

Capability cues are contextual signals that decision-makers could reasonably construe as reflections of overall ability (Chatterjee & Hambrick, 2011). Better capability cues suggest that the

CEO might have greater ability, whereas lower capability cues indicate that the CEO might have less ability (Mishina, Block, & Mannor, 2012). Thus, capability cues differ regarding their valence and magnitude. As we will argue subsequently, capability cues are usually noisy and consequently also differ regarding their informativeness about CEO ability.

Consistent with the idea of forming attributions of firm performance and updating beliefs following capability cues (Haleblian & Rajagopalan, 2006), the literature suggests that boards rely on cues based on observable firm performance (e.g., Ghosh & Wang, 2019; Hilger et al., 2013; Jenter & Kanaan, 2015; Moliterno, Beck, Beckman, & Meyer, 2014). Not surprisingly, such capability cues are related to subsequent executive turnover (Berns & Klarner, 2017; Fredrickson et al., 1988; Hilger et al., 2013; Withers et al., 2023). Most prominently, boards account for firm performance, such as stock returns or returns on assets, when evaluating the CEO (Wiersema & Zhang, 2011). Hilger, Mankel, and Richter (2013) concludes that fifty out of fifty-seven studies suggest that poor firm performance is a key antecedent of executive dismissal, suggesting that CEOs are held responsible for firm performance. In particular, stock prices are an important external cue that managers pay attention to (Greve, 1998).

However, these capability cues are imperfect signals since they are usually a noisy measure of a CEO's true inherent ability (Denrell, 2005; Denrell & Liu, 2021; Kim, Kim, & Miner, 2009). In other words, capability cues vary in their informative strength regarding CEO ability. Since the informative cue component in noisy capability cues is challenging to disentangle from luck factors, biased decisions may occur, potentially leading to erroneous inferences and dismissal decisions when these noisy capability cues misrepresent the CEO's ability.

The informativeness of capability cues decreases with the extent to which luck factors influence the outcome. We define luck factors as situational influences beyond a CEO's control, i.e., unstable, uncontrollable, or external factors (Liu & Rond, 2016). Since luck factors are

confounded by observable capability cues and account for a considerable part of, for instance, firm performance (e.g., Fitza, 2014), resorting to these cues might lead to a bias in attribution (Denrell, Fang, & Liu, 2015, 2019; Liu & Rond, 2016). In other words, since decisions are made based on salient attributes, i.e., for instance, whether performance appears good or bad, the luck factors that led to the outcome may influence the belief updating of boards—even if they provide no intrinsic informational content about a CEO's ability. This underestimation of luck in observed outcomes may create a form of attribution bias where CEOs are dismissed or retained due to events outside their control.

Prior research in cognitive psychology and behavioral economics has shown that decision makers tend to overweight the outcomes that occur relative to their informational content, which is referred to as "outcome bias" (e.g., Baron & Hershey, 1988). Outcome bias refers to a fundamental misattribution where luck factors are misattributed to the actions of an involved party (Brownback & Kuhn, 2019). In other words, since performance may be due to luck, CEOs should be evaluated on the basis of the process by which the outcome is achieved and not on the outcome alone (Denrell, 2005). However, if luck factors cannot be separated from informative cues, good or bad luck can substantially affect individuals' evaluations since evaluators develop biased beliefs about individuals' abilities.

Drawing on these insights, we expect that boards misattribute luck factors in observed capability cues to the ability of the CEO. This finding suggests that boards develop overly optimistic beliefs about CEO ability when capability cues are positively influenced by luck factors and develop unduly pessimistic beliefs when capability cues are negatively influenced by luck factors. Consequently, we conjecture that such misattribution of luck to CEO ability leads to a decreased probability of a CEO being dismissed:

Hypothesis (H1). *Boards are less likely to dismiss CEOs when capability cues appear more favorable due to luck factors.*

Moderating Role of Experience and Pressure

Taking an information processing perspective under boundedly rational directors, we examine contingency factors to substantiate the theorized main effect. Bounded rationality acknowledges that individuals often face limitations in terms of time, information, and cognitive capacity when making decisions. To explain this concept, Simon used the metaphor of "two blades of a scissor" (Simon, 1947; Simon, 1990), illustrating that bounded rationality is the result of the interaction between the cognitive limitations of decision-makers and the characteristics of the decision context (Sobrepere i Profitós, Keil, & Kuusela, 2022). Thus, decision makers must work within the constraints of their cognitive abilities and the decision environment (Simon, 1947; Simon, 1990).

In the following, using the “two blades of the scissor” metaphor of bounded rationality to structure our arguments, we theoretically outline how cognitive capabilities and decision context moderate the information processing of noisy capability cues and thus can mitigate or accentuate the behavioral tendency to misattribute luck to CEO abilities.

Moderating role of experience

Simon (1947; 1990) highlights the importance of considering the cognitive abilities of decision makers, representing one blade of the “scissor”, as a fundamental aspect of comprehending decision-making. It is recognized that decision makers possess limited cognition: they have limited information processing capacity, time constraints, and cognitive biases, influencing how a person perceives and processes information when making decisions. In what

follows, we argue that decision experience plays a pivotal role in enhancing the information processing of noisy capability cues.

As individuals gain experience, decision quality is usually assumed to improve. The advantages of prior experiences can be explained through a sociocognitive perspective as a result of "complex schemas" or "knowledge structures" individuals have developed about their environment (e.g., Kiesler & Sproull, 1982; Walsh, 1995; Westphal & Fredrickson, 2001). These structures become more complex with fewer schema categories and more information units per category as people gain experience, resulting in more efficient information processing (e.g., Ford & Baucus, 1987). This is particularly true for individuals who have experiences concentrated in a related domain and are not scattered across different contexts, suggesting that they have more highly developed knowledge structures for that domain (Day & Lord, 1992; Lurigio & Carroll, 1985).

Directors with prior board experience may significantly improve the board information processing of the focal firm (Khanna et al., 2014; McDonald, Westphal, & Graebner, 2008; Pavićević et al., 2022) and overall board task performance (Elms & Pugliese, 2023). For example, evidence suggests that directors with acquisition experience might have developed a better understanding of acquisitions and thus improved a firm's subsequent acquisition performance (Kroll, Walters, & Wright, 2008). Similarly, the results of Tian, Haleblian, and Rajagopalan (2011) suggest that independent board members' CEO experience and industry experience improve CEO hiring decisions. Moreover, Zorn, DeGhetto, Ketchen Jr, and Combs (2020) show that board experience can mitigate choice-supportive bias and escalate the commitment tendencies of boards when evaluating whether to dismiss a CEO.

Directors with experiences concentrated in a related domain and not scattered across different contexts possess a mental repository of cases upon which they can draw (Chi, Feltovich, & Glaser,

1981; Pavićević et al., 2022). Consequently, they have more background information and, above all, more efficiently structured information, which leads to better information processing overall (Day & Lord, 1992). Thus, directors who have experience with similar decisions have a lower cognitive load since more information can be processed more readily by them (Khanna et al., 2014; Kor, 2006).

In particular, directors may use knowledge structures developed based on their experience on other boards (Carpenter & Westphal, 2001). As a result of their exposure to other boards, directors may acquire a variety of experiences, increasing their cognitive breadth and enhancing their awareness of multiple alternatives (Zhu, Hu, & Shen, 2020). Furthermore, directors' involvement on other boards serves as a significant source of information regarding business practices and strategies (Carpenter & Westphal, 2001; Mizruchi, 1996). Having participated in the evaluation process of CEOs on other boards, directors may have gained insights into the effectiveness of various practices and their implementation (Haunschild, 1993). Thus, they can develop a more profound understanding of cause-and-effect relationships and the informativeness of capability cues.

Taking these arguments together, we expect that board experience in CEO evaluation fosters a better understanding of the informativeness of capability cues and reduces the tendency to evaluate CEOs based on luck in their CEO dismissal decisions. We thus hypothesize the following:

Hypothesis (H2). *Board experience attenuates the tendency to dismiss CEOs less when capability cues appear more favorable due to luck factors.*

Moderating role of institutional shareholder pressure

While cognitive abilities constitute one blade of the scissor representing bounded rationality, it is crucial to consider the decision context to comprehend how decision-making is made (Simon, 1947; Simon, 1990). The second blade pertains to the complexity of the decision context, the quality and availability of information, and the structure of the decision problem. In what follows, we consider pressure, a key environmental feature of the decision context and an important determinant of decision quality (e.g., Hambrick et al., 2005; Jamal, 1984; Keinan, 1987; Wright, 1974). The types of managerial decisions that directors must make are vulnerable to pressure because they frequently involve complex and difficult issues with significant implications (Finkelstein & Hambrick, 1996; Mintzberg, 1975). Consequently, we examine how pressure affects information processing and thus moderates the effect of luck factors on CEO dismissal.

The decision environment in organizational contexts necessitates that decisions often be made under conditions that are stressful, i.e., when individuals face excessive pressure or other demands (Hambrick et al., 2005; Staw, Sandelands, & Dutton, 1981). The broader decision-making literature indicates that pressure can negatively impact information processing and decision quality (Fiedler & Garcia, 1987; Vecchio, 1990). Compared to those in low-pressure situations, individuals under pressure often exhibit reduced performance (Ahituv, Igbaria, & Sella, 1998) and commit more cognitive mistakes (Baradell & Klein, 1993). Individuals tend to fall back on familiar responses from past experiences, even if those responses are insufficient (Kaempf, Klein, Thordsen, & Wolf, 1996); rely more on stereotypes (Gilbert & Hixon, 1991); and show a tendency to disregard situational contexts (Endsley, 1995). Stress biases human decision-making toward habitual choices rather than toward goals (Soares et al., 2012), suggesting that the brain resorts to habitual decision-making.

Moreover, pressure often leads to time constraints, limiting the ability to thoroughly assess the decision-making process. Time pressure is prevalent, especially in settings that require important and complex decisions (Klapproth, 2021). Stressful situations can similarly lead to high-pressure environments where people often behave as if they were under time pressure (Smith & Barrett, 2019; Svenson & Maule, 1993). Consequently, there is reduced information processing due to a narrowed field of attention and simplified information processing, resulting in preference dominance, well-learned, and habitual behavior regardless of the specific situation (Klapproth, 2021; Staw et al., 1981). Thus, we argue that when decision makers feel pressured, individuals may default to a simpler evaluation method and focus more on noisy capability cues as a way to reduce mental strain and simplify judgment.

One particular manifestation of a board's decision environment characterized by high pressure is ownership from institutional investors since managers might particularly sense pressure to deliver performance as expected by the company's owners (Hambrick et al., 2005). The board of directors serves as a crucial mechanism through which shareholders exert their influence (Jensen & Meckling, 1976). Institutional shareholders have a great influence on key strategic decisions, such as executive successions and dismissal decisions (Jung, 2014; Salancik & Pfeffer, 1980; Walther, Calabrò, & Morner, 2017). Institutional investors are typically diversified owners and exhibit analogous behavioral tendencies and limitations when processing information (e.g., Kempf, Manconi, & Spalt, 2017; Liu, Low, Masulis, & Le Zhang, 2020). They often lack both the information and the right incentives to push the best decisions for the company forward (Bainbridge, 2006; Strine, 2006). Thus, we argue that institutional investors who are further away from the underlying actions of the CEO than from the underlying actions of the board are more inclined to focus on noisy capability cues and consequently misattribute luck factors to CEO quality.

When performance is under scrutiny, institutional investors demand corrective action for the shortfall and publicly voice their concerns and dissatisfaction, increasing the pressure on boards in various ways (Westphal & Bednar, 2008). First, boards respond with greater involvement in the strategic decision-making process (Judge Jr & Zeithaml, 1992), exert more monitoring (Liu et al., 2020), and show increased responsiveness to shareholders' interests in the wake of greater external pressure from institutional investors (Ertimur, Ferri, & Stubben, 2010). Second, institutional investors may also put pressure on boards with demands to act that would limit the time needed to collect, share, and analyze information regarding the CEO's ability, reducing the board's ability to cope with information uncertainty. Finally, institutional shareholders have specific expectations or demands for strategic actions and performance, which may create external pressure on boards to conform (Fisman, Khurana, Rhodes-Kropf, & Yim, 2014; Hellman, 2005). These forms of pressure may direct boards' attention toward their demands, finding fast solutions, and thus a greater dependence on heuristics (e.g., Hambrick et al., 2005; Joseph & Gaba, 2020; Payne, Bettman, & Johnson, 1993; Soll, Milkman, & Payne, 2015). Overall, we argue that institutional investors are more inclined to focus on noisy capability cues since they are further away from the CEO. When institutional investors put pressure on boards demanding action based on noisy capability cues, this pressure likely disturbs the board's information processing so that it leads to less accurate evaluations.

We further argue that information processing is increasingly disrupted when powerful institutional shareholders put pressure on boards rather than when shares are widely dispersed (Hambrick et al., 2005; McEachern, 1975). The more concentrated institutional holdings are, the more the preferences and beliefs of institutional investors become reflected in the decision-making of the board (Fisman et al., 2014). In particular, the literature suggests that the size of shareholdings matters for having the power to impose demands and put pressure upon management and boards

(Jung, 2014).[3] Thus, pressure from institutional investors is likely to increase as institutional shareholdings become more concentrated.

In summary, pressure from powerful institutional investors may alter the decision context and disrupt the accurate information processing of boards. Deriving from these arguments, we expect that the increased pressure that directors face from institutional shareholders moderates the tendency of boards to act on luck factors. Thus, we hypothesize the following:

Hypothesis (H3). *Institutional shareholder pressure accentuates the tendency of boards to dismiss CEOs less likely when capability cues appear more favorable due to luck factors.*

METHODS

Data and Sample

The sample firms and CEOs in the dataset for the period between 2000 and 2018 are taken from the ExecuComp database, which broadly contains S&P 1500 firms. For each firm-year observation, we obtain the name of the CEO and several CEO characteristics. We first merge this sample with the CEO dismissal database constructed by Gentry, Harrison, Quigley, and Boivie (2021) and exclude all fiscal years in which CEO turnover was not categorized as dismissal related to job performance (*departure_code* = 3).[4] Following Gupta, Mortal, Silveri, Sun, and Turban (2020), we include only CEOs who have been in office for at least 12 months at the beginning of a given fiscal year to ensure that the previous performance measures are fully attributable to the current CEO. Second, we add information on firm fundamentals collected from Compustat North

[3] Compared to institutional smallholders, who have fewer opportunities to exert influence, challenge poor management decisions, and pressure boards, blockholding institutional investors are more likely to do so because of their large shareholdings (Chen, Harford, & Li, 2007; Borokhovich, Brunarski, Harman, & Parrino, 2006). In addition, investors with relatively larger shares will less likely take the "Wall Street walk" (Parrino, Sias, & Starks, 2003) when dissatisfied with current management as such an exit is costly due to a substantial price discount (Coffee Jr, 1991).
[4] These data are open source and can be downloaded from https://doi.org/10.5281/zenodo.5348198 (Gentry, Harrison, Quigley, & Boivie, 2021).

America and annualized stock and S&P 500 index returns derived from the Center for Research in Security Prices (CRSP). Finally, we merge board characteristics from the BoardEx database and institutional investor information from the Thomson Reuters' 13f database into our sample. Once we removed observations with incomplete data, our sample without covariates consisted of 24,242 firm-year observations, and our sample including covariates consisted of 22,349 firm-year observations.

Measures

Dependent variable

The dependent variable CEO dismissal equals 1 if the board dismisses the CEO in the focal fiscal year and 0 otherwise.

Independent variable

As a measure of noisy capability cues, we employ relative stock returns for three reasons. First, prior research on CEO dismissal has shown that relative stock returns, i.e., industry-adjusted stock returns or market-adjusted stock returns, play an important role in predicting CEO dismissal as a measure of firm performance (e.g., Jenter & Kanaan, 2015; Wiersema & Zhang, 2011). Second, stock market performance is an important cue that organizational decision makers pay attention to (Greve, 1998). Stock prices and returns are more frequently referenced in the Management Discussion and Analysis (MD&A) sections of annual reports than are other performance measures, such as return on assets, return on equity, or return on investment (Certo, Jeon, Raney, & Lee, 2022). Third, stock returns are subject to luck factors (e.g., Amore & Schwenen, 2022; Daniel, Li, & Naveen, 2020). Finally, stock returns provide an advantage over accounting-based measures of performance because they are less subject to concerns about

manipulation, such as earnings management, which is a key feature of our identification strategy, as we outline below.

We choose the S&P 500 index return to calculate relative stock returns because it is an unambiguous, salient benchmark. This return is unambiguous because its calculation follows a transparent set of rules, and it is salient because the S&P 500 index incorporates the 500 largest companies in the U.S. based on market value. Even if boards are expected to use additional relative performance measures such as measures based on industry peer firms to evaluate their CEOs, it is also likely that they are aware of the S&P 500 index return and whether their company was able to outperform this index during a given year.[5] Finally, relying upon the S&P 500 index reduces our discretion in defining the peer group.

Our noisy capability cue is *Relative return SPX*, defined as the difference between the total yearly stock return including reinvested dividends of a firm and the yearly S&P 500 index return at the end of the fiscal year. Based on *Relative return SPX*, we define the indicator variable *Outperformance SPX* equal to 1 if *Relative return SPX* is positive and zero otherwise.

Although our main independent variable of interest, *Outperformance SPX*, is informative about the performance of a CEO when analyzed in isolation, it becomes uninformative once *Relative return SPX* is accounted for because all information on *Outperformance SPX* is already contained in *Relative return SPX*. In other words, conditional on the relative stock return with respect to the S&P 500 index, information on whether a firm underperformed the index or outperformed the index can be viewed as uninformative.

[5] For instance, many firms report their stock returns in comparison to industry peers and the S&P 500 index in the annual 10-K forms.

Moderators

To measure the board's experience in evaluating CEOs, we calculate the number of boards of publicly listed companies that the board members of the focal firm have served on during their careers (*Board seat experience*) and then average this number across all directors on the focal board.[6]

To proxy for institutional shareholder pressure, we follow Hartzell and Starks (2003) and use institutional ownership concentration. This choice is based on the premise that higher ownership concentration facilitates streamlined coordination among institutions and enables more impactful pressure on boards to consider their perspectives. As a first measure of institutional shareholder pressure, we calculate the Herfindahl index of institutional fractional holdings (*Institutional investor HHI*), where a higher Herfindahl index implies that ownership is more concentrated (Hartzell & Starks, 2003). As a second measure of shareholder pressure, we again draw on Hartzell and Starks (2003) and employ the proportion of institutional ownership owned by the five largest institutional investors in each firm (*Institutional investor top 5*).

Covariates

The inclusion of covariates in quasiexperimental regression discontinuity designs (see below) is not required since units are assumed to be quasirandomly assigned to the treatment. However, similar to the practice of including preintervention covariates in randomized experiments, we included several covariates to increase the precision of the statistical inferences (Calonico, Cattaneo, Farrell, & Titiunik, 2019). First, we include *Firm size* as the natural logarithm of total

[6] We explicitly do not only focus on directors having experience with CEO dismissals because directors also evaluate CEOs that are retained. Furthermore, guided by the approach to aggregate individual director experience to board experience by McDonald et al. (2008), we used the sum of the number of previous board seats in additional analyses and the results remain similar.

assets and *Firm value* as the natural logarithm of the firm's market capitalization. Second, we include the age of the CEO (*CEO age*), the CEO's tenure (*CEO tenure*), and a dummy variable indicating whether each CEO is the chairperson of the board (*CEO duality*) to capture CEO characteristics.[7] Third, we include the size of the board (*Board size*) and the average age of all board members (*Board age*) to account for differences in board characteristics. Finally, we include the percentage of ownership held by institutional investors (*Institutional investor percentage*), year fixed effects and industry fixed effects.[8] Table 1 shows the descriptive statistics and the correlations of all the variables in our sample.

Insert Table 1about here

In this sample, CEO dismissals occur in approximately 3% of all firm-year observations. This rate is consistent with the CEO dismissal rate reported by Gupta, Mortal, Silveri, Sun, and Turban (2020) and Shin and You (2023).

Regression Discontinuity Design

Outside the laboratory, it is challenging to identify errors in belief updating and subsequent decision-making. Typically, one lacks access to all relevant explicit and implicit information available to boards. Moreover, beliefs and the correct Bayesian benchmark are usually unobservable (Augenblick, Lazarus, & Thaler, 2021). This makes it difficult to assess whether boards accurately evaluate CEOs based on observed capability cues, i.e., whether their belief-

[7] If *CEO age* is missing in the ExecuComp database, we obtained the CEO's age from the Form 10-K. If the item *becameceo* in the ExecuComp database is missing or inaccurate in the ExecuComp database, we infer the approximate tenure of the corresponding CEO based on the number of fiscal years he or she is observable. The construction of *CEO duality* is based on the item *titelann*.

[8] The industries are based on the Fama and French (1997) classification of 48 industries.

updating process to capability cues is rational or whether they give weight to luck factors when dismissing CEOs.

We circumvent this inherent issue by identifying a quasiexperimental setup in which we isolate a luck factor in a noisy capability cue. In particular, we exploit a regression discontinuity design (RDD), which is a nonexperimental research design that allows for a credible analysis of causal effects (Cattaneo et al., 2019; Cattaneo & Titiunik, 2022). RDDs have emerged as one of the most credible nonexperimental strategies for understanding the causal effect of a variable of interest, closely approximating the idea of a counterfactual (Bastardoz et al., 2022; Cattaneo et al., 2019; Imbens & Lemieux, 2008; Lee & Lemieux, 2010). A distinct feature of an RDD is that the treatment is quasirandomly assigned based on whether an observable variable, the "running variable", exceeds a specific cutoff value (or threshold). Thus, in an RDD, one exploits the discontinuous change in the treatment to obtain the local causal effect of the treatment on an outcome of interest (Cattaneo et al., 2019).

We make use of the discontinuous change in the perception of a positive and negative capability cue around the natural threshold of the benchmark performance, i.e., whether a firm outperforms or underperforms the benchmark. In our context, the running variable is the *Relative return SPX* at the end of the previous fiscal year, and the treatment variable is *Outperformance SPX* indicating whether *Relative return SPX* was positive. In this setup, the treatment variable *Outperformance SPX* is conditionally uninformative and does not contain any additional information over or above the information already contained in the *Relative return SPX*. Thus, a rational Bayesian board would disregard this luck factor in its updating of beliefs about CEO ability.

The core assumption of the RD design is fulfilled when firms falling barely below or above the *Relative return SPX* of zero are comparable to each other in all other aspects (Cattaneo &

Titiunik, 2022), implying that the treatment status of *Outperformance SPX* is akin to random assignment close to the cutoff of zero *Relative return SPX* (Reinwald et al., 2022; Sieweke & Santoni, 2020). Because the validity of our identification strategy depends on quasirandom assignment, stock returns are more suitable than other accounting-based capability cues, such as ROA or ROE, over which CEOs may have some discretion. The quasirandom assignment assumption seems feasible because first, CEOs do not have direct control over their own firms' stock returns, and second, CEOs do not have any control over S&P 500 index returns. Thus, whether the relative stock return is slightly positive (e.g., +0.5%) or slightly negative (e.g., -0.5%) is essentially contingent on chance.

Following Calonico, Cattaneo, and Titiunik (2014b) and Cattaneo, Idrobo, and Titiunik (2019), we use a nonparametric local linear approach to estimate the sharp RD point estimate β_1.[9] The estimating equation is given by:

$$\begin{aligned} \textit{CEO Dismissal}_{i,t} = {} & \beta_0 + \beta_1 \textit{ Outperformance SPX}_{i,t-1} + \beta_2 \textit{ Relative return SPX}_{i,t-1} \\ & + \beta_3 \textit{ Outperformance SPX}_{i,t-1} \times \textit{Relative return SPX}_{i,t-1} + \beta X_{i,t-1} + \varepsilon_{i,t} \quad (1) \end{aligned}$$

where *i* denotes the firm and *t* refers to the fiscal year. Following Calonico, Cattaneo, and Titiunik (2014b) and Cattaneo, Idrobo, and Titiunik (2019), we employ a triangular kernel function to determine the weight of the observations within the bandwidth and choose the bandwidth that optimizes the mean squared error (MSE) of the estimate.

[9] Because an RD estimator is a boundary point, global parametric polynomial regressions can lead to misleading RD point estimators (Cattaneo, Idrobo, & Titiunik, 2019).

The choice of bandwidth is crucial in RD designs, and a data-driven bandwidth selector prevents nontransparent, ad hoc choices. Because larger bandwidths tend to increase the bias of an estimator, while smaller bandwidths tend to increase the variance, a bandwidth that minimizes the MSE optimizes this bias-variance trade-off (Calonico, Cattaneo, & Farrell, 2020). However, because the MSE-optimal bandwidth is not small enough to remove the bias term, conventional statistical inference methods that ignore this bias term are invalid (Cattaneo et al., 2019). Thus, we employ the bias-corrected RD approach developed by Calonico, Cattaneo, and Titiunik (2014b), based on which the estimated bias term is removed from the RD point estimator β_1 in Equation (1) and robust confidence intervals are used for inference.[10]

RESULTS

Main Results

We start by providing graphical evidence on whether the likelihood of CEO dismissal discontinuously decreases after barely outperforming the S&P 500 index compared to barely underperforming the S&P 500 index in the previous year. In Figure 1, each dot represents the mean probability of CEO dismissal within evenly spaced bins across a large bandwidth of fifty percentage points. The number of evenly spaced bins is chosen using the integrated mean squared error (IMSE)-optimal approach.[11] Figure 1 indicates that there is a discontinuous drop in the probability of CEO dismissal at a *Relative return SPX* of zero, which provides the first suggestive

[10] See Calonico et al. (2014b) for a detailed discussion and Calonico, Cattaneo, and Titiunik (2014a) and Calonico, Cattaneo, Farrell, and Titiunik (2017) for the implementation of this approach.

[11] Minimizing the IMSE of the local means estimator allows for a data-driven choice of the number of bins. Using the IMSE-optimal number of bins balances the trade-off between greater variability within a bin, which exists if the number of bins is large, and greater bias, which exists if the number of bins is small (Cattaneo, Idrobo, & Titiunik, 2019).

evidence that boards take the luck factor of barely outperforming the S&P 500 index into account in their CEO dismissal decisions.

Insert Figure 1 about here

The estimation results based on Equation (1) are displayed in Table 2. The RD estimate in Column (1) is negative and implies that CEOs of firms that barely outperformed the S&P 500 index in the previous fiscal year are approximately 1.8 percentage points less likely to be dismissed than CEOs of firms with barely underperformed the S&P 500 index in the previous fiscal year ($p = 0.014$). The effect size is economically relevant: It corresponds to a decrease of approximately 56.3% percent in the control mean of 3.2%.[12] Column (2) of Table 2 shows that the RD estimate remains similar when covariates for firm characteristics, CEO characteristics, and board characteristics as well as year and industry fixed effects are included. Overall, the results are consistent with Hypothesis 1, which states that boards are less likely to dismiss CEOs when capability cues appear more favorable due to luck factors, even if these cues are conditionally uninformative.

Insert Table 2 about here

To test whether the influence of uninformative capability cues on boards' forced CEO turnover decisions is conditional on the board's experience (Hypothesis 2) and institutional shareholder pressure (Hypothesis 3), we follow Flammer (2015) and Reinwald, Zaia, and Kunze (2022) and perform subsample analyses within the RDD.

[12] Following Ludwig and Miller (2007), we define the control mean as the bias-corrected local polynomial estimate of the likelihood of CEO dismissal just below the threshold of zero *Relative return SPX*, which represents the nontreatment counterfactual.

We first split our sample at the median value of *Board seat experience* and re-estimate the RD model. The results of Column (1) in Table 3 show that when boards have less than median experience with previous board mandates, the RD estimate becomes more pronounced (β_1 = -0.031, p = 0.004). In contrast, when boards have above-median experience, the RD estimate displayed in Column (2) of Table 3 decreases (β_1 = 0.001, p = 0.896). A Wald test reveals that the two RD estimates differ from each other (p = 0.017) and thus supports the moderating effect of board experience proposed in Hypothesis 2.

Insert Table 3 about here

To test Hypothesis 3, we re-estimate the RD model separately for the subsamples of firm-year observations with above- and below-median *Institutional investor HHI*. While the RD estimate in Column (1) of Table 4 for boards facing low institutional shareholder concentration decreases (β_1 = 0.000, p = 0.995), the RD estimate in Column (2) for boards facing high institutional shareholder concentration becomes more pronounced (β_1 = -0.033, p = 0.003). Again, a Wald test shows that the difference between the coefficients is substantial (p = 0.014).

We find similar results for the subsamples split at the median value of *Institutional investor top 5*. While the effect of the *Outperformance SPX* is smaller for firms where the top 5 institutional investors hold a lower proportion of institutional ownership (β_1 = -0.002, p = 0.829), as shown in Column (3) of Table 4, the effect of the *Outperformance SPX* is larger for firms where the top 5 institutional investors hold a larger proportion of institutional ownership (β_1 = -0.029, p = 0.006), as shown in Column (3) of Table 4. These findings support Hypothesis 3, as luck factors, in the form of barely outperforming the S&P 500 index, affect boards' CEO dismissal decisions only if shareholder pressure is supposedly high.

Insert Table 4 about here

Validation and Falsification Checks

While the continuity assumption underlying the RD design, namely, that the only change that occurs at the cutoff is a shift in the treatment status, cannot be tested directly, there are several validation methods that provide indirect evidence about the validity of an RD design (Cattaneo et al., 2019; La Cuesta & Imai, 2016). We conduct the most important validation and falsification checks that are often employed in the context of RD designs (e.g., Imbens & Lemieux, 2008; Ludwig & Miller, 2007). First, we investigate whether CEOs or firms are able to precisely manipulate relative stock returns to make them barely positive rather than barely negative. Second, we test whether firms that are near the cutoff, their CEOs, their boards, and institutional shareholders have similar observable characteristics. Third, we test whether discontinuities exist at the artificial cutoff values used in the relative return functions. Finally, we test the model's sensitivity to the choice of bandwidth, kernel function, and polynomial order.[13]

Manipulation tests

A major concern in the context of RD designs is that selection into the treatment group might occur. If CEOs or firms manage to precisely manipulate relative stock returns such that the relative returns are barely positive rather than barely negative, assignment into the treatment group would be nonrandom (Flammer & Bansal, 2017). We formally test the assumption of a smooth *Relative return SPX* function around the cutoff by employing a density test first proposed by McCrary (2008). Specifically, we follow the manipulation testing procedures developed by Cattaneo,

[13] All validation and falsification checks are estimated without covariates. However, the results remain similar if the covariates are included.

Jansson, and Ma (2018), using local polynomial density estimators and testing the null hypothesis that the density of each relative return function is continuous around the cutoff of zero. Figure 2 displays the estimated densities.

Insert Figure 2 about here

The estimated density barely below the cutoff of zero *Relative return SPX* is very similar to the estimated density barely above the cutoff of zero, and the difference is not statistically significant (T = -0.069; p = 0.945). Thus, the failure to reject the null hypothesis of the absence of a difference in these densities offers evidence supporting the validity of the RD design (Cattaneo et al., 2019).

Tests of discontinuities for predetermined covariates

If CEOs or firms are unable to precisely influence *Relative return SPX*, the firms just above and just below the cutoff of zero *Relative return SPX* should be similar in relation to all variables not affected by the treatment (Cattaneo et al., 2019). Thus, an important RD falsification test is to examine whether firms with barely positive relative returns are similar to those with barely negative relative returns in terms of observable characteristics. If selection into the treatment is feasible, an imbalance of predetermined covariates would be expected (Ludwig & Miller, 2007).

Table 5 shows the results of discontinuity tests for various predetermined covariates. As before, we estimate the optimal bandwidth for each dependent variable separately and use robust bias-correction methods for valid inference (Calonico et al., 2014b). Panel A of Table 5 shows that the sizes and market values in fiscal year *t*-1 of the firms close to either side of the cutoff are similar and that the RD estimates remain statistically insignificant. Moreover, Column (3) of Panel A shows that the firms are similar in terms of previous firm performance measured as the

logarithmized stock return of each firm in fiscal year t–2, as the RD estimates are close to zero and statistically insignificant.

Panel B of Table 5 shows the results regarding differences in CEO characteristics, i.e., CEO age, CEO tenure, and CEO duality, among firms around the cutoff. Again, all RD estimates are nonsignificant, implying that the CEOs of the firms around the cutoff are similar with respect to these characteristics. Similarly, the results of the discontinuity tests of Panels C and D of Table 5 show that firms around the cutoff are similar in terms of board characteristics and institutional shareholder characteristics. Overall, these tests show that various predetermined firm, CEO, board, and institutional shareholder characteristics are not discontinuous at the cutoff, further supporting the validity of the RD design.

Insert Table 5 about here

Tests of discontinuities at artificial cutoff values

In this section, we conduct a falsification analysis to test whether there are treatment effects at artificial cutoff values where no discontinuities are expected. We follow Imbens and Lemieux (2008) and investigate discontinuities at the median of the subsample of firms with negative relative returns and at the median of the subsample of firms with positive relative returns during the previous year. This ensures that only observations with the same treatment statuses are used for each artificial cutoff analysis (Cattaneo et al., 2019).

Table 6 shows the results of these falsification tests using the estimation methods for the analysis with the real cutoff of zero. All estimates are statistically insignificant, suggesting that the likelihood of forced CEO turnover does not change discontinuously at these artificial cutoffs.

Insert Table 6 about here

Sensitivity to choice of bandwidth, kernel, or polynomial

To further validate our RD design, we test the sensitivity of our baseline model. First, we investigate the sensitivity of the results using different bandwidths. A large bandwidth mechanically leads to a biased estimate, and a small bandwidth mechanically leads to increased confidence intervals due to the large variance of the estimate. Thus, investigating the sensitivity of the results to various bandwidth choices is meaningful only close to the MSE-optimal bandwidth and close to the bandwidth for which the coverage error (CER) of the robust bias-corrected confidence interval is minimized, i.e., the CER-optimal bandwidth. Thus, we explore the sensitivity of the results to the CER-optimal bandwidth, the MSE-optimal bandwidth, twice the CER-optimal bandwidth, and twice the MSE-optimal bandwidth (Calonico et al., 2020; Cattaneo et al., 2019).

Figure 3 presents the bias-corrected RD estimates and robust 90%-level confidence intervals for each bandwidth. The point estimates remain relatively stable between approximately -1.5 and -1.8 percentage points, with p values less than 0.10. Overall, this analysis shows that the negative effect of both a barely positive *Relative return SPX* is robust to different bandwidth choices.

Insert Figure 3 about here

Second, we employ a uniform kernel function in which all observations within the bandwidth are equally weighted (Cattaneo et al., 2019). The results in Column (1) of Table 7 show that the RD estimate remains virtually unaffected by the change in the kernel function. Finally, a local quadratic regression was used instead of a local linear regression. Again, the results in Column (2) of Table 7 show that the RD estimate is insensitive to this alteration. Overall, the RD estimates are

robust to changes in the bandwidth, the kernel function, and the polynomial order, which supports the validity of our findings.

Insert Table 7 about here

CONCLUSION

In this study, we theorize how luck factors inherent in noisy capability cues influence corporate boards' decisions to dismiss the CEO. Consistent with our theory, the empirical results show that CEOs of firms that barely outperformed the S&P 500 index in the previous year are less likely to be dismissed than CEOs of firms that barely underperformed the S&P 500 index, even though this difference in performance is due to luck factors. Moreover, we find that the influence of these luck factors is weaker for experienced boards but stronger for boards facing concentrated institutional shareholders.

Contributions and Implications

This study makes important contributions to the literature on board decision-making more generally and on CEO dismissal in particular. First, taking on an information processing lens, we theorize upon the cognitive processes among directors, which largely remain a black box (van Ees et al., 2009), when confronted with noisy capability cues. Our study explores how the information processing of boards, particularly in CEO evaluation, is impaired by noisy capability cues. Thus, we add to the literature on group information processing by boards of directors (e.g., Boivie et al., 2016; Khanna et al., 2014; Pavićević et al., 2022).

We theorize and provide evidence that the two blades of the scissor (Simon, 1947; Simon, 1990), cognitive capabilities and decision context, are important contingencies. We focus on two specific manifestations that are likely to influence how directors process and act upon noisy

capability cues. Like Zorn, DeGhetto, Ketchen Jr, and Combs (2020), our findings suggest that board experience is beneficial not only for strategic decision-making (Westphal & Fredrickson, 2001) and performance (Kor & Sundaramurthy, 2009) but also for curbing cognitive biases in the board setting. In addition, we add to the literature by examining board group information processing under institutional shareholder pressure. Our findings highlight that the greater the likelihood of dismissing a CEO following capability cues that appear more negative due to luck factors is, the greater the pressure on institutional shareholders. Taken together, our study suggests important contingencies that alter information processing in groups.

The fact that CEOs are dismissed for luck challenges the rational paradigm of board decision-making. While there is considerable literature on biases in CEO decision-making (e.g., Malhotra, Zhu, & Reus, 2015; Pavićević & Keil, 2021; Schumacher, Keck, & Tang, 2020), there is surprisingly little evidence on boards (Graffin et al., 2013). Considering that, on the one hand, the board's reputation is at risk due to heightened scrutiny and, on the other hand, these incidents are consequential, boards should be incentivized and better able to marshal their limited time and cognitive resources to reach an optimal decision (Boivie et al., 2016). However, the findings support the idea that despite scrutiny of market mechanisms and strong economic incentives in these high-stakes decisions, even the most consequential decisions, such as CEO dismissals, are subject to cognitive distortions in information processing. One reason for this bias might persist is that dismissal decisions are relatively rare, limiting the opportunities to learn from biased and potentially wrong dismissal decisions.

The documented main finding is also economically important. CEO turnover and succession itself are key punctuated events with significant financial implications (Boivie et al., 2016). Replacing the CEO and finding a new CEO are challenging and costly. CEO succession is accompanied by potential disruption and instability (Ballinger & Marcel, 2010), and it increases

the uncertainty surrounding a firm and induces a greater level of scrutiny from external observers (Boivie et al., 2016). Furthermore, it poses significant employment risks for CEOs, which may undermine incentive structures and have implications for managerial behavior. Thus, suboptimal dismissal decisions have direct and indirect implications for subsequent firm performance.

More generally, our study speaks to the literature on CEO turnover-performance sensitivity. An extensive body of literature suggests that performance is a key predictor of retaining or dismissing a CEO (see Hilger et al., 2013). Boards often rely on noisy capability cues when evaluating CEO ability because the inherent ability of CEOs is unobservable. However, resorting to such observable but noisy capability cues poses a danger that promotes misattribution when luck factors cannot be perfectly separated from informative cues. If luck factors partly influence the cue, the informative content of the aggregate (noisy) cue decreases. Under these circumstances, it is pivotal to disentangle luck factors from the informative component reflecting CEO ability. Thus, the risk of misattribution increases with luck factors cofounded in the noisy capability cue.

In the extant corporate governance literature, empirical evidence suggests that CEOs are rewarded for luck factors in terms of their compensation (Bertrand & Mullainathan, 2001; Chiu, Oxelheim, Wihlborg, & Zhang, 2016; Daniel et al., 2020; Garvey & Milbourn, 2006). Although this body of evidence is consistent with a board's misattribution of luck to the abilities of a CEO, recent field evidence surveying directors and investors on the objectives, constraints, and determinants of CEO pay suggests that one primary reason that CEOs are paid for luck is fairness considerations (Edmans, Gosling, & Jenter, 2021). Thus, both directors and investors seem to agree that "CEO should benefit from an industry upswing, since investors and stakeholders do" (Edmans et al., 2021: 39–40). Our findings are difficult to reconcile with fairness considerations but rather consistent with the misattribution of luck factors to CEO ability.

Finally, this study contributes to the field of management research by addressing the issue of endogeneity bias. Endogeneity is a key concern in the strategy and management literature (Hamilton & Nickerson, 2003; Semadeni, Withers, & Trevis Certo, 2014; Shaver, 1998). Management research has made much progress over the years, with different critiques and reviews addressing endogeneity in empirical work (e.g., Antonakis, Bendahan, Jacquart, & Lalive, 2010; Bastardoz et al., 2022; Sieweke & Santoni, 2020). However, although the value of innovative identification strategies has been highlighted, regression discontinuity designs still rarely find way into management research (Reinwald et al., 2022)—with some notable exceptions (Flammer, 2015; Flammer & Bansal, 2017; Reinwald et al., 2022; Tian et al., 2023). Drawing from work on behavioral decision research and cognitive psychology (Lefgren et al., 2015; Meier et al., 2022; Meier et al., 2023), our study shows how the broader literature on decision-making can enrich management research with respect to both theory and methods to address endogeneity concerns.

The results of this paper also have important practical implications for firms. First, basing CEO dismissal decisions partly on luck factors that are not under the control of the CEO is costly, as it exposes CEOs to unnecessary risks and may lead to inefficient effort incentives. Second, while board experience mitigates the board's tendency to consider luck factors, institutional shareholders can have adverse effects on decision making if their ownership is concentrated among a few large institutional shareholders. Finally, the existence of outcome bias in corporate boards' CEO dismissal decisions indicates that this phenomenon might be more widespread in organizations than previously anticipated.

Limitations and Directions for Future Research

Nonetheless, our study has several limitations. Our operationalization of noisy capability cues relies on stock returns, and we isolate luck factors using barely positive and barely negative

capability cues. Focusing on the stock market allows us to circumvent, at least to some extent, manipulation concerns associated with accounting-based measures of return (e.g., ROA). CEOs have discretion to manage earnings, making accounting-based cues unsuitable for our empirical approach. Furthermore, stock returns are a particularly salient external performance measure that managers pay attention to (Greve, 1998). Stock returns and stock prices are more frequently referenced in annual reports than operating performance measures such as return on assets (Certo et al., 2022). Nevertheless, there might be other salient but noisy capability cues that boards pay attention to.

In a similar spirit, while we chose the S&P 500 index as the most prominent stock market index, we are not able to observe on what performance metric and benchmark boards actually rely on. This is an inherent limitation of all studies that rely on performance relative to a benchmark or peer performance. However, given that the S&P 500 index is a highly salient index, we are confident that it provides a good proxy for testing our theoretical conjectures. It reduces our discretion in relying on idiosyncratic benchmarks, and stock-based measures (both return and the benchmark) are harder to manipulate than operational measures of performance such as ROA. Thus, we are convinced that the document effect represents a robust lower bound of the true economic effect.

Our identification strategy restricts the analysis to observations near the cutoff. While this approach provides advantages regarding causal inference, i.e., provides high internal validity, the inference is applicable only for observations near the cutoff. Thus, the local nature of RDDs limits generalizability, i.e., external validity. However, since we focus on the cutoff of zero relative returns with respect to the S&P 500 index, this implies that firms close to this cutoff perform like the overall market. Thus, these firms should represent an average firm, and we are confident that we can draw broader conclusions. This is an advantage compared to other studies relying on RDD

frameworks in management research where external validity is a concern due to the treatment and control firms potentially constituting a selected population of firms (Flammer, 2015; Flammer & Bansal, 2017; Reinwald et al., 2022). Finally, while we show that luck factors influence the probability of CEO turnover, we do not examine the consequences of such behavior. We leave this as a fruitful avenue for future research.

TABLES

Table 1: Descriptive Statistics and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 CEO dismissal	0.03	0.17	1													
2 Outperformance SPX	0.57	0.50	-0.09	1												
3 Relative return SPX	0.12	0.61	-0.05	0.48	1											
4 Board seat experience	3.11	1.32	0.03	0.00	-0.02	1										
5 Institutional investor HHI	0.06	0.08	0.03	-0.07	-0.03	-0.05	1									
6 Institutional investor top 5	0.42	0.14	0.03	-0.12	-0.06	-0.12	0.79	1								
7 Firm size	7.81	1.76	0.01	0.02	-0.08	0.36	-0.19	-0.30	1							
8 Firm value	7.66	1.61	-0.02	0.14	0.03	0.44	-0.26	-0.42	0.82	1						
9 CEO age	56.50	7.19	-0.01	0.00	-0.02	-0.04	-0.01	0.01	0.09	0.05	1					
10 CEO tenure	9.31	7.27	-0.05	-0.01	-0.01	-0.16	0.01	0.04	-0.09	-0.07	0.42	1				
11 CEO duality	0.56	0.50	-0.05	0.03	0.00	0.02	-0.07	-0.10	0.18	0.15	0.26	0.26	1			
12 Board size	9.36	2.53	0.01	0.03	-0.04	0.18	-0.12	-0.17	0.61	0.48	0.07	-0.11	0.11	1		
13 Board age	62.31	4.29	-0.04	-0.02	-0.06	0.01	-0.02	0.01	0.14	0.09	0.45	0.20	0.05	0.08	1	
14 Institutional investor percentage	0.75	0.23	-0.01	0.01	-0.02	0.11	-0.47	-0.53	0.03	0.12	-0.05	-0.04	-0.02	-0.10	-0.01	1

Notes: N = 22,349. Summary statistics and pairwise correlations.

Table 2: Main Results

	Dependent Variable: CEO dismissal					
	(1)			(2)		
	Beta	SE	p value	Beta	SE	p value
Outperformance SPX	-0.018	0.007	0.014	-0.015	0.007	0.040
Covariates		No			Yes	
Observations		24,242			22,349	
Eff. Obs. left of cutoff		5,271			4,927	
Eff. Obs. right of cutoff		5,552			5,153	
Bandwidth		0.178			0.176	
Bandwidth for bias estimate		0.343			0.310	

Notes: This table reports the RD results of local linear regressions with triangular kernel weights and MSE-optimal bandwidths. *Outperformance SPX* is equal to one if the relative stock return compared to the S&P 500 is positive and zero otherwise. The RD estimates are bias-corrected following Calonico, Cattaneo, and Titiunik (2014b), with local quadratic regressions and MSE-optimal bandwidths for the bias estimators. The estimate in Model 2 is covariate-adjusted as in Calonico, Cattaneo, Farrell, and Titiunik (2019). The standard errors are heteroskedasticity-robust.

Table 3: High vs. Low Board Seat Experience

	Dependent Variable: CEO dismissal					
	(1)			(2)		
	Below median			Above median		
	Beta	SE	p value	Beta	SE	p value
Outperformance SPX	-0.031	0.011	0.004	0.001	0.011	0.896
Covariates		Yes			Yes	
Observations		11,135			11,214	
Eff. Obs. left of cutoff		2,269			2,345	
Eff. Obs. right of cutoff		2,277			2,523	
Bandwidth		0.163			0.161	
Bandwidth for bias estimate		0.338			0.276	

Notes: This table reports the RD results of local linear regressions with triangular kernel weights and MSE-optimal bandwidths for the subsample with below median *Board seat experience* in Model 1 and the subsample with above median *Board seat experience* in Model 2. *Outperformance SPX* is equal to one if the relative stock return compared to the S&P 500 is positive and zero otherwise. The RD estimates are bias-corrected following Calonico, Cattaneo, and Titiunik (2014b), with local quadratic regressions and MSE-optimal bandwidths for the bias estimators. All estimates are covariate-adjusted as in Calonico, Cattaneo, Farrell, and Titiunik (2019). The standard errors are heteroskedasticity-robust.

Table 4: High vs. Low Shareholder Pressure

	Dependent Variable: CEO dismissal											
	Institutional investor HHI						Institutional investor top 5					
	(1)			(2)			(3)			(4)		
	Below median			Above median			Below median			Above median		
	Beta	SE	p value	Beta	SE	p value	Beta	SE	p value	Beta	SE	p value
Outperformance SPX	0.000	0.010	0.995	-0.033	0.011	0.003	-0.002	0.010	0.829	-0.029	0.011	0.006
Covariates	Yes			Yes			Yes			Yes		
Observations	11,174			11,175			11,175			11,174		
Eff. Obs. left of cutoff	2,294			2,509			2,370			2,556		
Eff. Obs. right of cutoff	2,587			2,381			2,668			2,462		
Bandwidth	0.158			0.183			0.167			0.186		
Bandwidth for bias estimate	0.269			0.325			0.278			0.320		

Notes: This table reports the RD results of local linear regressions with triangular kernel weights and MSE-optimal bandwidths for the subsample with below median *Average board seat experience* (*Institutional investor top 5*) in Model 1 (Model 3) and the subsample with above median *Board seat experience* (*Institutional investor top 5*) in Model 2 (Model 4). *Outperformance SPX* is equal to one if the relative stock return compared to the S&P 500 is positive and zero otherwise. The RD estimates are bias-corrected following Calonico et al. (2014), with local quadratic regressions and MSE-optimal bandwidths for the bias estimators. All estimates are covariate-adjusted as in Calonico, Cattaneo, Farrell, and Titiunik (2019). The standard errors are heteroskedasticity-robust.

Table 5: Tests of Discontinuities for Predetermined Covariates

Panel A: Firm Characteristics									
Dependent Variable:	Firm size			Firm value			Stock return$_{t-2}$		
	(1)			(2)			(3)		
	Beta	SE	p value	Beta	SE	p value	Beta	SE	p value
Outperformance SPX	0.004	0.080	0.964	0.030	0.075	0.688	0.002	0.015	0.892
Panel B: CEO Characteristics									
Dependent Variable:	CEO age			CEO tenure			CEO duality		
	(1)			(2)			(3)		
	Beta	SE	p value	Beta	SE	p value	Beta	SE	p value
Outperformance SPX	-0.006	0.286	0.983	0.387	0.305	0.204	0.014	0.022	0.526
Panel C: Board Characteristics									
Dependent Variable:	Board size			Board age			Board seat experience		
	(1)			(2)			(3)		
	Beta	SE	p value	Beta	SE	p value	Beta	SE	p value
Outperformance SPX	0.079	0.116	0.497	-0.095	0.191	0.617	-0.072	0.060	0.226
Panel D: Institutional Shareholders									
Dependent Variable:	Institutional investor percentage			Institutional investor HHI			Institutional investor top 5		
	(1)			(2)			(3)		
	Beta	SE	p value	Beta	SE	p value	Beta	SE	p value
Outperformance SPX	-0.011	0.012	0.307	0.000	0.003	0.937	-0.004	0.006	0.497

Notes: This table reports the RD results of local linear regressions with triangular kernel weights and MSE-optimal bandwidths. *Outperformance SPX* is equal to one if the relative stock return compared to the S&P 500 is positive and zero otherwise. The RD estimates are bias-corrected following Calonico et al. (2014), with local quadratic regressions and MSE-optimal bandwidths for the bias estimators. All models are estimated without covariates and the number of observations varies between 22,914 and 24,242. The standard errors are heteroskedasticity-robust. In all models, *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 6: Tests of Discontinuities at Artificial Cutoff Values

	Dependent Variable: CEO dismissal					
	(1)			(2)		
	Beta	SE	p value	Beta	SE	p value
RD estimate c(Relative return SPX = -0.17)	0.023	0.023	0.305			
RD estimate c(Relative return SPX = 0.23)				0.004	0.015	0.781
Covariates		No			No	
Observations		24,242			24,242	
Eff. Obs. left of cutoff		1,059			1,499	
Eff. Obs. right of cutoff		1,338			1,308	
Bandwidth		0.051			0.061	
Bandwidth for bias estimate		0.078			0.093	

Notes: This table reports the RD results of local linear regressions with triangular kernel weights and MSE-optimal bandwidths. The RD estimates are bias-corrected following Calonico et al. (2014), with local quadratic regressions and MSE-optimal bandwidths for the bias estimators. Column (1) only includes observations below the real cutoff of zero. Column (2) only includes observations above the real cutoff of 0. The artificial cutoffs are equal to the medians of the two subsamples and all models are estimated without covariates. The standard errors are heteroskedasticity-robust. In all models, *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

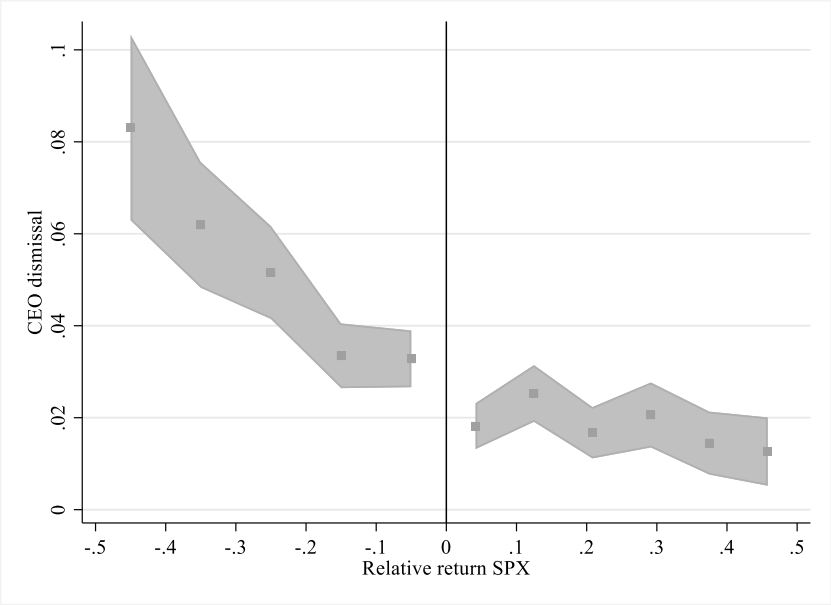
Table 7: Sensitivity to Choice of Kernel and Polynomial Order

	Dependent Variable: CEO dismissal					
	(1)			(2)		
	Beta	SE	p value	Beta	SE	p value
Outperformance SPX	-0.018	0.007	0.013	-0.021	0.009	0.016
Kernel		Uniform			Triangular	
Polynomial order		1			2	
Covariates		No			No	
Observations		24,242			24,242	
Eff. Obs. left of cutoff		4,495			6,664	
Eff. Obs. right of cutoff		4,741			7,208	
Bandwidth		0.148			0.247	
Bandwidth for bias estimate		0.292			0.378	

Notes: This table reports the RD results of local linear regressions with triangular kernel weights and MSE-optimal bandwidths. Column (1) is estimated using a uniform kernel. Column (2) is estimated using a second order polynomial. All models are estimated without covariates and the standard errors are heteroskedasticity-robust. In all models, *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

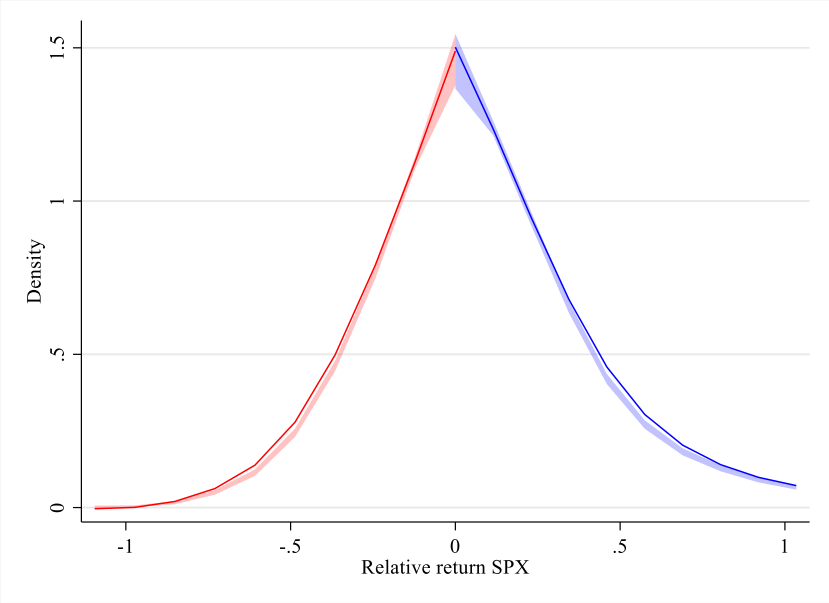
FIGURES

Figure 1: RD Plot



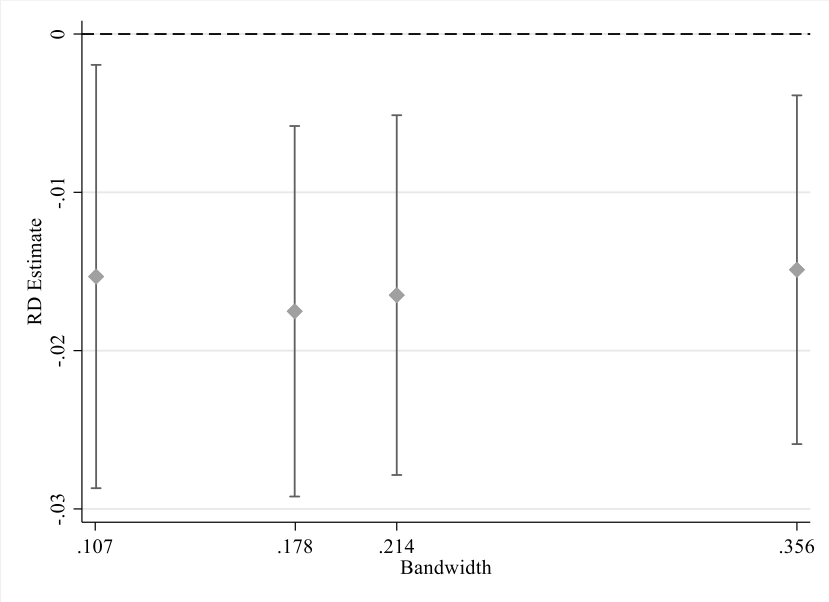
Notes: Notes: The figure shows the regression discontinuity plot within the window of -0.5 to +0.5 of *Relative return SPX*. Local sample means of the dependent variable (*CEO dismissal*) are plotted in evenly spaces bins. The number of bins is chosen using the using the integrated mean squared error (IMSE)-optimal approach. The shaded areas represent 95% confidence bands.

Figure 2: Manipulation Test



Notes: The figure shows the estimated density of *Relative return SPX* around the cutoff of zero.

Figure 3: Sensitivity to Bandwidth Choice



Notes: The figure shows the sensitivity to bandwidth selection of bias-corrected RD estimates with 90%-level confidence intervals for each bandwidth without the covariates. The choice of bandwidths is data-driven, using the bandwidth for which the coverage error (CER) of the robust bias-corrected confidence interval is minimized (0.107), the MSE-optimal bandwidth (0.178), twice the CER-optimal bandwidth (0.214), and twice the MSE-optimal bandwidth (0.356) (Cattaneo et al., 2019).

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