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Who Shall Succeed? An Examination of Manager Overconfidence and CEO Selection

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Abstract By categorizing managerial confidence attributes into overconfidence, rational, and diffidence with the methodology used in the finance literature, we investigate how company boards strategically select CEO replacements from the senior management pool with different confidence attributes. In normal retirements, company boards tend to select the succeeding managers of the same confidence attribute as the retiring CEOs. If the boards fire company CEOs, they tend to select rational successors irrespective of the confidence attributes of the ousted CEOs. Such board inclination of picking rational successors also occurs when corporate operation is at the recession stage or corporate strategy is changed surrounding succession. The evidence indicates that managerial confidence attribute is an important consideration of the board in the CEO selection process and the board deliberately selects the CEO with a certain attribute to move the firm in a planned direction.

Keywords: Overconfidence, CEO selection, Corporate strategy, Operation status

JEL classifications: G3, G34, G39

Introduction

The effects of managerial personal traits on corporate operation have recently attracted the attention of financial scholars. Of particular interest is the fact that a significant proportion of chief executive officers (CEOs) in modern firms are characterized as overconfident. On a positive note, overconfident CEOs are found to be suitable to undertake innovative projects that are challenging and risky (Hirshleifer et al., 2012; Galasso and Simcoe, 2011). However, overconfident CEOs often distort corporate decisions (e.g., Ahmed and Duellman, 2013; Schrand and Zechman, 2012; Malmendier and Tate, 2008, 2005). These behavioral distortions ultimately lead to a failed corporate operation (Artinger and Powell, 2016; Hmieleski and Baron, 2009). Given these findings, a natural question to ask is the following: How are such managers promoted to the CEO positions despite their overconfidence attribute?¹

CEOs play a central role in designing strategic direction, setting financial policy, conducting mergers and acquisitions and other investment activities. Given the importance of the position, selecting a qualified CEO for a firm is one of the board's most crucial jobs. Despite its importance, CEO succession as a process has received minimal explicit attention in the finance literature—although a large number of studies explore CEO replacements (e.g., Jenter and Kanaan, 2015; Kini et al., 2004; Franks et al., 2001; Denis et al., 1997; Warner et al., 1988), most of them focus on the departure of predecessor CEOs, whereas few examine the selection of succeeding CEOs. It is unknown, therefore, what lurks in the waters of a departing CEO's wake. To partially fill this gap of knowledge, this study explores how a CEO is selected from a senior

¹Theorists argue that entrepreneurs have higher overconfidence/optimism than nonentrepreneurs (e.g., Lowe and Ziedonis, 2006). To some extent, this argument can explain the extensive CEO overconfidence in founder-managed firms. However, it cannot explain the overconfidence that widely exists in firms managed by professional CEOs, although founder CEOs are found to be more overconfident than professional CEOs (Lee et al., 2017).

management pool with different confidence attributes including overconfidence, rational and diffidence. Specifically, we attempt to understand whether manager personality is a significant factor that affects the promotion of managers in modern firms.

We examine the selection of succeeding CEOs in different contexts. First, conditional on the nature of the predecessor CEOs' departures, we compare the confidence distribution in succeeding CEOs with that in the pool of senior managers from which CEOs are chosen. We find that when CEOs with biased attributes—either overconfident or diffident—retire normally, senior managers who have the same type of confidence attribute as the predecessor CEOs have a better chance of being promoted to the succeeding CEOs than other managers, thereby resulting in an attribute continuity pattern between the predecessors and the successors. The chance of promotion for such managers, however, is significantly reduced in firms in which the predecessor CEOs are fired; accordingly, successors in firms with forced departures are typically rational regardless of the attributes of the ousted CEOs. Therefore, based on their confidence attributes, senior managers are promoted differently between predecessor CEOs' normal retirements and forced departures. We interpret our results as indicating that manager personal attribute is an important factor assessed by the board in CEO selection.

Besides the nature of the predecessors' departures, we distinguish the recruitment origin of the successors. Extant studies show that CEOs prefer to hire like-minded subordinates (e.g., Davidson et al., 2015). In line with them, we find that successors who are internally promoted are more likely to have the same type of attribute as the predecessors relative to successors who are externally recruited. The evidence indicates that there is a higher level of homogeneity among the top management team within a firm than on the whole managerial labor market.

We then explore the successor selection within the context of a change in corporate strategy. One might expect that the CEO selection in a firm depends on its strategic need to adapt to environmental change, such as industry shock or macroeconomic setback (e.g., Finkelstein et al., 2009). Constructing various empirical measures for strategic change initiated surrounding succession, we find that the priority of promotion for managers who have the same type of attribute as the predecessor CEOs is weakened in firms in which corporate strategy is changed after CEO transition, confirming that strategic change has a significant effect on successor selection.

To control for endogeneity and reverse causality, we further check the board's intention to initiate strategic change and its impact on CEO attribute transition from the perspective of operation status in the years before CEO change. Since operational recession likely brings the need to initiate strategic change, we expect that the board would *deliberately* select a successor who has a different attribute from the predecessor to implement corporate reform at the recession stage. Our results do provide confirming evidence. We find that the priority of promotion for managers sharing the same type of attribute with the predecessor CEOs is less pronounced in operational recessions than in operational booms. Such evidence suggests that the process of succession is calculated by the board according to its operation status and strategic plan. Importantly, the board can discern the attribute biases of succession candidates and is able to select the CEO with a certain attribute to move the firm in a certain direction.

We further extend the analysis to internal governance. Managers who have the same type of attribute as the predecessor CEOs are more likely to get promoted if the predecessor CEOs are more powerful in the firms. By contrast, such priority of promotion is significantly reduced if the

board governance is strong. The evidence indicates that a strong board has a better control over the process of CEO succession.

This study contributes to the financial literature in several ways. First, this study complements the strand of studies on CEO change. The cycle of CEO promotion, departure, and succession is an integral, dynamic process. Prior studies mostly address the economic feature of CEO change by investigating the (forced) departure of predecessor CEOs (e.g., Jenter and Kanaan, 2015; Kini et al., 2004; Franks et al., 2001; Warner et al., 1988). This study reveals the diverse features of CEO transition from the perspective of successor selection. The evidence suggests that CEO change is not just an economic event in a firm, but a reflection of the underlying governance structure and directional change in a firm under the control of the board.

Second, this study conducts a pioneering investigation on the role of managerial personal traits in CEO selection. A growing body of research shows that manager-specific attributes and preferences have nonnegligible impacts on corporate decisions (e.g., Cain and Mckee, 2016; Graham et al., 2013; Bamber et al., 2010; Bertrand and Schoar, 2003). The evidence leads the researchers to ask if manager personality is essential to developing a complete model of CEO succession (e.g., Berns and Klarner, 2017). This study provides first evidence that manager confidence attribute is an important factor assessed by the board during the CEO selection process.² Importantly, the board has a certain ability to identify manager attributes with

² Admittedly, confidence level is just one dimension of manager personality. We do not suggest that it is the only or most important manager characteristic assessed by the board in CEO selection. Other characteristics such as resoluteness, empathy, communication and listening skills and team-related skills, etc., could have also been assessed by the board. For instance, with a set of interview data on a large array of personality characteristics, Kaplan et al. (2012) show that firms value certain psychological characteristics or preferences of the CEO. Kaplan and Sorensen (2020) find that executives with greater interpersonal skills are more likely to be hired. Cornelli et al. (2013) document that boards collect both “hard” (i.e., verifiable) and “soft” (i.e., nonverifiable) information about CEOs’ competence when making replacement decisions. Balsam and Kwack (2022) find that the likelihood of promotion increases for subordinate managers if they have connections with the CEO established outside the firm.

probabilistic accuracy and to select the CEO with a certain attribute to move the firm in a planned direction. Our evidence has one key implication for CEO overconfidence—the decision distortions associated with overconfidence, if needed, can be forestalled by establishing an effective CEO selection mechanism through which overconfident managers can be screened out in the promotion tournament.

Third, this study adds to the stream of literature that explores the function of management leadership in the evolution of modern corporations (e.g., Lam et al., 2018; Bloom and Van Reenen, 2007; Hambrick and Mason, 1984). Manager attribute constitutes part of the corporate culture (Zingales, 2015) and a firm’s culture is more likely to be created and inherited through the selection of subordinates and a successor who have similar attributes as the CEO.³ Of particular note, the priority of promotion for overconfident managers in firms in which predecessor CEOs with that attribute retire normally suggests that overconfidence is *not* perceived as problematic by the boards in these firms, thereby providing a perspective for understanding why CEO overconfidence persistently, widely exists in modern firms.⁴

The remainder of the paper is structured as follows. We review the related literature and develop our hypotheses in Section 1. Section 2 defines key variables and explains the sample formation process. Section 3 presents the main results about the relationship between manager confidence attribute and CEO selection. Further results on attribute-related CEO selection are provided in Section 4. Section 5 discusses the findings and concludes the study.

1. Literature Review and Hypothesis Development

³ For example, Warren Buffett, the world-known value investor, deliberately grooms like-minded investors Ajit Jain and Greg Abel to succeed him and extend the culture of value investment in Berkshire Hathaway Inc.

⁴ This perspective is somewhat in the spirit of Hirshleifer et al. (2012) and Galasso and Simcoe (2011) which shows a positive role of manager overconfidence in innovation.

The literature shows that a substantial portion of CEOs in modern firms are characterized as overconfident and overconfident CEOs often distort corporate decisions (e.g., Hribar and Yang, 2016; Artinger and Powell, 2016; Chen et al., 2015; Schrand and Zechman, 2012; Malmendier and Tate, 2008, 2005). Despite the behavioral distortions, overconfident CEOs typically believe that their decisions can maximize shareholders' welfare. This is fundamentally different from the typical agency problem in which CEOs *intentionally* maximize their own interests at the expense of shareholders' interests. As it is hard to moderate decision distortions caused by overconfidence through standard external monitoring, understanding how overconfident CEOs are selected by the boards is helpful to explore any underlying mechanism that is likely to constrain them.

Few studies examine the role of manager overconfidence in CEO succession. Specifically, Goel and Thakor (2008) model CEO selection as a promotion tournament game among managers with different confidence attributes. In the game, an overconfident manager often underestimates the risk and *inadvertently* realizes the highest payoff. Consequently, under a value-maximizing governance structure, an overconfident manager is more likely to be promoted than a rational manager if the board does not realize the problem of overconfidence. In Goel-Thakor model, the predecessor CEO is assumed to leave the firm for retirement and her attribute is assumed to be rational. As the model does not discern the nature of the predecessor CEO's departure, it is not clear how the CEO selection process will evolve if the board realizes that its initial CEO hiring decision was imperfect and subsequently fires the promoted overconfident CEO.⁵ It is also

⁵ The Goel-Thakor model, however, does predict that the promoted, overconfident CEO will be fired if the board knows about the overconfidence problem. In keeping with the model prediction, Campbell et al. (2011) show that overconfident CEOs are more likely to be fired than rational ones.

unknown whether the selection of succeeding CEOs will be different if predecessor CEOs have a biased attribute rather than rational.

Choi et al. (2013) observe that overconfident CEOs are disproportionately followed by overconfident successors. By contrast, Campbell (2014) shows that the confidence level of successors decreases relative to that of predecessors. Based on their evidence, it is not clear the link in confidence attributes between the predecessor CEOs and their successors. Additionally, both studies do not check the confidence distribution in senior managers. It is unknown how CEOs are selected from among management pool with different confidence attributes.⁶

Moreover, it is argued that corporate strategy change represents a significant context of CEO succession (e.g., Finkelstein et al., 2009; Goodstein and Boeker, 1991). None of the abovementioned studies address the change in corporate strategy during the process of CEO replacement, however. It is unknown whether the process of CEO succession is calculated by the board according to its operation trend and strategic plan.

This study seeks to address these issues when exploring how a CEO is selected from among senior manager pool with different confidence attributes. We conduct the examination in different contexts, including the nature of predecessor CEO's departure, recruitment origin of succeeding CEOs, and change in corporate strategy, etc.

1.1. The nature of predecessor CEO's departure

The cycle of CEO promotion, departure, and succession is an integral, dynamic process, and all CEO selections are essentially triggered by an incumbent CEO leaving the office. Studies show that firm performance is essentially different between a CEO's normal retirement and a

⁶ For example, if all the succession candidates in a firm are overconfident, the successor must also be overconfident. In such a case, based only on the attribute of the successor, it is hard to determine whether an overconfident manager has a better chance to be appointed as succeeding CEO than other managers.

CEO's forced departure. Specifically, a firm's performance is often as good as its industry peers in normal CEO retirements but is typically worse than the peers in forced departures (e.g., Fee and Hadlock, 2004; Kini et al., 2004; Warner et al., 1988).

When a firm performs well, the retiring CEO can exert a strong influence over successor selection (Zajac and Westphal, 1996; Friedman and Olk, 1995). It is found that when the retiring CEO becomes a significant player in choosing the new CEO, she often chooses a successor in her own image: a successor who has the same mindset and the same vision as the CEO is more likely to follow the departing CEO's path (Zajac and Westphal, 1996; Sonnenfeld, 1988). Moreover, since a retiring CEO typically has a longer tenure inside her company than a fired one, she may be able to better groom a management team with similar attributes as her potential successors. From the perspective of the board, because the retiring CEO has performed well, the board may have no chance to fully learn about the problem of her attribute, e.g., overconfidence. Alternatively, even though the board realizes that the retiring CEO is overconfident, it may attribute the firm's satisfactory performance to managerial overconfidence. After all, CEO overconfidence is not without a positive effect on corporate operation (e.g., Hirshleifer et al., 2012; Galasso and Simcoe, 2011). Under either circumstance, the board may tend to side with the departing CEO on the selection of her successor. Consequently, a subordinate who has the same type of attribute as the retiring CEO is more likely to be selected as the successor, resulting in a pattern of attribute continuity between the departing and the succeeding CEOs in normal retirements.⁷

⁷ We use the terms departing CEO and predecessor CEO interchangeably in this study.

H1a: When overconfident and diffident CEOs retire, a subordinate who has the same type of confidence attribute as the departing CEO is more likely to be selected as the successor than other subordinates.

H1b: Predecessors and successors tend to share the same type of confidence attribute in normal CEO retirements.

A fired CEO may also groom a management team with similar attributes as her potential successors. However, because she is being ousted, she is not the central figure dominating decision-making in successor selection. Although she may have some input into the decision, her preference is outweighed by others, usually the board of directors (Friedman and Olk, 1995). Studies show that the board typically has its own preference about the selection of the successor, which is different from that of the fired CEO (Zajac and Westphal, 1996). Additionally, because forced CEO departures usually occur abruptly, which indicates a sense of urgency driving the event, a successor who has a different behavioral pattern than the ousted CEO is more likely to be appreciated by the market (Shen and Cannella, 2002a). More specifically, Goel and Thakor (2008) model that “rational” is the optimal confidence attribute for a CEO, while overconfident and diffident CEOs are fired by the board due to decision distortions. This has been confirmed by Campbell et al. (2011). After firing an overconfident/diffident CEO, it is natural that the board will be cautious and avoid employing a successor with the same type of attribute. Consequently, CEO succession will exhibit a pattern of attribute convergence between the predecessors and the successors, and the succeeding CEO will concentrate on the rational attribute in forced CEO departures.

H2: When overconfident and diffident CEOs are fired, the succeeding CEOs tend to be rational.

1.2. The recruitment origin of succeeding CEOs

To some extent, the board's selection of the succeeding CEO is constrained by the supply of senior managers within a firm. On the one hand, given that it is easier for a CEO to persuade subordinates to follow her when they share the same views, a CEO prefers to hire like-minded subordinates. For example, Davidson et al. (2015) find that a frugal CEO is more likely to appoint a frugal CFO. On the other hand, from the subordinates' standpoint, they may prefer to work with a like-minded CEO as they are more likely to be appreciated and promoted. As Useem and Karabel (1986, p.198) observe, "...the already powerful promote people most similar to themselves". Therefore, consciously or subconsciously, a predecessor CEO may cultivate certain confidence attributes among her management team.

Given the similarity of attributes within a company, when a successor is selected internally, the succeeding CEO is likely to have the same confidence attribute as the departing CEO. Moreover, in a firm in which a predecessor CEO has a suboptimal attribute (e.g., overconfidence), it is likely that there are not enough qualified, rational managers from which the board can choose. As a result, the board's plan to select a rational successor will be weakened when succession is implemented through an internal promotion. To correct the decision distortions caused by the predecessor, the board may have to recruit a rational succeeding CEO from outside. This is similar to Parrino (1997), who explores the homogeneity of a firm's industry and argues that whether a CEO will be replaced through outside succession depends on availability.

H3: Relative to successors who are externally recruited, successors who are internally promoted are less likely to have the rational attribute but are more likely to have the same type of attribute as the predecessors.

1.3. Change in corporate strategy

Researchers in strategic management believe that CEO succession provides an occasion for the board to realign corporation leadership with contextual conditions (e.g., Finkelstein et al., 2009; Goodstein and Boeker, 1991). Therefore, succession is more effective if the new CEO is matched to a firm's strategic need. In corporate finance, Graham et al. (2013) provide evidence that more confident and risk-tolerant CEOs are more likely to cluster in high-growth companies, implying the matching of CEO attributes with those of the firm. Fee et al. (2013) propose that the board deliberately chooses new CEOs with certain styles to move the firm in a certain direction and anticipate such effects, suggesting that CEO succession is optimally managed by the board. Lin et al. (2020) find that CEO turnovers in bankrupt firms are positively related to the likelihood of reemerging from bankruptcy. There is also a significant increase in management quality following CEO turnovers.

Building on these studies, if a firm aims to keep its current strategy consistent surrounding CEO succession, the board is likely to choose a successor who has the same type of confidence attribute as the departing CEO, since a successor who has the same mindset as the CEO is more likely to follow the departing CEO's path (Zajac and Westphal, 1996; Sonnenfeld, 1988). In contrast, if a firm aims to change its current strategy, a successor with a different attribute from the departing CEO is likely to be selected. Therefore, the priority of promotion for senior

managers who have the same type of attribute as the departing CEO would be strengthened in firms in which corporate strategy is persistent, whereas it would be weakened in firms in which strategy is changed surrounding CEO succession.

H4: Predecessors and successors are more likely to share the same type of confidence attribute in firms with persistent strategy than in firms with strategic change.

2. The Sample

2.1. Defining confidence attributes

Overconfidence has different definitions and different measurements. Malmendier and Tate (2005) define a CEO as overconfident if she holds onto her options even when they are deep in the money (i.e., more than 67% moneyness). This measure of overconfidence builds on Hall and Murphy's (2002) theory, in which the portfolios of risk-averse managers are not diversified, and such managers therefore should exercise their options early if they are sufficiently in the money. This measure is also adopted by Hirshleifer et al. (2012) to investigate the impact of manager overconfidence on firm innovation activity. Campbell et al. (2011) take a similar approach, although they use the term "optimism." Specifically, they set the deep-in-the-money cutoff for "high optimism" at or above 100% of the option exercise price and the cutoff for "low optimism" at or below 30% of the option exercise price.

In this study, we follow Campbell et al. (2011) to estimate CEO option moneyness and use the authors' cutoffs to define overconfident and diffident CEOs.⁸ Rational CEOs are those who

⁸ Relative to an overconfident CEO, a diffident CEO may be less optimistic about the company's future, and thus, selects to exercise stock options earlier with a lower moneyness. Alternatively, or in

are classified as neither overconfident nor diffident. We also follow them to require an executive to exhibit the relevant option holding/exercise behavior at least twice during the sample period to be classified as overconfident/diffident. We define the attributes for all CEOs as beginning from when a CEO position is acquired.

We also define and classify key non-CEO senior managers similarly to determine how succeeding CEOs are selected from among them. Non-CEO senior managers include those whose total compensation is among the top five in the company in the year immediately preceding the change in CEO, as reported by the ExecuComp dataset. These executives typically hold key positions in the firm, such as chief operating officer (COO), chief financial officer (CFO), president, vice-president, or CEOs for important subdivisions. Normally, the new CEO is selected from among these senior managers. We define the attributes for key non-CEO managers as beginning from when a manager is hired and ending in the year before CEO change.

2.2. Defining corporate strategic change

It is notoriously difficult to define the strategic change in a firm, although it represents a significant context of CEO succession (e.g., Finkelstein et al., 2009; Goodstein and Boeker, 1991). Theoretically, corporate strategy is the direction an organization takes with the objective of achieving business success in the long term. Miles and Snow's (1978) classical typology of strategy classify firms into four basic managerial strategies; prospecting (innovative and

combination, a diffident CEO may be less aggressive (i.e., conservative) in decision making, although she is optimistic about the company's future. As such, she may also exercise options with a low moneyness. To some extent, this is similar to the "quiet life hypothesis" on managerial behavior mentioned in Bertrand and Mullainathan (2003). Their study is not an "attribute" story but a governance story, i.e., weak corporate governance makes managers to prefer a quiet life so as to avoid taking risky projects. Similarly, in the mergers and acquisitions setting, Jenter and Lewellen (2015) document that target CEOs' retirement preferences affect the outcomes of takeovers. A CEO close to age 65 is more likely to sell her company to live a quiet life.

exploratory), defending (narrow and focused), analyzing (a mix of prospecting and defending), and reacting (waiting for environmental cues). Strategies work best, they argue, when they are aligned with corporate structure and the environment. Strategic change is reflected in the choices of product/market domains or competitive advantages through which firms define their relationship to the environment (Bourgeois, 1980).

Empirically, to measure a corporation's strategic change, researchers have focused on corporate restructuring, strategic diversification, or refocusing involving sell-offs or divestitures, which causes a series of changes in corporate asset, research and development expenditure, operation expenses, financial status and capital structure (e.g., Safieddine and Titman, 1999; Berger and Ofek, 1996; John and Ofek, 1995; Hoskisson and Johnson, 1992).

Building on these studies, we construct five proxies for strategic change. These proxies measure the change of a corporation's strategy from diverse perspectives.

(1) Strategy Change¹. This proxy is to measure the extent of strategic change initiated surrounding CEO succession. It is constructed from four dimensions: (1) plant and equipment newness (net P&E/gross P&E), (2) research and development intensity (R&D/sales), (3) financial leverage (debt/equity), and (4) nonproduction overhead (selling, general, and administrative expenses/sales). We calculate the extent of strategic change initiated surrounding CEO succession in the following way: *First*, the percentage change is calculated for each strategic dimension for each sample firm from one year before the CEO turnover to three years after the turnover. Firm-years with missing information required are treated as having zero value. *Second*, for each strategic dimension, if the absolute value of percentage change is larger than the median absolute value of industry peers, then it is coded as one and zero otherwise. Industries are classified at the two-digit Standard Industrial Classification (SIC) codes. *Third*, the extent of

strategic change for each sample firm is obtained as the sum of coding for the four dimensions. A larger value means a larger extent of strategic change initiated.

(2) Strategy Change₂. This proxy is to measure the change of the strategic type (i.e., strategy differentiation) for a corporation in its industry, according to Miles and Snow's (1978) typology of strategy. Strategy differentiation is based on two distinct perspectives: (1) market-product domain, and (2) choice of technical systems (leadership or not). We define the change of strategic type in the following way: *First*, for each year, firms in an industry are divided into four groups based on the ratio of a firm's sale to the total sales of the industry peers. Similarly, firms are also divided into four groups based on the ratio of a firm's research and development (R&D) expense to the total R&D expense of the industry peers. Firm-years with missing information required are treated as having zero value. Industries are classified at the two-digit SIC codes. *Second*, a firm is classified as *prospecting* if both ratios are at the fourth quartile (the highest 25%) in an observation year, as *reacting* if both ratios are at the first quartile (the lowest 25%), and as *defending/analyzing* if it is classified as neither prospecting nor reacting. *Third*, a firm is classified as strategic change (persistence) if its strategic type in the year before CEO turnover is different (same) with that in the third year after turnover.

(3) Strategy Change₃. This proxy is to measure the takeover activities conducted by a firm following the CEO succession. Specifically, it is constructed as a dummy variable that equals one if the sum of transaction values of acquisitions/divestitures for a firm in the three years following the CEO turnover is larger than 20% of the firm's equity in the year before turnover and zero otherwise.⁹

⁹ The cutoff of 20% here is similar to the equity method in accounting for recording investments in associated companies or entities. The equity method is applied when a firm's ownership interest in another firm is valued at 20-50% of the stock in the investee. Specifically, the median percentage of transaction value in our sample is 35% for the group of firms with strategic change defined in this way.

(4) Strategy Change⁴. This proxy is to measure any change or plan to change in a firm's strategy following the CEO turnover. By reading firms' annual reports, conference calls, and press reports in the three years following the CEO turnovers, we classify a firm as strategic change if the firm mentions any change in operation plan from the perspective of consumer product development, cost reduction, international deployment, or undertaking acquisitions or divestitures.¹⁰ A firm is classified as strategic persistence if it is not classified as strategic change.

(5) Strategy Change⁵. This proxy is to measure a board's *intention* to initiate strategic change in a firm. Studies suggest that there is a strong need to initiate strategic change when a firm falls into an operational crisis such as industry shock or macroeconomic setback and the boards intentionally select managers with different attributes to implement corporate reform (Eisfeldt and Kuhnen, 2013; Helmich and Brown, 1972). Building on these studies, we classify a firm as in an operational boom (recession) stage if the average industry cash flow level in the three years preceding the CEO turnover is above (below) the average in the preceding ten years, where cash flow level is obtained as operating cash flow divided by total assets. Therefore, firms are divided into the group with strategic change if they are in an operational recession stage and the group without strategic change if they are in an operational boom stage.

2.3. The sample

We collect data on manager confidence attributes from ExecuComp. We require that an observation does not miss option data on the departing and succeeding CEOs. We also use ExecuComp to identify the year in which a CEO changes. Specifically, we distinguish between

¹⁰ In Appendix B, we report a case of strategic change classified in this approach.

predecessor CEOs' normal retirements and forced departures.¹¹ Following Campbell et al. (2011), CEO departures are classified as forced if all the following conditions are met: (1) the departing CEO is under the age of 60 when she leaves the firm, (2) the departing CEO does not leave the firm because of death or health problems, and (3) the departing CEO does not serve on the board of the firm after leaving the CEO position. CEO departures are classified as retirements if all the following conditions are met: (1) the departing CEO is above the age of 60 when she leaves the firm, (2) the succeeding CEO is not above the age of 60 when she is appointed CEO, and (3) the turnover is not classified as "DECEASED" or "RESIGNED" by the ExecuComp dataset.

The acquisition data come from the Securities Data Company's (SDC) U.S. Mergers and Acquisitions Database. Data on firm attributes are collected from Compustat and stock data from CRSP. Data on the CEO/manager and director characteristics are mainly collected from ExecuComp and BoardEx. We try to ensure that our observations do not miss any data necessary to conduct this study. For observations that are not included in the datasets used in this study, the data needed are collected manually from the proxy statements and the 10-K forms on EDGAR.

Finally, we obtain a sample of 21,081 total CEO-firm-year observations across 4,596 CEO-firms over the period from 1992 to 2012, which includes 1,063 CEO turnovers.¹²

¹¹ In the turnover literature, it is difficult to cleanly identify voluntary turnovers. Furthermore, a serious endogeneity problem could be involved because a CEO may appear to leave "voluntarily" when she feels she does not fit the "attribute culture" of the company in which she works. Thus, it is difficult to infer whether the board endorses or does not endorse the confidence attribute of a CEO who leaves voluntarily. Considering these issues, we do not look at voluntary departures in this study.

¹² Guay (1999) documents that most of newly issued options have a ten-year duration. For previously granted options, Core and Guay (2002) show that the median portfolio time-to-maturity is 7.23 years. Our classification of manager confidence level is based on the average moneyness of exercisable stock options granted in previous years. Our calculation of the value for previously granted options is the same with Core and Guay (2002). Given these, we set the end of our sample period in 2012 to leave enough time for CEOs/managers to hold/exercise their previously granted options, from which their attribute can be inferred.

(Insert Table 1 here)

Table 1 presents the attribute distribution of the CEOs in the sample. In Panel A, for all 4,596 CEOs in the full sample, 35.2% are classified as overconfident, 59.3% as rational, and 5.4% as diffident.¹³ Taking this as the benchmark for the attribute distribution of CEOs in the CEO labor market, we see that of the 1,063 departing CEOs, 38.5% are overconfident, 56.2% are rational, and 5.4% are diffident. The overconfident percentage of departing CEOs is significantly larger than that in the full sample ($t=1.98$). This is consistent with Goel and Thakor's (2008) prediction that excessively overconfident CEOs are more likely to be fired.

The overconfident percentage drops significantly from 38.5% in departing CEOs to 31.9% in succeeding CEOs ($t=3.19$). Meanwhile, the rational percentage increases significantly from 56.2% in departing CEOs to 60.7% in succeeding CEOs ($t=-2.11$). This evidence suggests that the board of directors brings in more rational CEOs to replace overconfident CEOs.

Panel B of Table 1 reports the characteristics of CEO successions. Of the 1,063 CEO turnovers, 356 ones are forced departures while 707 normal retirements. Most of the replacements come from internal promotion. However, the replacements differ greatly across the nature of the incumbent CEO's departure. As shown in Panel C, in the retirement sample, 630 out of 707 (89.1%) succeeding CEOs are selected through internal promotions, but in the forced turnover sample, only 258 of 356 (72.5%) are promoted internally. These results indicate that firms are more likely to select CEOs internally when incumbent CEOs retire but are more likely

¹³ The attribute distribution in the sample is quite similar to that documented by Campbell et al. (2011). With the same measure of overconfidence, they classify 34.1% of CEOs as overconfident, 57% as rational, and 8.9% as diffident in a sample of 3,352 CEOs between 1992 and 2006.

to hire CEOs externally when incumbent CEOs are fired, in keeping with prior works (e.g., Huson et al., 2001; Parrino, 1997).

Internal promotion results in the selection of successors who are more overconfident and diffident, whereas external recruitment results in the selection of successors who are more rational. Using the retirement turnover as an example, of 630 succeeding CEOs chosen through internal promotion, 56% are rational, while 36% and 8% are overconfident and diffident, respectively. However, of the 77 CEOs recruited from the outside, 77.9% are rational, but only 19.5% and 2.6% are overconfident and diffident, respectively. The differences between them are highly significant.

Panel D of Table 1 presents the preturnover positions of internal succeeding CEOs. Most retiring CEOs promote their heirs apparent as successors; prior to the succession, such heirs apparent typically held the position of COO and/or President. More specifically, of the 630 succeeding CEOs, 61.3% were heirs apparent before the promotion. This figure indicates that the selection of successors in the retirement sample focuses on continuing the policy and strategy adopted by the incumbent CEO.

Nevertheless, of the 258 successors in the forced departure sample, only 36.4% were heirs apparent before the promotion. The difference between the retirement and the forced departure samples for “Heir apparent” is highly significant ($t=6.91$). In the forced departure sample, the successors’ backgrounds are more diversified, indicating that the boards of directors focus more on changes in current corporate policy and strategy.

(Insert Table 2 here)

We also seek to gain a general idea of the kinds of firms and types of CEOs who tend to have certain confidence attributes. Table 2 provides interesting results. Panel A reports firm attributes. Relative to diffident and rational CEOs, overconfident CEOs work in firms with higher performance in terms of stock return, return on assets (ROA), and sales growth. However, these firms also have higher firm-specific stock volatility, indicating that they are riskier. Interestingly, on average, these firms possess the smallest asset size but the highest valuation in terms of the market-to-book ratio; in contrast, firms run by diffident CEOs possess the largest asset size and the lowest valuation. Firms with overconfident CEOs also show a higher level of investment than those with rational CEOs, which are higher than those of firms with diffident CEOs. This is consistent with Goel and Thakor's (2008) argument that overconfident CEOs typically overinvest, while diffident CEOs underinvest.

At the bottom of Panel A of Table 2, we report the stock performances for the retirement and forced turnover samples in the year before the CEO turnover. Firms in the forced turnover sample perform poorly compared to their industry peers, since the mean and median values of *AReturn* are uniformly negative. These results are consistent with the turnover literature (e.g., Murphy and Zimmerman, 1993; Warner et al., 1988), which shows that stock performance has a significant effect on forced turnover decisions. More importantly, for the forced turnover sample, the raw and industry-adjusted stock returns of firms operating under overconfident CEOs are significantly lower than the stock returns of firms operating under rational CEOs. In contrast, the stock performance of firms run by overconfident CEOs, who can continue their tenure through retirement, is significantly higher than that of firms run by rational CEOs. These results again indirectly validate both the importance of our classification of forced turnovers and retirements and our conjecture that an overconfident CEO's retirement is an indication of a company board

failing to see overconfidence as problematic (for good reason, since overconfidence could be an optimal attribute for some companies).

Panel B reports CEO/manager attributes. For firms with overconfident CEOs, although their managers do not appear to receive much higher compensation packages, they are granted more stock options and restricted stocks, their sensitivity of compensation to stock return volatility (Vega) is larger, and their shareholdings in their firms are also much larger. This evidence suggests that overconfident CEOs have a higher level of risk tolerance. Hrazdil et al.'s (2020) document that risk-tolerant managers have a larger value of Vega. This evidence is also consistent with Gervais et al.'s (2011) argument that rational and mildly overconfident managers are more likely to work at safe, diversified-value firms with relatively flat compensation contracts. In contrast, highly overconfident managers are more likely to be attracted to the compensation convexity offered by risky, growth-focused firms.

As for levels of education, managers working in firms with overconfident CEOs are more likely to hold a bachelor's degree but less likely to hold a Master of Business Administration (MBA) or doctor degree. They are less likely to have a law or finance background but more likely to own an industry background. Finally, relative to the diffident and rational counterparts, overconfident CEOs have a larger pay slice and power index.

Panel C reports board characteristics. Firms with overconfident CEOs are more likely to have male directors. Their directors own more shares of the firms and are less likely to serve on other boards.

Panel D and E report five proxies for strategic change and their Pearson correlations. Generally, the strategic change proxies are correlated with one another. The only exception is the correlation between Strategy Change₂ and Strategy Change₃, which is negative and not

significant. Note that Strategy Change2 is constructed based on research and development (R&D) expenditure while Strategy Change3 based on takeover activities. Not surprisingly, a firm would spend less resources on external takeover activities if it allocates more budget on internal R&D.

(Insert Table 3 here)

We also compare the characteristics between predecessor and succeeding CEOs. The results are reported in Table 3. On average, predecessors' age is 62.8 when they leave the CEO positions while successors are 51.5 when they inaugurate. Relative to the predecessors, successors are more likely to hold an MBA degree than other degrees. Successors are also more likely to have finance background but less likely to have law or industry background. However, this does not mean that managers with finance background are more likely to be promoted to CEO positions. Successors with finance background is 15% while senior managers with finance background are 19.5%, 22.1% and 24.7% for overconfident, rational and diffident groups shown in Panel B of Table 2, respectively. This evidence shows that managers with finance background are actually less likely to be promoted to CEO positions.

In addition, the percentage of Alumni is 8% for succeeding CEOs, and it is larger than 5.3%, 4.5%, and 4% for overconfident, rational and diffident groups shown in Panel B of Table 2, respectively. Obviously, a manager is more likely to succeed the incumbent CEO if they graduate from the same university. The results also show that the likelihood of promotion is higher if a manager shares the same background with the incumbent CEO, as the percentage of Same Profession is 70.1% for succeeding CEOs, which is larger than 61.2%, 59.8% and 60.2% for senior managers in Panel B of Table 2.

3. Major Empirical Findings

3.1. Conditional confidence attribute distributions

We begin our analysis with a nonparametric approach to check the inherent link in confidence attributes between the succeeding CEOs and their predecessors and the senior manager pool from which the successors are chosen.

(Insert Table 4 here)

3.1.1. The nature of predecessor CEO's departure

First, conditional on the nature of the predecessor CEO's departure, we compare the attribute distribution of the senior manager pool with that of the internal succeeding CEOs. Table 4 reports the results.

In the retirement sample, of the 1,022 managers who are potential candidates to replace the retiring overconfident CEOs, 49.5% are overconfident. However, following promotion, 60.3% of succeeding CEOs are overconfident. The difference between them is highly significant ($t=-3.00$). Meanwhile, 48.1% of managers are rational, which is significantly larger ($t=3.29$) than the 36.4% of internal successors who are rational. These differences show that overconfident managers are more likely to be selected as the successors following the retirements of overconfident predecessors, lending support to H1a. Similarly, in firms in which diffident CEOs retire, of the 132 managers available for promotion, 31.8% are classified as diffident and 65.2% as rational. After promotion, however, 35.5% of succeeding CEOs are diffident, and 61.3% are rational.

Thus, more diffident managers than rational managers are promoted to CEO positions following the retirement of diffident CEOs, again confirming the prediction of H1a.

In firms in which overconfident CEOs are fired, 43.4% of senior managers are overconfident; however, among those promoted, only 39.8% of successors are overconfident. At the same time, 52.7% of managers are rational, but 55.6% of successors are rational. Although the differences are not statistically significant, the results show that rational managers are more frequently promoted to CEO positions than overconfident managers. Similarly, in firms in which diffident CEOs are fired, there is also a trend of choosing rational successors, since 77.3% of successors are rational, which is a higher percentage than the corresponding 67.4% of rational managers. Overall, the results confirm the prediction of H2.

Table 4 also reports the distribution of confidence attributes in firms in which departing CEOs are rational. When rational CEOs retire, overconfident managers are more likely to win in the promotion tournament than other managers. This evidence confirms the prediction of Goel and Thakor (2008). Such priority decreases when rational CEOs are fired, however.

Next, we perform a further check of attribute distributions of internal succeeding CEOs. When retiring CEOs are overconfident, 60.3% (144 of 239) of succeeding CEOs are still overconfident. Similarly, when retiring CEOs are rational, 68.6% of succeeding CEOs are also rational. This pattern exists for the diffident attribute. When retiring CEOs are diffident, 35.5% of succeeding CEOs are diffident. Although this is not the highest weighting in the corresponding attribute distribution, it is extremely high compared to the typical weightings of diffidence (approximately 5% to 10%) in other groups. Thus, there appears to be a general “attribute continuity” pattern in cases of retirement turnover, lending support to H1b.

The link in attributes, however, decreases significantly in cases of forced turnover. When overconfident CEOs are fired, 39.8% (43 of 108) of successors are overconfident, which is significantly smaller than the corresponding figure of 60.3% in the retirement sample ($t=3.59$). Meanwhile, 55.6% of successors are rational, in contrast with only 36.4% in the retirement sample ($t=-3.39$). Evidently, following the forced turnover of overconfident CEOs, firms tend to recruit successors who are less overconfident, leaning toward rational CEOs instead. Similarly, when diffident CEOs are fired, only 13.6% of successors are diffident, which is significantly smaller than the 35.5% found for the retirement sample ($t=1.80$). Again, succeeding CEOs are mostly rational, with a percentage of 77.3%, larger than the 61.3% found for the retirement sample. Thus, there appears to be an attribute convergence (specifically, to the rational attribute) pattern surrounding CEO succession in cases of forced turnover, in contrast to the attribute continuity pattern found for cases of retirement turnover. The results provide support to H2.

Note that not all fired overconfident and diffident CEOs are replaced with rational ones. This result may be driven by several factors. First, the information asymmetry between a board and a succession candidate cannot be eliminated with respect to the candidate's attribute/ability, no matter how alert the board is in successor selection. Second, as we will show later, CEO transition is not just an economic issue but is affected by many factors, such as CEO power and board governance. Under some circumstances, the board cannot appoint its preferred candidate as the successor. Third, it is possible that some turnovers that are classified as forced in the sample are essentially due to the CEO moving on to better job opportunities. A CEO typically cannot move on to a better job unless she performs very well in her current job; however, her good performance in the firm is likely to lead the board of directors to select a manager with

similar attribute as the successor. As such, the attribute convergence pattern in the forced turnover sample may be weakened.

3.1.2. The recruitment origin of succeeding CEOs

The attribute distribution of succeeding CEOs who are recruited externally is also reported in Table 4.¹⁴ Again, there is an attribute continuity pattern in the retirement sample and an attribute convergence pattern in the forced turnover sample. For instance, 45.8% of successors (11 of 24) are still overconfident in firms in which overconfident CEOs retire, in contrast to 18.4% in firms in which overconfident CEOs are fired. The difference between these percentages is highly significant ($t=2.38$). Meanwhile, 54.2% of successors are rational in the retirement sample, which is significantly smaller than the 78.9% found for the forced turnover sample ($t=-2.10$).

Of particular note, the attribute continuity pattern in the retirement sample is weakened in cases of external successors compared to internal successors. For instance, when overconfident CEOs retire, 45.8% of external successors are overconfident. This figure is smaller than the corresponding figure of 60.3% for internal successors ($t=-1.37$). Furthermore, 54.2% of external successors are rational, which is a significantly larger percentage than the 36.4% of internal successors who are rational ($t=1.71$). Obviously, firms choose more overconfident successors through internal promotion but more rational successors through external recruitment.

Additionally, the attribute convergence pattern in the forced turnover sample is more evident for external successors than for internal successors. For instance, when overconfident CEOs are fired, 18.4% of external successors are overconfident, which is a much smaller

¹⁴ Following the prior literature (e.g., Dalton and Kesner, 1985), we define outsiders as successors who are not with their firms while the predecessors held office. The main results are qualitatively unchanged if we define outsiders as successors who had been with their firms for less than one (Davidson et al., 1990) or two (Cannella and Lubatkin, 1993) years.

percentage than the 39.8% of internal successors who are overconfident ($t=-2.42$). Meanwhile, 78.9% of external successors are rational, which is a larger percentage than the corresponding 55.6% of internal successors ($t=2.59$). Again, more overconfident successors are chosen through internal promotion, but more rational ones are chosen through external recruitment. Overall, the results support H3.

3.1.3. Change in corporate strategy

Next, we examine CEO succession within the context of corporate strategy change. Table 5 reports the distributions of confidence attributes of senior managers and internal succeeding CEOs by our first strategic change proxy, Strategy Change1.¹⁵

(Insert Table 5 here)

In firms in which corporate strategy is persistent, of the 1,089 managers who are potential candidates to replace the departing overconfident CEOs, 47.8% are overconfident. After promotion, 57.6% of succeeding CEOs are overconfident. The difference between them is highly significant ($t=-2.75$). Apparently, more overconfident managers are promoted to be succeeding CEOs than other managers. Similarly, when diffident CEOs leave, 32.7% of senior managers are diffident, while 35.3% of succeeding CEOs are diffident, indicating that more diffident managers are promoted.

A different picture is shown in firms in which strategy is changed surrounding succession. When overconfident CEOs leave, 46.8% of senior managers are overconfident. Yet, the

¹⁵ We get quite similar results for strategic change proxies Change2, Change3, and Change4. To save space, results for these proxies are not tabulated, but they are all available upon request.

percentage drops to 45.1% for overconfident succeeding CEOs. Similarly, when diffident CEOs leave, 25.7% of senior managers are diffident while only 10.5% of succeeding CEOs are diffident. Clearly, if corporate strategy is changed, the priority of promotion is significantly weakened for senior managers who have the same type of attribute as the predecessor CEO.

While these pieces of evidence confirm our prediction, i.e., H4, one should be careful to interpret the linkage between strategy change and attribute transition inherent in CEO selection. A board may intend to change corporate strategy through CEO turnover, deliberately choosing a successor who has a different attribute from the predecessor to implement corporate reform. If so, this change in strategy is expected by the board and the board's intention to change strategy leads to a change in the CEO attribute. Alternatively, a board may have no intention to change corporate strategy and the subsequent change in strategy is merely a natural result of CEO succession in which successors who have different attributes from the departing CEOs are selected for certain reasons (e.g., political reasons). In this case, a change in strategy is beyond the expectation of the board and a change in CEO attribute leads to a change in corporate strategy. The causality between strategic change and CEO attribute transition, therefore, is unclear.¹⁶

To determine the succession process is calculated by the board, we then explore a board's *intention* to initiate strategic change in a firm and its corresponding impact on CEO succession from the perspective of operation status. Helmich and Brown (1972) argue that successors with different leadership styles are selected to respond to diverse operational conditions. Eisfeldt and Kuhnen (2013) argue that there should be a matching between the attributes of CEOs and the

¹⁶ The endogeneity problem we encounter here is similar to that in previous literature testing the impact of CEO replacement on firm policies/performance change (e.g., Kang and Shivdasani, 1995; Denis and Denis, 1995; Murphy and Zimmerman, 1993). Fee et al. (2013) point out that the endogeneity is caused by the research methodology adopted in these studies and the problem may apply to *any* sample of job movers.

attributes of the firms they lead. In their model, recessions signal that the leadership or skill of the CEO cannot match the requirements of the firm and thus CEOs are more likely to be fired in operational recessions than in operational booms. These studies suggest that there is a strong need to initiate strategic change when a firm falls into an operational crisis such as industry shock or macroeconomic setback and the boards intentionally select managers with different attributes to implement corporate reform.

Based on these studies, our last proxy for strategy change, Strategy Change5, classifies a firm as in an operational boom (recession) stage if the average industry cash flow level in the three years preceding the CEO turnover is above (below) the average in the preceding ten years. As operational boom/recession is obtained using operation data within the years before the CEO turnover, by construction it excludes the impact of succeeding CEOs on corporate operation. Accordingly, the aforementioned endogeneity problem does not exist within the research framework adopted here.

(Insert Table 6 here)

Table 6 reports the distributions of confidence attributes of senior managers and internal succeeding CEOs by operation status. When overconfident CEOs leave in a boom stage, 58.6% of succeeding CEOs are still overconfident, and this percentage is significantly larger than the corresponding overconfidence distribution of 49.2% for internal managers ($t=-2.42$). When overconfident CEOs leave in a recession stage, 47.2% of successors are still overconfident. Although this percentage is larger than the overconfidence distribution of 45.2% for internal managers, the difference between them is not statistically significant ($t=-0.44$). Apparently, the

priority of promotion for overconfident managers is weakened in a recession stage. Given that operational recession reflects a strong need to initiate strategic change, the results suggest that in a recession stage, the board deliberately selects a successor who has a different attribute from the predecessor to implement corporate reform.

Overall, the results based on boards' *intention to initiate* strategic change through CEO replacement reinforces the earlier findings based on strategic change *initiated* following CEO replacement, confirming that succession process is calculated and dominated by the board according to its operation status and strategic direction. Importantly, the board can discern the attribute biases of succession candidates and is able to select the CEO with a certain attribute to move the firm in a certain direction.

3.2. Regression analysis

3.2.1. The selection of succeeding CEOs from among internal senior managers

After the nonparametric analysis, we conduct probit regressions of the appointment of succeeding CEOs on the attributes of internal senior managers, controlling for firm and manager characteristics. Table 7 reports the regression results.

(Insert Table 7 here)

We first put the confidence attributes of managers and predecessor CEOs in the regression model, controlling for firm and manager characteristics. In Specification (1), the coefficient of *SameAttribute* is significantly negative, indicating that rational managers are less likely to be

selected as the successors when rational CEOs leave their firms. This result is consistent with Goel and Thakor (2008). In their model, overconfident managers rather than rational managers are more likely to get promoted when rational CEOs leave the firms.

The interactions of *SameAttribute* with *Predecessor_Ovt* and *Predecessor_Dft* are both significantly positive. The results indicate when predecessor CEOs with biased attributes—either overconfident or diffident—leave their firms, senior managers who have the same type of confidence attribute as the predecessor CEOs are more likely to be promoted to the succeeding CEOs than other managers.

In Specification (2), we interact the confidence attributes with the nature of predecessor CEO departure. The interaction term *Predecessor_Ovt*SameAttribute* is significantly positive while *Forced*Predecessor_Ovt*SameAttribute* is significantly negative. Therefore, consistent with our prediction, overconfident managers are more likely to be selected as the successors than other managers when overconfident CEOs retire. Their chance of promotion, however, is significantly reduced when overconfident CEOs are fired. A similar picture is also shown for the promotion of diffident managers to succeed diffident CEOs.

In Specifications (3) to (7), we interact the confidence attributes with corporate strategy change proxies. In all specifications, *Predecessor_Ovt*SameAttribute* is significantly positive. However, the further interaction with *Strategy Change Proxy* is significantly negative. The results confirm our prediction that, following the departure of overconfident predecessors, the chance of promotion is reduced for overconfident managers if corporate strategy is changed or the board has the intention to change corporate strategy. The results are also similar for the promotion of diffident managers when diffident CEOs leave their firms.

3.2.2. The attribute link between succeeding and departing CEOs

Next, we test the link in confidence attributes between succeeding and departing CEOs with a multinomial logit model using “Rational” as the “pivot” attribute. Table 8 reports the regression results. Specifications (1) to (7) in Panel A are the regression results for overconfident successors, and Specifications (8) to (14) in Panel B are the results for diffident successors.

(Insert Table 8 here)

Specification (1) tests the impact of the nature of predecessor departure on the attribute link. *Predecessor_Ovt* is significantly positively related to overconfident successors while *Predecessor_Dft* is significantly negative. The results indicate that when an overconfident CEO retires, the succeeding CEO is *more* likely to be overconfident than rational and diffident. In contrast, if a diffident CEO retires, the succeeding CEO is *less* likely to be overconfident. Therefore, consistent with our prediction, there is a pattern of attribute continuity between predecessors and successors in normal retirements. However, such continuity pattern is significantly weakened under forced turnovers since the interaction term *Forced*Predecessor_Ovt* is significantly negative. As we argue, there is a pattern of attribute convergence (i.e., rational) in CEO selection under forced turnovers.

Specification (2) tests the impact of recruitment origin of succeeding CEOs on the attribute link. *Predecessor_Ovt* is significantly positive, while its interaction with *External* is significantly negative. The results demonstrate that the attribute continuity pattern between predecessors and successors is weakened when successors are recruited externally, lending support to our prediction.

Specifications (3) to (7) test the impact of strategic change on the attribute link between successors and predecessors. In all specifications, the coefficient of *Predecessor_Ovt* is significantly positive, while that of *Predecessor_Dft* is significantly negative. These results indicate a strong attribute continuation between the departing and the succeeding CEOs in firms in which corporate strategy is persistent surrounding succession. The continuation tendency, however, is weakened in firms in which corporate strategy is changed, since the interaction of *Strategy Change Proxy* with *Predecessor_Ovt* is significantly negative. Our prediction therefore is confirmed.

A similar picture is shown in Specifications (8) to (14), which use diffident successors as the dependent variable to test the link in confidence attributes. Across all specifications, *Predecessor_Ovt* is significantly negative, while *Predecessor_Dft* is significantly positive, indicating that a diffident successor is more likely to be chosen if the departing CEO is also diffident but is less likely to be chosen if the departing CEO is overconfident. Again, this attribute link is weakened in cases that the predecessor CEO is fired, the succeeding CEO is selected externally, or the corporate strategy is changed.

4. Additional Analyses

4.1. Industry innovation

A significant portion of rational CEOs in our sample are fired while a portion of overconfident and diffident CEOs remain in their positions until retirement. This evidence may be driven by the error of measurement of CEO overconfidence. The confidence attribute is a continuous variable by nature but becomes a discrete variable in the construct. Thus, there is a

potential for misclassification.¹⁷ Nevertheless, overconfident CEOs may also retire for good reasons. Galasso and Simcoe (2011) find that overconfident CEOs are good at conducting innovation and are more likely to take their firms in a new technological direction. Hirshleifer et al. (2012) also document that overconfident managers are more suitable for innovative projects that are riskier and more challenging.

Given the advantage of overconfident managers in innovation, there is concern on the endogeneity of the relation between manager overconfidence and CEO selection. It is possible that the priority of overconfident managers to succeed overconfident predecessor CEOs is driven by the industry innovativeness. Therefore, we turn to examine the impact of industry innovation on successor selection. Following Hirshleifer et al. (2012), we define industry innovativeness by corporate R&D expenditure. We first calculate each industry's average R&D expenditure, scaled by book assets per year per industry, in which industries are classified at the two-digit SIC codes. Firm-years with missing R&D information are treated as having zero R&D expenditures. An industry is defined as innovative if its R&D expenditure in a given year is above the median R&D expense across all industries for more than 50% of the sample period and as noninnovative otherwise.¹⁸ Table 9 reports the impact of industry innovation on CEO selection.

¹⁷ It is conceivable that company boards *correctly* fire those CEOs who are actually non-rational and/or are only “marginally” rational, replacing them with truly rational ones, but that statisticians *mistakenly* include the fired CEOs in the “rational” category *ex ante*. Similarly, some CEOs *mistakenly* categorized by statisticians as “overconfident” or “diffident” may not actually be overconfident or diffident; thus, they work until retirement. This misclassification problem cannot be avoided as long as we categorize the confidence attribute, but we believe that the problem is not large enough to be consequential. Since the focus is the difference in CEO succession attributes between the forced turnover and normal retirement samples, any misclassifications, if they exist, should affect both equally in normal retirement cases and forced turnover cases.

¹⁸ The full list of innovative industries is available upon request. Hirshleifer et al. (2012) also use patent citations (i.e., the average citation count per patent in the industry) to define industry innovativeness. Due to limitations on data collection, we do not adopt such a method since the latest available data for patent citations goes only to 2006. Nonetheless, we apply the patent citation method as a robustness test for data between 1992 and 2006, with no qualitative change in the primary results.

(Insert Table 9 here)

In Specification (1) in Table 9, the interaction term *Predecessor_Ovt*SameAttribute* is significantly positive, indicating that overconfident managers are more likely to be promoted following the departure of overconfident CEOs. This evidence shows that the relationship between manager overconfidence and CEO selection is not driven by industry innovation. Even so, such priority of promotion is more pronounced in innovative industries as the further interaction with *Innovative* is significantly positive, indicating firms in innovative industries tend to favor overconfident managers.

4.2. CEO power

Most CEOs are selected internally from among the senior management pool in modern firms (Huson et al., 2001; Parrino, 1997). Typically, the board does not develop the succession candidates by itself; instead, it relies on the incumbent CEO to groom internal candidates along selection criteria. Because the incumbent CEO knows the requirement of the job and the individual candidates better than anyone else, she can either support or harm the board's succession activities during succession preparation and implementation (Cannella and Shen, 2001). Therefore, the succession and its outcome are largely influenced by the power of predecessor CEOs to control the process.

We therefore test the effect of CEO power on the selection of succeeding CEOs. We measure CEO power from diverse perspectives, including CEOs' tenure, shareholding, pay slice and whether holding the title of "chairman" of the board and/or president. We also construct a

power index based on these measures. A CEO naturally has more power if she has a longer tenure, larger shareholding and pay slice, and more titles in the firm.

Specifications (2) to (6) in Table 9 test the impact of CEO power on CEO selection. In all specifications, the interactions of *SameAttribute* with *Predecessor_Ovt* and *Predecessor_Dft* are both significantly positive, indicating that senior managers sharing the same type of confidence attribute as the predecessor CEOs are more likely to be promoted when predecessors are overconfident or diffident. Such priority of promotion is even more pronounced if the predecessor CEOs have longer tenure or more titles in the firms, since the interactions of *CEO Characteristic* with *Predecessor_Ovt * SameAttribute* and *Predecessor_Dft * SameAttribute* are both significantly positive in specifications (2) and (3). The priority of promotion is also more pronounced if predecessor CEOs have a larger power index in specification (6). Overall, the evidence shows that powerful CEOs have stronger influence on the selection of successors.

4.3. Board governance

The influence of predecessor CEOs on successor selection is constrained by the board. The board of directors plays a central role in selecting a CEO and monitoring her performance (Fama and Jensen, 1983; Fama, 1980). Mizruchi (1983) argues that boards dominated by outside directors have better control over the process of CEO succession. Shen and Cannella (2002b) and Boeker and Goodstein (1993) find that boards with high proportions of outside directors are less likely to choose CEOs from inside the firm.

We therefore test the effect of board governance on the selection of succeeding CEOs. For the strength of board's monitoring, we check board size, the proportion of independent directors, director tenure, director shareholding, directors' appointments to other boards, gender ratio and

nationality mix. We also construct a board governance index based on these measures. Studies (e.g., Yermack, 1996) show that a board is more efficient and thus the governance effect is stronger if the board has a smaller size or larger proportion of independent directors. This is particularly the case if the independent directors are not appointed by the incumbent CEO (Coles et al., 2014). The governance effect of a board is also stronger if directors have longer tenure, larger shareholding of the firm, and more directorships. A board is also more efficient if the board has more female directors (Adams and Ferreira, 2009; Adams and Funk, 2012) and directors come from different countries. An et al. (2019) find that corporate innovation is positively related to board diversity.

(Insert Table 10 here)

Table 10 reports the impact of board governance on CEO selection. In all specifications, the interaction terms *SameAttribute *Predecessor_Ovt* and *SameAttribute *Predecessor_Dft* are significantly positive, indicating the priority of promotion for managers sharing the same type of confidence attribute as the predecessor CEOs in firms where predecessors are overconfident or diffident. Such priority is even more pronounced if board size is larger, since the further interactions with *Board Governance* are significantly positive in specification (1). This evidence indicates that a smaller board has a stronger governance on the selection of succeeding CEOs.

The governance effect is also stronger if a board has a larger proportion of independent directors that are not appointed by the incumbent CEO or directors have longer tenure on the board, as shown in specifications (2) and (3), respectively. In specification (4), a similar picture

is shown for director shareholding, though to a lesser extent. Overall, the results confirm that firms with a better board governance have a better control over the process of CEO selection.

4.4. Alternative measures of overconfidence

In this study, we define overconfident CEOs/managers as those holding options at 100% or greater moneyness. One may argue that the option exercise behavior is not driven by the character of an executive, but by inside information. An executive with inside information would like to hold options longer to get a higher gain from the exercise. However, Malmendier and Tate (2005) document that the delaying in option exercise cannot bring a higher gain for the CEOs, thereby confirming that such behavior is not based on inside information. Moreover, relative to a CEO, a subordinate manager knows less about inside information.

Another argument is that the delaying in option exercise is driven by the firm performance. For those CEOs/managers classified as overconfident in our sample, their option exercise happens to be in the high-growth stage of the firm when the stock price is high. Moreover, the executives in a top management team are typically granted options on the same date and these options also expire at the same time. As the option moneyness depends only on the stock return since the award date, the moneyness is likely to be the same for all executives within each firm for a given tranche of options. These issues lead to concern on the endogeneity problem in constructing the measure for overconfidence.

To address the endogeneity problem, we first check the distribution of confidence attributes among the top management team for each sample firm. We find that the overwhelming majority of sample firms have more than one type of confidence attributes, indicating that there is

considerable dispersion in overconfidence within the top management team. We then perform robustness checks for our main results with other proxies for overconfidence.

4.4.1 Share purchase behavior

Share purchase behavior is a proxy that is commonly used to measure the character of a manager (e.g., Hirshleifer et al., 2012; Campbell et al., 2011; Malmendier and Tate, 2008, 2005). Studies show that rational managers often sell old stock in their firms to balance their portfolios when they receive additional stock-based compensation such as options and restricted stock (Ofek and Yermack, 2000). By contrast, overconfident managers often purchase additional stock despite already owning a large number of shares in the firm (Malmendier and Tate, 2005).

The share purchase behavior covers the entire tenure of a manager at the firm, which may include both the high-growth and low-growth stage of the firm caused by the business cycle or firm-specific factors. Therefore, net share purchase is more likely to reflect a manager's confidence on the future of the firm, rather than a manipulation of stock price. Considering this, we adopt share purchase behavior to measure the character of a manager in robustness check. Following Malmendier and Tate (2008, 2005) and Campbell et al. (2011), we classify a CEO/manager as overconfident if her net share purchase is positive throughout her entire tenure at a firm, as diffident if her net share selling is more than 10% of her total shareholding in the firm, and as rational if she is classified as neither overconfident nor diffident. Data regarding managerial share purchase and sales are collected from Thomson Financial Insider Transactions database. With such a measure, we re-run probit regressions of the selection of succeeding CEOs on the attributes of internal senior managers. For the sake of brevity, we report the regression

results for our first strategic change proxy Strategy Change¹ in Table 11. The results show that our main results are qualitatively unchanged.

(Insert Table 11 here)

4.4.2 Other overconfidence measures for CEOs

Leaving aside share purchase/selling behavior, previous studies also use a firm's investment level (Campbell et al., 2011), earnings forecast accuracy (Hribar and Yang, 2016), and market perception obtained from press coverage (Malmendier and Tate, 2005) to measure a CEO's confidence level. These measures are *only* applicable to CEOs, not the senior manager pool. We therefore cannot use these measures to compare the distribution of confidence attribute between the succeeding CEOs and the senior manager pool. Nevertheless, we are able to and do use these measures to compare the attribute distribution between the departing and the succeeding CEOs and between the internal and the external succeeding CEOs. Our main predictions are generally confirmed for these tests.¹⁹

4.5. Other robustness checks

We also conduct many other tests of CEO succession. (1) The financial accounting standard known as FAS 123R is introduced in 2006 by the Financial Accounting Standards Board (FASB), which requires companies to deduct the amount of share-based (equity) payment granted to their employees on an annual basis. Some firms therefore accelerate their vesting schedules in 2005 to avoid reporting requirements of FAS 123R. Considering this, we divide our sample into two

¹⁹ To save space, results of robustness checks performed here and thereafter are not tabulated, but they are all available upon request.

parts based on FAS 123R and find no significant difference about the association of manager overconfidence and CEO selection between them. (2) We construct a senior manager pool with managers whose total compensation is among the top three instead of the top five in the company in the year immediately preceding the change in CEO. Our main results remain qualitatively the same. (3) We define the confidence attribute of external succeeding CEOs with the option exercise data in their old firms. The comparison of the attribute distribution between internal and external succeeding CEOs is not significantly changed. (4) We divide our sample according to whether the departing CEO is the founder of the firm. The results show no significant difference in CEO selection patterns between founder-managed firms and non-founder-managed firms. (5) We check the impact of institutional shareholders who hold more than 5% of shares in the firm on CEO attribute transition and find no direct linkage between them.

5. Discussion and Conclusion

This study seeks to understand how a CEO is selected from the senior management pool with different confidence attributes and whether manager personality is a significant factor that affects the promotion of managers. In firms in which overconfident and diffident CEOs retire normally, senior managers who have the same type of confidence attribute as the departing CEOs have better chances of being promoted to be succeeding CEOs than other managers. The chance of promotion for such managers, however, is significantly reduced in firms in which the predecessor CEOs are fired. Consequently, the retirement sample shows a pattern of attribute continuity in which retiring and succeeding CEOs share the same attributes, whereas the forced turnover sample shows a pattern of attribute convergence in which CEOs with overconfident or

different attributes are fired and replaced by CEOs with rational attributes. The attribute convergence is more evident in firms in which successors are recruited externally. The results indicate that manager attribute is a factor assessed by the board during the CEO selection process and the board has a certain ability to identify manager attributes with probabilistic accuracy.

Further analysis shows that the priority of promotion for senior managers who have the same attribute as the departing CEO is weakened in firms in which corporate strategy is changed following CEO turnover. The priority of promotion for such managers is also reduced when the firm falls into operational recession. As operational recession reflects a strong need to initiate strategic change, the evidence indicates that the board deliberately selects a successor who has a different attribute from the predecessor to implement corporate reform in a recession stage. Therefore, the succession process is calculated by the board based on strategic need.

We also find that such priority of promotion is less pronounced if the departing CEO has less power in the firm or the governance of the board is strong. Therefore, the process and outcome of successions not only reflect changes in corporate strategy but are also vital indices of the underlying governance within a firm. Our evidence confirms the CEO succession literature documenting that the CEO turnover decision is not exogenous but is affected by a variety of factors including power struggle within a firm (e.g., Friedman and Olk, 1995). More recently, Khurana and Kyung (2021) find that high-quality managers are reluctant to join firms with internal control material weakness.

CEO succession as a process has received minimal explicit attention in the finance literature. In management science, researchers have devoted substantial effort to explore the fascinating and considerable diversity that exists in CEO succession. However, regarding the association of manager personality and CEO succession, previous research usually uses observable

demographic attributes such as age and organizational tenure as proxies for underlying cognitive attributes (e.g., Zajac and Westphal, 1996; Hambrick and Mason, 1984), given that data about demographic attributes can be readily obtained. Few studies, if any, construct empirical measures for managerial personal traits, e.g., overconfidence, and investigate their impact on the selection process of CEOs, given the difficulty of empirically measuring the personality characteristics of managers. Reviewing early works on CEO succession, Kesner and Sebor (1994) highlight that manager personality is essential to developing a complete model of succession but has not received researchers' attention. Recently, in another in-depth assessment of this literature, Berns and Klarner (2017) also point out that little is known about the role of managerial personal traits in CEO succession. Our study fills in the critical gap in the field of succession by exploring how a CEO is selected from a senior management pool with different confidence attributes including overconfidence, rational and diffidence. Although using a U.S.-only sample, our findings of CEO selection associated with manager overconfidence may also apply internationally. With 2,790 CEOs of diverse manufacturing firms in China, Li and Tang (2010) document that CEO hubris/overconfidence enhances firm risk taking in China. Ferris et al. (2013) find that CEO overconfidence is an international phenomenon and can significantly explain the international mergers and acquisitions. They also find that CEO overconfidence is most extensively observed in individuals heading firms headquartered in Christian countries that encourage individualism while de-emphasizing long-term orientation in their national culture.

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Table 1
Characteristics of CEO successions

The Panel A presents the distribution of confidence attributes for 4,596 CEO-firm combinations collected from the ExecuComp database between 1992 and 2012, which include 1,063 CEO turnovers. Panel B presents the nature of predecessor CEO departures and recruitment origins of succeeding CEOs. Panel C presents the distribution of the confidence attributes for succeeding CEOs by their recruitment origins and the nature of predecessor departures. Panel D presents the managerial positions of internally promoted successors in the year before CEO turnovers, which are classified as Heir apparent (COO and/or President), CFO, Other (including vice-presidents and CEOs/senior managers of key subdivisions), and Unknown. We report the percentages (%) and observations (Obs.) for the attribute distribution. A CEO is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. The *t*-statistics are reported for the comparison of confidence distributions. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. The distributions of CEO confidence attributes

	Overconfident		Rational		Diffident		Total	
	Percentage	Observations	Percentage	Observations	Percentage	Observations	Percentage	Observations
All CEOs	35.2%	1,620	59.3%	2,726	5.4%	250	100%	4,596
Departing CEOs	38.5%	409	56.2%	597	5.4%	57	100%	1,063
Succeeding CEOs	31.9%	339	60.7%	645	7.4%	79	100%	1,063
<i>T-statistic</i>								
Depart. vs All	1.98**		-1.88*		-0.10			
Depart. vs Succeed.	3.19***		-2.11**		-1.95*			

Panel B. The nature of predecessor CEO departures and recruitment origins of succeeding CEOs

	Percentage	Observations
<i>Nature of predecessor CEO departures</i>		
Forced departure	33.5%	356
Normal retirement	66.5%	707
<i>Recruitment origins of succeeding CEOs</i>		
Internal promotion	83.5%	888

External recruitment	16.5%	175
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Panel C. Confidence distributions of succeeding CEOs by the nature of predecessor departures and recruitment origins

		Overconfident		Rational		Diffident		Total	
		%	Obs.	%	Obs.	%	Obs.	%	Obs.
Retire	Internal promotion	36%	227	56%	353	8%	50	100%	630
	External recruitment	19.5%	15	77.9%	60	2.6%	2	100%	77
	<i>T-statistic</i>								
	Internal vs External	3.36***		-4.25***		2.52**			
Forced	Internal promotion	27.9%	72	62.4%	161	9.7%	25	100%	258
	External recruitment	25.5%	25	72.4%	71	2%	2	100%	98
	<i>T-statistic</i>								
	Internal vs External	0.45		-1.78*		3.27***			

Panel D. Preturndover positions of internal succeeding CEOs

		Heir apparent		CFO		Other		Unknown		Total	
		%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.
Retire		61.3%	386	4.1%	26	19.5%	123	15.1%	95	100%	630
Forced		36.4%	94	9.7%	25	38.4%	99	15.5%	40	100%	258
<i>T-statistic</i>		6.91***		-2.77***		-5.51***		-0.16			

Table 2
Descriptive statistics

This table presents the descriptive statistics for a sample of 21,081 CEO-firm-year observations across 4,596 CEO-firm combinations between 1992 and 2012, which include 1,063 CEO turnovers. Sample firms are divided into three groups based on the confidence attributes of incumbent CEOs: overconfident (Ovt), rational (Ran), and diffident (Dft). A CEO is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. Definitions of variables are reported in Appendix A. We report the mean and the median values. All dollar values are measured in constant 2012 dollars (millions for firm attributes, thousands for CEO compensation). At the bottom of Panel A, the stock returns are reported for the 707 retiring CEOs and for the 356 fired CEOs in the year before CEO change. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, for the *t*-test and the two-tailed Wilcoxon test.

	Mean			<i>t</i> -statistic		Median			<i>z</i> -statistic	
	Ovt	Ran	Dft	Ovt-Ran	Ovt-Dft	Ovt	Ran	Dft	Ovt-Ran	Ovt-Dft
<i>Panel A: Firm characteristics</i>										
Return	0.184	0.102	0.097	12.74***	8.17***	0.142	0.074	0.074	12.7***	7.21***
AReturn	0.015	-0.050	-0.058	10.73***	7.20***	-0.004	-0.054	-0.056	10.54***	6.24***
ROA	0.097	0.071	0.086	12.29***	3.89***	0.099	0.077	0.079	18.07***	9.47***
Leverage	0.560	0.587	0.609	-7.38***	-8.98***	0.553	0.588	0.622	-7.73***	-9.60***
Growth	0.198	0.133	0.082	3.43***	11.66***	0.116	0.060	0.056	25.71***	15.38***
MV	7125	5418	8714	5.96***	-2.18**	1524	1249	2010	9.17***	-4.90***
AT	7191	11608	16661	-1.76*	-2.66***	1460	1696	3008	-4.58***	-11.80***
M/B	2.153	1.671	1.625	15.28***	13.41***	1.616	1.358	1.291	25.01***	14.30***
Volatility	0.532	0.451	0.377	6.55***	13.68***	0.393	0.317	0.285	20.22***	16.72***
Investment	0.062	0.022	0.008	10.51***	10.19***	0.018	0.005	0	7.67***	7.88***
Return: retirement	0.211	0.107	0.084	8.35***	5.66***	0.177	0.087	0.051	7.93***	5.42***
AReturn: retirement	0.043	-0.044	-0.057	7.13***	4.71***	0.026	-0.042	-0.065	6.95***	4.35***
Return: forced	-0.091	0.019	-0.003	-2.08**	-0.79	-0.166	0.018	-0.033	-3.06***	-1.20
AReturn: forced	-0.219	-0.156	-0.209	-1.39	-0.16	-0.254	-0.140	-0.228	-2.03**	-0.59

Panel B: CEO/manager characteristics

Cash Pay	1403	1165	1362	8.82***	1.08	950	862	1009	8.85***	-3.57***
Equity Pay	2538	1804	2526	6.29***	0.06	615	367	694	10.52***	-3.52***
Total Pay	4402	3416	4414	7.45***	-0.05	1938	1574	2078	12.28***	-2.26**
Compensation Ratio	0.351	0.304	0.364	10.83***	-1.67*	0.363	0.273	0.376	10.26***	-1.98**
Share Percentage	0.027	0.018	0.010	10.1***	16.53***	0.0054	0.0022	0.0021	29.35***	18.15***
Vega	668.7	531.9	572.3	6.52***	2.67***	541.6	431.4	486.7	6.76***	2.29**
Gender	0.983	0.978	1	1.17	-5.14***	1	1	1	1.13	-1.99**
Age	55.5	55.5	55.4	0.22	0.85	56	56	56	0.08	0.27
Tenure	6.68	5.37	7.29	11.81***	-2.54**	6	5	7	11.21***	-2.96***
MBA	0.354	0.365	0.404	-0.60	-1.40	0	0	0	-0.60	-1.40
Doctor	0.135	0.142	0.148	-0.55	-0.53	0	0	0	-0.54	-0.53
Master	0.071	0.094	0.069	-2.27**	0.04	0	0	0	-2.24**	0.04
Bachelor	0.346	0.331	0.316	0.82	0.85	0	0	0	0.82	0.85
Law	0.103	0.114	0.121	-0.98	-0.75	0	0	0	-0.97	-0.75
Finance	0.195	0.221	0.247	-0.90	-1.75*	0	0	0	-0.89	-1.74*
Industry	0.702	0.665	0.632	0.94	1.72*	1	1	1	0.93	1.83*
Alumni	0.053	0.045	0.040	1.31	2.61***	0	0	0	1.31	1.75*
Same Degree	0.325	0.310	0.316	0.65	0.21	0	0	0	0.65	0.21
Same Profession	0.612	0.598	0.602	0.55	0.23	1	1	1	0.55	0.23
Same Gender	0.915	0.917	0.919	-0.25	-0.26	1	1	1	-0.25	-0.26
Heir Apparent	0.226	0.249	0.221	-0.98	0.08	0	0	0	-0.98	0.08
CEO Title	1.846	1.789	1.871	3.43***	-0.65	2	2	2	3.74***	-0.54
CEO Pay Slice	0.596	0.578	0.540	0.45	0.79	0.513	0.424	0.448	1.58	1.02
CEO Power Index	2.176	1.974	2.153	7.30***	0.45	2	2	2	6.85***	0.90

Panel C: Board characteristics

Board Size	10.54	10.27	11.76	2.09**	-4.18***	10	10	11	0.20	-5.03***
Director Ratio	0.144	0.137	0.158	1.50	-0.74	0.125	0.111	0.100	1.04	0.79
Director Tenure	8.678	7.508	8.736	8.43***	-0.24	8.461	7.133	8.705	9.67***	-0.19
Director Share	0.169	0.073	0.117	6.04***	-1.64	0	0	0	8.25***	-1.61
Directorship	7.267	7.533	7.654	-2.51**	-2.23**	7	7.230	7.091	-2.31**	-2.13**
Gender Ratio	0.883	0.877	0.846	1.57	5.25***	0.889	0.889	0.833	2.02**	5.03***

Nationality Mix	0.086	0.081	0.095	1.02	-0.84	0	0	0	1.46	-1.56
Board Index	2.875	2.610	2.869	6.33***	0.08	3	3	3	6.52***	0.31

Panel D: Proxies for strategic change

Strategy Change1	0.667	0.780	0.693	-5.07***	-0.56	0	1	0	-6.12***	-0.98
Strategy Change2	0.114	0.119	0.189	-0.49	-2.73***	0	0	0	-0.49	-3.20***
Strategy Change3	0.076	0.122	0.071	-6.31***	0.33	0	0	0	-6.01***	0.33
Strategy Change4	0.156	0.178	0.145	-2.18**	0.89	0	0	0	-2.17**	0.88
Strategy Change5	0.391	0.429	0.422	-2.67***	-1.05	0	0	0	-2.67***	-1.05

Panel E: Pearson correlations among proxies for strategic change

	Strategy Change1	Strategy Change2	Strategy Change3	Strategy Change4	Strategy Change5
Strategy Change1	1	0.110***	0.047***	0.068***	0.057***
		<.0001	0.0002	0.0006	<.0001
Strategy Change2	—	1	-0.007	0.063***	0.039***
			0.637	0.0012	0.0072
Strategy Change3	—	—	1	0.122***	0.052***
				<.0001	0.0001
Strategy Change4	—	—	—	1	0.046***
					0.0027
Strategy Change5	—	—	—	—	1

Table 3
Comparison of CEO characteristics between predecessors and successors

This table presents the results for the comparison of CEO characteristics between predecessor and succeeding CEOs for 1,063 CEO turnovers collected from the ExecuComp database between 1992 and 2012. Definitions of variables are reported in Appendix A. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, for the *t*-test and the two-tailed Wilcoxon test.

Variables	Predecessors		Successors		Predecessors vs. Successors	
	Mean	Median	Mean	Median	<i>t</i> -statistic	<i>z</i> -statistic
Age	62.8	63	51.5	52	32.66***	26.3***
Gender	0.975	1	0.961	1	1.84*	1.84*
MBA	0.314	0	0.383	0	-3.33***	-3.32***
Doctor	0.130	0	0.118	0	0.86	0.86
Master	0.093	0	0.081	0	1.00	1.00
Bachelor	0.359	0	0.352	0	0.36	0.36
Law	0.098	0	0.071	0	2.27**	2.26**
Finance	0.088	0	0.150	0	-4.37***	-4.35***
Industry	0.835	1	0.782	1	3.15***	3.14***
Alumni	0.080	0	0.080	0	—	—
Same Degree	0.320	0	0.320	0	—	—
Same Profession	0.701	1	0.701	1	—	—
Same Gender	0.945	1	0.945	1	—	—

Table 4
Conditional distribution of confidence attributes of senior managers and succeeding CEOs

This table presents the conditional distribution of confidence attributes of succeeding CEOs promoted internally, of succeeding CEOs recruited externally, and of the pool of senior managers from which internal succeeding CEOs are selected, for a sample of 707 CEO retirement turnovers and 356 forced CEO turnovers collected from the ExecuComp database over the period 1992-2012. The sample is first divided into two groups based on the nature of predecessor CEO turnovers; then, each group is further divided into three subgroups according to the confidence attributes of the departing CEOs (*i.e.*, overconfident (Ovt), rational (Ran), or diffident (Dft)). A CEO/manager is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. The percentage of each attribute's distribution is reported above the number of observations. The conditional distributions of succeeding CEOs (or senior managers) with the same attribute are compared between retirement and forced turnovers, with *t*-statistics reported at the bottom of the table. The conditional attribute distributions of succeeding CEOs promoted internally are compared with those of succeeding CEOs recruited externally and of senior managers with the same attribute, with *t*-statistics reported in the brackets. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

		Internal senior managers				Internal succeeding CEOs				External succeeding CEOs			
		Ovt	Ran	Dft	Total	Ovt	Ran	Dft	Total	Ovt	Ran	Dft	Total
Retirement	Ovt	49.5% 506 [-3.00] ***	48.1% 492 [3.29] ***	2.3% 24 [-0.79]	100% 1,022	60.3% 144	36.4% 87	3.3% 8	100% 239	45.8% 11 [-1.37]	54.2% 13 [1.71] *	0% 0 [-2.87] ***	100% 24
	Ran	16.1% 260 [-2.77] ***	72.2% 1,162 [1.35]	11.7% 188 [1.82] *	100% 1,610	22.8% 82	68.6% 247	8.6% 31	100% 360	7.8% 4 [-3.39] ***	88.2% 45 [3.79] ***	3.9% 2 [-1.50]	100% 51
	Dft	3% 4 [-0.06]	65.2% 86 [0.40]	31.8% 42 [-0.39]	100% 132	3.2% 1	61.3% 19	35.5% 11	100% 31	0% 0 [-1.00]	100% 2 [4.35] ***	0% 0 [-4.06] ***	100% 2
Forced	Ovt	43.4% 210 [0.68]	52.7% 255 [-0.54]	3.9% 19 [-0.33]	100% 484	39.8% 43	55.6% 60	4.6% 5	100% 108	18.4% 7 [-2.42] **	78.9% 30 [2.59] **	2.6% 1 [-0.60]	100% 38
	Ran	17.3% 100 [-1.01]	68.3% 395 [0.59]	14.4% 83 [0.32]	100% 578	21.1% 27	65.6% 84	13.3% 17	100% 128	31% 18 [1.47]	67.2% 39 [0.21]	1.7% 1 [-3.33] ***	100% 58

	Dft	4.2% 4 [-0.74]	67.4% 64 [-0.90]	28.4% 27 [1.43]	100% 95	9.1% 2	77.3% 17	13.6% 3	100% 22	0% 0 [-1.45]	100% 2 [2.49] **	0% 0 [-1.82] *	100% 2
<i>t</i> -statistic (R vs F)	Ovt	2.22**	-1.65*	-1.57		3.59***	-3.39***	-0.55		2.38**	-2.10**	-1.00	
	Ran	-0.64	1.75*	-1.61		0.39	0.62	-1.39		-3.22***	2.72***	0.68	
	Dft	-0.46	-0.35	0.55		-0.83	-1.22	1.80*		—	—	—	

Table 5
Conditional attribute distributions of senior managers and internal succeeding CEOs by change in corporate strategy

This table presents the confidence attribute distribution of internal succeeding CEOs and the pool of senior managers from which internal succeeding CEOs are selected for a sample of 630 CEO retirement turnovers and 258 forced CEO turnovers over the period 1992-2012. The sample is first divided into two groups based on change in strategic direction surrounding CEO succession; then, each group is further divided into three subgroups according to the confidence attribute of the departing CEOs (*i.e.*, overconfident (Ovt), rational (Ran), or diffident (Dft)). A firm is classified as Strategic Change (SC) if the value of *Strategy Change1* is above the median value of sample firms and as Strategic Persistence (SP) otherwise. Definition of *Strategy Change1* is reported in Appendix A. A CEO/manager is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. The percentage of each attribute's distribution is reported above the number of observations. The conditional distributions of succeeding CEOs (or senior managers) with the same attribute are compared between SP and SC, with *t*-statistics reported at the bottom of the table. The conditional attribute distributions of senior managers are compared with those of succeeding CEOs with the same attribute, with *t*-statistics reported at the right of the table. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

		Internal senior managers				Internal succeeding CEOs				<i>t</i> -statistic (managers vs CEOs)		
		Ovt	Ran	Dft	Total	Ovt	Ran	Dft	Total	Ovt	Ran	Dft
Strategic Persistence	Ovt	47.8%	49%	3.1%	100%	57.6%	39.6%	2.9%	100%	-2.75***	2.68***	0.22
		521	534	34	1,089	141	97	7	245			
	Ran	17.2%	70.4%	12.5%	100%	21.2%	69.6%	9.1%	100%	-1.76*	0.29	1.95*
		282	1,157	205	1,644	79	259	34	372			
	Dft	3.9%	63.4%	32.7%	100%	2.9%	61.8%	35.3%	100%	0.27	0.18	-0.29
		6	97	50	153	1	21	12	34			
Strategic Change	Ovt	46.8%	51.1%	2.2%	100%	45.1%	49%	5.9%	100%	0.30	0.37	-1.52
		195	213	9	417	46	50	6	102			
	Ran	14.3%	73.5%	12.1%	100%	25.9%	62.1%	12.1%	100%	-2.65***	2.49**	0.02
		78	400	66	544	30	72	14	116			
	Dft	2.7%	71.6%	25.7%	100%	10.5%	78.9%	10.5%	100%	-1.05	-0.64	1.41
		2	53	19	74	2	15	2	19			
<i>t</i> -statistic (SP vs SC)	Ovt	0.38	-0.71	1.09		2.13**	-1.62	-1.18				
	Ran	1.59	-1.41	0.21		-1.04	1.52	-0.87				
	Dft	0.49	-1.23	1.07		-0.97	-1.28	2.25**				

Table 6

Conditional distribution of confidence attributes of senior managers and internal succeeding CEOs by operation status

This table presents the confidence attribute distribution of internal succeeding CEOs and the pool of senior managers from which the internal succeeding CEOs are selected for a sample of 630 CEO retirement turnovers and 258 forced CEO turnovers over the period 1992-2012. The sample is first divided into two groups based on a firm's operation status; then, each group is further divided into three subgroups according to the confidence attribute of the departing CEOs (*i.e.*, overconfident (Ovt), rational (Ran), or diffident (Dft)). Operation status is set to be in a Recession Stage (RS) if the value of *Strategy Change5* equals one and in a Boom Stage (BS) otherwise. Definition of *Strategy Change5* is reported in Appendix A. A CEO/manager is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. The percentage of each attribute's distribution is reported above the number of observations. The conditional distributions of succeeding CEOs (or senior managers) with the same attribute are compared between BS and RS, with *t*-statistics reported at the bottom of the table. The conditional attribute distributions of senior managers are compared with those of succeeding CEOs with the same attribute, with *t*-statistics reported at the right of the table. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

		Internal senior managers				Internal succeeding CEOs				<i>t</i> -statistic (managers vs CEOs)		
		Ovt	Ran	Dft	Total	Ovt	Ran	Dft	Total	Ovt	Ran	Dft
Boom Stage	Ovt	49.2%	47.4%	3.4%	100%	58.6%	37.4%	3.9%	100%	-2.42**	2.58**	-0.38
		435	419	30	884	119	76	8	203			
	Ran	16.4%	71.9%	11.7%	100%	22%	69.3%	8.7%	100%	-2.17**	0.89	1.66*
		219	962	157	1,338	66	208	26	300			
	Dft	1.8%	71.7%	26.5%	100%	3.8%	65.4%	30.8%	100%	-0.51	0.63	-0.43
		2	81	30	113	1	17	8	26			
Recession Stage	Ovt	45.2%	52.7%	2.1%	100%	47.2%	49.3%	3.5%	100%	-0.44	0.74	-0.85
		281	328	13	622	68	71	5	144			
	Ran	16.6%	70%	13.4%	100%	22.9%	65.4%	11.7%	100%	-1.89*	1.23	0.63
		141	595	114	850	43	123	22	188			
	Dft	5.3%	60.5%	34.2%	100%	7.4%	70.4%	22.2%	100%	-0.43	-0.95	1.20
		6	69	39	114	2	19	6	27			
<i>t</i> -statistic (BS vs RS)	Ovt	1.54	-2.04**	1.56		2.11**	-2.21**	0.23				
	Ran	-0.14	0.96	-1.16		-0.22	0.90	-1.06				
	Dft	-1.43	1.78*	-1.25		-0.55	-0.38	0.70				

Table 7
The association of successor selection and subordinate manager attribute

This table presents the results of the probit regression of the selection of internal succeeding CEOs on the confidence attributes of subordinate managers for a sample of 3,921 manager-firm-year observations over the period 1992-2012, which includes 630 CEO retirement turnovers and 258 forced CEO turnovers collected from the ExecuComp database. The dependent variable is a dummy variable that equals one if a subordinate manager is promoted to be the succeeding CEO and zero otherwise. *SameAttribute* is a dummy variable that equals one for an individual manager if he has the same confidence attribute as the predecessor CEO and zero otherwise. *Predecessor_Ovt* is the attribute dummy for the predecessor CEO, which equals one for overconfidence and zero otherwise. *Predecessor_Dft* is another attribute dummy for the predecessor CEO, which equals one for diffidence and zero otherwise. A CEO/manager is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. *Forced* is a dummy variable that equals one if the predecessor CEO is forced to leave and zero for retirement turnover. Definitions of strategy change proxies and other variables are reported in Appendix A. The *p*-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively, based on standard errors corrected for heteroscedasticity and autocorrelations.

	(1)	(2)	Strategy Change Proxy				
			(3) Change1	(4) Change2	(5) Change3	(6) Change4	(7) Change5
Intercept	0.400*** (<.001)	0.392*** (<.001)	0.419*** (<.001)	0.383*** (0.006)	0.414*** (<.001)	0.388*** (<.001)	0.445*** (<.001)
SameAttribute	-0.042*** (0.003)	-0.062*** (<.001)	-0.043** (0.026)	-0.039** (0.024)	-0.037** (0.016)	-0.050** (0.034)	-0.043** (0.031)
Predecessor_Ovt	-0.024 (0.127)	-0.039** (0.046)	-0.042* (0.054)	-0.011 (0.565)	-0.013 (0.156)	-0.032* (0.017)	-0.046** (0.048)
Predecessor_Dft	-0.032 (0.207)	-0.063* (0.054)	-0.061* (0.090)	-0.027 (0.425)	-0.018 (0.506)	-0.053 (0.221)	-0.029 (0.402)
Predecessor_Ovt * SameAttribute	0.072*** (<.001)	0.105*** (<.001)	0.136*** (<.001)	0.126*** (0.007)	0.169*** (0.009)	0.096*** (0.007)	0.124** (0.034)
Predecessor_Dft * SameAttribute	0.054** (0.020)	0.155*** (0.004)	0.064** (0.011)	0.147** (0.028)	0.058** (0.031)	0.098** (0.033)	0.069** (0.024)
Forced		-0.060** (0.022)					
Forced * SameAttribute		-0.066** (0.027)					
Forced* Predecessor_Ovt		0.052 (0.121)					

Forced* Predecessor_Dft			0.092*				
			(0.077)				
Forced* Predecessor_Ovt * SameAttribute			-0.038**				
			(0.040)				
Forced* Predecessor_Dft * SameAttribute			-0.092***				
			(0.004)				
Strategy Change Proxy			0.013*	0.0004	0.010	-0.034	-0.002
			(0.069)	(0.994)	(0.740)	(0.364)	(0.927)
Strategy Change Proxy * SameAttribute			-0.011*	0.014	-0.028	0.021	-0.011*
			(0.051)	(0.791)	(0.436)	(0.618)	(0.077)
Strategy Change Proxy * Predecessor_Ovt			0.022	0.002	-0.084*	0.032	0.032
			(0.246)	(0.972)	(0.055)	(0.482)	(0.361)
Strategy Change Proxy * Predecessor_Dft			0.033	0.039	-0.086	0.064	-0.037
			(0.257)	(0.637)	(0.226)	(0.325)	(0.488)
Strategy Change Proxy * Predecessor_Ovt * SameAttribute			-0.063**	-0.051***	-0.097**	-0.026***	-0.059***
			(0.011)	(0.009)	(0.014)	(0.006)	(0.003)
Strategy Change Proxy * Predecessor_Dft * SameAttribute			-0.018*	-0.087*	-0.009**	-0.048***	-0.019
			(0.097)	(0.066)	(0.043)	(0.002)	(0.137)
Age	-0.002*	-0.002*	-0.002*	-0.002*	-0.002*	-0.001**	-0.002*
	(0.053)	(0.053)	(0.051)	(0.095)	(0.052)	(0.045)	(0.057)
Gender	0.040**	0.041**	0.041**	0.050**	0.040**	0.052*	0.037*
	(0.034)	(0.030)	(0.031)	(0.043)	(0.032)	(0.067)	(0.069)
Heir Apparent	0.499***	0.497***	0.498***	0.496***	0.500***	0.482***	0.478***
	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)
Tenure	-0.002*	-0.002*	-0.002*	-0.002*	-0.002**	-0.004**	-0.002*
	(0.085)	(0.087)	(0.086)	(0.086)	(0.085)	(0.042)	(0.087)
MBA	0.028	0.026	0.028	0.007	0.029	0.002	0.023
	(0.297)	(0.331)	(0.299)	(0.828)	(0.276)	(0.951)	(0.423)
Doctor	-0.105*	-0.103*	-0.106*	-0.106*	-0.108*	-0.104**	-0.096*
	(0.082)	(0.081)	(0.081)	(0.075)	(0.091)	(0.042)	(0.098)
Master	0.050	0.048	0.050	0.018	0.052	0.014	0.049
	(0.148)	(0.160)	(0.146)	(0.679)	(0.131)	(0.741)	(0.177)
Bachelor	0.024	0.022	0.023	0.026	0.024	0.024	0.022
	(0.373)	(0.398)	(0.389)	(0.429)	(0.353)	(0.484)	(0.435)
Law	-0.047**	-0.042**	-0.048**	-0.044*	-0.048**	-0.047**	-0.043**
	(0.041)	(0.040)	(0.034)	(0.052)	(0.042)	(0.039)	(0.031)
Finance	-0.006*	-0.004*	-0.006*	0.011*	-0.006*	-0.014*	-0.002*
	(0.089)	(0.081)	(0.086)	(0.082)	(0.082)	(0.084)	(0.087)
Industry	0.148**	0.153**	0.151**	0.159**	0.161**	0.136**	0.164**
	(0.028)	(0.024)	(0.026)	(0.043)	(0.036)	(0.037)	(0.018)

Alumni	0.198*	0.207*	0.189*	0.193*	0.191*	0.203**	0.195*
	(0.081)	(0.071)	(0.096)	(0.086)	(0.082)	(0.039)	(0.087)
Same Degree	-0.032	-0.032	-0.033	-0.032	-0.034	-0.032	-0.032
	(0.361)	(0.362)	(0.367)	(0.365)	(0.372)	(0.376)	(0.359)
Same Profession	0.084*	0.084*	0.084	0.083*	0.084	0.086*	0.084*
	(0.096)	(0.094)	(0.102)	(0.097)	(0.108)	(0.096)	(0.095)
Same Gender	0.226	0.228	0.231	0.234	0.252	0.253	0.235
	(0.278)	(0.272)	(0.310)	(0.312)	(0.329)	(0.371)	(0.293)
Log(Vega)	-0.004	-0.002	-0.005	-0.002	-0.005	-0.004	-0.008
	(0.674)	(0.826)	(0.605)	(0.562)	(0.597)	(0.728)	(0.405)
Compensation Ratio	0.188***	0.189***	0.188***	0.182***	0.189***	0.179***	0.181***
	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)
Share Percentage	0.025***	0.025***	0.025***	0.027***	0.025***	0.026***	0.026***
	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)
Log MV	-0.017***	-0.017***	-0.017***	-0.015***	-0.018***	-0.017***	-0.017***
	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)
M/B	-0.003	-0.003	-0.003	-0.001	-0.004	-0.001	-0.004
	(0.419)	(0.451)	(0.454)	(0.810)	(0.382)	(0.768)	(0.327)
ROA	0.029	0.031	0.030	0.015	0.027	0.011	0.031
	(0.491)	(0.464)	(0.476)	(0.772)	(0.514)	(0.822)	(0.493)
Return	0.016	0.016	0.015	0.023*	0.018*	0.025**	0.020*
	(0.110)	(0.119)	(0.129)	(0.084)	(0.082)	(0.034)	(0.065)
Growth	0.004	0.004	0.002	0.003	0.009	0.001	0.001
	(0.824)	(0.805)	(0.887)	(0.896)	(0.611)	(0.973)	(0.885)
Leverage	0.008	0.009	0.011	-0.008	0.003	-0.001	0.009
	(0.729)	(0.694)	(0.639)	(0.765)	(0.904)	(0.967)	(0.708)
Volatility	-0.059	-0.047	-0.048	-0.052	-0.065	-0.041	-0.044
	(0.500)	(0.596)	(0.588)	(0.647)	(0.458)	(0.682)	(0.639)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-square	0.308	0.310	0.311	0.310	0.312	0.311	0.310
Observations	3,921	3,921	3,921	3,921	3,921	3,921	3,921

Table 8
The confidence attribute link between the successor and predecessor CEOs

This table reports the results of the multinomial logit regression of the confidence attributes of succeeding CEOs on those of predecessor CEOs. The sample includes 707 CEO retirement turnovers and 356 forced CEO turnovers collected from the ExecuComp database over the period 1992-2012. The dependent variable is the attribute of the succeeding CEO, which equals one for overconfidence in Panel A (or diffidence in Panel B) and zero otherwise. *Predecessor_Ovt* is the attribute dummy for the predecessor CEO, which equals one for overconfidence and zero otherwise. *Predecessor_Dft* is another attribute dummy for the predecessor CEO, which equals one for diffidence and zero otherwise. A CEO/manager is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. *Forced* is a dummy variable that equals one if the predecessor CEO is forced to leave and zero for retirement turnover. *External* is a dummy variable that equals one if the succeeding CEO is selected through external recruitment and zero if the CEO is selected through internal promotion. Definitions of strategy change proxies and other variables are reported in Appendix A. The *p*-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively, based on standard errors corrected for heteroscedasticity and autocorrelations.

Panel A: Regressing overconfident successors

	(1)	(2)	Strategy Change Proxy				
			(3) Change1	(4) Change2	(5) Change3	(6) Change4	(7) Change5
Intercept	0.254* (0.062)	0.352** (0.046)	0.276* (0.091)	0.286*** (0.003)	0.279** (0.018)	0.312*** (0.004)	0.235** (0.014)
<i>Predecessor_Ovt</i>	0.318*** (<.001)	0.265*** (<.001)	0.213*** (<.001)	0.199*** (<.001)	0.211*** (<.001)	0.219*** (<.001)	0.202*** (<.001)
<i>Predecessor_Dft</i>	-0.206** (0.012)	-0.185*** (0.006)	-0.245*** (0.009)	-0.268*** (0.002)	-0.190*** (0.008)	-0.281** (0.011)	-0.194** (0.016)
<i>Forced</i>	-0.009 (0.853)						
<i>Forced*Predecessor_Ovt</i>	-0.214*** (0.006)						
<i>Forced*Predecessor_Dft</i>	0.068 (0.638)						
<i>External</i>		-0.062 (0.235)					

<i>External*Predecessor_Ovt</i>			-0.164**				
			(0.022)				
<i>External*Predecessor_Dft</i>			0.007				
			(0.865)				
<i>Strategy Change Proxy</i>			0.047	-0.084	0.012	-0.065	-0.005
			(0.336)	(0.293)	(0.817)	(0.305)	(0.901)
<i>Strategy Change Proxy*Predecessor_Ovt</i>			-0.178***	-0.069**	-0.076**	-0.185***	-0.085**
			(0.009)	(0.043)	(0.026)	(0.007)	(0.018)
<i>Strategy Change Proxy*Predecessor_Dft</i>			0.007	0.277	0.030	0.009	0.009
			(0.596)	(0.278)	(0.531)	(0.572)	(0.654)
<i>Log MV</i>	-0.023***	-0.032**	-0.021***	-0.029**	-0.019*	-0.027*	-0.018**
	(0.005)	(0.013)	(0.004)	(0.037)	(0.079)	(0.059)	(0.049)
<i>M/B</i>	0.045***	0.022**	0.021**	0.025**	0.036***	0.024**	0.035***
	(<.001)	(0.027)	(0.039)	(0.038)	(0.006)	(0.048)	(0.008)
<i>ROA</i>	0.298	0.205	0.350*	0.122	0.179	0.102	0.240*
	(0.131)	(0.214)	(0.062)	(0.433)	(0.168)	(0.512)	(0.089)
<i>Return</i>	0.075**	0.082**	0.077*	0.034*	0.086**	0.073*	0.083**
	(0.021)	(0.026)	(0.076)	(0.053)	(0.018)	(0.098)	(0.028)
<i>Growth</i>	-0.003	-0.005	-0.002	-0.133*	-0.060	-0.009	-0.002
	(0.156)	(0.214)	(0.974)	(0.081)	(0.278)	(0.159)	(0.966)
<i>Leverage</i>	0.233***	0.238***	0.223***	0.199**	0.186**	0.191**	0.228***
	(<.001)	(0.008)	(<.001)	(0.027)	(0.012)	(0.038)	(0.002)
<i>Volatility</i>	0.072	0.111	0.042	0.418	0.343	0.335	0.466
	(0.865)	(0.654)	(0.917)	(0.254)	(0.226)	(0.371)	(0.414)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-square	0.157	0.147	0.144	0.137	0.138	0.147	0.139
Observations	1,063	1,063	1,063	1,063	1,063	1,063	1,063

Panel B: Regressing diffident successors

	(8)	(9)	Strategy Change Proxy				
			(10) Change1	(11) Change2	(12) Change3	(13) Change4	(14) Change5
Intercept	-0.128 (0.145)	0.002 (0.353)	0.020 (0.866)	-0.087 (0.368)	-0.002 (0.985)	-0.104 (0.316)	0.072 (0.456)
<i>Predecessor_Ovt</i>	-0.071*** (0.002)	-0.068*** (0.001)	-0.072** (0.048)	-0.071** (0.024)	-0.058** (0.024)	-0.079** (0.043)	-0.115*** (0.003)
<i>Predecessor_Dft</i>	0.225*** (<.001)	0.158*** (<.001)	0.211*** (0.002)	0.254*** (<.001)	0.261*** (<.001)	0.306*** (<.001)	0.182** (0.028)
<i>Forced</i>	-0.043* (0.063)						
<i>Forced*Predecessor_Ovt</i>	0.069** (0.035)						
<i>Forced*Predecessor_Dft</i>	-0.139** (0.041)						
<i>External</i>		-0.016 (0.532)					
<i>External*Predecessor_Ovt</i>		0.051 (0.453)					
<i>External*Predecessor_Dft</i>		-0.152* (0.068)					
<i>Strategy Change Proxy</i>			0.044 (0.221)	-0.026 (0.639)	0.012 (0.746)	0.027 (0.565)	-0.015 (0.628)
<i>Strategy Change Proxy*Predecessor_Ovt</i>			0.022 (0.705)	0.044 (0.609)	0.004 (0.944)	-0.026 (0.701)	0.069 (0.130)
<i>Strategy Change Proxy*Predecessor_Dft</i>			-0.150** (0.036)	-0.287* (0.073)	-0.082** (0.038)	-0.192** (0.025)	-0.099* (0.058)
<i>Log MV</i>	0.018*** (0.003)	0.009 (0.162)	0.014 (0.113)	0.017* (0.074)	0.021*** (0.008)	0.017* (0.098)	0.019*** (0.008)
<i>M/B</i>	-0.005 (0.652)	0.002 (0.664)	0.001 (0.931)	-0.004 (0.718)	-0.001 (0.946)	-0.003 (0.778)	0.001 (0.935)
<i>ROA</i>	0.036 (0.758)	-0.003 (0.956)	0.072 (0.594)	0.070 (0.519)	0.018 (0.844)	0.077 (0.489)	0.063 (0.505)
<i>Return</i>	-0.027	-0.018	-0.004	-0.032	-0.037	-0.035	-0.016

	(0.167)	(0.356)	(0.881)	(0.240)	(0.118)	(0.213)	(0.508)
<i>Growth</i>	0.017	0.010	-0.058	-0.014	-0.006	-0.035	-0.071*
	(0.533)	(0.301)	(0.232)	(0.798)	(0.873)	(0.925)	(0.063)
<i>Leverage</i>	-0.018	-0.041	0.061	0.001	-0.007	-0.008	0.033
	(0.564)	(0.551)	(0.346)	(0.986)	(0.887)	(0.910)	(0.514)
<i>Volatility</i>	-0.251	-0.246	-0.543*	-0.067	-0.359*	-0.426*	-0.338*
	(0.115)	(0.132)	(0.066)	(0.127)	(0.071)	(0.073)	(0.086)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-square	0.062	0.067	0.078	0.067	0.065	0.081	0.067
Observations	1,063	1,063	1,063	1,063	1,063	1,063	1,063

Table 9

The association of successor selection and subordinate manager attribute by industry innovativeness and CEO power

This table presents the results of the probit regression of the selection of internal succeeding CEOs on the confidence attributes of subordinate managers for a sample of 3,921 manager-firm-year observations over the period 1992-2012, which includes 630 CEO retirement turnovers and 258 forced CEO turnovers collected from the ExecuComp database. The coefficients of control variables are not reported. The dependent variable is a dummy variable that equals one if a subordinate manager is promoted to be the succeeding CEO and zero otherwise. *SameAttribute* is a dummy variable that equals one for an individual manager if he has the same confidence attribute as the predecessor CEO and zero otherwise. *Predecessor_Ovt* is the attribute dummy for the predecessor CEO, which equals one for overconfidence and zero otherwise. *Predecessor_Dft* is another attribute dummy for the predecessor CEO, which equals one for diffidence and zero otherwise. A CEO/manager is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. *Innovative* is a dummy variable that equals one if a firm belongs to an innovative industry and zero otherwise. Definitions of CEO characteristics and other variables are reported in Appendix A. The *p*-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively, based on standard errors corrected for heteroscedasticity and autocorrelations.

	(1)	CEO Characteristic				
		(2) Tenure	(3) Title	(4) Share	(5) Pay Slice	(6) Power Index
Intercept	0.376*** (<.001)	0.386*** (0.002)	0.391*** (<.001)	0.398*** (<.001)	0.393*** (<.001)	0.390*** (<.001)
SameAttribute	-0.038** (0.027)	-0.029* (0.055)	-0.021** (0.049)	-0.037*** (0.001)	-0.029* (0.065)	-0.034** (0.035)
Predecessor_Ovt	-0.022 (0.273)	-0.022 (0.417)	-0.062 (0.249)	-0.026 (0.124)	-0.014 (0.400)	-0.032 (0.437)
Predecessor_Dft	-0.038 (0.201)	0.022 (0.668)	-0.083 (0.349)	-0.031 (0.253)	-0.084** (0.042)	-0.091 (0.278)
Predecessor_Ovt * SameAttribute	0.042** (0.022)	0.046*** (0.001)	0.055** (0.015)	0.074** (0.014)	0.068** (0.041)	0.053*** (0.006)
Predecessor_Dft * SameAttribute	0.071** (0.013)	0.047** (0.046)	0.028* (0.083)	0.056** (0.024)	0.044** (0.030)	0.031** (0.028)
Innovative	-0.012 (0.639)					
Innovative* SameAttribute	-0.012					

Innovative* Predecessor_Ovt	(0.672)					
	-0.008					
Innovative* Predecessor_Dft	(0.794)					
	0.019					
Innovative* Predecessor_Ovt * SameAttribute	(0.734)					
	0.038**					
Innovative* Predecessor_Dft * SameAttribute	(<.001)					
	-0.020*					
	(0.076)					
CEO Characteristic		0.002	-0.007	-0.001	0.013**	-0.002
		(0.280)	(0.729)	(0.701)	(0.047)	(0.843)
CEO Characteristic * SameAttribute		-0.002	0.013**	0.004	0.017**	0.016**
		(0.232)	(0.049)	(0.266)	(0.041)	(0.029)
CEO Characteristic * Predecessor_Ovt		-0.001	0.021	0.001	-0.012*	0.002
		(0.554)	(0.439)	(0.759)	(0.084)	(0.935)
CEO Characteristic * Predecessor_Dft		-0.005	0.025	-0.001	0.099*	0.026
		(0.198)	(0.576)	(0.796)	(0.083)	(0.479)
CEO Characteristic * Predecessor_Ovt * SameAttribute		0.032**	0.026***	0.012	0.003	0.024**
		(0.019)	(0.003)	(0.530)	(0.827)	(0.031)
CEO Characteristic * Predecessor_Dft * SameAttribute		0.011**	0.035**	-0.001	0.011*	0.026**
		(0.034)	(0.022)	(0.859)	(0.078)	(0.035)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-square	0.309	0.311	0.311	0.310	0.310	0.311
Observations	3,921	3,921	3,921	3,921	3,921	3,921

Table 10
The association of successor selection and subordinate manager attribute by board governance

This table presents the results of the probit regression of the selection of internal succeeding CEOs on the confidence attributes of subordinate managers for a sample of 3,921 manager-firm-year observations over the period 1992-2012, which includes 630 CEO retirement turnovers and 258 forced CEO turnovers collected from the ExecuComp database. The coefficients of control variables are not reported. The dependent variable is a dummy variable that equals one if a subordinate manager is promoted to be the succeeding CEO and zero otherwise. *SameAttribute* is a dummy variable that equals one for an individual manager if he has the same confidence attribute as the predecessor CEO and zero otherwise. *Predecessor_Ovt* is the attribute dummy for the predecessor CEO, which equals one for overconfidence and zero otherwise. *Predecessor_Dft* is another attribute dummy for the predecessor CEO, which equals one for diffidence and zero otherwise. A CEO/manager is classified as overconfident if she holds options at 100% or greater moneyness, as diffident if she exercises options at 30% or lower moneyness, and as rational if she is classified as neither overconfident nor diffident. Definitions of board characteristics are reported in Appendix A. The *p*-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively, based on standard errors corrected for heteroscedasticity and autocorrelations.

	(1) Board Size	(2) Director Ratio	(3) Director Tenure	(4) Director Share	(5) Director- ship	(6) Gender Ratio	(7) Nationality Mix	(8) Board Index
Intercept	0.397*** ($<.001$)	0.398*** ($<.001$)	0.393*** ($<.001$)	0.385*** (0.001)	0.392*** ($<.001$)	0.386*** ($<.001$)	0.392*** ($<.001$)	0.376*** ($<.001$)
SameAttribute	-0.023** (0.036)	-0.043*** (0.003)	-0.031* (0.086)	-0.041*** (0.003)	-0.083 (0.167)	-0.135* (0.094)	-0.045*** (0.002)	-0.075*** (0.006)
Predecessor_Ovt	-0.081 (0.483)	-0.023 (0.162)	-0.049 (0.350)	-0.021 (0.193)	-0.107* (0.093)	-0.133 (0.618)	-0.026 (0.111)	-0.139* (0.062)
Predecessor_Dft	-0.001 (0.992)	-0.032 (0.226)	-0.056 (0.488)	-0.024 (0.356)	-0.086 (0.418)	-0.329 (0.316)	-0.029 (0.286)	0.018 (0.866)
Predecessor_Ovt * SameAttribute	0.066** (0.014)	0.113*** (0.003)	0.087*** (0.005)	0.078*** (0.006)	0.045** (0.015)	0.076** (0.021)	0.076** (0.011)	0.073** (0.029)
Predecessor_Dft * SameAttribute	0.048* (0.063)	0.079** (0.024)	0.071* (0.058)	0.085* (0.063)	0.055** (0.041)	0.051** (0.017)	0.056** (0.047)	0.069* (0.055)
Board Characteristic	0.003 (0.970)	-0.108 (0.652)	0.001 (0.857)	-0.524 (0.881)	0.016** (0.035)	-0.087 (0.717)	-0.098 (0.538)	-0.004 (0.847)
Board Characteristic * SameAttribute	-0.009 (0.361)	0.017 (0.950)	-0.001 (0.799)	-2.523 (0.599)	-0.020** (0.032)	0.106 (0.713)	0.140 (0.438)	-0.003 (0.914)
Board Characteristic * Predecessor_Ovt	-0.001 (0.992)	-0.060 (0.837)	0.003 (0.619)	-3.562 (0.456)	-0.021** (0.031)	-0.176 (0.558)	0.103 (0.580)	0.020 (0.401)

Board Characteristic * Predecessor_Dft	-0.006 (0.668)	-0.084 (0.847)	0.003 (0.752)	-8.851 (0.177)	-0.018 (0.229)	0.337 (0.364)	0.017 (0.943)	-0.028 (0.408)
Board Characteristic * Predecessor_Ovt	0.026*	-0.059**	-0.017*	-0.092	-0.013	0.020	-0.111	-0.012
* SameAttribute	(0.064)	(0.018)	(0.058)	(0.159)	(0.292)	(0.960)	(0.671)	(0.697)
Board Characteristic * Predecessor_Dft *	0.022*	-0.032***	-0.026*	-0.039***	-0.074	-0.294	0.278	-0.011*
SameAttribute	(0.072)	(0.007)	(0.060)	(<.001)	(0.213)	(0.615)	(0.566)	(0.078)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-square	0.309	0.309	0.310	0.311	0.311	0.308	0.308	0.311
Observations	3,921	3,921	3,921	3,921	3,921	3,921	3,921	3,921

Table 11
Robustness check on the association of successor selection and subordinate manager attribute

This table presents the results of the probit regression of the selection of internal succeeding CEOs on the confidence attributes of subordinate managers for a sample of 3,921 manager-firm-year observations over the period 1992-2012, which includes 630 CEO retirement turnovers and 258 forced CEO turnovers collected from the ExecuComp database. The coefficients of control variables are not reported. The dependent variable is a dummy variable that equals one if a subordinate manager is promoted to be the succeeding CEO and zero otherwise. *SameAttribute* is a dummy variable that equals one for an individual manager if he has the same confidence attribute as the predecessor CEO and zero otherwise. *Predecessor_Ovt* is the attribute dummy for the predecessor CEO, which equals one for overconfidence and zero otherwise. *Predecessor_Dft* is another attribute dummy for the predecessor CEO, which equals one for diffidence and zero otherwise. A CEO/manager is classified as overconfident if her net share purchases are positive throughout her entire tenure at a firm, as diffident if her net share selling is more than 10% of her total shareholding in the firm, and as rational if she is classified as neither overconfident nor diffident. *Forced* is a dummy variable that equals one if the predecessor CEO is forced to leave and zero for retirement turnover. Definition of *Strategy Change1* is reported in Appendix A. The *p*-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively, based on standard errors corrected for heteroscedasticity and autocorrelations.

	(1)	(2)
Intercept	0.356*** (0.006)	0.359*** (<.001)
SameAttribute	-0.023* (0.086)	-0.022* (0.056)
Predecessor_Ovt	0.113*** (<.001)	0.123*** (<.001)
Predecessor_Dft	-0.069* (0.078)	-0.031 (0.319)
Predecessor_Ovt * SameAttribute	0.055** (0.041)	0.096** (0.033)
Predecessor_Dft * SameAttribute	0.161** (0.013)	0.182** (0.017)
Forced	-0.032 (0.446)	
Forced* SameAttribute	-0.010** (0.031)	
Forced* Predecessor_Ovt	0.056 (0.251)	
Forced* Predecessor_Dft	0.096 (0.127)	
Forced* Predecessor_Ovt * SameAttribute	-0.081*** (0.004)	
Forced* Predecessor_Dft * SameAttribute	-0.098** (0.042)	
Strategy Change1		-0.017

		(0.278)
Strategy Change1 * SameAttribute		-0.041**
		(0.035)
Strategy Change1* Predecessor_Ovt		0.014
		(0.640)
Strategy Change1* Predecessor_Dft		-0.022
		(0.687)
Strategy Change1* Predecessor_Ovt * SameAttribute		-0.047**
		(0.028)
Strategy Change1* Predecessor_Dft * SameAttribute		-0.135**
		(0.043)
Control Variables	Yes	Yes
Industry Dummies	Yes	Yes
Year Dummies	Yes	Yes
Adj R-square	0.315	0.314
Observations	3,921	3,921

Appendix A: Definition of variables

AT	Book value of total assets.
MV	Book value of total assets minus the book value of equity plus the market value of equity.
M/B	Market-to-book ratio, obtained as the ratio of <i>MV</i> to <i>AT</i> .
ROA	Ratio of net income to total assets.
Return	Annual raw stock return during the fiscal year.
AReturn	Annual raw stock return during the fiscal year, adjusted by the median return of two-digit SIC industry peers.
Growth	Percentage change in the sales compared to the previous year.
Volatility	Standard deviations of raw stock returns computed over the five years prior to an observation year.
Leverage	Book value of liabilities divided by the book value of total assets.
Investment	Industry-adjusted investment rate, obtained as a firm's capital expenditure divided by the firm's year-beginning property, plants, and equipment, deducting the median rate of the whole two-digit SIC code industry in the same year.
Cash Pay	A CEO/manager's cash payment, obtained as the sum of salary and annual bonus.
Equity Pay	A CEO/manager's equity payment, obtained as the sum of the value of restricted stock granted during the year, the value of stock options granted during the year, and long-term incentive payouts.
Total Pay	A CEO/manager's total payment, obtained as the sum of salary, bonus, other annual compensation, value of restricted stock granted, value of stock options granted during the year, long-term incentive payouts, and all other compensation.
Compensation Ratio	<i>Equity Pay</i> divided by <i>Total Pay</i> .
Share Percentage	A CEO/manager's share percentage (options included) in the firm.
Vega	The sensitivity of executive compensation to stock return volatility based on Guay (1999).
Gender	A CEO/manager's gender, which is set to be one for male and zero for female.
Age	A CEO/manager's age at year-end.
Tenure	The number of years that a CEO/manager holds the current position, calculated from the beginning of the year in which a manager is hired (or from the year 1992, if the beginning year cannot be tracked) to the current fiscal year.
MBA	A dummy variable that equals one if a CEO/manager holds a Master of Business Administration degree and zero otherwise.
Doctor	A dummy variable that equals one if a CEO/manager's highest level of education is a doctor degree and zero otherwise.
Master	A dummy variable that equals one if a CEO/manager's highest level of education is a master's (non-MBA) degree and zero otherwise.
Bachelor	A dummy variable that equals one if a CEO/manager's highest level of education is a bachelor's degree and zero otherwise.

Law	A dummy variable that equals one if a CEO/manager owns a law degree at bachelor's level or higher and zero otherwise.
Finance	A dummy variable that equals one if a CEO/manager holds a Chartered Professional Accountant, Chartered Financial Analyst, or Certified Public Accountant certificate, and/or if he/she had worked as a treasurer, controller, or chief financial officer in the current or previous firms and zero otherwise.
Industry	A dummy variable that equals one if a CEO/manager is classified as neither <i>Law</i> nor <i>Finance</i> group and zero otherwise.
Heir Apparent	A manager's position in the firm in the year preceding CEO turnover, which is set to be one if he holds the position of President and/or chief operating officer and zero otherwise.
Alumni	A dummy variable that equals one if a manager graduates from the same university with the incumbent CEO and zero otherwise.
Same Degree	A dummy variable that equals one if a manager's highest degree of education is the same with the incumbent CEO and zero otherwise.
Same Profession	A dummy variable that equals one if a manager's profession is the same with the incumbent CEO and zero otherwise, where profession is classified as <i>Law</i> , <i>Finance</i> and <i>Industry</i> .
Same Gender	A dummy variable that equals one if a manager's gender is the same with the incumbent CEO and zero otherwise.
CEO Title	Equals one if a CEO does not hold any board position, two if the CEO is also the Chairman of the board, and three if the CEO is both the Chairman of the board and the President.
CEO Pay Slice	The percentage of the total compensation of the CEO to the top five executives, where total compensation is obtained as the sum of salary, bonus, other annual compensation, value of restricted stock granted, value of stock options granted during the year, long-term incentive payouts, and all other compensation.
CEO Power Index	The sum of the coding of four CEO characteristics in the following manner: <i>CEO Tenure</i> is coded as one if it is above the median level of the whole CEOs in the sample and zero otherwise; <i>CEO Pay Slice</i> is coded as one if it is above the median level of the whole CEOs in the sample and zero otherwise; <i>CEO Share Percentage</i> is coded as one if it is above the median level of the whole CEOs in the sample and zero otherwise; <i>CEO Title</i> is coded as one if its value is above the median level of the whole CEOs in the sample and zero otherwise.
Board Size	The number of directors on the board.
Director Ratio	The proportion of independent directors on the board that are not appointed by the incumbent CEO.
Director Tenure	The average number of years that directors have served in the position.
Director Share	The average percentage of a firm's shares held by directors.
Directorship	The average number of boards that directors have served on.
Gender Ratio	The proportion of male directors on the board.

Nationality Mix Board Index	<p>The proportion of directors from different countries on the board.</p> <p>The sum of the coding of seven board characteristics in the following manner: <i>Board Size</i> is coded as one if it is below the median level of the whole sample and zero otherwise; <i>Director Ratio</i> is coded as one if it is above the median level of the whole sample and zero otherwise; <i>Director Tenure</i> is coded as one if it is above the median level of the whole sample and zero otherwise; <i>Director Share</i> is coded as one if it is above the median level of the whole sample and zero otherwise; <i>Directorship</i> is coded as one if it is above the median level of the whole sample and zero otherwise; <i>Gender Ratio</i> is coded as one if it is below the median level of the whole sample and zero otherwise; <i>Nationality Mix</i> is coded as one if it is above the median level of the whole sample and zero otherwise.</p>
Forced	A dummy variable that equals one if the predecessor CEO is forced to leave and zero for retirement turnover.
External	A dummy variable that equals one if the succeeding CEO is selected through external recruitment and zero if the CEO is selected through internal promotion.
Strategy Change1	<p>The extent of strategic change constructed from four dimensions: (1) plant and equipment newness (net P&E/gross P&E), (2) research and development intensity (R&D/sales), (3) financial leverage (debt/equity), and (4) nonproduction overhead (selling, general, and administrative expenses/sales). Based on the four dimensions, the extent of a firm's strategic change initiated surrounding CEO succession is obtained in the following way: <i>First</i>, the percentage change is calculated for each strategic dimension for each sample firm from one year before the CEO turnover to three years after the turnover. Firm-years with missing information required are treated as having zero value. Industries are classified at the two-digit SIC codes. <i>Second</i>, for each strategic dimension, if the absolute value of percentage change is larger than the median absolute value of industry peers, then it is coded as one and zero otherwise. <i>Third</i>, the extent of strategic change initiated for each sample firm is obtained as the sum of coding for the four dimensions.</p>
Strategy Change2	<p>The change of the strategic type (i.e., strategy differentiation) for a corporation in its industry, according to Miles and Snow's (1978) typology of strategy. We define the change of strategic type in the following way: <i>First</i>, for each year, firms in an industry are divided into four groups based on the ratio of a firm's sale to the total sales of the industry peers. Similarly, firms are also divided into four groups based on the ratio of a firm's research and development (R&D) expense to the total R&D expense of the industry peers. Firm-years with missing information required are treated as having zero value. Industries are classified at the two-</p>

	<p>digit SIC codes. <i>Second</i>, a firm is classified as <i>prospecting</i> if both ratios are at the fourth quartile (the highest 25%) in an observation year, as <i>reacting</i> if both ratios are at the first quartile (the lowest 25%), and as <i>defending/analyzing</i> if it is classified as neither prospecting nor reacting. <i>Third</i>, a firm is classified as strategic change (persistence) if its strategic type in the year before CEO turnover is different (same) with that in the third year after turnover.</p>
Strategy Change3	A dummy variable that equals one if the sum of transaction values of acquisitions/divestitures for a firm in the three years following a CEO turnover is larger than 20% of the firm's equity in the year before turnover and zero otherwise.
Strategy Change4	A dummy variable that equals one if a firm mentions any change in operation plan from the perspective of consumer product development, cost reduction, international deployment, or undertaking acquisitions/divestitures in its annual reports, conference calls, or press reports in the three years following a CEO turnover and zero otherwise.
Strategy Change5	A dummy variable that equals one if the average industry cash flow (i.e., operating cash flow/assets) in the three years preceding CEO turnover is below the average in the preceding ten years and zero otherwise.
Innovative	A dummy variable that equals one if a firm belongs to an innovative industry and zero otherwise. To define industry innovativeness, the average R&D expenditure is calculated for each industry, scaled by book assets per year per industry, in which industries are classified at the two-digit SIC level. An industry is defined as innovative if its R&D expenditure in a given year is above the median R&D expense across all industries for more than 50% of the sample period and as noninnovative otherwise.
SameAttribute	A dummy variable that equals one for an individual subordinate manager if he has the same confidence attribute as the predecessor CEO and zero otherwise.
Predecessor_Ovt	The attribute dummy for the predecessor CEO, which equals one for overconfidence and zero otherwise.
Predecessor_Dft	The attribute dummy for the predecessor CEO, which equals one for diffidence and zero otherwise.
Year	The observation year of a firm.
Industry	The industry that a firm belongs to.

Appendix B: A case of corporate strategy change

Bristol-Myers Squibb Company changed its CEO in 2007. The following is an excerpt from the part of Management's Discussion and Analysis of Financial Condition and Results of Operations in the firm's annual report in 2007:

"Business Environment

The Company has maintained a competitive position in the market and strives to uphold this position, which is dependent on its success in discovering and developing innovative, cost-effective products that serve unmet medical need. Recently, several of the Company's competitors have announced cost reduction programs in an effort to reduce their respective cost bases and increase their productivity and competitiveness. The Company has also announced a three-year PTI to reduce costs, streamline operations and rationalize global manufacturing as part of its efforts to become a more productive and competitive biopharmaceutical company.

Strategy

In December 2007, the Company outlined its multi-year strategy designed to transform the Company into a next-generation biopharmaceutical company. The strategy encompasses all aspects and all geographies of the business and will yield substantial cost savings and cost avoidance and increase the Company's financial flexibility to take advantage of attractive market opportunities that may arise.

As it transitions into a next-generation biopharmaceutical company, the Company seeks to reallocate resources to enable strategic acquisitions, such as the acquisition of Adnexus in October 2007, as well as pursue partnerships and other collaborative arrangements, such as the worldwide alliance with AstraZeneca PLC (AstraZeneca) to discover, develop and commercialize saxagliptin and dapagliflozin and the two separate agreements with Pfizer Inc. (Pfizer) for the research, development and commercialization of a Pfizer discovery program and for the development and commercialization of apixaban. ”