Journal of Banking and Finance 113 (2020) 105733

Contents lists available at ScienceDirect

Journal of Banking and Finance

journal homepage: www.elsevier.com/locate/jbf

# Governance, board inattention, and the appointment of overconfident CEOs☆

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ARTICLE INFO

*Article history:*
Received 9 September 2018
Accepted 28 December 2019
Available online 17 January 2020

*JEL classification:*
G34

*Keywords:*
Executive overconfidence
CEO turnover
New CEO selection
Executive tenure
Internal appointment
Governance
Boards
Information asymmetry

ABSTRACT

Are overconfident executives more likely to be promoted to CEOs? Using an option-based overconfidence measure, we show that firms with overconfident executives tend to hire internally. Further, when firms hire internally, they are more likely to pick a more confident candidate. The results suggest that governance and board inattention can play a role, with overconfident executives being more likely to become CEOs in firms with entrenched and busy boards, suggesting that such boards might confuse luck-with-skill following the confident executives' tendencies towards greater risk-taking.

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> "Being more likeable and confident makes you more likely to be hired in that role, but it has no relationship to performance" – Elena Lytkina Botelho, partner at ghSMART and founder of The CEO Genome Project.

## 1. Introduction

A personality trait that is routinely associated with corporate CEOs is "overconfidence". CEOs are frequently perceived to have an exaggerated opinion of their own abilities and the prospects of the firms they manage. Indeed, anecdotal reports suggest that boards might shy away from hiring people seen as too introverted. Certainly, many founder CEOs are overconfident (Lee et al., 2017) and, according to established metrics, so are many non-founders (see e.g., Otto, 2014; Sen and Tumarkin, 2015).[1]

Overconfident CEOs are generally associated with worse corporate performance. They over-estimate their own abilities, leading them to overinvest (Malmendier and Tate, 2005), and engage in value-reducing takeovers (Malmendier and Tate, 2008; Kolasinski and Li, 2013; Banerjee et al., 2015). In an entrepreneurial context, overconfidence can induce individuals to erroneously overestimate success likelihood when entering new markets (Artinger and Powell, 2016), though in some contexts - such as in innovative firms - such risk-taking can be beneficial (Hirshleifer et al., 2012). However, overconfident CEOs are less likely to learn from their mistakes

☆ The paper benefited from comments received from presentations at University of Adelaide, Brandeis University, Curtin University, Monash University, Nanyang Technological University, National University of Singapore, UNSW Business School, University of Queensland, and University of Technology Sydney. We also thank the participants at the Sirca Young Researcher Workshop (2014), Financial Management Association Annual Meeting (2014), New Zealand Finance Colloquium (2015), Indian Finance Conference (2015), FMA Asia-Pacific Meeting (2016), Asian Finance Association Meeting (2017), Australasian Finance and Banking Conference (AFBC, 2017), Australian Conference of Economists (ACE, 2017), FIRN Annual Meeting (2017), and the China International Conference on Finance (CICF, 2017). We further thank Syed Zamin Ali, Martin Bugeja, Robert Durand, Xue Han, Ravi Jagannathan, Tuyet Nhung Le, Sophia Li, Chelsea Liu, Wei-lin Liu, Zoltan Matolcsy, Thomas Noe, Barry Oliver, Shams Patham, Vanitha Ragunathan, Lee Smales, Tom Smith, Bill Wilhelm, David Yermack, and Jeffrey Yu. Humphery-Jenner acknowledges the financial support of ARC DECRA Grant DE150100895. All authors contributed equally to the paper; authors are in alphabetical order.

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[1] https://www.bbc.com/worklife/article/20170803-busting-the-myths-of-successful-ceos.

https://doi.org/10.1016/j.jbankfin.2019.105733
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(Chen et al., 2015) and ultimately expose their firms to greater litigation risk (Banerjee et al., 2018b). This can lead to overconfident CEOs facing greater turnover risk (Choi et al., 2013).

This begs the question of why such overconfident individuals might become CEOs in the first place. In general, we would expect firms to select CEOs that fit their strategic goals and imperatives (Chen and Hambrick, 2012; Cichello et al., 2009; Bol et al., 2010). In certain cases, an overconfident CEO would be an appropriate choice. For example, in an innovative firm that seeks additional entrepreneurial risk-taking, an overconfident CEO could be beneficial. However, this benefit accrues in a sub-set of innovative firms, rather than in the broad cross-section of companies (see e.g., Hirshleifer et al., 2012). Thus, in this paper, we focus on a governance- and information-based explanation for the prevalence of overconfident CEOs. Zajac (1990) and Zhang (2008), for example, highlight that boards face informational barriers when appointing CEOs. This even applies to internal appointments because the CEO skill set differs from that of other executives (Zhang and Rajagopalan, 2004). Since it is inherently difficult to discern ability, successful executives may often be overconfident individuals who took more risks and were fortunate in terms of the outcome. Further, because executives can often shift blame for failures but take credit for successes, they may be asymmetrically rewarded for successes, but not penalized in the job-market for failures (Harford and Schonlau, 2013). Thus, an overconfident individual's tendency to take more risks can increase the likelihood of being perceived as high ability and being promoted.

We expect these governance and information barriers to become more severe in companies with weaker board oversight. Worsening oversight could arise if the firm's directors are "busy" owing to multiple other board appointments (Masulis and Mobbs, 2014). Information barriers can also be more severe where the board is relatively more entrenched through mechanisms such as anti-takeover provisions, and classified boards, which can insulate directors from disciplinary takeovers and facilitate value-destruction (Masulis et al., 2007; Harford et al., 2012) and shirking (Bertrand and Mullainathan, 2003). These oversight issues would weaken directors' incentives to push through the informational barriers at the CEO appointment stage, and rely more on the public signals generated by a candidate's risk-taking.

We obtain executive and turnover data from Execucomp, and corporate data from CRSP/Compustat. For our empirical tests, we start with a sample of CEO-turnover events between 1994 and 2016. We start by looking at whether firms are more likely to hire an overconfident candidate when selecting a CEO. The initial results look at both internal and external hires. We then pay particular attention to the sub-sample of CEO-turnover events in which an internal candidate (someone who has been with the company for at least one year) is hired. This sub-sample allows us to examine the factors that companies weigh in choosing among internal candidates. For our measures of overconfidence, we compute option-based measures of overconfidence, similar to those in Banerjee et al. (2015); Malmendier and Tate (2005, 2008) for each executive in the sample.[2]

Our analysis of the attributes of potential candidates at the selection stage confirms that, on the whole, firms exhibit a distinct preference for overconfident CEOs. Further, we find that companies with more overconfident senior executives are more likely to hire internally. This is potentially symptomatic of firms promoting individuals who have a prolific investment track record.

Next, we use conditional logit models to assess whether, conditional on an internal hire, the more confident candidates in a firm tend to be promoted to CEO. The benefit of this methodology is that it accounts for the grouping of executives within a firm, and allows us to examine the executive-specific (rather than firm-specific) factors, such as overconfidence, that influence whether an executive is promoted at a given firm. We control for various executive-level variables such as tenure, current position, and compensation level. We find that among a firm's senior executives, the overconfident ones are more likely to be promoted to CEO when the firm hires internally.

We further explore which governance-related factors are associated with appointing an overconfident executive to CEO. We find evidence that governance and board inattention influences appointment decisions. These types of situations are more likely to exacerbate the latent informational problems that arise when identifying new CEOs. That is, overconfident individuals are more likely to be selected at companies with more anti-takeover provisions and a classified board, as well as with busier boards. They are also more likely to be appointed at companies with greater information asymmetry.

We undertake a battery of robustness tests to eliminate alternative explanations for our results. Preliminarily, we control for the other executive-level characteristics that might affect hiring decisions. These include (but are not limited to) the executive's position, tenure, and pay. The conditional logit model also controls for any firm-related factors that might influence decisions in an individual turnover event. Additionally, we ensure that the results hold when we restrict the sample to the upper echelons of management (thereby ensuring that our results do not merely reflect an artifact of executive seniority, pay, or tenure). We also check that our results are not merely driven by executives holding options to appear loyal (and, in so doing, indirectly appear overconfident according to option based measures). In addition, we undertake several additional robustness tests to ensure that other factors do not drive the results.

The remainder of this paper proceeds as follows. Section 2 discusses the prior literature and contains the empirical predictions. Section 3 describes the data. Section 4 presents the main results. Section 5 contains additional robustness tests. Section 6 concludes.

## 2. Hypotheses

It is not unusual for CEOs to be overconfident individuals with an inflated sense of their own abilities and the prospects of firms they manage. This section draws on the literature on CEO-firm matching, and on information asymmetry in management turnover, to hypothesize why that might be the case.

At the time of CEO selection, firms lack full information about candidates' abilities (Zajac, 1990; Zhang, 2008). This information asymmetry can cause boards to misinterpret candidates' signals about their performance. Indeed, the information asymmetry can favor the selection of risk-taking candidates. Arguably, overconfident executives might be more prone to overinvest, or to enter new markets without paying sufficient heed to the potential competition (Moore et al., 2007).[3] Excess investment and market entry can, in turn, lead to organizational failure and value destruction (Barnett and Freeman, 2001; Simon and Houghton, 2003; Hmieleski and Baron, 2009). However, overconfidence coupled risk-taking and luck can cause a misidentification of luck for skill. This is especially the case given the empirical finding that executives tend to be asymmetrically rewarded in the labor market for

[2] We focus on option-based measures of overconfidence, as opposed to news-based measures of overconfidence (see e.g., Hirshleifer et al., 2012), as the news-based measures are premised on being able to identify news-reports pertaining to a particular individual. It is not necessarily realistic to expect non-C-suite executives to appear regularly in news articles.

[3] An additional perspective is that errors in judgement, in addition to overconfidence, could generate such excess market entry (Hogarth and Karelaia, 2012).

successes, but are not punished for failures Harford and Schonlau (2013).

There are potentially several reasons for such CEO selection. First, the selection of an overconfident CEO could be the result of board's inattention or lack of due diligence. It may be the case that board members are too busy to carefully scrutinize each candidate and in the process may overlook "behavioral attributes', which are comparatively more difficult to identify. In this case, a board could pay undue deference to apparently charismatic – and confident – candidates.[4] Similarly, if the board is entrenched, they may not exert the effort required to perform a careful scrutiny of all potential candidates because they are, for instance, less concerned about the threat of a hostile takeover. These boards may, therefore, be more prone to select executives that appear talented but are actually overconfident individuals that took excessive risks and were lucky. This is because, by definition, overconfident executives are more willing to take risks (Hirshleifer et al., 2012; Bernardo and Welch, 2001). This manifests, for instance, in the type of compensation contracts such individuals prefer (Humphery-Jenner et al., 2016). If successful, overconfident executives will generate larger payoffs and be seen as having greater ability – the case of "rewarded for luck." This implies that among firms as a whole, we would expect overconfident individuals to be more likely to be selected as CEO.

Thus, we expect that more confident executives are more likely to be selected as CEO. Further, firms with more overconfident executives will be more likely to hire internally rather than seek an external CEO. Subsequently, we make the following hypotheses.

**Hypothesis 1.** Executive confidence increases the likelihood that he/she is appointed as CEO.

**Hypothesis 2.** A firm with a larger pool of overconfident executives is less likely to hire an external CEO.

Next, we look at the second stage of the CEO selection process, where the board chooses to hire an internal candidate for CEO. Boards do have better information about candidates when hiring an insider to become CEO (Zajac, 1990). However, even when selecting an internal candidate, boards lack full information about candidates' capabilities. This is because, for instance, CEOs' skill sets differ from that of other executive functions (Zhang and Rajagopalan, 2004). This implies that boards might similarly rely on observable characteristics, as manifested through CEO overconfidence (and its associated investment) when making selection decisions.

From the perspective of our research question, an advantage of this conditional choice is the fact that we can observe the set of internal candidates (in Execucomp) who are considered by the board for the CEO position, and we can collect relevant data on these candidates. Thus we ask the following question: controlling for various other characteristics of these internal candidates, does an executive's overconfidence increase the likelihood that he/she will be selected as CEO? Formally, we state the following hypothesis:

**Hypothesis 3.** In the case of an internal CEO hire, a firm's overconfident senior executives have a higher chance of being selected for the top post.

We have argued above that information asymmetry can drive the selection of an overconfident CEO. This is premised on the idea that boards have difficulty evaluating candidates. The evaluation process could be further hampered by busyness or agency conflicts at the board level, which could induce board members to exert less effort than would be optimal. Overconfident CEOs, as indicated above, can be more capable of grandstanding by undertaking a series of risky investments. Thus, the board could simply observe the investments' outcomes, without inquiring adequately into their characteristics, and appoint an overconfident CEO.

The information asymmetry issue will concentrate more in some types of boards. In this context, it will be situations where the directors are 'busy' and lack time to mitigate some information asymmetry. To some extent, business arising from a director having multiple outside positions can imbue that director with additional skills, knowledge, and connections (Masulis and Mobbs, 2011). However, busy directors also tend to devote less time to each individual role, in general. For example Masulis and Mobbs (2014) show that busy directors tend to prioritize roles at larger companies, though clearly each company receives less time than if the director had fewer positions.[5] Hence, the presence of busy directors could detract from the scrutiny of potential CEO candidates and raise the odds of an overconfident CEO being appointed. We capture this in the following hypothesis.

**Hypothesis 4.** Firms with busier boards are more likely to appoint overconfident CEOs.

Information asymmetry issues will also be worse if the board is 'entrenched'. An entrenched board is protected from hostile takeovers that might arise if the board selects a low-quality CEO. Entrenchment is operationalized through mechanisms such as poison pills and classified board structures. Entrenchment allows boards to exercise less discipline, and exert less effort, when making decisions (Bertrand and Mullainathan, 2003). In turn, this can manifest in low-quality investment decisions (Masulis et al., 2009; Gompers et al., 2003; Bebchuk et al., 2009). For example, entrenchment enables managers to make worse acquisition decisions and potentially to engage in self-interested behavior (Humphery-Jenner and Powell, 2011; Harford et al., 2012; Masulis et al., 2007; Humphery-Jenner, 2012). As a result, an entrenched board (i.e., one with a preponderance of anti-takeover provisions), will be less inclined to mitigate issues of information asymmetry.[6] Thus, they will be more likely to rely on the easily observable grandstanding that overconfident candidates might display. Hence, we hypothesize:

**Hypothesis 5.** Firms with more entrenched boards are more likely to appoint overconfident CEOs.

As indicated above, information asymmetry can make it more difficult for boards to distinguish luck from skill, and could lead boards to select an overconfident executive. This implies that information asymmetry per se should be positively related to the appointment of an overconfident executive. One driver of information asymmetry is corporate complexity. Corporate complexity tends to increase with the number of different geographic regions that the firm operates in. Further, another proxy for information asymmetry is the firm's stock return volatility. More volatile returns tend to suggest that the market has more difficulty pricing the firm and imply that the firm has greater information asymmetry. Additionally, firms with less analyst coverage face higher information asymmetry as analysts are a key conduit of information to the market. This would also impact boards as boards - to some extent - cross-validate their beliefs by reference to other independent third-party analysis. Therefore, we make the following hypothesis:

[4] This is consistent with evidence that analysts tend to pay undue attention to 'charismatic' CEOs pronunciations (Ganelli et al., 2009).

[5] These problems tend to be more severe for insider directors (Liu and Paul, 2015).

[6] We acknowledge that a degree of entrenchment is less harmful in some specific circumstances (Humphery-Jenner, 2014; Johnson et al., 2015). However, entrenchment is generally regarded as harmful for the average firm.

**Hypothesis 6.** Firms with greater information asymmetry are more likely to appoint overconfident CEOs.

## 3. Data

### 3.1. Sample Construction

This study utilizes several standard databases. We use the Execucomp Database for data on executive and CEO compensation to construct a cross-sectional sample of all turnover events involving firms in the Execucomp universe (mostly S&P 1500 companies) between 1994 and 2016. We obtain 4,381 turnover events along with firm-level data from Compustat for each event. Of these, firms choose an internal candidate in 2,567 cases. A company can be involved in more than one turnover event. For each observation, we identify whether the firm hires an internal or an external candidate, where an internal candidate is defined to be an executive who has been with the company for at least two years.[7] We also collect information on all external candidates in Execucomp in the year of a turnover. From the Execucomp database we also obtain other executive characteristics that might influence corporate performance, including tenure and age, the ratio of incentive compensation, and the executive's percentage ownership.

We build an executive-level dataset of all potential CEO hires for each turnover event. We construct it by identifying each turnover. We then obtain the aforementioned data on the firm's own internal candidates. We supplement this with data on all executives in the Execucomp universe at the time of the turnover and in the same SIC two-digit industry as the hiring firm. We focus on external executives in the firm's two-digit SIC industry as executives in similar industry are the most plausible candidates to become CEO.[8] We use this dataset in order to identify how an executive's confidence level influences the likelihood that he/she is appointed as CEO.

We construct an executive-level sample for internal-CEO hires. The details of the sample-construction process are in Appendix 1. This sample allows us to look at whether corporations tend to select more confident executives, conditional on an internal hire. We winsorize all continuous variables at 1%.

### 3.2. Overconfidence Measures

For our measures of managerial overconfidence, we focus on option-based measures of overconfidence, and check the robustness of the results to our chosesn measure. The logic behind option based measures is that an executive's human capital is undiversified and is concentrated in her company. Thus, a rational, risk-averse executive will want to cash-out her well in-the-money options early in order to reduce her risk exposure – while an overconfident executive might not.[9] Subsequently, several prior studies have used executive option holdings in order to assess their level of overconfidence.[10]

We collect the number and value of unexercised, but vested, options that an executive has in year $t$ (both from the Execucomp database). We then construct the value-per-option by dividing the value of the executive's vested-but-unexercised option holdings by the number of such options held. The 'Confidence' measure is then constructed as a measure of how far in-the-money the options are, which we obtain by dividing the value-per-option by the share price at the end of the fiscal year. For the most part, we use a continuous variable, rather than an indicator-measure (such as 'Holder67'), since it enables us to rank various executives in terms of their confidence level, and also coheres with the idea that there could be a continuum of confidence-levels (per Ben-David et al., 2013). We also take the natural logarithm of one plus the level of confidence in order to account for potential non-linearities in the confidence/promotion relationship. In additional tests, we examine the ranking of the executive's level of confidence relative to her peers at the firm, and examine the effect of the quadratic of the confidence term to allow for non-monotonicity (e.g., the possibility that, beyond some level, the likelihood of an executive being promoted might not be increasing monotonically in confidence). In robustness tests, we also find that the results are qualitatively similar if we use the Holder67 measure of overconfidence (see Section 5).

While our measures of overconfidence are similar to those used in Malmendier and Tate (2008, 2005), there are some differences: First, they rely on indicator variables that equal one if their option-based measures are above a particular threshold. For example, *Holder67* requires that the persons have held their options for at least five years, while the stock price has appreciated by at least 67% over that time.[11] As noted, we use a continuous measure of overconfidence, however, since the continuum of overconfidence-levels allows us to rank among executives. Second, their measures require several years of data (e.g., *Holder67* requires five years of data). Such a time-span of data is often not available for non-CEO executives. Thus, to capture the situations where the executive has not been in the firm for more than five years, we use a yearly measure of confidence. However, since our measure is based on the value of vested-but-unexercised options (and vesting periods are usually multiple years), our measure is only a slight relaxation of the five-year requirement in Malmendier and Tate (2008, 2005).

There are other overconfidence-measures in the literature that we do not use for our analysis. First, we do not use a press-based measure of overconfidence (see e.g., Hirshleifer et al., 2012; Chen et al., 2015). This is because individual executives do not usually present themselves in media-reports. Thus, press-based measures are more apt to describe the overconfidence of the CEO or that of the overall management team (as not allowing a comparison of individual managers). Second, we do not use trading-behavior measures (see e.g., Kolasinski and Li, 2013). Such measures tend to classify a manager as overconfident if he/she purchases shares and loses money on that purchase. Consequently, overconfident CEOs that increase corporate value could be classified as non-overconfident under trading-behavior measures. In our specific context, this can raise problems because the two-year trading window (as per Kolasinski and Li, 2013) would overlap with the turnover event, which itself could drive stock returns.

### 3.3. Proxies for and Board Failure and Information Asymmetry

We construct the measures of board failure by using board busyness and board entrenchment. As indicated above, we anticipate a busy and entrenched board to be more susceptible to

[7] The objective is to not misclassify as internal hires, the cases in which an individual joins the firm with the understanding that she is soon to be elevated to CEO.

[8] In robustness tests, we relax this requirement, and look at other SIC industry classifications, and we find qualitatively similar results.

[9] An alternative explanation for the failure to exercise/cash-out options could be that the executive has private information suggesting that the company will perform above-market-expectations. However, Malmendier and Tate (2008) find that overconfident CEOs tend to lose money on their trades, implying that such option-based measures of overconfidence do not merely reflect the presence of positive private information.

[10] See for example: Malmendier and Tate (2008, 2005); Malmendier et al. (2011); Lee et al. (2017); Banerjee et al. (2018a, 2015, 2018b); Humphery-Jenner et al. (2016).

[11] The *Holder67* starts by creating an indicator that equals one if the executive's *Confidence* measure is at least 67% on at least two years. *Holder67* then equals one from the first year on which *Confidence* is at least 67% if *Confidence* is at least 67% on at least two years.

**Table 1**
Distributions of CEO Turnover, Internal Appointment, and Executive Confidence This table contains temporal distributions of CEO turnovers, potential seasoned candidates – top executives of the firm who are with the firm for at least two years, and candidates per CEO job vacancy regarding each turnover (C/T) in Columns 2 – 4. The corresponding distributions within internal appointment sample for internal appointments, seasoned candidates, and candidates per internal appointment are shown in columns 5 – 7. In the latter columns, the distributions of of executive confidence level within internal appointment sample are presented. Appendix 2 contains the variable definitions.

| Turnover | | | | Internal Appointment | | | Exe-Confidence Level in Internal Sample | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year (1) | Turnover (2) | Candidate (3) | C/T (4) | Internal (5) | Candidate (6) | C/I (7) | Mean (8) | Stdev (9) | Q1 (10) | Median (11) | Q3 (12) |
| 1994 | 174 | 714 | 4.103 | 111 | 474 | 4.270 | 0.205 | 0.226 | 0.000 | 0.136 | 0.365 |
| 1995 | 159 | 632 | 3.975 | 98 | 400 | 4.082 | 0.267 | 0.224 | 0.052 | 0.252 | 0.426 |
| 1996 | 168 | 685 | 4.077 | 99 | 420 | 4.242 | 0.273 | 0.262 | 0.000 | 0.233 | 0.483 |
| 1997 | 191 | 779 | 4.079 | 116 | 489 | 4.216 | 0.336 | 0.265 | 0.063 | 0.356 | 0.534 |
| 1998 | 189 | 761 | 4.026 | 123 | 523 | 4.252 | 0.314 | 0.282 | 0.004 | 0.279 | 0.545 |
| 1999 | 234 | 969 | 4.141 | 151 | 644 | 4.265 | 0.241 | 0.290 | 0.000 | 0.106 | 0.461 |
| 2000 | 247 | 1,031 | 4.174 | 152 | 650 | 4.276 | 0.243 | 0.276 | 0.000 | 0.144 | 0.412 |
| 2001 | 174 | 714 | 4.103 | 100 | 426 | 4.260 | 0.250 | 0.236 | 0.012 | 0.203 | 0.410 |
| 2002 | 191 | 806 | 4.220 | 120 | 532 | 4.433 | 0.136 | 0.185 | 0.000 | 0.042 | 0.216 |
| 2003 | 175 | 737 | 4.211 | 102 | 444 | 4.353 | 0.243 | 0.230 | 0.043 | 0.186 | 0.403 |
| 2004 | 205 | 828 | 4.039 | 124 | 528 | 4.258 | 0.279 | 0.234 | 0.074 | 0.250 | 0.441 |
| 2005 | 183 | 764 | 4.175 | 106 | 459 | 4.330 | 0.246 | 0.240 | 0.003 | 0.202 | 0.424 |
| 2006 | 199 | 718 | 3.608 | 107 | 409 | 3.822 | 0.242 | 0.223 | 0.021 | 0.190 | 0.389 |
| 2007 | 201 | 808 | 4.020 | 113 | 483 | 4.274 | 0.200 | 0.221 | 0.000 | 0.120 | 0.349 |
| 2008 | 203 | 822 | 4.049 | 113 | 470 | 4.159 | 0.098 | 0.187 | 0.000 | 0.000 | 0.109 |
| 2009 | 164 | 616 | 3.756 | 88 | 350 | 3.977 | 0.134 | 0.212 | 0.000 | 0.013 | 0.181 |
| 2010 | 176 | 654 | 3.716 | 98 | 377 | 3.847 | 0.161 | 0.207 | 0.000 | 0.074 | 0.260 |
| 2011 | 199 | 738 | 3.709 | 125 | 476 | 3.808 | 0.167 | 0.217 | 0.000 | 0.052 | 0.299 |
| 2012 | 176 | 649 | 3.688 | 94 | 364 | 3.872 | 0.160 | 0.207 | 0.000 | 0.055 | 0.287 |
| 2013 | 181 | 689 | 3.807 | 88 | 349 | 3.966 | 0.243 | 0.241 | 0.000 | 0.224 | 0.440 |
| 2014 | 197 | 712 | 3.614 | 109 | 415 | 3.807 | 0.183 | 0.233 | 0.000 | 0.007 | 0.371 |
| 2015 | 200 | 738 | 3.690 | 122 | 479 | 3.926 | 0.171 | 0.229 | 0.000 | 0.000 | 0.336 |
| 2016 | 195 | 731 | 3.749 | 108 | 434 | 4.019 | 0.158 | 0.217 | 0.000 | 0.000 | 0.324 |
| All | 4,381 | 17,295 | 3.948 | 2,567 | 10,595 | 4.127 | 0.218 | 0.244 | 0.000 | 0.127 | 0.385 |

shirking and to exercise less discipline and effort when evaluating candidates. We measure board busyness based on the number of directorships held by board of directors in a firm based on the Risk Metrics database. We measure entrenchment by collecting its Gompers et al. (2003) index of 24 anti-takeover provisions. We also collect data on the Bebchuk et al. (2009) index of six anti-takeover provisions. For both indices, a higher score represents greater entrenchment. Moreover, we measure an entrenched board by determining whether a firm has a classified board. These entrenchment proxies are also constructed based on Risk Metrics.

We further collect data on measures of information asymmetry. These include the number of geographic business segments (which would represent business complexity), stock return volatility (which would reflect difficulties pricing the firm), and the number of analysts covering the firm (which would reflect information production, and the board's capacity to cross-validate opinions through external sources). In each case, we divide the sample of firms into above and below the median, and classify them as high or low information asymmetry, as applicable to the measure.

### 3.4. Summary Statistics and Sample Description

The summary statistics are in Tables 1 and 2. Table 1 provides data on the number of CEO turnovers and internal candidates for the CEO position by year. Internal candidates are senior executives from Execucomp that have been with the firm for at least two years at the time of the turnover. As indicated, we have 4,381 CEO turnovers in the dataset, with 2,567 cases in which an internal candidate was selected as the new CEO. On average, there were roughly four executive candidates (for which we have the necessary data) for any internal promotion. The median level of confidence of executives appointed internally was 0.127. The average level of confidence varies over time.

The CEO and firm characteristics of the executives present when a CEO is internally promoted are in Table 2. The definitions of the variables are in the Appendix 2. The median executive receives about 53% of her compensation in the form of incentive pay and has a shareholding of 2.38% of the company. The vast majority of the executives are male (93.7%) and have been with the firm for at least two years (with the average tenure being over five years). Executives hold positions, such as COO (9.7%) and President (15.7%), who are expected to be related to the likelihood of being selected CEO.

## 4. Analysis

### 4.1. Does Executive Confidence Influence the Likelihood of Becoming CEO?

We start by analyzing how executive confidence influences the likelihood of becoming CEO. We include all potential external candidates in the Execucomp universe. Specifically, we look only at outcomes where the firm hires a candidate from the Execucomp universe. We find 2,567 CEO selection outcomes in which an Execucomp firm selects an internal candidate.

We examine how a firm chooses a CEO from the pool of potential Execucomp candidates. For each turnover event, we identify all executives who are active in Execucomp in that turnover year. We then create three sub-samples: (1) those working at a firm in the same two-digit SIC industry as the hiring firm's primary industry, (2) those at a firm in the same two-digit SIC industry as either of the hiring firm's top two segments, and (3) those at a firm in the same state as the hiring firm. The number of potential candidates varies across sub-sample. In each case, we include both internal and external candidates, but we require that they have information in Execucomp. We then analyze the impact of the executive confidence on the likelihood of being appointed as CEO in a turnover

**Table 2**
Distribution of key variables. This table documents key characteristics such as confidence, compensation, shareholding and gender of all potential internal candidates (top executives of the firm) as well as other control variables. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. Appendix 2 contains the variable definitions.

| Variable | Firm-Year Observations | Mean | Stdev | Quartile 1 | Median | Quartile 3 |
|---|---|---|---|---|---|---|
| Executive Confidence | 10,595 | 0.218 | 0.244 | 0.000 | 0.127 | 0.385 |
| Executive Compensation | 10,595 | 0.531 | 0.268 | 0.338 | 0.572 | 0.754 |
| Executive Shareholding | 10,595 | 0.238 | 0.780 | 0.009 | 0.039 | 0.129 |
| Executive Male | 10,595 | 0.937 | 0.242 | 1.000 | 1.000 | 1.000 |
| Executive's Position: CFO | 10,595 | 0.095 | 0.293 | 0.000 | 0.000 | 0.000 |
| Executive's Position: COO | 10,595 | 0.097 | 0.296 | 0.000 | 0.000 | 0.000 |
| Executive's Position: President | 10,595 | 0.157 | 0.364 | 0.000 | 0.000 | 0.000 |
| Executive's Position: Chairman | 10,595 | 0.027 | 0.161 | 0.000 | 0.000 | 0.000 |
| Executive Tenure | 10,595 | 5.693 | 3.407 | 3.000 | 5.000 | 7.000 |
| Executive Age | 10,595 | 51.753 | 6.512 | 48.000 | 51.000 | 56.000 |
| Exec Age Missing | 10,595 | 0.180 | 0.385 | 0.000 | 0.000 | 0.000 |
| Log Value of Total Assets | 10,595 | 7.944 | 1.775 | 6.635 | 7.823 | 9.160 |
| ROA | 10,595 | 0.030 | 0.113 | 0.010 | 0.039 | 0.078 |
| Leverage | 10,595 | 1.154 | 2.223 | 0.172 | 0.572 | 1.183 |
| Market-to-Book | 10,595 | 3.231 | 3.567 | 1.408 | 2.080 | 3.547 |
| R&D Expenses | 10,595 | 0.022 | 0.045 | 0.000 | 0.000 | 0.023 |
| Cash Holding | 10,595 | 0.119 | 0.146 | 0.020 | 0.059 | 0.163 |
| Volatility of Stock Return | 10,595 | 0.026 | 0.015 | 0.016 | 0.022 | 0.032 |
| S&P 500 Inclusion Dummy | 10,595 | 0.365 | 0.481 | 0.000 | 0.000 | 1.000 |

event. In all cases, we control for the executive's characteristics and for the characteristics of the executive's current firm (i.e., to control for the idea that an executive at a large firm might be more likely to become CEO). It is worth noting that across all the models, following the prior literature (see e.g., Warner et al., 1988), we control for the market adjusted stock return of candidate's firm as a proxy for candidate's performance, and find that better-performing candidates are more likely to be selected as CEOs. We estimate the selection-likelihood models by using both OLS[12] and logit models, and use fixed effects as relevant to the sample being examined.

The results are in Table 3 and highlight that executive confidence significantly influences the likelihood of being selected. This is the case whether or not the pool of external executives is those in the same two-digit SIC industry as the hiring firm, or its largest two subsidiaries, or those in the same state as the hiring firm.

This result is both statistically and economically meaningful. In Column 1 of Table 3, the average value of the dependent variable is 0.179% (i.e., this is the likelihood of being appointed as CEO of the hiring firm for any of the potential candidates). The coefficient on the confidence variable indicates that when confidence increases by one standard deviation (i.e., 0.244), the likelihood of being appointed increases by 0.01997 percentage points.

These results have some caveats. We cannot observe the full set of external candidates for the CEO position. We can only observe – and obtain confidence data – on executives in the Execucomp universe. It is not clear that this would bias our results. Nevertheless, in the following tests, we cross-validate the impact of confidence in several ways. We look at whether having more confident internal candidates increases the likelihood of hiring internally. We also look at how confidence influences an executive's chances when the firm does hire internally.

### *4.2. Does Executives' Confidence Influence the Decision to Make An Internal Hire?*

We next test whether the confidence of the company's existing team of executives influences the appointment of an internal candidate. The argument, as noted above, is that if firms, on average, are prone to seek overconfident CEOs, then a firm with overconfident senior executives will be more likely to appoint a new CEO internally.

We examine the role of CEO confidence in the internal/external hiring-decision by constructing a logit model to predict the likelihood that the company hires internally. When undertaking this analysis, we examine whether the average level of executive confidence, and/or the confidence of the most confident executive influences the likelihood of hiring internally. The model is of the following form:

$$h_i = \alpha + \mathbf{e}_i\beta + \mathbf{x}_i\theta + \lambda_t + \varepsilon_j, \quad (1)$$

where, $h_i$ is an indicator that equals one if the company hires internally in turnover event $i$, $\mathbf{e}_i$ is a vector of executive-level characteristics associated with the turnover event, $\mathbf{x}_i$ is a vector of firm-specific characteristics and $\lambda_t$ is a set of year dummies to mitigate documented time-effects in outside succession (on which, see e.g., Huson et al., 2001).

The results are reported in Table 4 and indicate that firms with more confident executives are more likely to hire internally, consistent with Hypothesis 1. Both the highest (columns 1 and 2) and average (columns 3 and 4) level of confidence among the firm's executives significantly increase the likelihood of an internal-hire. These results are economically significant. The marginal effect associated with *Confidence* in Column 1 is 0.18. This implies that one standard deviation in *Confidence* increases the likelihood that the firm hires internally by 4.38 percentage points.[13] This, in turn, means that increasing internal-executive confidence by one standard deviation increases the likelihood of an internal hire by 7.45%.[14]

Other corporate characteristics influence the internal-external choice as well. As indicated, the mean and highest level of shareholding and compensation among a firm's executives increase the likelihood of an internal hire. The findings are consistent with firm

[12] We note that an OLS model can be superior to a logit model in the presence of many fixed effects (Greene, 2004). Nevertheless, we include both analyses for completeness.

[13] We obtain this figure by multiplying the marginal effect (0.180) by the standard deviation of the confidence variable (0.244) in the internal-external sample.

[14] We obtain this as follows: the likelihood of an internal hire is 58.845%. A one standard deviation increase in executive confidence increases this likelihood to 58.845% + $\sigma$ (Confidence) × *Marginal effect (Confidence)* = 58.845 %+ 4.38%. So, the percentage increase is ((58.845% + 4.38%) - 58.845%)/(58.845%).

**Table 3**
Executives' Confidence and CEO Selection. This table contains regression models that examine the relationship between executive confidence and the likelihood that he/she is appointed as CEO. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. In Columns 1 and 4, the pool of potential hires is any executive at a firm in the same SIC two-digit industry as the hiring firm; in Columns 2 and 5, it is any executive in the same SIC two-digit industry as the hiring firm's largest two industrial segments; in Columns 3 and 6, it is any executive at the same state as the hiring firm. Columns 1-3 are OLS models; Columns 4-6 are logit models. All models include fixed effects, as stated in the column footer and cluster standard errors by event. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent | Executive Appointed as CEO | | | | | |
|---|---|---|---|---|---|---|
| Matching | SIC2 & Year | Segment SIC2 & Year | State & Year | SIC2 & Year | Segment SIC2 & Year | State & Year |
| Model | OLS | OLS | OLS | Logit | Logit | Logit |
| Column | [1] | [2] | [3] | [4] | [5] | [6] |
| ln[Executive Confidence] | 0.082*** | 0.043*** | 0.057*** | 0.570*** | 0.479*** | 0.698*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.001] | [0.000] |
| Exec Compensation | 0.097*** | 0.057*** | 0.055*** | 0.798*** | 0.874*** | 0.709*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Shareholding | 0.005*** | 0.002*** | 0.002*** | 0.139*** | 0.111*** | 0.179*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Male | 0.039*** | 0.024*** | 0.024*** | 0.500*** | 0.552*** | 0.540*** |
| | [0.001] | [0.001] | [0.003] | [0.000] | [0.000] | [0.000] |
| Exec Position: CFO | -0.013 | -0.008 | -0.002 | -0.524*** | -0.523*** | -0.492*** |
| | [0.232] | [0.212] | [0.766] | [0.000] | [0.000] | [0.000] |
| Exec Position: COO | 0.469*** | 0.266*** | 0.324*** | 0.444*** | 0.483*** | 0.402*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: President | 0.523*** | 0.300*** | 0.389*** | 2.924*** | 2.962*** | 3.053*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | -0.046*** | -0.021*** | -0.025*** | 1.403*** | 1.378*** | 1.575*** |
| | [0.000] | [0.003] | [0.005] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | -0.023** | -0.014*** | -0.020*** | 0.135* | 0.168** | 0.110 |
| | [0.011] | [0.005] | [0.002] | [0.082] | [0.038] | [0.175] |
| Exec Age | -0.001** | -0.001** | -0.001** | -0.026*** | -0.026*** | -0.028*** |
| | [0.012] | [0.025] | [0.020] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -0.093*** | -0.052*** | -0.084*** | -2.619*** | -2.478*** | -3.160*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Ln[Total Assets] | 0.006** | 0.003** | 0.006*** | 0.022 | 0.010 | 0.042** |
| | [0.031] | [0.029] | [0.000] | [0.336] | [0.676] | [0.049] |
| ROA | 0.080*** | 0.046*** | 0.057*** | 0.130 | 0.298 | 0.285 |
| | [0.003] | [0.003] | [0.003] | [0.616] | [0.261] | [0.304] |
| Leverage | 0.001 | 0.000 | 0.001 | 0.009 | 0.003 | 0.025 |
| | [0.671] | [0.772] | [0.676] | [0.601] | [0.860] | [0.101] |
| Market-to-Book | -0.001** | -0.001** | -0.001** | -0.012 | -0.015* | -0.018** |
| | [0.014] | [0.031] | [0.041] | [0.130] | [0.061] | [0.022] |
| R&D Expenses | 0.101** | 0.049** | 0.066** | -0.213 | -0.178 | -0.124 |
| | [0.015] | [0.035] | [0.033] | [0.743] | [0.795] | [0.847] |
| Cash Holding | -0.014 | -0.007 | -0.018 | -0.470** | -0.475** | -0.344* |
| | [0.371] | [0.418] | [0.115] | [0.012] | [0.015] | [0.074] |
| Volatility of Stock Return | -2.307*** | -1.253*** | -1.440*** | -13.441*** | -11.972*** | -13.721*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| S&P 500 Inclusion Dummy | 0.011 | 0.008* | 0.008 | 0.010 | 0.023 | -0.007 |
| | [0.154] | [0.065] | [0.115] | [0.871] | [0.733] | [0.908] |
| Mkt Adj Return | 0.032*** | 0.018*** | 0.022*** | 0.210*** | 0.214*** | 0.199*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Internal Executive | 14.910*** | 14.881*** | 14.968*** | 9.480*** | 9.776*** | 10.987*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Fixed Effects | Industry × Year; Hiring Firm | Segment Industry × Year; Hiring Firm | State × Year; Hiring Firm | Industry × Year; Hiring Firm | Segment Industry × Year; Hiring Firm | State × Year; Hiring Firm |
| Observations | 1,494,582 | 2,585,837 | 2,013,009 | 1,494,577 | 2,453,247 | 2,012,586 |
| Adjusted/Pseudo R-squared | 0.1466 | 0.1469 | 0.1512 | 0.7082 | 0.7221 | 0.7456 |

hiring internally when it places a greater value on its executives, as reflected in their higher compensation. Similarly, the higher share ownership could, in part, be the result of higher stock grants to a more valued executive. The characteristics of the departing CEO appear to have an impact as well: Internal hires are more likely when the departing CEO is older, has been at the firm for a longer time (e.g., *Departing CEO's Tenure > 2 Years*),[15] or was chairperson of the board. This suggests that an internal hire is more likely if the departing CEO was more powerful, consistent with the idea that powerful CEOs can shape the board's policy in relation to hiring (and subsequent replacement), increasing the likelihood of an internal hire (Cannella and Lubatkin, 1993).

Firm-level characteristics do not generally influence the likelihood of an internal hire. Better performance, as indicated by the firm's market-adjusted stock return, is significantly associated with an increased likelihood of an internal hire. Qualitatively similar results obtain (untabulated) if the firm's stock performance is not adjusted for the market. In unreported results, we find that institutional ownership and industry market-share-homogeneity are insignificantly related to internal-external choice.

### 4.3. Are Confident Executives More Likely to Become CEOs?

We next analyze the impact of executive confidence on the likelihood that the executive becomes the CEO. The econometric approach we take is dictated by the fact that it is impossible to ob-

[15] We use an indicator for whether the CEO's tenure is at least two years (as opposed to a continuous measure of CEO-tenure) because it is not always possible to identify the CEO's precise start-date. Such CEOs without a precise start date recorded often commenced prior to 1992 (i.e., prior to the beginning of Execucomp). As our sample begins in 1994, we deem any CEO with missing commencement-date data to have been with the firm for at least two years. Thus, the use of the indicator-variable reduces the number of observations omitted due to missing data.

**Table 4**
Logit models – Executive Confidence and CEO Selection. This table contains logit models that examine the likelihood that the firm appoints an internal candidate as its CEO. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. The unit of observation is at the turnover level (i.e., each observation is a turnover). The dependent variable is an indicator that equals one if an insider is appointed as CEO. We cluster standard errors at the firm level. We include industry and year, or industry × year fixed effects, as indicated in the table footer. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable | Insider Appointed as CEO | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Column | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| Max Executive Confidence | 0.915*** | 1.054*** | 0.985*** | 1.204*** | | | | |
| | [0.000] | [0.000] | [0.000] | [0.000] | | | | |
| Max Executive Compensation | 0.592*** | 0.538*** | 0.647** | 0.504** | | | | |
| | [0.003] | [0.008] | [0.010] | [0.049] | | | | |
| Max Executive Shareholding | 0.261*** | 0.256*** | 0.293*** | 0.296*** | | | | |
| | [0.000] | [0.000] | [0.000] | [0.000] | | | | |
| Max Executive Tenure > 2 Years | 0.161 | 0.195 | 0.014 | 0.003 | | | | |
| | [0.542] | [0.513] | [0.967] | [0.993] | | | | |
| Max Executive Age | 0.002 | 0.004 | 0.003 | 0.004 | | | | |
| | [0.819] | [0.550] | [0.763] | [0.617] | | | | |
| Max Executive Missing-Age | -0.535*** | -0.545*** | -0.635*** | -0.653*** | | | | |
| | [0.000] | [0.000] | [0.000] | [0.000] | | | | |
| Mean Executive Confidence | | | | | 1.578*** | 1.893*** | 1.627*** | 2.069*** |
| | | | | | [0.000] | [0.000] | [0.000] | [0.000] |
| Mean Executive Compensation | | | | | 0.977*** | 0.942*** | 1.025*** | 0.961*** |
| | | | | | [0.000] | [0.000] | [0.001] | [0.002] |
| Mean Executive Shareholding | | | | | 0.796*** | 0.825*** | 0.903*** | 0.974*** |
| | | | | | [0.000] | [0.000] | [0.000] | [0.000] |
| Mean Executive Tenure > 2 Years | | | | | 0.452** | 0.431** | 0.441* | 0.411* |
| | | | | | [0.012] | [0.022] | [0.056] | [0.092] |
| Mean Executive Age | | | | | -0.006 | -0.005 | 0.001 | 0.001 |
| | | | | | [0.583] | [0.632] | [0.947] | [0.941] |
| Mean Executive Missing-Age | | | | | -1.628*** | -1.679*** | -2.043*** | -2.119*** |
| | | | | | [0.000] | [0.000] | [0.000] | [0.000] |
| Departing CEO's Compensation | -0.280* | -0.278* | -0.331* | -0.305 | -0.466*** | -0.472*** | -0.510** | -0.511** |
| | [0.073] | [0.084] | [0.082] | [0.117] | [0.006] | [0.008] | [0.016] | [0.019] |
| Departing CEO's Shareholding | 0.008 | 0.007 | 0.011 | 0.010 | 0.008 | 0.007 | 0.013 | 0.011 |
| | [0.404] | [0.480] | [0.352] | [0.431] | [0.390] | [0.467] | [0.310] | [0.386] |
| Departing CEO's Gender | 0.122 | 0.103 | 0.183 | 0.139 | 0.169 | 0.152 | 0.238 | 0.189 |
| | [0.627] | [0.687] | [0.565] | [0.664] | [0.513] | [0.564] | [0.459] | [0.561] |
| Departing CEO-Chairman | 0.373*** | 0.352*** | 0.478*** | 0.458*** | 0.352*** | 0.331*** | 0.462*** | 0.440*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Departing CEO's Tenure > 2 Years | 0.667*** | 0.706*** | 0.740*** | 0.796*** | 0.634*** | 0.673*** | 0.713*** | 0.775*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Departing CEO's Age | 0.023*** | 0.022*** | 0.025*** | 0.024*** | 0.021*** | 0.020*** | 0.023*** | 0.022*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.001] |
| Departing CEO's Missing-Age | -0.480 | -0.423 | -0.706 | -0.482 | -0.549 | -0.502 | -0.771 | -0.603 |
| | [0.273] | [0.347] | [0.323] | [0.496] | [0.192] | [0.254] | [0.238] | [0.369] |
| Ln[Total Assets] | 0.066* | 0.081** | 0.053 | 0.077 | 0.048 | 0.065 | 0.036 | 0.064 |
| | [0.079] | [0.038] | [0.278] | [0.127] | [0.217] | [0.106] | [0.478] | [0.222] |
| ROA | 0.498 | 0.321 | 0.368 | 0.198 | 0.395 | 0.191 | 0.333 | 0.114 |
| | [0.133] | [0.356] | [0.345] | [0.629] | [0.246] | [0.586] | [0.409] | [0.783] |
| Leverage | -0.012 | -0.010 | -0.029 | -0.034 | -0.001 | 0.001 | -0.018 | -0.026 |
| | [0.563] | [0.647] | [0.248] | [0.204] | [0.976] | [0.952] | [0.489] | [0.343] |
| Market-to-Book | 0.024* | 0.020 | 0.028 | 0.028 | 0.008 | 0.008 | 0.011 | 0.016 |
| | [0.088] | [0.166] | [0.120] | [0.150] | [0.558] | [0.610] | [0.547] | [0.401] |
| R&D Expenses | -0.484 | -0.606 | -0.518 | -0.627 | -0.278 | -0.326 | -0.274 | -0.347 |
| | [0.621] | [0.545] | [0.659] | [0.597] | [0.781] | [0.747] | [0.821] | [0.777] |
| Cash Holding | -0.645** | -0.607* | -0.513 | -0.495 | -0.655** | -0.638** | -0.489 | -0.488 |
| | [0.035] | [0.053] | [0.165] | [0.190] | [0.034] | [0.043] | [0.190] | [0.201] |
| Volatility of Stock Return | -15.735*** | -14.970*** | -28.117*** | -26.874*** | -16.610*** | -15.811*** | -29.613*** | -28.314*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| S&P 500 Inclusion Dummy | 0.135 | 0.115 | 0.182 | 0.159 | 0.158 | 0.133 | 0.199 | 0.164 |
| | [0.239] | [0.326] | [0.212] | [0.290] | [0.175] | [0.265] | [0.182] | [0.287] |
| Num Candidates | 0.433*** | 0.440*** | 0.517*** | 0.526*** | 0.514*** | 0.528*** | 0.606*** | 0.619*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Mkt Adj Return | 0.341*** | 0.356*** | 0.351** | 0.324** | 0.297*** | 0.291** | 0.304** | 0.257* |
| | [0.002] | [0.003] | [0.025] | [0.042] | [0.005] | [0.010] | [0.037] | [0.063] |
| Mkt Adj Return (*t*-1) | | 0.077 | | 0.065 | | 0.039 | | 0.006 |
| | | [0.384] | | [0.577] | | [0.625] | | [0.950] |
| Mkt Adj Return (*t*-2) | | -0.009 | | -0.032 | | -0.034 | | -0.067 |
| | | [0.823] | | [0.622] | | [0.435] | | [0.338] |
| Year FE | Yes | Yes | No | No | Yes | Yes | No | No |
| Industry FE | Yes | Yes | No | No | Yes | Yes | No | No |
| Year x Industry FE | No | No | Yes | Yes | No | No | Yes | Yes |
| Observations | 4,379 | 4,244 | 3,645 | 3,503 | 4,379 | 4,244 | 3,645 | 3,503 |
| Pseudo R-squared | 0.1475 | 0.1490 | 0.2026 | 0.2022 | 0.1675 | 0.1707 | 0.2245 | 0.2262 |

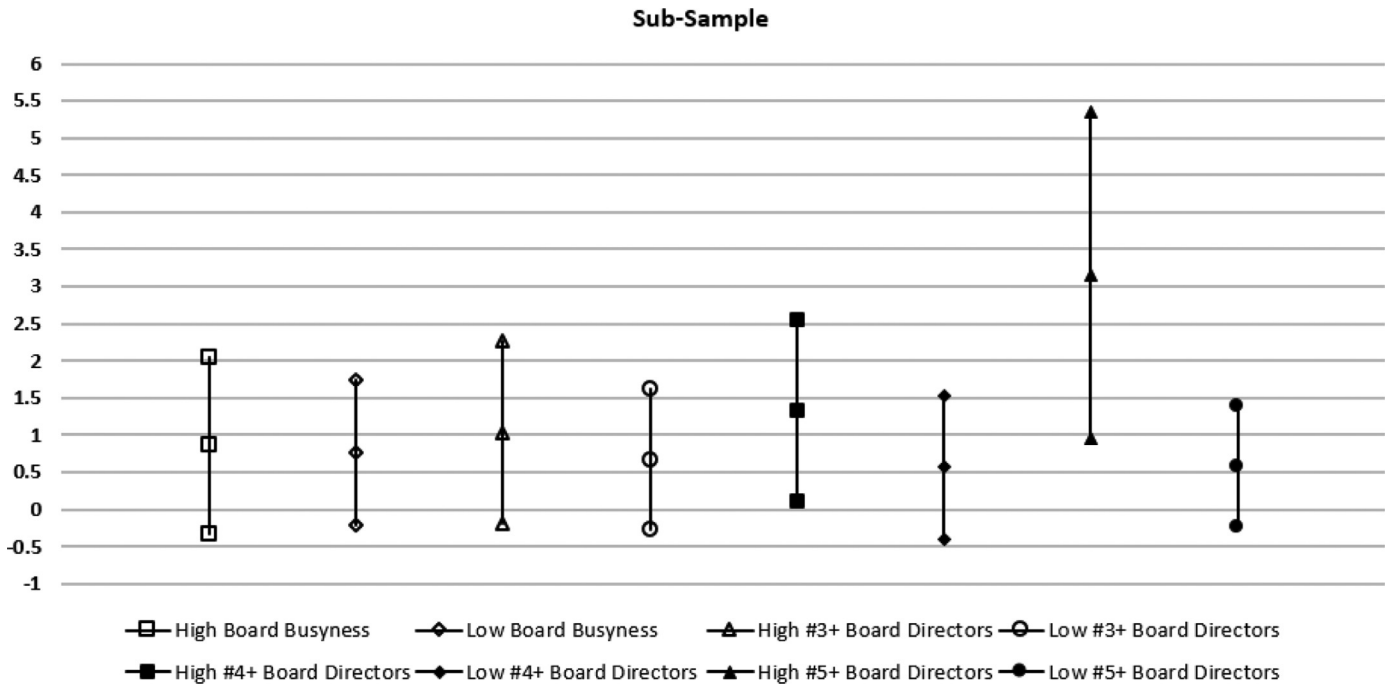



**Fig. 1.** 95% confidence intervals for *Confidence* coefficients in Table 7.

serve all possible external hires for a position. We can, however, observe the set of internal candidates and their attributes. This allows us to investigate the factors that drive the decision to hire one internal candidate over the others, conditional on internal promotion. Our focus here is primarily on executive-level attributes that drive the decision to hire a particular candidate, rather than the characteristics of the companies. Thus, we need to use an econometric technique, the conditional logit model (McFadden, 1973), that appropriately accounts for the 'grouping' of observations (i.e., the attributes of the candidates in each internal hiring decision). In turn, by treating each turnover as an individual event, the process implicitly controls for firm-year effects.

For our analysis, we construct a cross-sectional sample of turnover events, limit the sample to situations where there is an internal hire. The conditional logit we use has the following basic form:

$$h_{i,j} = \alpha + \mathbf{c}_j\beta + \mathbf{x}_j\theta + \varepsilon. \quad (2)$$

Here, $h_{i,j}$ is an indicator for whether executive $j$ is hired in turnover event $i$, $\mathbf{c}_j$ is a vector of confidence characteristics, and $\mathbf{x}_j$ is a vector of other executive-specific characteristics. For the most part, we only include one confidence variable (the executive's level of confidence). Firm-specific factors are not included since the conditional logic eliminates any factors that do not vary across executives in an individual turnover event. Similarly, the models do not include firm, year, or industry fixed effects(as the conditional logit model itself mitigates such factors by econometrically controlling for all turnover-event invariant factors). Nevertheless, in robustness tests, we ensure the results are similar if we use logit models or OLS models with industry, year, or firm effects.

One concern in conditional logit models is that the independence of irrelevant alternatives (IIA) assumption must be met. The IIA assumption asserts that the relative preference between alternatives, say A, B, and C, is not influenced by the availability of, say, alternative D. For example, IIA asserts that the decision-maker (i.e., the company/board) ranks all alternatives (i.e., the executives) and that the relative rank order between executives remains the same if one of the executives is removed from the sample. From an empirical standpoint, this means that the coefficient on *Confidence* should be the same if we exclude any one executive from the company's choice set. Thus, we test the IIA assumption by running equality-of-coefficient tests. We do this by iteratively removing a random executive from each company's choice set and testing whether the coefficient is the same in the full sample as in the reduced sample. In unreported results, we find that there is no significant difference in coefficients, suggesting that the IIA assumption is met in our sample.

The baseline results are in Column 1 of Table 5. In this table, we report the regression coefficients (as opposed to marginal effects). The main finding is that executives with greater confidence are more likely to be appointed as CEO (at 1% significance). This result is also economically significant. The marginal effect associated with the *Confidence* variable in Column 1 is 0.113. Thus, an increase in *Confidence* by one standard deviation (0.178 in this sample) is associated with a 2.56 percentage point increase in the likelihood of being selected as CEO. Given that the likelihood of selection is 24.23% in this sample, a one standard deviation increase in confidence is associated with a 10.57% increase in the likelihood of selection.

The results in relation to the control variables present some interesting outcomes. As in the earlier section, executives that own more shares and receive higher incentive compensation are more likely to become CEO. As noted above, the higher shareholding and incentive compensation could be the result of larger stock grants and indicative of a more valuable executive, one that is more likely to be promoted to CEO. The executive's position also influences the likelihood that he/she will become CEO. The COO, Chair, and President are all more likely to become CEO. These results suggest that executives that either have operational experience (i.e., as COO) or have existing influence (i.e., as Chair) are more likely to be appointed CEO.

The results are robust to excluding mid-tier executives and to splitting the sample by the amount of time the executive has been with the firm, which could reflect executive loyalty and relation-

**Table 5**
Executive's Salary Rank, Tenure, Confidence, and CEO Selection. This table contains conditional logit models that examine the relationship between the executive confidence and the likelihood of being selected as CEO. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. We run conditional logistic regressions in which the dependent variable is an indicator that equals one if the executive is selected as CEO. Because this is a conditional logit model we do *not* include firm characteristics, or fixed effects (as the conditional logit model econometrically controls for all turnover invariant factors that are common to all candidates). Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Sample<br>Column | Full Sample<br>[1] | Top 5 Executives<br>[2] | Top 3 Executives<br>[3] | Exec Tenure at least 3 years<br>[4] | Exec Tenure at least 4 years<br>[5] |
|---|---|---|---|---|---|
| log[Exec Confidence] | 0.750** | 0.682** | 0.654* | 1.086*** | 1.054** |
| | [0.028] | [0.047] | [0.068] | [0.004] | [0.017] |
| Exec Compensation | 2.602*** | 2.582*** | 2.487*** | 2.393*** | 2.528*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Shareholding | 0.389*** | 0.371*** | 0.375*** | 0.389*** | 0.445*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Male | 0.588*** | 0.582*** | 0.543*** | 0.591*** | 0.574*** |
| | [0.000] | [0.001] | [0.002] | [0.001] | [0.007] |
| Exec Position: CFO | -0.490*** | -0.468*** | -0.458*** | -0.550*** | -0.627*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: COO | 0.514*** | 0.554*** | 0.589*** | 0.448*** | 0.435*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.003] |
| Exec Position: President | 2.854*** | 2.829*** | 2.773*** | 2.803*** | 2.739*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.405*** | 2.372*** | 2.351*** | 2.321*** | 2.011*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | 0.163 | 0.149 | 0.137 | | |
| | [0.198] | [0.244] | [0.307] | | |
| Exec Age | -0.042*** | -0.042*** | -0.043*** | -0.043*** | -0.050*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -4.379*** | -4.348*** | -4.283*** | -4.509*** | -4.303*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Observations | 10,595 | 10,166 | 9,141 | 8,794 | 6,079 |
| Pseudo R-squared | 0.5671 | 0.5660 | 0.5647 | 0.5675 | 0.5567 |

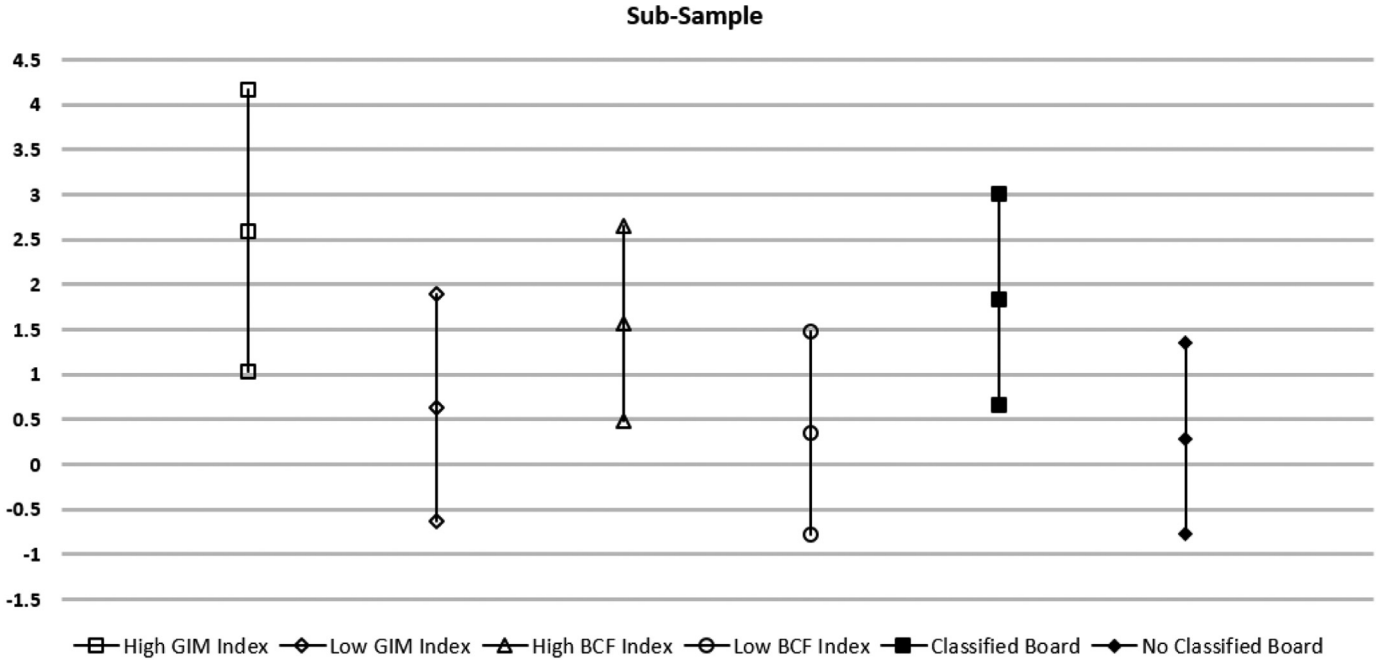



**Fig. 2.** 95% confidence intervals for *Confidence* coefficients in Table 8.

ships with the board. Columns 2 and 3 of Table 5 contain models that restrict attention to the top five (Column 2) and top three (Column 3) highest-paid executives (thereby restricting the analysis to the most important executives). Columns 4 and 5 require the executive to have been with the firm for at least three and four years (thereby ensuring that the results do not merely reflect the characteristics of executives who are 'parachuted' in to become CEO). The positive relationship between confidence and the likelihood of appointment holds in all sub-samples.

The coefficients on the other control variables are large as expected. Executive age reduces the likelihood of becoming CEO, indicating that executives that are closer to retirement age are less likely to be promoted (consistent with Brickley, 2003). The coefficient on the missing-age dummy might be the result of older executives being less likely to have their age recorded in the database, possibly as a result of having entered the database earlier, prior to the recording of all executive age data. We replace the missing age with the average executive age for that year. The executive's tenure

**Table 6**
Executive Confidence Rank, Team Confidence, and CEO Selection. This table contains conditional logit models that examine the relationship executive's rank in terms of confidence and the likelihood of being selected as CEO. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. We consider several measures of executive confidence rank. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable | CEO Selection | | | |
|---|---|---|---|---|
| Column | [1] | [2] | [3] | [4] |
| Exec has highest level of confidence | 0.230** | | | |
| | [0.020] | | | |
| Exec has highest second level of confidence | 0.097 | | | |
| | [0.340] | | | |
| Exec has highest third level of confidence | 0.217** | | | |
| | [0.048] | | | |
| Exec confidence in top 3 | | 0.179** | | |
| | | [0.031] | | |
| Exec Confidence | | | 3.174*** | |
| | | | [0.002] | |
| Exec Confidence Squared | | | -5.141** | |
| | | | [0.013] | |
| Exec Confidence less Co's average exec confidence | | | | 0.534** |
| | | | | [0.042] |
| Exec Compensation | 2.613*** | 2.613*** | 2.598*** | 2.604*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Shareholding | 0.388*** | 0.389*** | 0.392*** | 0.389*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Male | 0.578*** | 0.582*** | 0.593*** | 0.587*** |
| | [0.001] | [0.000] | [0.000] | [0.000] |
| Exec Position: CFO | -0.496*** | -0.494*** | -0.491*** | -0.489*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: COO | 0.513*** | 0.512*** | 0.509*** | 0.514*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: President | 2.860*** | 2.858*** | 2.861*** | 2.854*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.417*** | 2.416*** | 2.433*** | 2.405*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | 0.172 | 0.169 | 0.166 | 0.165 |
| | [0.173] | [0.181] | [0.190] | [0.192] |
| Exec Age | -0.043*** | -0.043*** | -0.043*** | -0.042*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -4.378*** | -4.385*** | -4.409*** | -4.380*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Observations | 10,595 | 10,595 | 10,595 | 10,595 |
| Pseudo R-squared | 0.5674 | 0.5671 | 0.5680 | 0.5670 |

does not significantly influence the likelihood of an appointment in our models.[16]

We further analyze whether it is the most confident executive who is promoted. Table 6 contains models that examine the importance of the executive's confidence rank (i.e., the confidence of the executive as compared to other executives in the company). The key results are in Column 1, which indicates that the executive with the highest confidence level is more likely to be appointed CEO. Column 2 indicates that being one of the three most confident executives significantly increases the likelihood of being promoted. Column 4 suggests that being more confident than the average team-member increases the likelihood of promotion. Nonetheless, Column 3, which includes the quadratic of confidence term, suggests the likelihood of promotion is not necessarily monotonic in confidence: in fact, at very high levels, confidence could reduce the likelihood of promotion. This is potentially consistent with the idea that highly overconfident CEOs may destroy value (see e.g., Malmendier and Tate, 2008), which would logically reduce the likelihood of being promoted for such executives.

### 4.4. Can Board Inattention and Governance Quality Account for Confident Executives' Appointments?

The next issue is whether governance issues and board inattention could account for the appointment of overconfident CEOs. As indicated, overconfident CEOs are not always optimal. Thus, a board might inadvertently pick an overconfident candidate because (a) they cannot fully observe the candidates' characteristics, and (b) overconfident candidates can engage in grandstanding whereby the overconfident risk-taking can cause boards to confuse luck for skill.

We expect these information asymmetry issues will be worse if board monitoring is less rigorous, as is likely when directors are busier. We capture board busyness by collecting data on the number of boards that the directors serve on simultaneously. In Table 7 we look at sub-sample splits based on whether the firm is above (or below) median[17] in terms of the number of simultaneous directorships (Columns 1 and 2), or number of directors with 3+ (Columns 3 and 4), 4+ (Columns 5 and 6), or 5+ (Columns 7 and 8) outside directorships.

[16] This may reflect the relative difficulty identifying the executive's exact tenure with the firm: specifically, while it is possible to identify if the executive has been with the firm as an executive for at least *n* years (in our case, at least two years), the precise start-date is often omitted from Execucomp, making the precise tenure unclear. Despite this, we obtain similar results vis-'a-vis executive overconfidence if we include the executive's tenure (where available) and omit the observations for which it is not available.

[17] The results are qualitatively similar if we compare top tercile and bottom tercile instead of above and below median.

**Table 7**
Board Busyness, Executive Confidence, and CEO Selection. This table presents the relationship between the role of board busyness, executive confidence level and likelihood of a confident candidate getting selected as the new CEO of the firm. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. The sample is split based on whether the board is 'high' or 'low' in terms of various measures of board-busyness. Columns 1 and 2 define the degree of busyness to be the number of additional directorships that each director holds. Thus, the columns split the sample based on whether the firm's directors hold an above-median (high) or below-median (low) number of other directorships, on average. Columns 3-8 split the sample based on whether the firm has an above median or below median number of directors with 3+, 4+, or 5+ directorships. The models are conditional logit models and the dependent variable is an indicator that equals one if the executive is selected as the firm's CEO. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| | Director Busyness | | Directors with 3 Plus Directorships | | Directors with 4 Plus Directorships | | Directors with 5 Plus Directorships | |
|---|---|---|---|---|---|---|---|---|
| | High | Low | High | Low | High | Low | High | Low |
| Exec Confidence | 0.858 | 0.767 | 1.038* | 0.671 | 1.336** | 0.563 | 3.154*** | 0.573 |
| | [0.155] | [0.121] | [0.099] | [0.162] | [0.031] | [0.253] | [0.005] | [0.164] |
| Exec Compensation | 3.724*** | 2.239*** | 4.034*** | 2.089*** | 3.288*** | 2.471*** | 1.678** | 3.009*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.020] | [0.000] |
| Exec Shareholding | 0.428*** | 0.403*** | 0.494*** | 0.380*** | 0.311*** | 0.465*** | 0.231* | 0.453*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.001] | [0.000] | [0.069] | [0.000] |
| Exec Male | 0.500** | 0.393 | 0.413 | 0.490** | 0.289 | 0.655** | 0.271 | 0.510** |
| | [0.049] | [0.130] | [0.118] | [0.049] | [0.252] | [0.012] | [0.451] | [0.016] |
| Exec Position: CFO | -0.754*** | -0.351** | -0.804*** | -0.358** | -0.756*** | -0.398** | -0.737** | -0.532*** |
| | [0.000] | [0.050] | [0.000] | [0.037] | [0.000] | [0.019] | [0.026] | [0.000] |
| Exec Position: COO | 0.546*** | 0.506*** | 0.649*** | 0.431** | 0.364* | 0.680*** | 0.090 | 0.679*** |
| | [0.004] | [0.005] | [0.001] | [0.013] | [0.061] | [0.000] | [0.757] | [0.000] |
| Exec Position: President | 2.939*** | 2.750*** | 2.983*** | 2.748*** | 2.920*** | 2.781*** | 2.759*** | 2.906*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.638*** | 2.127*** | 2.492*** | 2.216*** | 2.777*** | 2.064*** | 2.771*** | 2.219*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | 0.172 | 0.061 | 0.037 | 0.213 | 0.152 | 0.126 | -0.067 | 0.182 |
| | [0.377] | [0.771] | [0.855] | [0.288] | [0.448] | [0.534] | [0.823] | [0.262] |
| Exec Age | -0.052*** | -0.033*** | -0.054*** | -0.034*** | -0.052*** | -0.033*** | -0.054*** | -0.038*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -4.777*** | -4.899*** | -4.802*** | -4.915*** | -4.810*** | -4.912*** | -16.984 | -4.640*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.977] | [0.000] |
| Observations | 4,098 | 4,127 | 3,782 | 4,443 | 3,964 | 4,261 | 1,895 | 6,330 |
| Pseudo R-squared | 0.5842 | 0.5556 | 0.5919 | 0.5532 | 0.5758 | 0.5653 | 0.5819 | 0.5684 |

The results in Table 7 provide some support for the information asymmetry theory. The 'Confidence' coefficients are only statistically significant in the sub-samples for busy boards as in Columns 4, 6, and 8. A difference in coefficients test for the 'Confidence' variable between busyness sub-samples suggests that the 'Confidence' coefficients are not generally statistically different from one another between the sub-samples, except when looking at high degrees of confidence (i.e., directors holding 5+ simultaneous positions). For firms with an above-median number of highly busy directors (holding 5+ simultaneous positions), 'Confidence' does have a statistically significantly greater impact on appointment likelihood than for those with a below-median number of busy directors.

To provide more context for this result, we graph the confidence intervals for the 'Confidence' coefficient in Fig. 1. The graph indicates some overlap in confidence intervals. However, as we move towards higher degrees of busyness (i.e., directors holding 5+ simultaneous positions), the confidence intervals separate, suggesting economically meaningful differences in the impact of confidence on appointment likelihood for busy boards.

We further explore director entrenchment as a factor in exacerbating the impact of information asymmetry. The underlying idea is that entrenched directors are at less risk of dismissal following periods of poor performance, which enables them to exercise less care when selecting a CEO. We capture such entrenchment by looking at whether the firm has a classified board, or an above-median or below-median number of anti-takeover provisions ('ATPs'), as proxied by the Gompers et al. (2003) index of 24 ATPs and Bebchuk et al. (2009) index of six ATPs.

The results are in Table 8 and are consistent with the information asymmetry theory. Overconfident executives are statistically significantly more likely to be appointed in firms with classified boards or high levels of ATPs (using either the Gompers et al. (2003) or the Bebchuk et al. (2009) index of ATPs). By contrast, executive confidence does not significantly influence appointment likelihood in firms without classified boards or with lower levels of ATPs.

Further, comparing the coefficients on the 'Confidence' variable across sub-samples, the confidence coefficient is significantly larger in magnitude for the entrenched sample. Comparison between Columns 1 and 2 suggests that the coefficient of 'Confidence' is statistically significantly larger in the entrenched sample (with t-stat of 2.148). This is similar when comparing the 'Confidence' variable between Columns 3 and 4 (t-stat of 2.807 in a difference in coefficients test) and Columns 5 and 6 (t-stat of 1.604 in a difference in coefficients test). This implies that board entrenchment has a statistically significant relationship with the likelihood that an overconfident executive is appointed as CEO. This is consistent with the idea that entrenched boards might exert less effort to distinguish luck from skill when making appointment decisions.

To visualize this, we plot the confidence intervals for the 'Confidence' coefficient in Fig. 2. Here, the coefficients' confidence intervals significantly vary across sub-samples, with a relatively low overlap in intervals between the high-entrenchment and low-entrenchment sub-samples. The coefficient estimates for the low-entrenchment sub-samples lie outside the confidence intervals for the estimates of the high-entrenchment sub-samples.

We next analyze the measures of information asymmetry. In Table 9 we split the sample based on whether the hiring firm has above, or below, median analyst coverage, stock return standard deviation, or number of geographic segments. We graph the confidence interval associated with the "Confidence" coefficient in Fig. 3. We find that overconfident executives are significantly more likely to be selected in firms that have an above-median number of geographic segments or stock return volatility (i.e., that face greater information asymmetry). Further, overconfident executives are significantly more likely to be selected in firms that have a below-median amount of analyst coverage (i.e., in firms where there is less information available for boards to evaluate division and corporate performance externally). These results support the

**Table 8**
Board Entrenchment, Executive Confidence, and CEO Selection. This table presents the relationship between the board entrenchment, executive confidence level and likelihood of a confident candidate getting selected as the new CEO of the firm. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. We consider several proxies of board entrenchment: the Gompers, Ishii, and Metrick (GIM) index, the Bebchuk, Cohen, and Ferrell (BCF) index, and an indicator for whether the firm has a classified board. The models are conditional logit models and the dependent variable is an indicator that equals one if the executive is selected as the firm's CEO. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| | GIM Index | | BCF Index | | Classified Board | |
|---|---|---|---|---|---|---|
| | ≥ 10 | < 10 | ≥ 3 | < 3 | Yes | No |
| Exec Confidence | 2.596*** | 0.638 | 1.566*** | 0.354 | 1.835*** | 0.288 |
| | [0.001] | [0.321] | [0.005] | [0.541] | [0.002] | [0.594] |
| Exec Compensation | 2.115*** | 2.396*** | 3.016*** | 2.536*** | 2.896*** | 2.472*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Shareholding | 0.367*** | 0.256*** | 0.633*** | 0.255*** | 0.440*** | 0.348*** |
| | [0.003] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Male | 0.650* | 0.655** | 0.570** | 0.555** | 0.869*** | 0.337 |
| | [0.050] | [0.037] | [0.014] | [0.048] | [0.002] | [0.138] |
| Exec Position: CFO | -0.899*** | -1.029*** | -0.613*** | -0.548** | -0.467** | -0.717*** |
| | [0.003] | [0.000] | [0.000] | [0.026] | [0.016] | [0.000] |
| Exec Position: COO | 0.582*** | 0.778*** | 0.231 | 0.792*** | 0.569*** | 0.451** |
| | [0.007] | [0.000] | [0.219] | [0.000] | [0.002] | [0.012] |
| Exec Position: President | 2.615*** | 2.651*** | 2.991*** | 2.712*** | 2.840*** | 2.855*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.439*** | 2.442*** | 2.134*** | 2.461*** | 2.133*** | 2.501*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | 0.002 | 0.277 | 0.198 | 0.218 | 0.027 | 0.379** |
| | [0.993] | [0.241] | [0.275] | [0.313] | [0.895] | [0.044] |
| Exec Age | -0.051*** | -0.044*** | -0.044*** | -0.051*** | -0.043*** | -0.047*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -4.176*** | -4.967*** | -3.865*** | -4.752*** | -4.434*** | -4.601*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Observations | 3,161 | 3,531 | 3,869 | 4,820 | 4,633 | 4,056 |
| Pseudo R-squared | 0.6124 | 0.5798 | 0.5079 | 0.6188 | 0.6033 | 0.5253 |

**Table 9**
Information Asymmetry, Executive Confidence, and CEO Selection. This table presents the relationship between the information asymmetry, executive confidence level and likelihood of a confident candidate getting selected as the new CEO of the firm. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. We consider several measures of information asymmetry between the appointing committee and potential candidates. These include measures of firm complexity (i.e., number of geographic segments and return volatility) and the amount of information produced (i.e., analyst following). The "high" and "low" columns denote the firm's characteristics being above, or below, median, respectively. The models are conditional logit models and the dependent variable is an indicator that equals one if the executive is selected as the firm's CEO. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| | Number of Geographical Segments | | Volatility of Stock Return | | Intensity of Analyst Following | |
|---|---|---|---|---|---|---|
| | High | Small | High | Low | Low | High |
| Exec Confidence | 0.970* | 0.270 | 0.849* | 0.691 | 0.974** | 0.549 |
| | [0.068] | [0.615] | [0.070] | [0.171] | [0.046] | [0.255] |
| Exec Compensation | 3.426*** | 2.216*** | 2.026*** | 3.679*** | 2.542*** | 2.662*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Shareholding | 0.429*** | 0.389*** | 0.400*** | 0.391*** | 0.429*** | 0.325*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Male | 0.460* | 0.934*** | 0.545** | 0.667*** | 0.583** | 0.598** |
| | [0.066] | [0.002] | [0.018] | [0.006] | [0.011] | [0.013] |
| Exec Position: CFO | -0.461*** | -0.337 | -0.401** | -0.570*** | -0.384** | -0.606*** |
| | [0.003] | [0.118] | [0.012] | [0.000] | [0.012] | [0.000] |
| Exec Position: COO | 0.689*** | 0.253 | 0.665*** | 0.326* | 0.555*** | 0.480*** |
| | [0.000] | [0.191] | [0.000] | [0.063] | [0.002] | [0.002] |
| Exec Position: President | 3.009*** | 2.810*** | 2.698*** | 3.048*** | 2.926*** | 2.775*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.701*** | 2.146*** | 2.160*** | 2.667*** | 2.324*** | 2.518*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | 0.139 | 0.200 | 0.209 | 0.090 | 0.127 | 0.204 |
| | [0.434] | [0.386] | [0.226] | [0.633] | [0.471] | [0.265] |
| Exec Age | -0.052*** | -0.038*** | -0.034*** | -0.054*** | -0.037*** | -0.049*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -4.614*** | -4.067*** | -4.103*** | -5.038*** | -4.279*** | -4.643*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Observations | 4,395 | 4,490 | 5,294 | 5,301 | 5,793 | 4,802 |
| Pseudo R-squared | 0.5590 | 0.6051 | 0.5569 | 0.5825 | 0.5892 | 0.5422 |

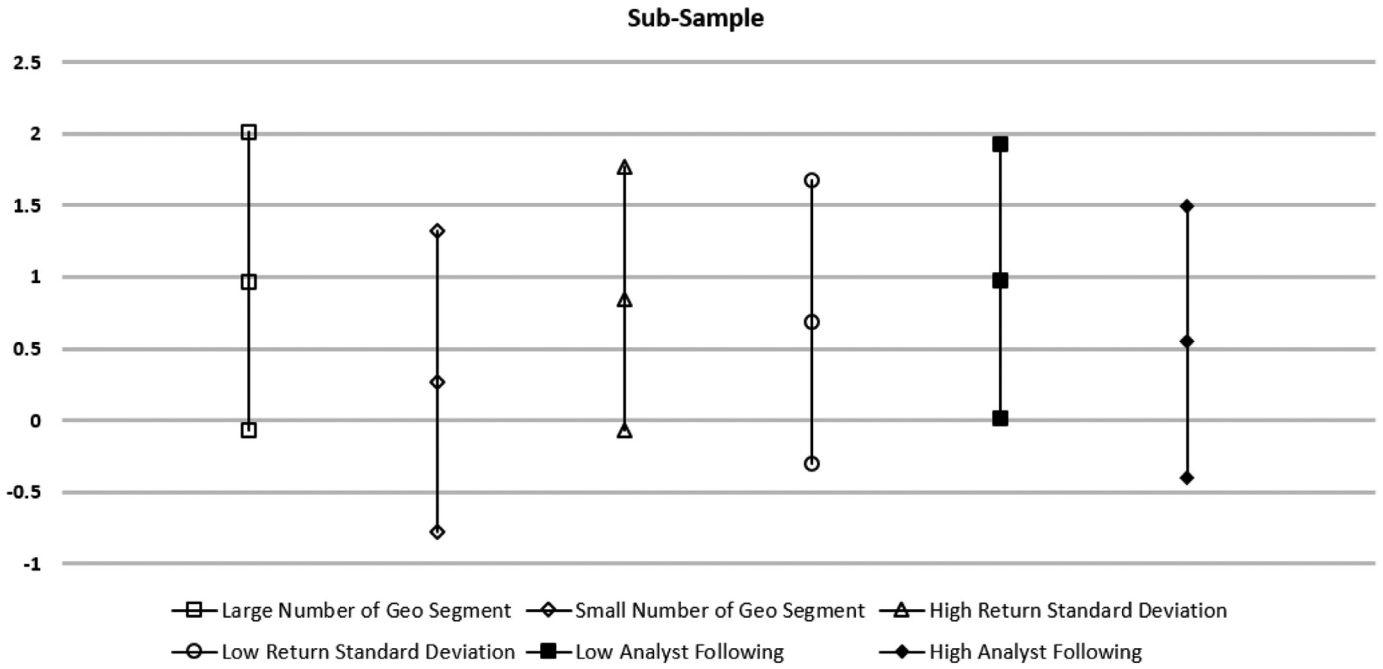



**Fig. 3.** 95% confidence intervals for *Confidence* coefficients in Table 9.

idea that informational barriers can cause boards to confuse luck for skill and appoint overconfident executives as CEOs.

## 5. Additional robustness tests

We undertake additional robustness tests in relation to the measure of overconfidence, the time-period under analysis, alternative explanations, and the modeling technique.

### 5.1. Additional measures of overconfidence

The results are robust to examining different measures of CEO overconfidence. Most of the reported models use a continuous measure of overconfidence. The results are qualitatively similar if we construct a *Holder67* measure, per Malmendier and Tate (2005, 2008). Malmendier and Tate (2005, 2008) use proprietary data to construct their *Holder67* measure. We construct *Holder67* by using publicly available data (as in Hirshleifer et al., 2012; Campbell et al., 2011; Malmendier et al., 2011). This method operates as follows. First, we construct a continuous confidence measure as follows:

$$\text{Confidence}_{i,t} = \frac{\text{Value Per Vested Option}}{\text{Average Strike Price}}, \quad (3)$$

where, the 'Value Per Vested Option' is the total value of the executives vested but unexercised options scaled by the number of those options. The 'Average Strike Price' is equal to the firm's price less the 'Value Per Vested Option'. The logic is that a reasonably accurate proxy for the strike price is: *Price - Value Per Vested Option = Price - (Price - Strike Price) = Strike Price*. *Holder67* is an indicator that equals one from the first time that *Confidence* is at least 0.67, if *Confidence* equals at least 0.67 on at least two occasions. For robustness, we also construct *Holder30, Holde50, Holder80*, and *Holder100* measures of overconfidence.

The results for the *Holder* measures are in Table 10. For brevity, we only report our baseline results. The main finding is that all *Holder* measures are positively and significantly related to the likelihood of the executive being appointed as CEO. These results support our baseline results using our prior continuous measures of overconfidence.

The results are robust to using other alternative measures of overconfidence. In Table 11, we show that our results hold for four alternative proxies for executives' confidence level and the likelihood of a senior internal candidate being selected as the new CEO. These alternatives are described in Appendix 2. Briefly, we consider the log of the raw number of in-the-money exercisable options held by the executives (Alt 1) as well as the log of the raw number of vested but un-exercised options held by the executives (Alt 2). The other measures (Alt 3 & Alt 4) normalize the first two alternative measures by the total number of vested options (exercised and un-exercised). In unreported tests, we also find qualitatively similar results if we use the total value of the executives vested-but-unexercised options scaled by his/her total compensation, or scaling the value-per-vested-option by the average strike price for those options (constructed as the price less the value-per-vested-option[18]).

### 5.2. Addressing alternative explanations

#### 5.2.1. Age and the opportunity to hold options

One possible concern pertains to the relationship between CEO age and option holding. Older executives would have had greater 'opportunity' to hold highly in the money options. This could cause the coefficient on our confidence measures to merely reflect the impact of executive age. Additionally, if a company were to appoint an executive who was older than the former CEO (at his/her time of departure), then it might signal that the appointment is a 'placeholder' appointment and that the executive's other characteristics (i.e., confidence) might have had little relevance. To see this, if the average age of a CEO at the appointment is $x$ and the average tenure is $n$ years, then the average CEO would be $x+n$ years old on departure. However, if the firm appoints a new CEO who is at least $x+n$ years old and is nearing retirement, then that appointment might only be intended to be temporary. While our conditional logit models control for both the executives age and his/her

[18] This measure works on the idea that the value-per-vested-option is approximately $S_t - X$, where $S_t$ is the stock price at time $t$ and $X$ is the strike price for the option. Thus, $S_t - (S_t - X) = X$.

**Table 10**
Robustness to *Holder* Measures of Overconfidence. his table contains conditional logit models that examine the relationship between executive confidence and the likelihood that he/she is appointed as CEO, using *Holder* measures of overconfidence. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable | CEO Selection | | | | |
|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] |
| Holder100 | 0.552*** | | | | |
| | [0.000] | | | | |
| Holder80 | | 0.505*** | | | |
| | | [0.000] | | | |
| Holder67 | | | 0.549*** | | |
| | | | [0.000] | | |
| Holder50 | | | | 0.580*** | |
| | | | | [0.000] | |
| Holder30 | | | | | 0.603*** |
| | | | | | [0.000] |
| Exec Compensation | 2.646*** | 2.660*** | 2.643*** | 2.638*** | 2.645*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Shareholding | 0.389*** | 0.395*** | 0.392*** | 0.392*** | 0.398*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Male | 0.634*** | 0.621*** | 0.617*** | 0.600*** | 0.591*** |
| | [0.001] | [0.001] | [0.001] | [0.001] | [0.002] |
| Exec Position: CFO | -0.526*** | -0.519*** | -0.529*** | -0.537*** | -0.548*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: COO | 0.525*** | 0.546*** | 0.538*** | 0.539*** | 0.546*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: President | 2.770*** | 2.767*** | 2.770*** | 2.773*** | 2.774*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.386*** | 2.388*** | 2.396*** | 2.430*** | 2.409*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | -0.041 | -0.031 | -0.034 | -0.037 | -0.016 |
| | [0.785] | [0.834] | [0.822] | [0.806] | [0.913] |
| Exec Age | -0.046*** | -0.046*** | -0.046*** | -0.045*** | -0.044*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -4.515*** | -4.519*** | -4.494*** | -4.501*** | -4.497*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Observations | 9,036 | 9,036 | 9,036 | 9,036 | 9,036 |
| Pseudo R-squared | 0.5824 | 0.5814 | 0.5818 | 0.5818 | 0.5810 |

tenure (see, e.g., Table 5), in Columns 1 of Table 12, we further ensure the selection-results are robust by ensuring that they hold if we drop any observation where the incoming CEO's age exceeds that of the preceding CEO.

### 5.2.2. Family firms

Family firms often have succession plans that involve family members. Those family members are often assigned significant amounts of stock and options and are foreseeably less likely to exercise those options for reasons other than overconfidence. We address this by using data from GMI ratings to identify which of our firms are family firms.[19] In Column 2 of Table 12, we show that the results are robust to excluding family firms from our sample.

### 5.2.3. Executives pretending to be overconfident or "Fake It 'till You Make It"

One argument is that executives might seek to appear 'enthusiastic' or 'committed' by retaining their options, thereby appearing to be overconfident: the "fake it 'till you make it" possibility. Thus, the concern is that the results reflect executives who are not truly overconfident, trying to act overconfident. We consider this possibility by analyzing the change in the confidence measure following the executive's appointment. This 'fake it' story would imply that the confidence measure would fall significantly following the appointment.

We start by analyzing the univariate change in confidence-level around the turnover. We find that after being appointed, the median change in confidence is almost zero. Additionally, the change in confidence-level (between appointed and non-appointed executives) is qualitatively similar if we restrict the sample to the set of highly confident executives (as defined by Holder67 equaling one prior to the turnover).

The fact that both promoted and non-promoted exhibit similar post-turnover confidence-change is consistent with two explanations, both of which would indicate that 'faking it' is unlikely to explain our results: (1) One explanation is that (on average) no one fakes being overconfident, which is why all exhibit a similar pattern in confidence-levels following the appointment; (2) An alternative explanation is that *everyone* (both appointed and non-appointed) fakes being more confident than they really are. In this case, the preponderance towards faking it simply shifts the 'average' level of perceived confidence but not the ranking among executives (i.e., the ones who are genuinely overconfident would still exhibit a higher level of confidence than the ones who are less overconfident). Thus, companies would look at the relative ranking of confidence-levels between executives, which would lead to the most confident executive to be appointed. In either case, this suggests that the results are unlikely to merely be a function of executives acting as overconfident in order to be selected as CEO.

We next dig deeper into the changes in confidence-level around the turnover event. To do this, we regress the change in confi-

[19] GMI ratings defines a family firm as "[a] company where family ties, most often going back a generation or two to the founder, play a key role in both ownership and board membership. Family members may not have full control of the shareholder vote (greater than 50%), but will generally hold at least 20%."

**Table 11**
Alternative Measures of Executive Confidence. This table contains conditional logit models that examine the relationship between executive confidence and the likelihood that he/she is appointed as CEO, using other alternative measures of executive confidence. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. We consider four alternative proxies for executives' confidence level and likelihood of one seasoned internal candidate getting selected as the new CEO of the firm (CEO Selection). We consider log of raw number of in-the-money exercisable options held by the executives (Alt_1). Next, we consider log of raw number of vested but unexercised options held by the executives (Alt_2). Other two alternative measures normalizes the first two alternative measures (Alt_3 & Alt_4) by the total number of vested options (exercised and un-exercised). Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Model | [1] | [2] | [3] | [4] |
|---|---|---|---|---|
| Executive Confidence Alt 1 | 0.252*** | | | |
| | [0.000] | | | |
| Executive Confidence Alt 2 | | 0.241*** | | |
| | | [0.000] | | |
| Executive Confidence Alt 3 | | | 1.199*** | |
| | | | [0.000] | |
| Executive Confidence Alt 4 | | | | 1.433*** |
| | | | | [0.000] |
| Exec Compensation | 2.514*** | 2.508*** | 2.620*** | 2.724*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Shareholding | 0.391*** | 0.406*** | 0.398*** | 0.392*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Male | 0.599*** | 0.612*** | 0.576*** | 0.598*** |
| | [0.000] | [0.000] | [0.002] | [0.002] |
| Exec Position: CFO | -0.488*** | -0.495*** | -0.472*** | -0.492*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: COO | 0.473*** | 0.459*** | 0.535*** | 0.529*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: President | 2.804*** | 2.798*** | 2.807*** | 2.809*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.343*** | 2.386*** | 2.499*** | 2.562*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | 0.028 | -0.030 | 0.194 | 0.286* |
| | [0.829] | [0.818] | [0.197] | [0.060] |
| Exec Age | -0.047*** | -0.048*** | -0.041*** | -0.041*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -4.401*** | -4.379*** | -5.035*** | -5.102*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Observations | 10,595 | 10,595 | 8,754 | 8,754 |
| Pseudo R-squared | 0.5758 | 0.5775 | 0.5865 | 0.5931 |

**Table 12**
Addressing Executive Age and Family Firm Related Issues. This table contains conditional logit models that examine the relationship between executive confidence and the likelihood that he/she is appointed as CEO, addressing the concerns related to executive age and family firm. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. Column 1 excludes situations where the CEO who is eventually appointed is older than the former CEO. Column 2 excludes family firms, as identified in GMI ratings. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Sample | New CEO younger than old CEO | Non-Family Firms |
|---|---|---|
| Column | [1] | [2] |
| Executive Confidence | 0.770* | 0.776** |
| | [0.079] | [0.036] |
| Exec Compensation | 3.217*** | 2.767*** |
| | [0.000] | [0.000] |
| Exec Shareholding | 0.484*** | 0.448*** |
| | [0.000] | [0.000] |
| Exec Male | 0.622*** | 0.669*** |
| | [0.002] | [0.000] |
| Exec Position: CFO | -0.559*** | -0.520*** |
| | [0.000] | [0.000] |
| Exec Position: COO | 0.801*** | 0.524*** |
| | [0.000] | [0.000] |
| Exec Position: President | 3.014*** | 2.858*** |
| | [0.000] | [0.000] |
| Exec Position: Chair | 3.227*** | 2.471*** |
| | [0.000] | [0.000] |
| Tenure greater than 2 years | 0.236 | 0.161 |
| | [0.132] | [0.226] |
| Exec Age | -0.046*** | -0.044*** |
| | [0.000] | [0.000] |
| Exec Age Missing | -4.504*** | -4.202*** |
| | [0.000] | [0.000] |
| Observations | 7,902 | 9,535 |
| Pseudo R-squared | 0.6205 | 0.5762 |

dence on other corporate and executive characteristics (prior to the turnover). This allows us to control for the potential impact of the firm's performance on confidence-levels. We report these results in Table 13. The sample includes all executives who are at the company at the time of the turnover and remain with the company for one, two, or three years after the turnover, as necessary to compute the dependent variable. The executive is in the sample whether or not he/she becomes CEO. Panel A reports regression results for models that include all the control variables (though we only report coefficients on the 'main' regressors and the constant). Panel B contains models that only control for the firm's market-to-book and market-adjusted stock return in the year prior to the turnover. Panel C reports models that control for the firm's market-adjusted stock return over the period from one year prior to the turnover to one, two, or three years after the turnover (as indicated in the variable name).

The regression analysis yields several interesting results. First, the constant term is positive and statistically significant. This suggests that after controlling for other corporate characteristics, executive-confidence appears to increase post-appointment. This is inconsistent with executives reversing apparent confidence-levels after the turnover (i.e., inconsistent with the "faking it 'till you make it" story). Second, the executive who is appointed as CEO does not appear to feature a significantly different change in confidence from other executives. Third, there is some evidence that declines in confidence are associated with stronger stock returns. We conjecture that this is because as the stock price increases, the strike price of the 'new' options also increases, causing the average strike price of the executive's options to increase (and thus, the average in-the-moneyness of those options to decline). This results in the apparent negative relationship between returns and confidence in these regressions. Overall, these regression results indicate that it is unlikely that executives simply increase the appearance of confidence prior to the turnover in order to be appointed.

### 5.3. Reverse-causality and succession planning

A potential issue is whether the results concentrate on situations in which the firm has a succession plan, which induces the heir apparent to become more overconfident. In this case, it is conceivable that the knowledge that he/she would be appointed would drive confidence rather than confidence driving appointment (generating reverse causality). We argue that the expectation of becoming CEO is unlikely to drive the results as option-based confidence measures tend to reflect behavioral characteristics. Further, in all of the reported models, we exclude any situation in which the executive in question was appointed within one year of the turnover (and thus, might have been appointed to succeed the CEO). Nonetheless, in this section, we address this succession planning issue in two additional ways.

First, we re-estimate the models excluding situations in which the prior CEO might have been near retirement and the firm has selected a successor. Specifically, we re-estimate the models excluding any turnover in which the preceding CEO was over 65 years old (Table 14, Column 1) or over 60 years old (Table 14, Column 2). The results are qualitatively similar to those in the baseline models, suggesting that retirement-related succession is unlikely to drive the results.

Second, we run models in which we interact the confidence measure with the indicators for whether the executive was 'president' or 'COO'. This is because both such positions are significantly more likely to be appointed as CEO; and thus, might be more

**Table 13**
Change in Executive Confidence around Turnovers. This table contains OLS regression models that examine the change in executive confidence-level following the turnover event. The sample includes all executives who were at the company at the time of the turnover and remain with the company for one, two, or three years after the turnover, as necessary to compute the dependent variable. The executive is in the database whether or not he/she becomes CEO. We restrict the sample to the set of executives who stay with the company (either as CEO or as a non-CEO executive) and for whom we have data both before and after the turnover. Panel A includes the full set of control variables (suppressed); Panel B controls only for prior market-adjusted stock return from year $t$ (i.e. one year before the turnover if the turnover is in year $t+1$); Panel C controls for the stock return from year $t$ (one year before a turnover) to years $t+2$, $t+3$, $t+4$, as indicated in the model. The models contain year effects and two-digit SIC industry effects. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable | ΔConfidence | | | Δ%Confidence | | |
|---|---|---|---|---|---|---|
| | $(t,t+2)$ | $(t,t+3)$ | $(t,t+4)$ | $(t,t+2)$ | $(t,t+3)$ | $(t,t+4)$ |
| Panel A: Full set of controls | | | | | | |
| Appointment | 0.008 | 0.002 | 0.006 | -0.041 | 0.099 | 0.222 |
| | [0.146] | [0.750] | [0.466] | [0.765] | [0.643] | [0.422] |
| Market to Book | -0.007*** | -0.011*** | -0.013*** | -0.047** | -0.118*** | -0.130*** |
| | [0.000] | [0.000] | [0.000] | [0.026] | [0.001] | [0.004] |
| Mkt Adj Return | -0.062*** | -0.084*** | -0.091*** | -0.758*** | -1.098*** | -1.224*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.002] |
| Constant | 0.312*** | 0.536*** | 0.782*** | 3.332 | 6.444* | 7.881* |
| | [0.001] | [0.001] | [0.000] | [0.122] | [0.066] | [0.051] |
| Other Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 6,606 | 5,166 | 4,036 | 4,712 | 3,744 | 2,959 |
| Adj R-squared | 0.1448 | 0.1749 | 0.2197 | 0.0861 | 0.0636 | 0.0813 |
| Panel B: Limited Controls | | | | | | |
| Appointment | 0.003 | 0.003 | 0.006 | -0.019 | 0.054 | 0.208 |
| | [0.380] | [0.508] | [0.268] | [0.811] | [0.651] | [0.210] |
| Market to Book | -0.006*** | -0.010*** | -0.013*** | -0.082*** | -0.112*** | -0.154*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Mkt Adj Return | -0.066*** | -0.089*** | -0.099*** | -0.777*** | -1.056*** | -1.100*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.002] |
| Constant | 0.192** | 0.362** | 0.467*** | 0.967 | 1.536 | 0.468 |
| | [0.013] | [0.012] | [0.000] | [0.322] | [0.275] | [0.585] |
| Other Controls | No | No | No | No | No | No |
| Observations | 6,606 | 5,166 | 4,036 | 4,712 | 3,744 | 2,959 |
| Adj R-squared | 0.1325 | 0.1622 | 0.1968 | 0.0645 | 0.0517 | 0.0617 |
| Panel C: Controlling for return over the turnover period | | | | | | |
| Appointment | 0.005 | 0.006 | 0.008* | -0.010 | 0.057 | 0.211 |
| | [0.153] | [0.167] | [0.097] | [0.900] | [0.636] | [0.206] |
| Market to Book | -0.009*** | -0.014*** | -0.017*** | -0.114*** | -0.148*** | -0.192*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Mkt Adj Return $(t,t+2)$ | 0.078*** | | | 0.736*** | | |
| | [0.000] | | | [0.000] | | |
| Mkt Adj Return $(t,t+3)$ | | 0.073*** | | | 0.588*** | |
| | | [0.000] | | | [0.000] | |
| Mkt Adj Return $(t,t+4)$ | | | 0.062*** | | | 0.617*** |
| | | | [0.000] | | | [0.000] |
| Constant | 0.146** | 0.285** | 0.366*** | 0.380 | 0.852 | -0.869 |
| | [0.027] | [0.012] | [0.000] | [0.556] | [0.367] | [0.181] |
| Other Controls | No | No | No | No | No | No |
| Observations | 6,588 | 5,130 | 3,994 | 4,702 | 3,730 | 2,934 |
| Adj R-squared | 0.1893 | 0.2031 | 0.2251 | 0.0765 | 0.0531 | 0.0658 |

prone to being chosen as an heir apparent in a succession plan. These results are in Columns 3-5 of Table 14. The key finding is that the executive confidence variable remains positive and significant, whereas the interaction term is statistically insignificant. This indicates that the core finding (i.e., that overconfident individuals are more likely to be appointed) does not merely concentrate in those positions (i.e., the COO, and president) that are more likely to be appointed. Thus, it is unlikely that the presence of a succession plan drives our results.

### 5.4. Additional endogeneity related tests

We undertake additional tests to mitigate endogeneity concerns. Sections 5.2.3 and 5.3 contain tests designed to mitigate endogeneity concerns. Nevertheless, we take additional steps to ensure that the results are robust. To do this, we create additional confidence-related measures and re-run our baseline conditional logit model using these measures. These are in Table 15. Column 1 calculates the executive's confidence level at all other firms he/she has served on in every year. We calculate the executive's average confidence level and take the natural log of one plus that confidence level. Given that this measure is constructed by using actions at different firms and is not contemporaneous with the turnover, this should not itself be driven by turnover related behavior. Column 2 calculates the executive's three-year average confidence level over the three years preceding the turnover. We calculate the natural log of one plus this number. Column 3 contains a similar measure, being the natural log of one plus the average confidence from two and three years prior to the turnover. The results are consistent with our baseline results and help to ensure that the results do not merely reflect endogeneity related issues.

**Table 14**
Addressing Succession-Plan Related Issues This table contains conditional logit models that examine the likelihood that an individual internal candidate is selected as CEO of the firm in a given turnover event. The dependent variable is an indicator that equals one if the executive is appointed as CEO. Columns 1 and 2 exclude any turnover event in which the prior CEO was over 65 or over 60, respectively. Columns 3-5 include interactions of the 'Executive Confidence' variable with the position variables, as indicated. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Sample | Old CEO ≤ 65 | Old CEO ≤ 60 | All | All | All |
|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] |
| A: Executive Confidence | 0.971*** | 1.186*** | 0.910*** | 0.863*** | 0.896*** |
| | [0.008] | [0.007] | [0.007] | [0.009] | [0.008] |
| B: Executive's Position: President | 2.670*** | 2.685*** | 2.696*** | 2.662*** | 2.715*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| C: Executive's Position: COO | 0.734*** | 0.545*** | 0.652*** | 0.621*** | 0.595*** |
| | [0.000] | [0.005] | [0.000] | [0.001] | [0.002] |
| A x B | | | -0.134 | | -0.220 |
| | | | [0.736] | | [0.618] |
| A x C | | | | 0.122 | 0.238 |
| | | | | [0.803] | [0.658] |
| Executive Compensation | 2.017*** | 1.554*** | 1.951*** | 1.949*** | 1.952*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Share Ownership | 0.241*** | 0.247*** | 0.272*** | 0.272*** | 0.272*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive is Male | 0.755*** | 0.735** | 0.755*** | 0.752*** | 0.754*** |
| | [0.002] | [0.010] | [0.001] | [0.001] | [0.001] |
| Executive's Position: CFO | -0.770*** | -0.786*** | -0.799*** | -0.800*** | -0.801*** |
| | [0.000] | [0.002] | [0.000] | [0.000] | [0.000] |
| Executive's Position: Chairman | 2.601*** | 2.588*** | 2.540*** | 2.536*** | 2.540*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Tenure > 2 years | -0.114 | -0.035 | -0.051 | -0.050 | -0.050 |
| | [0.497] | [0.865] | [0.742] | [0.746] | [0.748] |
| Executive Age | -0.045*** | -0.042*** | -0.045*** | -0.045*** | -0.045*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Missing Age | -4.033*** | -4.126*** | -3.955*** | -3.955*** | -3.956*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Observations | 6,681 | 3,903 | 8,016 | 8,016 | 8,016 |
| Pseudo R-squared | 0.6008 | 0.5715 | 0.6000 | 0.6000 | 0.6001 |

**Table 15**
Executive Confidence and CEO Selection Using Confidence Measures in Other Firms and in Lagged Years This table contains conditional logit models that examine the relationship between Executive confidence and the likelihood that he/she is appointed as CEO, using confidence measures in other firms and in lagged years. Column 1 calculates the executive's confidence level at all other firms he/she has served on in every year. We calculate the executive's average confidence level and take the natural log of one plus that confidence level. Column 2 calculates the executive's three-year average confidence level over the three years preceding the turnover. We calculate the natural log of one plus this average. Column 3 is the natural log of one plus the average confidence from two and three years before the turnover. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable | CEO Selection | | |
|---|---|---|---|
| Column | [1] | [2] | [3] |
| Exec Confidence at Other Firms | 2.359* | | |
| | [0.057] | | |
| 2 yr average Confidence Lagged 1 year | | 1.179** | |
| | | [0.017] | |
| 2 yr average Confidence Lagged 2 years | | | 0.827* |
| | | | [0.061] |
| Exec Compensation | 2.410** | 2.425*** | 2.440*** |
| | [0.031] | [0.000] | [0.000] |
| Exec Shareholding | 0.248 | 0.377*** | 0.374*** |
| | [0.159] | [0.000] | [0.000] |
| Exec Male | 0.947 | 0.377* | 0.376* |
| | [0.188] | [0.072] | [0.073] |
| Exec Position: CFO | 0.210 | -0.686*** | -0.684*** |
| | [0.630] | [0.000] | [0.000] |
| Exec Position: COO | 0.200 | 0.423*** | 0.428*** |
| | [0.689] | [0.003] | [0.003] |
| Exec Position: President | 2.901*** | 2.718*** | 2.715*** |
| | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.908*** | 2.002*** | 2.003*** |
| | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | -0.391 | | |
| | [0.358] | | |
| Exec Age | 0.018 | -0.051*** | -0.051*** |
| | [0.477] | [0.000] | [0.000] |
| Exec Age Missing | -16.824 | -4.237*** | -4.248*** |
| | [0.991] | [0.000] | [0.000] |
| Observations | 498 | 5,876 | 5,876 |
| Pseudo R-squared | 0.5355 | 0.5495 | 0.5490 |

**Table 16**
Executive Confidence and CEO Selection Controlling for Executive Bonus This table contains conditional logit models that examine the relationship between executive confidence and the likelihood that he/she is appointed as CEO, controlling for executive bonus measures. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| | [1] | [2] | [3] | [4] | [5] | [6] |
|---|---|---|---|---|---|---|
| Executive Confidence | 0.779** | 0.974*** | 0.838** | 1.009*** | 0.795** | 0.981*** |
| | [0.025] | [0.004] | [0.017] | [0.003] | [0.023] | [0.004] |
| ln(1+$Bonus) | 0.206*** | 0.129*** | | | | |
| | [0.000] | [0.000] | | | | |
| Bonus/Salary | | | 0.709*** | 0.489*** | | |
| | | | [0.000] | [0.000] | | |
| Bonus/(Bonus + Salary) | | | | | 2.727*** | 1.672*** |
| | | | | | [0.000] | [0.000] |
| Exec Compensation | 3.027*** | | 3.052*** | | 3.152*** | |
| | [0.000] | | [0.000] | | [0.000] | |
| Exec Position: President | 2.813*** | 2.906*** | 2.818*** | 2.908*** | 2.824*** | 2.913*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: COO | 0.490*** | 0.485*** | 0.509*** | 0.487*** | 0.489*** | 0.483*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Shareholding | 0.406*** | 0.356*** | 0.383*** | 0.343*** | 0.396*** | 0.350*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Male | 0.591*** | 0.587*** | 0.588*** | 0.585*** | 0.594*** | 0.588*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: CFO | -0.496*** | -0.503*** | -0.484*** | -0.493*** | -0.489*** | -0.496*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Position: Chair | 2.532*** | 2.486*** | 2.493*** | 2.465*** | 2.537*** | 2.489*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Tenure greater than 2 years | 0.173 | 0.216* | 0.141 | 0.190 | 0.153 | 0.199 |
| | [0.179] | [0.084] | [0.272] | [0.129] | [0.236] | [0.111] |
| Exec Age | -0.041*** | -0.043*** | -0.042*** | -0.044*** | -0.040*** | -0.043*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Exec Age Missing | -4.365*** | -4.396*** | -4.359*** | -4.389*** | -4.376*** | -4.403*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Observations | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 |
| Pseudo R-squared | 0.5741 | 0.5542 | 0.5761 | 0.5559 | 0.5759 | 0.5549 |

### 5.5. Might Confidence Merely Correspond to Executive Performance or Skill?

A concern with the confidence measure is that it presupposes that the executive has received options, which could reflect the executive's performance and which could, in turn, lead to the selection of the executive. The reported results are intended to address this at least in part by controlling for the executive's incentive compensation.[20] Further, the conditional logit models implicitly control for the firm's performance, which an executive's skill/performance would influence. Nonetheless, in Table 16 we re-estimate the models controlling for the executive's dollar bonus (Columns 1 and 2), bonus/salary (Columns 3 and 4) and bonus/[bonus+salary] (Columns 5 and 6), either in addition to or instead of the executive's incentive compensation. The underlying logic is that a better performing executive would receive a higher bonus. From Table 16, the results vis-à-vis executive confidence are qualitatively similar in these models, suggesting that the confidence-related results do not merely reflect the executive's performance and consequent receipt of options.

We take some additional temps to help mitigate concerns about the correlation between performance and confidence measures. A related concern to the above is that executives might simply hold high numbers of options because they anticipate strong future performance. However, for several reasons, this should not affect the results. First, prior studies show that overconfident CEOs – who have high levels of option holdings – underperform (Malmendier and Tate, 2005; 2008). Second, such firm-wide performance is a common effect that all executives at that firm experience. The conditional logit models implicitly control for this by implicitly controlling for turnover effects. Third, this notwithstanding, in unreported robustness tests, we also find qualitatively similar results if we use a 'residual' overconfidence measure, which is orthogonalized for firm performance. We obtain this by obtaining the residual from a regression of confidence onto firm performance and then using this residual as our measure of overconfidence. This suggests that the results do not merely reflect a spurious correlation between option holdings and performance.

### 5.6. Modeling Technique

The reported executive-level models use a conditional logit model (in Table 5). As discussed, the conditional logit is appropriate for the structure of the data. However, we also find that the results are also robust to using an ordinary logit model or a linear probability model (estimated using OLS). These models include relevant firm-level controls. We test several different types of fixed effects, including year effects, firm effects, and industry × year effects. Table 17 and Table 18 contain the results for the logit and linear probability (OLS) models, respectively. The results are consistent with the main models in Table 5.

### 5.7. Tenure Issues

The executive's tenure could influence whether he/she is selected as the CEO. The baseline models in Table 5 control for tenure by including an indicator for whether the executive has been at the firm for at least two years. We use this indicator because the exact start date for some executives is unreported. But,

[20] In the baseline models, we define this as 1 - [(Salary + Bonus)/Total Compensation].

**Table 17**
Logit Models: Executive Confidence and CEO Selection This table contains regression models that examine the relationship between executive confidence and the likelihood that he/she is appointed as CEO. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. The models are logit models in which the dependent variable is an indicator that equals one if the executive is appointed as CEO. We include industry × year fixed effects (using SIC 2-digit industries), firm effects, or year effects, and cluster standard errors by firm, or by firm-year, as denoted in the table footer. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable | Executive Appointed as CEO | | | | Executive Appointed as CEO | | | |
|---|---|---|---|---|---|---|---|---|
| Column | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| log[Exec Confidence] | 0.513** | 0.485** | 0.513** | 0.485** | 0.612** | 0.640** | 0.612** | 0.640** |
| | [0.013] | [0.021] | [0.012] | [0.019] | [0.038] | [0.032] | [0.038] | [0.032] |
| ln(1+$Bonus) | 1.326*** | 1.764*** | 1.326*** | 1.764*** | 2.436*** | 2.805*** | 2.436*** | 2.805*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Share Ownership | 0.447*** | 0.455*** | 0.447*** | 0.455*** | 0.505*** | 0.508*** | 0.505*** | 0.508*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive is Male | 0.602*** | 0.612*** | 0.602*** | 0.612*** | 0.761*** | 0.769*** | 0.761*** | 0.769*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive's Position: CFO | -0.638*** | -0.637*** | -0.638*** | -0.637*** | -0.688*** | -0.685*** | -0.688*** | -0.685*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive's Position: COO | 0.825*** | 0.831*** | 0.825*** | 0.831*** | 0.880*** | 0.868*** | 0.880*** | 0.868*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive's Position: President | 4.007*** | 4.027*** | 4.007*** | 4.027*** | 4.482*** | 4.492*** | 4.482*** | 4.492*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive's Position: Chairman | 2.701*** | 2.686*** | 2.701*** | 2.686*** | 3.301*** | 3.350*** | 3.301*** | 3.350*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Tenure > 2 years | 0.047 | 0.050 | 0.047 | 0.050 | 0.207 | 0.202 | 0.207 | 0.202 |
| | [0.677] | [0.657] | [0.679] | [0.659] | [0.133] | [0.146] | [0.133] | [0.146] |
| Executive Age | -0.040*** | -0.040*** | -0.040*** | -0.040*** | -0.053*** | -0.053*** | -0.053*** | -0.053*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Missing Age | -4.974*** | -4.946*** | -4.974*** | -4.946*** | -6.079*** | -6.071*** | -6.079*** | -6.071*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Ln[Total Assets] | -0.048 | -0.017 | -0.048* | -0.017 | -0.191* | -0.193** | -0.191* | -0.193** |
| | [0.106] | [0.570] | [0.089] | [0.550] | [0.050] | [0.041] | [0.050] | [0.041] |
| ROA | -0.495* | -0.486* | -0.495* | -0.486* | -1.158** | -1.239*** | -1.158** | -1.239*** |
| | [0.087] | [0.096] | [0.087] | [0.095] | [0.012] | [0.008] | [0.012] | [0.008] |
| Leverage | 0.033** | 0.026* | 0.033** | 0.026* | -0.028 | -0.037 | -0.028 | -0.037 |
| | [0.021] | [0.063] | [0.025] | [0.067] | [0.276] | [0.151] | [0.276] | [0.151] |
| Market-to-Book | -0.030*** | -0.027*** | -0.030*** | -0.027*** | -0.031** | -0.027* | -0.031** | -0.027* |
| | [0.003] | [0.007] | [0.003] | [0.007] | [0.040] | [0.070] | [0.040] | [0.070] |
| R&D Expenses | 1.046 | 1.063 | 1.046 | 1.063 | -0.986 | -1.269 | -0.986 | -1.269 |
| | [0.156] | [0.150] | [0.154] | [0.149] | [0.707] | [0.641] | [0.707] | [0.641] |
| Cash Holding | -0.216 | -0.114 | -0.216 | -0.114 | -0.752 | -0.546 | -0.752 | -0.546 |
| | [0.335] | [0.619] | [0.340] | [0.619] | [0.152] | [0.300] | [0.152] | [0.300] |
| Volatility of Stock Return | -4.702* | -4.484 | -4.702* | -4.484 | -5.619 | -6.621 | -5.619 | -6.621 |
| | [0.084] | [0.105] | [0.085] | [0.107] | [0.181] | [0.107] | [0.181] | [0.107] |
| S&P 500 Inclusion Dummy | -0.042 | -0.025 | -0.042 | -0.025 | 0.013 | 0.083 | 0.013 | 0.083 |
| | [0.618] | [0.769] | [0.599] | [0.756] | [0.929] | [0.583] | [0.929] | [0.583] |
| Departing CEO's Compensation | | -1.005*** | | -1.005*** | | -1.334*** | | -1.334*** |
| | | [0.000] | | [0.000] | | [0.000] | | [0.000] |
| Departing CEO's Shareholding | | -0.022*** | | -0.022*** | | -0.020 | | -0.020 |
| | | [0.003] | | [0.004] | | [0.142] | | [0.142] |
| Departing CEO is Male | | -0.372* | | -0.372* | | 0.091 | | 0.091 |
| | | [0.056] | | [0.062] | | [0.692] | | [0.692] |
| Departing CEO-Chairman | | -0.177** | | -0.177** | | 0.107 | | 0.107 |
| | | [0.016] | | [0.016] | | [0.296] | | [0.296] |
| Departing CEO's Tenure > 2 Years | | 0.001 | | 0.001 | | -0.072 | | -0.072 |
| | | [0.992] | | [0.992] | | [0.496] | | [0.496] |
| Departing CEO's Age | | -0.001 | | -0.001 | | -0.001 | | -0.001 |
| | | [0.781] | | [0.784] | | [0.874] | | [0.874] |
| Departing CEO's Missing-Age | | -0.308 | | -0.308 | | -1.019** | | -1.019** |
| | | [0.349] | | [0.348] | | [0.013] | | [0.013] |
| Industry x Year Fixed Effects | Yes | Yes | Yes | Yes | No | No | No | No |
| Firm FE | No | No | No | No | Yes | Yes | Yes | Yes |
| Year FE | No | No | No | No | Yes | Yes | Yes | Yes |
| Clustering | Firm | Firm | Firm-Year | Firm-Year | Firm | Firm | Firm-Year | Firm-Year |
| Observations | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 |
| Pseudo R-squared | 0.4615 | 0.4645 | 0.4615 | 0.4645 | 0.5035 | 0.5056 | 0.5035 | 0.5056 |

**Table 18**
OLS Models: Executive Confidence and CEO Selection This table contains regression models that examine the relationship between executive confidence and the likelihood that he/she is appointed as CEO. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. The models are OLS models in which the dependent variable is an indicator that equals one if the Executive is appointed as CEO. We include industry × year fixed effects (using SIC 2-digit industries), firm effects, or year effects, and cluster standard errors by firm, or by firm-year, as denoted in the table footer. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable | Executive Appointed as CEO | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Column | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| log[Exec Confidence] | 0.050*** | 0.049** | 0.050*** | 0.049** | 0.052** | 0.053** | 0.052** | 0.053** |
| | [0.009] | [0.011] | [0.009] | [0.011] | [0.043] | [0.041] | [0.043] | [0.041] |
| ln(1+$Bonus) | 0.126*** | 0.160*** | 0.126*** | 0.160*** | 0.202*** | 0.229*** | 0.202*** | 0.229*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Share Ownership | 0.058*** | 0.058*** | 0.058*** | 0.058*** | 0.061*** | 0.061*** | 0.061*** | 0.061*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive is Male | 0.048*** | 0.049*** | 0.048*** | 0.049*** | 0.057*** | 0.058*** | 0.057*** | 0.058*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive's Position: CFO | -0.069*** | -0.069*** | -0.069*** | -0.069*** | -0.073*** | -0.073*** | -0.073*** | -0.073*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive's Position: COO | 0.099*** | 0.100*** | 0.099*** | 0.100*** | 0.100*** | 0.100*** | 0.100*** | 0.100*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive's Position: President | 0.683*** | 0.682*** | 0.683*** | 0.682*** | 0.699*** | 0.698*** | 0.699*** | 0.698*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive's Position: Chairman | 0.376*** | 0.372*** | 0.376*** | 0.372*** | 0.383*** | 0.384*** | 0.383*** | 0.384*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Tenure > 2 years | 0.001 | 0.001 | 0.001 | 0.001 | 0.011 | 0.011 | 0.011 | 0.011 |
| | [0.915] | [0.893] | [0.915] | [0.893] | [0.349] | [0.365] | [0.349] | [0.365] |
| Executive Age | -0.004*** | -0.004*** | -0.004*** | -0.004*** | -0.005*** | -0.005*** | -0.005*** | -0.005*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Executive Missing Age | -0.144*** | -0.142*** | -0.144*** | -0.142*** | -0.156*** | -0.155*** | -0.156*** | -0.155*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Ln[Total Assets] | -0.004 | -0.001 | -0.004 | -0.001 | -0.018** | -0.019** | -0.018** | -0.019** |
| | [0.180] | [0.610] | [0.156] | [0.589] | [0.028] | [0.015] | [0.028] | [0.015] |
| ROA | -0.046* | -0.049* | -0.046* | -0.049* | -0.081** | -0.093** | -0.081** | -0.093** |
| | [0.085] | [0.073] | [0.087] | [0.075] | [0.043] | [0.023] | [0.043] | [0.023] |
| Leverage | 0.003** | 0.002** | 0.003** | 0.002* | -0.003 | -0.003 | -0.003 | -0.003 |
| | [0.017] | [0.049] | [0.021] | [0.053] | [0.191] | [0.116] | [0.191] | [0.116] |
| Market-to-Book | -0.003*** | -0.002*** | -0.003*** | -0.002*** | -0.003** | -0.003** | -0.003** | -0.003** |
| | [0.001] | [0.006] | [0.001] | [0.006] | [0.023] | [0.041] | [0.023] | [0.041] |
| R&D Expenses | 0.070 | 0.059 | 0.070 | 0.059 | 0.059 | 0.031 | 0.059 | 0.031 |
| | [0.325] | [0.407] | [0.327] | [0.408] | [0.795] | [0.896] | [0.795] | [0.896] |
| Cash Holding | -0.013 | -0.002 | -0.013 | -0.002 | -0.057 | -0.038 | -0.057 | -0.038 |
| | [0.537] | [0.914] | [0.541] | [0.914] | [0.183] | [0.390] | [0.183] | [0.390] |
| Volatility of Stock Return | -0.506* | -0.546** | -0.506* | -0.546** | -0.265 | -0.380 | -0.265 | -0.380 |
| | [0.052] | [0.038] | [0.050] | [0.038] | [0.451] | [0.279] | [0.451] | [0.279] |
| S&P 500 Inclusion Dummy | -0.006 | -0.003 | -0.006 | -0.003 | 0.004 | 0.009 | 0.004 | 0.009 |
| | [0.452] | [0.688] | [0.427] | [0.670] | [0.702] | [0.433] | [0.702] | [0.433] |
| Departing CEO's Compensation | | -0.082*** | | -0.082*** | | -0.104*** | | -0.104*** |
| | | [0.000] | | [0.000] | | [0.000] | | [0.000] |
| Departing CEO's Shareholding | | -0.002** | | -0.002** | | -0.001 | | -0.001 |
| | | [0.011] | | [0.011] | | [0.211] | | [0.211] |
| Departing CEO is Male | | -0.041* | | -0.041* | | -0.003 | | -0.003 |
| | | [0.064] | | [0.070] | | [0.873] | | [0.873] |
| Departing CEO-Chairman | | -0.020*** | | -0.020*** | | 0.001 | | 0.001 |
| | | [0.002] | | [0.002] | | [0.891] | | [0.891] |
| Departing CEO's Tenure > 2 Years | | -0.001 | | -0.001 | | -0.004 | | -0.004 |
| | | [0.892] | | [0.892] | | [0.705] | | [0.705] |
| Departing CEO's Age | | 0.000 | | 0.000 | | 0.000 | | 0.000 |
| | | [0.991] | | [0.991] | | [0.595] | | [0.595] |
| Departing CEO's Missing-Age | | -0.018 | | -0.018 | | -0.103*** | | -0.103*** |
| | | [0.534] | | [0.535] | | [0.001] | | [0.001] |
| Industry x Year Fixed Effects | Yes | Yes | Yes | Yes | No | No | No | No |
| Firm FE | No | No | No | No | Yes | Yes | Yes | Yes |
| Year FE | No | No | No | No | Yes | Yes | Yes | Yes |
| Clustering | Firm | Firm | Firm-Year | Firm-Year | Firm | Firm | Firm-Year | Firm-Year |
| Observations | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 | 10,595 |
| Adj R-Squared | 0.4504 | 0.4517 | 0.4504 | 0.4517 | 0.4253 | 0.4261 | 0.4253 | 0.4261 |

we can nevertheless determine if he/she has been there for at least two years by observing how many observations he/she has in Execucomp.

We check that the results are similar if we use a continuous measure of tenure. Here, we construct a continuous tenure measure that equals either the number of years the executive has been at the firm (if reported) or the number of years the executive has been with the firm in the Execucomp datafile. We then re-estimate the baseline conditional logit models (in Table 5) using this measure. The results are in Table 19 and are consistent with Table 5.

**Table 19**
Executive Confidence and CEO Selection Using Alternative Executive Tenure Measure This table contains conditional logit models that examine the relationship between executive confidence and the likelihood that he/she is appointed as CEO, using alternative executive tenure measure. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable<br>Column | CEO Selection<br>[1] |
|---|---|
| Executive Confidence | 0.639*<br>[0.062] |
| Exec Compensation | 2.573***<br>[0.000] |
| Exec Shareholding | 0.368***<br>[0.000] |
| Exec Male | 0.574***<br>[0.001] |
| Exec Position: CFO | -0.480***<br>[0.000] |
| Exec Position: COO | 0.496***<br>[0.000] |
| Exec Position: President | 2.850***<br>[0.000] |
| Exec Position: Chair | 2.420***<br>[0.000] |
| Executive Tenure | 0.053***<br>[0.000] |
| Exec Age | -0.049***<br>[0.000] |
| Exec Age Missing | -4.387***<br>[0.000] |
| Observations | 10,595 |
| Pseudo R-squared | 0.5696 |

### 5.8. Option Backdating Issues

A possible concern is that the overconfidence-measures, which are based on CEO option-exercise behavior, might be susceptible to issues with option backdating. Such backdating could give the appearance of the executive holding highly in the money options. While we argue that it would still be irrational to hold highly in the money options (even if their value reflect option-backdating), in unreported tests we find that the results are qualitatively similar if we omit any firm with any indication of option-backdating in GMI Ratings.[21]

### 5.9. Post-turnover performance

The foregoing analysis begs the question of whether overconfident appointees perform worse, especially when appointed in firms that we hypothesize might make worse hiring decisions. This analysis is relatively fraught: new CEOs are often burdened with their predecessor's performance for some time after the turnover. Nevertheless, we analyze the impact of newly appointed CEOs' confidence on post-turnover performance in Table 20. Here, we look at the relationship between confidence and Tobin's Q five years after the turnover event.

We split the sample based on various characteristics associated with potentially limited attention in the hiring process: board busyness (5+ outside directorships), entrenchment (Bebchuk et al. (2009) index), and complexity (number of geographic segments). In these subsample analyses, we control for the log values of board busyness (ln[Director Busyness]), entrenchment (ln[BCF Index]), and complexity (ln[Number of Geo. Segments]), to account for the potential concerns that these moderator variables (e.g., corporate governance and complexity) may influence firm's post-turnover performance. We find that overconfident appointees tend to perform worse than less confident peers. This effect tends to concentrate on the companies that we would expect to have worse oversight and decision-making in the hiring process.

In unreported robustness tests, we further adopt 'residual' overconfidence measures, which are orthogonalized for board busyness, entrenchment, and complexity. We obtain these residual measures from regressions of confidence onto board busyness, entrenchment, and complexity. Then, we use the residual values as our measures of overconfidence and find similar results, which suggest that our findings are not driven by corporate governance and firm complexity in the companies with poor oversight and hiring process.

## 6. Conclusion

This paper examines whether and when overconfident executives are more likely to be promoted to CEOs. It is not unusual for CEOs to be overconfident, with an exaggerated opinion of their own abilities and the prospects of firms they manage. We investigate whether the overconfidence of CEOs is a trait that is observed and favored by boards at the time of CEO selection. Our empirical tests indicate that boards do have a propensity to select overconfident individuals to be CEOs. We find that firms with executives that are relatively more confident tend to hire internally. Further, when firms hire internally, they are more likely to pick a more confident candidate.

We argue that governance, board inattention, and informational barriers can play a role in the selection of overconfident executives as CEOs. The underlying idea is that boards lack full information at the time they appoint the CEOs. Thus, they must rely on publicly available signals. Given that overconfident CEOs take more risk, and executives tend to suffer lower job-market penalties

[21] Specifically, GMI Ratings provides a backdating flag and backdating information. In these unreported tests, we exclude any firm that at any time exhibits any backdating.

**Table 20**
Executive Confidence and Post-Turnover Firm Performance This table contains OLS regression models that examine the relationship between executive confidence and post-turnover firm performance. The sample includes all turnover events that feature an *ExecuComp* firm and in which that firm hires an executive in the *ExecuComp* universe. The models are linear models in which the dependent variable is 5-year forward-looking Tobin's Q. We include industry × year effects (using two-digit SIC industries), and cluster standard errors at the firm level. Appendix 2 contains the variable definitions. Superscripts ***, ** and * denote significance at 1%, 5%, and 10%, respectively.

| Dependent Variable | Tobin's $Q_{t+5}$ | | | | | |
|---|---|---|---|---|---|---|
| Sub-samples | Directors with 5+ directorships | | BCF Index | | Number of Geographical Segments | |
| | High | Low | ≥ 3 | < 3 | High | Low |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ln[Confidence] | -1.085*** | 0.021 | -0.545** | 0.008 | -0.458* | -0.092 |
| | [0.002] | [0.920] | [0.036] | [0.975] | [0.089] | [0.679] |
| Executive Compensation | 0.048 | -0.075 | 0.262 | -0.025 | 0.204 | -0.213 |
| | [0.837] | [0.534] | [0.244] | [0.852] | [0.240] | [0.167] |
| Executive % Shareholding | -0.025 | 0.007 | 0.030 | 0.014 | 0.001 | 0.066* |
| | [0.635] | [0.821] | [0.629] | [0.594] | [0.975] | [0.066] |
| Executive Gender Indicator | 0.278 | -0.063 | 0.186 | -0.039 | 0.245* | -0.142 |
| | [0.534] | [0.610] | [0.146] | [0.822] | [0.090] | [0.401] |
| Exec Position: CFO | 0.043 | 0.138 | -0.021 | 0.145 | 0.268* | -0.315** |
| | [0.833] | [0.387] | [0.879] | [0.479] | [0.096] | [0.028] |
| Exec Position: COO | -0.044 | 0.020 | -0.034 | -0.012 | 0.026 | 0.002 |
| | [0.743] | [0.732] | [0.723] | [0.848] | [0.728] | [0.976] |
| Exec Position: President | 0.080 | -0.080 | -0.029 | -0.081 | 0.053 | -0.087 |
| | [0.482] | [0.204] | [0.732] | [0.231] | [0.458] | [0.254] |
| Exec Position: Chairman | 0.041 | 0.113 | 0.005 | -0.071 | 0.198* | -0.239* |
| | [0.829] | [0.210] | [0.972] | [0.522] | [0.095] | [0.084] |
| Tenure > 2 years Indicator | 0.042 | -0.007 | -0.045 | -0.089 | 0.072 | -0.482*** |
| | [0.763] | [0.950] | [0.690] | [0.463] | [0.567] | [0.001] |
| Executive Age | -0.000 | 0.007* | -0.003 | 0.009** | -0.003 | 0.012** |
| | [0.995] | [0.075] | [0.633] | [0.049] | [0.635] | [0.021] |
| Missing Age Indicator | | -0.131 | | -0.355 | | -0.536** |
| | | [0.588] | | [0.226] | | [0.027] |
| Size | -0.071 | 0.008 | -0.028 | 0.007 | -0.028 | 0.077* |
| | [0.250] | [0.839] | [0.628] | [0.830] | [0.438] | [0.054] |
| ROA | 0.840 | -1.152*** | -0.385 | -0.504 | -0.438 | -0.614 |
| | [0.335] | [0.004] | [0.447] | [0.400] | [0.285] | [0.298] |
| Leverage | 0.066* | 0.050** | 0.028 | 0.076*** | 0.068*** | 0.054** |
| | [0.072] | [0.011] | [0.139] | [0.000] | [0.010] | [0.026] |
| Market-to-Book | -0.142*** | -0.101*** | -0.066** | -0.113*** | -0.138*** | -0.089*** |
| | [0.000] | [0.000] | [0.036] | [0.000] | [0.000] | [0.000] |
| R&D Expenses | -3.333 | 0.820 | 1.662 | -1.130 | 0.573 | -0.748 |
| | [0.152] | [0.591] | [0.400] | [0.432] | [0.712] | [0.668] |
| Cash Holding | -0.396 | -0.738* | 0.018 | -0.825** | -0.674 | -0.444 |
| | [0.497] | [0.090] | [0.977] | [0.019] | [0.179] | [0.244] |
| Volatility of Stock Return | -21.434*** | -4.970 | -7.454** | -4.234 | -10.064*** | -2.430 |
| | [0.000] | [0.130] | [0.019] | [0.215] | [0.007] | [0.590] |
| S&P 500 Inclusion Indicator | 0.134 | -0.139 | 0.001 | -0.138 | 0.027 | -0.233** |
| | [0.470] | [0.113] | [0.994] | [0.119] | [0.798] | [0.032] |
| Market-adjusted Stock Return | -0.106 | -0.081 | -0.071 | -0.166* | 0.010 | -0.229** |
| | [0.433] | [0.336] | [0.545] | [0.056] | [0.917] | [0.018] |
| ln[Director Busyness] | -0.193 | 0.388 | | | | |
| | [0.614] | [0.115] | | | | |
| ln[BCF Index] | | | -0.074 | -0.014 | | |
| | | | [0.725] | [0.857] | | |
| ln[Number of Geo. Segments] | | | | | 0.049 | 0.029 |
| | | | | | [0.537] | [0.878] |
| Constant | 4.941*** | 1.089** | 0.052 | 0.712 | 2.375*** | 0.449 |
| | [0.000] | [0.024] | [0.943] | [0.164] | [0.000] | [0.365] |
| No. of Observation | 336 | 905 | 469 | 848 | 630 | 717 |
| Adj R-squared | 0.4265 | 0.3067 | 0.2239 | 0.2825 | 0.3397 | 0.2659 |

if those risky projects fail, we anticipate that overconfident executives are more likely to become CEOs. We further hypothesize that this will be especially apparent in companies with a busy board, or an entrenched board, where the board might have less time or incentive to look deeper into the executive's risk-taking.

Overall, we find support for the information asymmetry hypothesis. Boards that are relatively busier and more entrenched, and thus, more susceptible to shirking and more insulated from the negative implications of their decisions, are also more likely to appoint overconfident CEOs. This implies that while appointing overconfident CEOs can reflect a desire to increase firm value, in some situations, the board might simply confuse the overconfident appointee's luck for skill.

We ensure that the results are robust to alternative explanations for the findings. For example, we control for executives' tenure, salary, and position. We also ensure that the results hold when restricting the sample to the upper levels of executive management. We take steps to mitigate concerns that the results merely reflect the possibility that executives hold options to appear 'loyal' and to be appointed. We also engage in a battery of additional robustness tests in order to mitigate econometric concerns and alternative explanations for the results.

Our paper contributes to the literature on CEO-hiring and on overconfidence by highlighting the importance of executive-overconfidence in influencing hiring-decisions. Our explanations need not be the only explanations for overconfident individuals becoming CEOs: in some firms, such overconfidence might be beneficial (see the theoretical modeling in Goel and Thakor, 2008). Future literature could analyze such selection decisions. Prior literature has examined the performance-implications and investment-implications of CEO overconfidence. However, our paper contributes to a better understanding of how such overconfident individuals come to be CEOs in the first place.

## Appendix A. Sample formation procedure

This appendix explains how to arrive at the potential seasoned internal CEO candidates in companies that will experience CEO turnovers and select new CEOs from these seasoned candidates in year t+1. In one company experiencing CEO turnover, there should be at least two seasoned executives with valid confidence level information to be selected in year t. An intermediate sample consists of 17,295 seasoned executives in firms experiencing both internal and external CEO appointments. We then drop executives in firms experiencing external CEO appointments, in firms where no internal executive survive until this step (for example, new CEO is selected from executives with tenures less than two years), or in firms where only one valid executive remains in the sample. We reach a final sample of 10,595 potential seasoned internal candidates between 1994-2016 used in the analysis in Table 5. This final sample is associated with 2,567 internal CEO appointments, as indicated in Table 1.

| Operation | Sample Size | Info Source |
|---|---|---|
| **Total # of executives between year 1992-2016** | 287,579 | *ExecuComp* |
| - Less missing values of in-the-money un-exercised exercisable options in year t | *35,203* | *ExecuComp* |
| | 252,376 | |
| - Less with missing values of fiscal year-end stock price in year t | *5,421* | *Compustat* |
| | 246,955 | |
| - Less with no PERMNO number | *2,830* | *Compustat* |
| | 244,125 | |
| - Less with no CEO turnover happening in year t+1 | *218,212* | *ExecuComp* |
| | 25,913 | |
| - Less if executives are the departing CEOs in year t | *4,579* | *ExecuComp* |
| | 21,334 | |
| - Less no NCUSIP number, departing CEOs confidence, shares outstanding, volatility of daily return, and market to book ratio in year t | *44* | *ExecuComp/CRSP* |
| | 21,290 | |
| - Less executives in 1992 and 1993 for year t to make the executive tenure greater than 2 years dummy valid | *628* | *ExecuComp* |
| | 20,662 | |
| - Less executives with tenure less than two years | 3,367 | *ExecuComp* |
| **Number of executives in firms experiencing both internal and external CEO appointments.** | **17,295** | |
| - Less executives in firms experiencing external CEO appointments in year t+1 | *3,923* | *ExecuComp* |
| | 13,372 | |
| - Less if no executive from the final sample is selected as CEO or only one executive remains in the sample | *2,777* | *ExecuComp* |
| **Final sample of potential seasoned internal candidates in year t between 1994-2016.** | **10,595** | |

## Appendix B. Detailed key variable definitions

This appendix presents the detailed definitions of the key variables. We winsorize all continuous variables at 1%.

| **CEO Selection Description** | | |
|---|---|---|
| CEO Turnover | When CEO in year $t$ is replaced by a successor in year $t$+1, this change will be counted as a CEO turnover. | *ExecuComp* |
| Potential Seasoned Internal Candidates | These are executives with valid confidence measurements, and at least two year tenures in year $t$ to be selected as new CEOs in year $t$+1. | *ExecuComp & Compustat* |
| **Executive Confidence Measures** | | |
| Executive Confidence | = (Estimated Value of In-the-Money Unexercised Exercisable Options / Fiscal Year-End Stock Price) / Unexercised Exercisable Options for an executive in year $t$. | *ExecuComp & CRSP/Compustat* |
| Executive Confidence Alt 1 | = ln [(Estimated Value of In-the-Money Unexercised Exercisable Options / Fiscal Year-End Stock Price) + 1] for an executive in year $t$. | *ExecuComp & CRSP/Compustat* |
| Executive Confidence Alt 2 | = ln (Unexercised Exercisable Options + 1) for an executive in year $t$. | *ExecuComp* |
| Executive Confidence Alt 3 | = (Estimated Value of In-the-Money Unexercised Exercisable Options / Fiscal Year-End Stock Price) / (Unexercised Exercisable Options + Number of Shares Acquired on Option Exercise) for an executive in year $t$. | *ExecuComp & CRSP/Compustat* |
| Executive Confidence Alt 4 | = (Unexercised Exercisable Options) / (Unexercised Exercisable Options + Number of Shares Acquired on Option Exercise) for an executive in year $t$. | *ExecuComp* |
| Executive Team's Confidence | Average value of confidence measure among all other executives within the same company in year $t$. | *ExecuComp* |
| HolderX | A Holder-type confidence measure constructed using publicly available data (as in Hirshleifer et al., 2012; Campbell et al., 2011; Malmendier et al., 2011). First, we construct a confidence measure as *Confidence = Value Per Vested Option/ Average Strike Price*. The *Value Per Vested Option* is the total value of vested options scaled by the number of options. The *Average Strike Price* is the price at the end of the fiscal year less the *Value Per Vested Option*. The variable *HolderX* is then an indicator that equals one from the first time that the confidence measure exceeds $X$ if the confidence measure exceeds $X$ on at least two occasions. | *Execucomp & CRSP/Compustat* |

(*continued on next page*)

| | | |
|---|---|---|
| **Executive Control Variable** | | |
| Executive Incentive Compensation | = 1 - [(Salary + Bonus) / Total Compensation] for an executive in year *t*. | *ExecuComp* |
| Executive Shareholding | = (Number of Shares Owned Excluding Options / Number of Shares Outstanding in Thousands) * 10,000 for an executive in year *t*. | *ExecuComp & CRSP* |
| Executive Gender | This dummy indicator is equal to one if an executive is male. | *ExecuComp* |
| Executive Tenure Greater than 2 years | This dummy indicator is equal to one if an executive has tenure greater than two years in year *t*. | *ExecuComp* |
| Executive Age | Age of an executive in year *t*. If the executive's age is missing, we replace it with the average executive age for that year. | *ExecuComp* |
| Executive Missing Age | This dummy indicator is equal to one if an executive's age information is missing. | *ExecuComp* |
| Executive's Position: CFO | This dummy indicator is equal to one if an executive holds a management role of CFO in year *t*. | *ExecuComp* |
| Executive's Position: COO | This dummy indicator is equal to one if an executive holds a management role of COO in year *t*. | *ExecuComp* |
| Executive's Position: President | This dummy indicator is equal to one if an executive holds a management role of president in year *t*. | *ExecuComp* |
| Executive's Position: Chairman | This dummy indicator is equal to one if an executive holds a management role of chairman in year *t*. | *ExecuComp* |
| **Departing CEO Control Variable** | | |
| Departing CEO's Confidence | Measure of confidence for departing CEO in year *t*. | *ExecuComp & Compustat* |
| Departing CEO's Incentive Compensation | Measure of incentive compensation for departing CEO in year *t*. | *ExecuComp* |
| Departing CEO's Shareholding | Measure of shareholding for departing CEO in year *t*. | *ExecuComp & CRSP* |
| Departing CEO's Gender | This dummy indicator is equal to one if departing CEO is male. | *ExecuComp* |
| Departing CEO-Chairman | This dummy indicator is equal to one if departing CEO holds a management role of chairman in year *t*. | *ExecuComp* |
| Departing CEO's Age | Age of departing CEO in year *t*. If the age is missing in Execucomp, then we replace the variable with the average CEO age for that year. | *ExecuComp* |
| Departing CEO's Missing-Age | This dummy indicator is equal to one if departing CEO's age information is missing. | *ExecuComp* |
| **Firm Control Variable** | | |
| Total Assets | Total Assets in millions in year *t*. | *Compustat* |
| Return on Assets | = Income Before Extraordinary Items / Total Assets in year *t*. | *Compustat* |
| Market to Book | = Market Capitalization / Total Common Equity in year *t*. | *Compustat* |
| Leverage | = (Long-Term Debt + Debt in Current Liabilities) / Total Common Equity in year *t*. | *Compustat* |
| R&D Expenses | = Research and Development Expense / Total Assets in year *t*. Missing R&D values are replaced with zero. | *Compustat* |
| Cash Holding | = Cash and Short-Term Investments / Total Assets in year *t*. | *Compustat* |
| Volatility of Stock Return | Standard deviation of daily stock return in year *t*. | *CRSP* |
| S&P 500 Inclusion Dummy | This dummy indicator is equal to one if company is included in S&P 500 index in year *t*. | *Compustat* |
| Market Adjsuted Return | Market adjusted stock return in year *t*. | *CRSP* |
| **Additional Variables** | | |
| Director Busyness | The average number of directorships held by board of directors in a firm. | *Risk Metrics* |
| Directors with X Plus Directorships | The number of board of directors with X+ directorships. | *Risk Metrics* |
| GIM Index | The Gompers, Ishii, and Metrick (GIM) entrenchment index. | *Risk Metrics* |
| BCF Index | The Bebchuk, Cohen, and Ferrell (BCF) entrenchment index. | *Risk Metrics* |
| Classified Board | This dummy indicator is equal to one if a firm's board is a classified board. | *Risk Metrics* |
| Number of Geographical Segments | Number of geographical segments of a firm. | *Compustat* |
| Intensity of Analyst Following | Number of analysts following a firm. | *IBES* |
| Bonus | Bonus compensation in year *t*. | *ExecuComp* |
| Salary | Salary compensation in year *t*. | *ExecuComp* |
| Tobin's Q | Market value over book value of assets in year *t*. | *Compustat* |

## Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jbankfin.2019.105733.

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