

DISCUSSION PAPER SERIES

DP14839

THE VALUE OF LUCK IN THE LABOR MARKET FOR CEOS

Mario Daniele Amore and Sebastian Schwenen

**FINANCIAL ECONOMICS
INDUSTRIAL ORGANIZATION**



THE VALUE OF LUCK IN THE LABOR MARKET FOR CEOS

Mario Daniele Amore and Sebastian Schwenen

Discussion Paper DP14839

Published 02 June 2020

Submitted 29 May 2020

Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: +44 (0)20 7183 8801
www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programmes:

- Financial Economics
- Industrial Organization

Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as an educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: Mario Daniele Amore and Sebastian Schwenen

THE VALUE OF LUCK IN THE LABOR MARKET FOR CEOs

Abstract

It is well-known that luck increases the compensation of CEOs at their current firm. In this paper, we explore how luck affects CEOs' outside options in the labor market, and the performance of firms that hire lucky CEOs. Our results show that luck at their current firm makes CEOs move to a new firm and be appointed as both CEO and chairman. Lucky CEOs tend to match with firms subject to low analyst coverage and operating in less competitive industries. Moreover, lucky CEOs are able to obtain a higher pay at the new firm (both in absolute terms and compared to new industry peers). Finally, difference-in-differences results show that hiring lucky CEOs hurts firm performance, mostly due to a surge in operating costs and a poorer usage of corporate assets.

JEL Classification: G34, D86, J33, M12

Keywords: luck, CEO Mobility, Compensation, firm performance, corporate governance

Mario Daniele Amore - mario.amore@unibocconi.it
Bocconi University and CEPR

Sebastian Schwenen - sebastian.schwenen@tum.de
Technical University of Munich

The Value of Luck in the Labor Market for CEOs

Mario Daniele Amore

Bocconi University
and CEPR

Sebastian Schwenen

Technical University of Munich
and DIW Berlin

May 28, 2020

Abstract

It is well-known that luck increases the compensation of CEOs at their current firm. In this paper, we explore how luck affects CEOs' outside options in the labor market, and the performance of firms that hire lucky CEOs. Our results show that luck at their *current firm* makes CEOs move to a *new firm* and be appointed as both CEO and chairman. Lucky CEOs tend to match with firms subject to low analyst coverage and operating in less competitive industries. Moreover, lucky CEOs are able to obtain a higher pay at the new firm (both in absolute terms and compared to new industry peers). Finally, difference-in-differences results show that hiring lucky CEOs hurts firm performance, mostly due to a surge in operating costs and a poorer usage of corporate assets.

JEL Code: G34; D86; J33; M12

Keywords: Luck; CEO Mobility; Compensation; Firm Performance; Corporate Governance

Mario Daniele Amore is Associate Professor at Bocconi University and Research Affiliate at CEPR. Email: mario.amore@unibocconi.it

Sebastian Schwenen is Assistant Professor at Technical University of Munich, School of Management, and Research Affiliate at the German Institute for Economic Research (DIW Berlin). Email: sebastian.schwenen@tum.de

1. Introduction

Going back to Bertrand and Schoar (2003), scholars have devoted considerable attention to CEOs.¹ On the one hand, CEOs have been shown to spur firm value (Bennedsen et al. 2020), e.g., through their executive talent and skills (Kaplan et al. 2012; Adams et al. 2018). On the other hand, there is evidence that CEOs often entrench themselves and enjoy perks at the expense of shareholders (Yermack 2006; Salas 2010). This controversy has spurred a parallel debate seeking to understand to what extent top executives are paid for their performance and contributions to shareholder value (Hall and Liebman 1998; Chang et al. 2010; Nguyen and Nielsen 2014).

A common approach to address this question consists in estimating the pay effect of “lucky events” that are exogenous to both the firm and the CEO. Contrary to the principal-agent prediction that shareholders filter out luck when designing pay packages that incentivize CEO effort, there is ample evidence that CEO pay increases with luck. An early interpretation of this finding is that CEOs are able to influence the pay-setting process to their favor (Bertrand and Mullainathan 2001). Later works argue that pay-for-luck occurs because luck improves CEOs’ labor market opportunities, which in turn makes shareholders willing to increase a CEO’s compensation in order to retain him/her (Oyer 2004; Rajgopal et al. 2006; Bizjak et al. 2008).²

In this paper, we provide several novel contributions to the literature on CEO compensation and firm performance. While the extant literature has been confined to using lucky events as determinant of CEOs’ pay at their *current firm*, we study how luck shapes the labor market prospects of CEOs and the performance of the new firms they match with. Specifically, we investigate: (1) how luck drives CEO mobility across firms, (2) how it affects

¹ See Bertrand (2009) for a comprehensive review of the literature on this topic.

² Another explanation is that pay-for-luck raises CEOs’ incentives to forecast or react to luck (Albuquerque et al. 2020).

the position that mobile CEOs obtain at their new firm, (3) the type of firms that lucky CEOs match with, (4) the level and incentive components of pay they receive, and (5) the corporate implications of hiring lucky CEOs. Theoretically, our work builds on the idea that firms that are, at least in part, ill-informed on the history of CEOs in the hiring pool, i.e., they face difficulties in distinguishing between luck and task performance when appointing a CEO and deciding upon his/her compensation package. In turn, this informational asymmetry will create a sorting mechanism whereby lucky CEOs will match more with firms where it is relatively easier to enjoy personal benefits at the expense of shareholders.

We conduct the analysis on the panel of S&P 1000 US firms from 1992 to 2018. As common to the literature, we identify luck shocks by using exogenous variations in firm value given by movements in oil prices and the business cycle. Arguably, these variations are beyond the control of CEOs and firms alike; yet, they allow CEOs “to shine” in the labor market as they boost the market value of their firms. We start by documenting that luck increases the likelihood of CEO transitions: CEOs whose firm value rises due to luck are significantly more likely to leave their company. Conditional on venturing into new positions, luck makes CEOs more likely to be appointed jointly as CEO and board chairman of the new firm. These results are robust to controlling for several individual- and firm-level variables.

Next, we probe into the characteristics of the hiring firms to shed light on the mechanisms that govern the matching between firms and lucky CEOs. Our results indicate that lucky CEOs move more frequently towards firms featuring lower analyst coverage, which makes these firms less equipped to evaluate and discipline its executives (Chang et al. 2006; Chen et al. 2015). Moreover, lucky CEOs move more frequently towards firms operating in less competitive industries, which are typically subject to laxer corporate governance and provide more room for managerial entrenchment (Giroud and Mueller 2010).

Extant literature investigating the potential for CEOs to skim their company shows that CEOs can increase their pay by influencing the pay-setting process, especially in weakly-governed companies (Bertrand and Mullainathan 2001; Garvey and Milbourn 2006). Our above results on the matching between lucky CEOs and weakly-governed firms suggest that this skimming may happen ex-ante, i.e., at the job market stage and during the draw up of new contracts. We explore this notion by testing whether the extent of luck that a CEO experiences at the departing firm is associated with the pay he/she will get at the new firm. Results indicate that lucky CEOs receive a significantly higher compensation at their new firm, even after controlling for a wide range of variables characterizing the CEO-firm match. Importantly, this larger pay results from non-cash compensation items rather than cash-based items (i.e. salary and bonus). This result lends support to the view that lucky CEOs skim hiring firms by bargaining on pay items that are easier to conceal (Frydman and Saks 2010). Finally, lucky CEOs who move to a new firm earn significantly more than their new industry peers. This finding suggests that exogenous shocks to a firm's value (i.e., luck) can spill over to other firms, raising executive pay across industries via CEO mobility in the labor market.³

Our results have two alternative interpretations for shareholders. On the one hand, luck may increase the CEOs' labor market options in a way that is costly for the shareholders of the hiring firm. On the other hand, it may be desirable for the new firm to attract a talented CEO whose luck may have made retention too costly at his/her previous firm. To separate out these interpretations, we employ a difference-in-differences approach that estimates the effect of incoming CEOs' luck on the corporate outcomes of the hiring firm. Our findings indicate that, while turnover per se has a positive effect on the hiring firm's performance (Huson et al. 2004), greater CEO's luck at his/her previous company is *detrimental* to the hiring firm's

³ The higher pay stemming from the hiring of lucky CEO moves may, in turn, trigger upward adjustments in the pay of other executives in the focal industry. On the "contagion" of positive shocks to CEO compensation, see, e.g., Bereskin and Cicero (2013) and Amman et al. (2016).

performance. Importantly, this result is not driven by pre-turnover diverging trends in performance between firms that hire low-luck and high-luck CEOs. Furthermore, the below-par performance of lucky CEOs is especially pronounced at the higher end of the pay distribution.

Why do firms hiring lucky CEOs subsequently underperform? To answer this question, we explore a number of outcomes related to efficiency and investment policy. Our results indicate that firms hiring lucky CEOs experience an increase in operating costs and a drop in their ability to generate revenues out of the asset base. By contrast, these firms do not exhibit changes in investment policies, as indicated by an insignificant effect of incoming CEOs' luck on R&D, capital expenditures and asset growth. Collectively, these results indicate that lucky CEOs harm firm performance by enjoying the “quiet life” rather than engaging in empire building (Bertrand and Mullainathan 2003).

Our work contributes to several strands of research. To start, we connect to a long-running literature on the sources of heterogeneity in executive compensation. Works in this area have explored factors such as firms' size and their quest for managerial talent (Gabaix and Landier 2008), the alignment between executives, shareholders and bondholders (Ortiz-Molina 2007), the monitoring role of boards (Chhaochharia and Grinstein 2009), and competitive pressures at the industry level (Jung and Subramanian 2017; Karuna 2007). Moreover, existing papers have analyzed the role of executive attributes at the personal level, such as education (Falato et al. 2015), style (Graham et al. 2012), business connections (Engelberg et al. 2013), visibility (Malmendier and Tate 2009) and reputation (Milbourn 2003). Starting from Bertrand and Mullainathan (2001), several works have documented that also lucky events unrelated to a CEO's effort affect CEO compensation (Garvey and Milbourn

2006; DeVaro et al. 2018; Feriozzi 2011; Davis and Hausman 2020).⁴ As argued, pay packages may reward luck as a result of CEOs skimming their companies (especially those with poor corporate governance), or as result of an optimal contracting through which shareholders raise compensation to retain CEOs whose luck improves outside opportunities (Oyer 2004; Bizjak et al. 2008). Importantly, this literature has focused exclusively on the relationship between luck and compensation at a CEO's current firm. Our contribution here consists in showing that exogenous events affecting a firm's CEO may have long-lasting consequences on the compensation and executive power that a CEO will secure during the course of his/her career. Furthermore, our findings reconcile the optimal contracting view on pay-for-luck with arguments based on rent extraction in that we show that outside options matter, but can likewise be prone to skimming activities.

By focusing on CEOs' labor market perspectives, we also contribute to the literature on the formation and stability of matches between firms and CEOs, and on the corporate implications for firms hiring new CEOs. The literature in this area has explored several features of the matching process, such as the geographic scope of the hiring pool (Yonker 2016), the role of managerial skills for performance-driven CEO turnover (Eisfeldt and Kuhnen 2013), the corporate origin of the new CEO (Allgood and Farrell 2003; Cziraki and Jenter 2020), and compensation and performance at his/her previous firm (Fee and Hadlock 2003, 2004). Our work contributes to this literature by illustrating how the luck component of past performance affects the formation of new matches and the contractual arrangements between firms and CEOs, and by illustrating the real effects of hiring lucky CEOs. In so doing, we also contribute to a literature on how departing CEOs fare in the labor market (Chang et al. 2010; Fee et al. 2018) as well as, more generally, on the mobility of top executives and its

⁴ There is some controversy about whether CEO compensation is only affected (upward) by positive luck, or also by negative luck (downward). See Naveen et al. (2020) for a contribution on this topic, as well as Choi et al. (2019) for the time evolution of pay-for-luck.

relationship with performance and pay (Frydman 2019; Graham et al. 2019). In this regard, a takeaway of our study is that the role of the labor market as a disciplining device for CEOs is imperfect as it also depends on the governance quality of the hiring firms.

Section 2 presents our data and summary statistics. In Section 3, we explore how luck shapes CEO transitions to new firms. In Section 4, we investigate CEO pay at the new firm, whereas in Section 5 we show the corporate implications for firms that hire lucky CEOs. Section 6 concludes.

2. Data and summary statistics

2.1. Sample

Our source of data at the individual level is the Execucomp dataset, which provides information on S&P 1000's executives (including their age, tenure, and compensation) going back to 1992.⁵ Moreover, we use the Compustat dataset to gather financial information at the firm level. Our period of observation covers the years from 1992 to 2018.

We restrict the analysis to CEOs, who are the upper echelon of the firm and have been the primary focus of the literature on pay-for-luck (e.g. Bertrand and Mullainathan 2001; Campbell and Thompson 2015; Naveen et al. 2020). We define and record CEO transitions by searching for executives that hold the CEO position in an Execucomp firm and that we later find at a different Execucomp firm. The first transitions in our sample are for CEOs that leave their firm in 1993 and appear at a new firm in 1994. The last transitions in our sample are for CEOs that leave their firm in 2016 and reappear in Execucomp at another firm in 2017.⁶ In contrast, where a CEO continued to work at his/her firm from one year to the next

⁵ Execucomp covers the top-5 executives by compensation; for a few firms, this information is provided also for executives outside of the top-5 ranking.

⁶ We exclude from the analysis CEOs with multiple simultaneous affiliations. These CEOs often take breaks from one of their companies, re-join in later years, and these dynamics complicate the identification of transition

we mark this CEO-year observation as “no CEO transition”. After dropping observations with missing values in the variables illustrated in the next section (e.g., CEO age or firm size), we obtain a sample that covers 30,116 CEO-year observations made up of 6,021 CEOs who have been leading any of the 3,597 unique firms in our sample.

Table 1 summarizes the sample. As shown, we have 345 instances of CEO transitions in total. Among those, 239 transitioned to a non-CEO position (i.e. any non-CEO executive position at another Execucomp firm), while 106 transitioned to a CEO position at another Execucomp firm. Of these, 48 were jointly appointed also as board chairmen. As illustrated, we lose a small number of CEO transitions for which we lack information on CEO or firm characteristics at either the departing or the hiring firm. These CEO moves across firms will constitute the dependent variable in our turnover analysis.⁷

INSERT TABLE 1 HERE

2.2. CEO and firm-level characteristics

For all of the CEOs in Table 1, we have Execucomp data on their compensation over time. Using this data, we compute four variables: (1) the logarithm of total CEO pay; (2) the ratio of total CEO pay to the mean compensation of other CEOs in the same 3-digit SIC industry and year; (3) the logarithm of cash compensation, namely the sum of salary and bonuses; (4)

events. Our results, however, are largely robust to leaving them in the sample. Our Compustat data range until 2018 so as to analyze firm performance following CEO transitions in 2017.

⁷ While there exist larger datasets also covering turnover events outside of Execucomp (e.g., Jenter and Kanaan 2015), tracking CEOs –including their pay– from one firm to another restricts us to the Execucomp data. We compare our sample to the one used in Eisfeldt and Kuhnen (2013), who classify CEO turnovers as *forced*, *exogenous*, and *unclassified* using media sources. Several of our turnover events are unique to our sample, possibly due to a lack of media coverage surrounding the turnover event. Where the two samples match, the majority of turnovers in our sample are classified by Eisfeldt and Kuhnen (2013) as exogenous or unclassified.

the logarithm of non-cash compensation, computed by subtracting salary and bonus from total pay.⁸ These will serve as dependent variables in our pay regressions.

To probe into the characteristics of CEOs' firms of origin and destination, we merge in yearly financial data from Compustat and construct the following variables: (1) the market to book ratio, computed as the ratio of the market value of equity scaled by the book value of equity (and winsorized between 0 and 10 to reduce concerns of outliers), to proxy for a firm's investment opportunities; (2) the logarithm of the number of employees to proxy for a firm's size; (3) operating profitability, measured by return on assets (ROA), i.e. as the ratio of earnings before interest and taxes (EBIT) divided by the book value of total assets (dropping observations in the 1% of left and right tails of the distribution).

To measure the quality of external governance a firm is subject to, we gather from the I/B/E/S database information on the number of analysts that cover a firm's stock. The intuition behind this approach is that analyst coverage represents a monitoring device which can effectively discipline a firm's management and endow market participants with information to better evaluate a CEO's task performance (Chang et al. 2006; Chen et al. 2015). Furthermore, using data on firms' revenues and their primary SIC code in Compustat, we calculate the annual Herfindahl-Hirschman index (HHI) for each 3-digit SIC industry and year in order to measure how concentrated is the industry where a firm operates. Firms in more concentrated industries are typically subject to laxer corporate governance and more severe problems of CEO's entrenchment (Giroud and Mueller 2010). Appendix A contains a description of each variable.

Panel A of Table 2 reports the average firm and CEO characteristics using four different samples. In column (1) we use CEO-firm observations in which the CEO did not change. In column (2) we use all CEO-firm observations in which the CEO changed (i.e. the

⁸ Non-cash compensation thus includes stock awards, options awards, or pension contributions.

firm involved in the CEO-firm match experienced a change in the CEO). In column (3) we use the CEO-firm observations in which the CEO changed toward a non-CEO position at another Execucomp firm. In column (4) we use the CEO-firm observations in which the CEO changed toward a CEO position at another Execucomp firm. The averages involving CEO transitions in Panel A are computed using the firm at the time of the CEO departure. As shown, non-transition observations are associated with the highest market to book, firm size and ROA. Among observations that featured a CEO transition, those in the CEO-to-CEO transition sample have the largest size and market to book.

Panel B shows the comparison of average firm and CEO characteristics using the CEO-firm observations in which the CEO changed toward a non-CEO position at another Execucomp firm. Specifically, the table shows the average comparison of firm or CEO characteristics in the firm of departure vs. the new firm (which a former CEO joined with a non-CEO position) at the year of the appointment. Column (3) of this table presents the results of *t*-tests (with standard errors in parenthesis). While the hiring firms appear to be significantly larger, there are no other significant differences across the hiring and departing firms.

Panel C shows the comparison of average firm and CEO characteristics using the CEO-firm observations in which the CEO moved toward a CEO position at another Execucomp firm. Specifically, the table shows the average comparison of firm or CEO characteristics in the firm of departure vs. the new firm (which a former CEO of a firm joined with a CEO position) at the year of the appointment. Again, Column (3) of this table presents the results of *t*-tests. The ROA and market to book at the hiring firm are lower than those at the departing firm, though the differences are not economically significant. Looking at compensation, we find that CEOs at their new firm earn, on average, around 2% more than their previous appointment. Moreover, 61% of them earn more at their new appointment.

INSERT TABLE 2 HERE

2.3. Luck measurement

Following existing works (e.g. Bertrand and Mullainathan 2001; Davis and Hausman 2020), we quantify luck as the variation in firm value that is beyond control of the CEO. Specifically, we devise a two-stage estimation similar to Bertrand and Mullainathan (2001) and Jenter (2015). In the first stage, we estimate variations in firm value that are due to luck by regressing firm value on factors that are exogenous to CEO's actions (or even to the whole industry), namely the yearly series of the oil price (West Texas Intermediate), GDP growth and employment rate from 1992 to 2018 (from the Bureau of Economic Analysis). In the second stage, we use the fitted values of this regression as a measure of changes in firm value that are caused by luck.⁹

To implement the first stage, we pool all firms within each 3-digit SIC industry so that the error term captures deviations from industry-wide market values, hence indicating the relative performance of CEOs as compared to their industry peers.¹⁰ Specifically, for all firms in each industry we estimate the following regression:

$$\ln(V_{i,t}) = \beta_0 + \beta_1 Oil_t + \beta_2 \Delta GDP_t + \beta_3 Emp_t + \delta_i + \gamma_t + \epsilon_{i,t} \quad (1)$$

where $V_{i,t}$ denotes the market value of firm i in year t , Oil_t refers to the oil price in year t , ΔGDP_t measures the GDP growth from year $t-1$ to t , and Emp_t is the US-wide employment rate in year t . We estimate this model using year dummies and firm fixed effects to account

⁹ While other first-stage instruments exist, e.g., changes in the exchange rate, the oil price is useful because it is co-determined by economies outside of the US, it is highly volatile and difficult to predict (Choi et al. 2019; Davis and Hausman 2020).

¹⁰ While an alternative would be to control for some measure of industry performance and regress firm value on our instruments across the entire economy, we opt for a pooled design to avoid noise in the measurement of industry performance.

for common shocks and constant heterogeneity across firms.¹¹ Standard errors are robust for heteroskedasticity. We denote as “Luck” the fitted values of firm value in equation (1), i.e. the exogenous part of firm value beyond the CEO’s control.¹² The residual in equation (1) captures all factors not idiosyncratic to the firm nor related to business cycle and oil price and that determine the market value (relative to the industry) of firm i matched with a given CEO in year t . In what follows, we denote this variable as “Match quality”, and use it as a control in our regression analysis. Since the dependent variable in equation (1) is measured in USD, changes in the luck and the match variable can be interpreted as a one dollar change in firm value that can be associated to a unit change on luck or match quality, respectively.

In the second stage, we use the luck-driven performance variable as an explanatory variable to estimate turnover, pay, and firm performance regressions. Results are presented in the next section.

3. Luck and CEO transitions

We start by testing how luck affects the decision of CEOs to move to a different company. To this end, we adopt a canonical turnover regression as in, e.g., Garvey and Milbourn (2006): we estimate a linear probability model where the dependent variable is the dummy for CEO departures described in Panel A of Table 1. Specifically, we model the departure of a CEO from firm i in year t as follows:

$$\Pr(\text{Departing } CEO_{i,t}) = \beta_0 + \beta_1 \text{Luck}_{i,t} + \beta_2 \text{Match}_{i,t} + \mathbf{X}'_{it} \beta_3 + \delta_t + \epsilon_{i,t} \quad (2)$$

where $\text{Luck}_{i,t}$ is our proxy for lucky events, operationalized as in the previous section, $\text{Match}_{i,t}$ is the proxy for the quality of CEO-firm matches, δ_t is a set of year fixed

¹¹ To carry out the estimation of equation (1) we delete SIC industries with less than 80 firm-year observations. On average, a 3-digit SIC code in our sample contains 4,856 firm-year observations.

¹² Despite our luck instruments are economy-wide, fitted values are defined, as the original market value items, at the firm-year level since our regression also includes firm fixed effects. Hence also the error terms that capture performance relative to the industry are at the firm-year level.

effects to account for common shocks, and the vector \mathbf{X}'_{it} includes a set of controls at the CEO level (individual age and tenure) as well as at the firm level (market to book value, firm size and profitability). Standard errors are robust to heteroskedasticity.

Results reported in Table 3 show that that tenure has a negative effect on the probability that CEOs leave the company: the longer the permanence of a CEO at a given firm, the lower the probability of him/her departing. Notably, the quality of the actual CEO-firm match relative to peer companies does not affect turnover decision. Moving to the key variable of interest, we find that luck has a positive and significant effect on the probability of CEO departure.¹³

INSERT TABLE 3 HERE

This result may indicate that luck improves CEOs' opportunities in the labor market. To investigate this mechanism, we perform additional regressions that estimate the position that a leaving CEO will get at the hiring company (within the Execucomp sample). We use the subsample of leaving CEOs (described in Panels B and C of Table 1) and estimate a set of linear probability models where the dependent variable is equal to zero when these CEOs move to a non-CEO position, and one if they move to a CEO and/or Chairman position in any company. As in Table 3, the explanatory variable is the luck measure together with the various controls at the individual and firm level. Results in column (1) of Table 4 indicate that, conditional on changing jobs, luck has a positive albeit insignificant effect on the probability that a leaving CEO becomes a Chairman (but no CEO). Also the estimate in column (2) on the probability that a leaving CEO becomes CEO at his/her new firm is positive but insignificant. Yet, it is well known that CEO appointments vary in their decision-making

¹³ These findings are robust to using a Logit regression rather than a linear probability model.

power. CEO-chairman duality has been long considered in the literature as a practice that boosts CEO power tilting the incentive pay structure in his/her favor at the detriment of shareholder value (Morse et al. 2011; Abernethy et al. 2015). Our results in column (3) indicate that luck has a positive and 10% statistically significant effect on the likelihood that a leaving CEO will be appointed as both CEO and chairman at the new company.¹⁴

Collectively, the results of this section offer some indication that luck makes CEOs more likely to move to new companies and allows them to take up new positions which involve high power and discretion.

INSERT TABLE 4 HERE

4. Luck, governance and pay at the hiring firm

In this section, we address two questions to better characterize the relationship between CEO luck and mobility. What are the governance characteristics of firms that match with lucky CEOs? And do lucky CEOs improve their pay at these firms? We hypothesize that hiring companies are not perfectly able to separate out luck from task performance in their candidate pool. Hiring companies observe CEOs at companies with an upsurge in market valuation but, because of imperfect information on the CEO's task performance, may misattribute luck to ability. This argument has two implications. First, lucky CEOs should sort more frequently into poorly governed firms, which are less able or have weaker incentives to gather and scrutinize information on the pool of potential hires. Second, lucky CEOs at such companies should enjoy greater bargaining power vis a vis shareholders and thus extract more private benefits in the form of higher compensation.

¹⁴ The quality of the CEO-firm match is relevant for the appointment as CEO-Chairman, suggesting that high-performing CEOs are also more likely to gain power at their new company.

4.1. The governance context of hiring firms

To address the first question, we conduct several tests to identify whether lucky CEOs are indeed more likely to match with poorly governed firm. These tests are implemented using the subsample of leaving CEOs that land a CEO job at another Execucomp firm. Our analysis exploits two dimensions of corporate governance. First, we use the number of analysts covering a given firm's stock. Consistent with existing works (e.g., Chang et al. 2006; Chen et al. 2015), we argue that hiring companies that are covered by fewer analysts are more informationally opaque and prone to corporate governance problems making executives able to extract rent from shareholders. Second, we use the concentration of the industry where the hiring firm operates. The intuition here rests on the idea that the CEOs of companies in more concentrated industries are subject to a weaker disciplining force of competition (Giroud and Mueller 2010).

Specifically, we explore the difference in analyst coverage or industry concentration between hiring and destination firms. We analyze differences between firms because CEOs have the possibility to renegotiate before changing jobs. That is, a CEO hit by a luck shock can renegotiate a higher compensation at his/her current company, or leave the company and capitalize on the luck shock to extract rent at a new firm. This latter approach is relatively easier to pursue whenever the hiring firm is worse governed relative to the departing firm.

We start by constructing a dependent variable equal to the difference in analyst coverage between the CEO's destination firm and the originating firm. Looking at the distribution of this variable, we find that on average (median) CEOs move to firms that are covered by 2 (0.9) analysts less than their previous firm. Generally, this variable displays a high variance (the bottom and top quartiles are equal to -7 and 2, respectively). We employ a OLS regression using CEO luck at the time of departure as key explanatory variable and the

set of controls similar to our previous analyses. Column (1) of Table 5 shows that luck makes CEOs leave toward companies with significantly *lower* analyst coverage.

To test our argument on the strength of competitive pressure, we compute the difference in industry concentration (i.e. HHI at the 3-digit SIC level and year) between a CEO's destination firm and originating firm. On average, this variable is equal to 25, indicating that CEOs tend to leave to firms that operate in marginally less competitive industries. We then use this measure as dependent variable and, as above, use luck and the other controls as explanatory variables. In line with our arguments, results in column (2) of Table 5 provide some evidence that luck makes CEOs leave toward *less competitive* industries. In sum, these findings suggest that lucky CEOs who leave their firms tend to match with firms with weaker governance structures as compared to their previous firms.

INSERT TABLE 5 HERE

4.2. CEO compensation at the new firm

In this section, we investigate the effect of luck on the pay of CEOs at their new firms. We start by providing a descriptive analysis of the association between a CEO's exposure to luck at the departing firm and his/her compensation at the new firm. As shown in Figure 1, there is a positive relationship between the natural logarithm of a CEO's total compensation during the first year of his new appointment and his/her level of luck at the time of departure from the former company (p -value<0.01).

Moving to a regression analysis, we use OLS to regress the logarithm of a CEO's total compensation (as of the first year of the new appointment) on his/her level of luck at the time of departure from the former company. We also include year fixed effects to account for common shocks to all firms. Standard errors are adjusted for heteroskedasticity. Table 6

shows that a higher luck at the previous company makes CEOs able to obtain a significantly higher total compensation at the new firms. This result holds controlling for year dummies, as shown in column (1), as well as when including the set of control variables used in the previous analyses, as shown in column (2). To rule out that the increase in CEO compensation is an artifact of CEOs changing toward higher-compensation industries, in column (3) we show that our results are robust to also controlling for the difference in the average pay between a CEOs' old and the new industry. To facilitate the economic interpretation, we re-estimate the regression in column (3) using the logarithm of luck (so that the coefficient represents an elasticity). Results indicate that a 1% increase in CEO's luck at his/her previous firm increases compensation at the new firm by 2%.

Next, we rule out that our results are driven by CEOs moving to firms which pay inherently more (regardless of the incoming CEOs' luck). To this end, in column (4) of Table 6 we add two further controls at the firm-level: (1) the differences in overall executive pay between the new and the previous firm, where overall executive pay is computed as the sum of the four highest paid executives excluding the CEO; (2) the difference in the luck shock between the new and the old firm. This latter control captures pay differences that result from CEOs moving to companies that likewise have profited from luck. Our results are robust to the inclusion of these controls.¹⁵

CEOs' mobility may occur from spin-outs whereby the CEO contributes to develop a new business by also acquiring a significant share of its equity, which in turn makes him/her able to ultimately control the pay process. To rule out this interpretation, in column (5) we account for managerial ownership by controlling for a CEOs' equity shares in his/her new

¹⁵ By controlling for the difference in pay between the old and new firm, we also control for a temporal increase in pay for cases where the new CEO appointment happens a few years after the previous CEO appointment.

company relative to the sum of shares held by all Execucomp executives of the firm. Adding this additional control leaves our results unaltered.

Finally, in column (6) we investigate whether CEOs' luck at their departing firm inflates their pay above and beyond the pay level in the destination industry. We do so by using as dependent variable the ratio of a CEO's pay in the new firm scaled by the average pay in the 3-digit SIC industry where the hiring firm operates. As shown, lucky CEOs earn significantly above average industry peers in their new job. To the extent that moving CEOs change their industry, this finding suggests that the pay effect of luck shocks can spill over across industries.

The above findings indicate that destination firms offer attractive positions to lucky CEOs. Notice that the control measuring the luck difference between the past and new firms in columns (4)-(6) show a positive relationship, albeit only significant in column (6), implying that hiring firms who experience luck shocks to their firm value pay more a new CEO. This result lends support to the argument in Oyer (2004) that outside options of CEOs increase in good times with high firm valuations in the pool of hiring firms.

INSERT TABLE 6 HERE

The attractiveness of outside options may, however, depend on the relative bargaining power of CEOs. Thus, we explore the extent of skimming at the job market stage. Specifically, we investigate if the increase in total compensation experienced by lucky CEOs who change jobs stems from specific compensation items. Drawing on previous works (e.g., Frydman and Saks 2010), we test whether lucky CEOs skim hiring companies by bargaining for compensation items that are easier to conceal, i.e. non-cash pay items. We therefore decompose our compensation variable into cash and non-cash items. The cash component

equals the sum of the salary and bonus items in the Execucomp database, whereas the non-cash component is computed by subtracting salary and bonus from total compensation. Thus, non-cash pay includes stock awards, options, pension contributions and long-term incentive plans.¹⁶ Table 7 shows the results when estimating the same regressions as for the total pay, but when changing the dependent variable to the logarithm of cash or non-cash compensation. As shown in columns (1)-(3), cash compensation is not significantly associated with newly hired CEOs' luck. By contrast, newly hired CEOs' luck has a positive and significant effect on non-cash compensation.

In untabulated regressions, we confirm the validity of these findings using a battery of robustness checks. In particular, (1) we add as an additional control variable the share of equity held by institutional investors, which has been shown to influence executive compensation as well as the rent-extraction ability of CEOs (Hartzell and Starks 2003); (2) we control for industry heterogeneity by means of 3-digit SIC dummies; (3) we compute standard errors clustered at the 3-digit SIC industry level (rather than robust standard errors, as done in the baseline analyses); (4) we use a binary luck variable (equal to one for values above the median, and zero below the median); (5) we estimate a median regression to reduce concerns of outliers in the distribution of CEO compensation; (6) we re-estimate our results assigning incoming CEOs with random luck shocks (drawn from a normal distribution with mean and variance equal to the values in the observed luck distribution). Consistent with our causal interpretation, this test indicates that random luck does not have any significant effect.

Collectively, the results of this section suggest that managerial labor markets may suffer from similar problems from luck as those occurring within the firm. Moreover, the above documented skimming activities at the job market stage reconcile the view that pay-

¹⁶ Stock options, in particular, have features that can be manipulated to increase CEO compensation at the expense of shareholders. See, e.g., Bebchuk et al. (2010) on the timing of option grants.

for-luck stems from outside options (Oyer 2004) with the literature arguing that pay-for-luck relates to the bargaining ability of CEOs. This is surprising in light of recent works suggesting that implicit incentives from the managerial labor market ameliorate agency problems (e.g. Graham et al. 2019; Fee et al. 2018). In the next section, we will address more explicitly the shareholder implications of our pay results.

INSERT TABLE 7 HERE

5. The corporate implications of hiring lucky CEOs

5.1. Operating profitability

Our evidence so far indicates that CEOs hit by luck shocks at their previous firms sort into firms with weaker corporate governance and are able to obtain more generous compensation packages. On the one hand, these results suggest that luck makes CEOs able to skim the hiring firms. On the other hand, it may be desirable for a firm to hire a talented CEO whose luck made retention too costly at his/her previous firm. In this section, we delve into the real effects of appointing lucky CEOs for the hiring firm.

In particular, we take advantage of the longitudinal structure of our data, which enables us to observe firms' performance and other financial characteristics before and after a CEO hire. For each of the 106 hiring firms (i.e. the sample used in Tables 5-7), we have data on accounting returns for the years before and after the CEO hire, amounting to a total of around 630 observations. Using this data, we estimate the following regression:

$$Y_{it} = \beta_0 + \beta_1 Post_t + \beta_2 Post_t * Luck_i + \mathbf{X}'_{it} \beta_3 + v_i + \delta_t + \epsilon_{i,t} \quad (3)$$

where the dependent variable is the operating profitability, measured as ROA of the firm i at time t . ROA is commonly used in the literature to identify the impact of CEOs' on the utilization of corporate assets (Giroud and Mueller 2010; Bennedsen et al. 2020). $Post$ is a

dummy variable equal to one for the years subsequent to a CEO hire, and zero for the years before, and *Luck* is a continuous treatment measuring the CEOs' extent of luck at the departing firm. The coefficient of the interaction between Post and Luck establishes whether luck has a different effect on firm profitability around a CEO's hire. Additionally, the regression includes the vector \mathbf{X}_{it} of firm- and CEO-level controls, firm fixed effects ν_i to remove corporate heterogeneity, and industry-year δ_t dummies to account for time-specific industry trends (Gormley and Matsa 2013). Standard errors are clustered by firm to account for heteroskedasticity and serial correlation at the firm level.

In the left panel of Table 8, column (1), we only include the post and treat variables, whereas in column (2) we add the full set of controls. As shown in this latter regression, the coefficient of the Post dummy is positive and significant at the 5% level. This finding is consistent with existing insights that accounting performance improves following a CEO turnover (Huson et al. 2004). However, the coefficient of the interaction between luck and the post-turnover dummy is negative and statistically significant at the 5% level. In other words, incoming CEO's luck at his/her previous company is associated with lower profitability at the new company. The profitability results in columns (1) and (2) are derived from a ROA measure of profits net of depreciation, amortization and interests in the numerator. Because these variables may be influenced by investment decisions made by past CEOs, we also calculate ROA as EBIT before depreciation and amortization costs (EBITDA) to total assets. The estimates in columns (3) and (4) confirm the negative and significant coefficient of the interaction term.

INSERT TABLE 8 HERE

In summary, incoming CEOs' luck harms the subsequent performance of the hiring companies. A key assumption for the causal interpretation of this result is that firms that hire low-luck and high-luck CEOs do not display diverging trends in profitability before the CEO arrival. To validate this assumption, in Figure 2 we plot the average profitability in each of the four years before and after the CEO change, separately for incoming CEOs above and below the median luck value. As shown, the performance of firms that hire high-luck or low-luck CEOs follows a parallel trend before the transition takes place. Moreover, the graph shows that starting from one year after transition, the performance of firms that hired low-luck CEOs gradually improves, whereas the performance of firms that hired high-luck CEOs experiences a moderate decline. To further validate the absence of diverging trends, we estimate a regression in which we replace the post dummy with a set of dummies for each of the years before and after the CEO appointment (using $t = -4$ as baseline group).¹⁷ Results in the right panel of Table 8 indicate that the coefficient of the interactions with luck are not statistically significant for all years up until the CEO appointment. At $t = 1$, the coefficient of the interaction becomes economically larger and close to 10% significance, while for the subsequent years the coefficients are even larger and more precisely estimated. This dynamics is coherent with a causal interpretation of lucky CEO hires on firm performance.

INSERT FIGURE 2 HERE

Another qualification concerns the sample used for the analysis. Our results rely on the exposure to a continuous luck treatment, i.e. we compare firm profitability before and after CEO appointments across firms that hire CEOs with different luck levels. Since we only employ CEOs that left their previous organization (and firms that subsequently hired them),

¹⁷ The coefficients of each standalone post dummy are included in the model but unreported to save space.

an important question is about whether our results generalize to all CEO types. Therefore, we estimate the average treatment effect for hiring firms as compared to a matched sample of firms that did not experience any CEO turnover. Similar to Malmendier and Tate (2009), we estimate the average treatment effect on the treated (i.e., hiring) firms, both with and without bias adjustment (Abadie et al. 2001). We perform our estimation using the full sample of all firms in Panel A of Table 1 (with available controls) and apply a median split to the subsample of 106 firms with newly incoming CEOs, which separates between incoming CEOs with low or high luck. We then estimate the treatment effect of hiring a CEO with low luck compared to a matched sample of firms that did not replace their CEO. We use five neighboring matches (based on CEO age, tenure, firm size, year and industry) and find no significant treatment effect. However, when estimating the treatment effect for firms that hire high-luck CEOs, the point estimate shows a significant decline in profitability of about 1.5% (p -value of 0.048 (0.046) with (without) bias adjustment).

5.2. *Mechanisms*

Lastly, we investigate the mechanisms that can explain the decline in performance following the appointment of high-luck CEOs. Toward this end, we explore two alternative theories in corporate governance (Bertrand and Mullainathan 2003). The first suggests that opportunistic CEOs in badly governed firms may derive private benefits by shying away from cognitively intensive tasks, such those involving bargaining with suppliers, unions etc. required to minimize operating costs. This “quiet life” perspective suggests that lucky CEOs would harm firm performance by letting costs go up. The second perspective suggests that lucky CEOs destroy shareholder value by overly investing in projects with unclear NPV: such overinvestment tends to depress firm value but, at the same time, it creates personal benefit to CEOs: running larger companies gives them visibility, higher compensation and personal

prestige. This “empire building” perspective suggests that lucky CEOs would harm firm performance by investing excessively in dubious projects.

We test these arguments in Table 9, where we employ a variety of dependent variables broadly related to each of the two theories outlined above. We consider the ratio of sales to assets as a proxy for the ability of CEOs to use corporate assets to generate revenues (column 1), the cost of goods sold scaled by revenues as proxy for the ability to control input costs (column 2), and administrative costs scaled by revenues as proxy for internal organizational costs (column 3). The explanatory variables and controls are similar to those employed in Table 8. As shown by the coefficient of Post×Luck, incoming lucky CEOs use corporate assets less efficiently and let input costs go up. By contrast, administrative costs do not change significantly. As done in Figure 2 for profitability, in untabulated tests we verify that none of these dependent variables exhibit diverging trends prior to the hire of new CEOs by their luck at the previous company.

Next, we adopt a number of variables apt to measure investment activities within the firm, and thus serving as proxies for empire building. Specifically, we consider the ratio of R&D expenditures to total assets (column 4), the ratio of capital expenditures to total assets (column 5), and the annual growth in the book value of total assets (column 6). As shown, the estimates do not yield significant evidence that incoming lucky CEOs engage in empire building.¹⁸ Taken together, these results suggest that lucky CEOs harm corporate profitability due to “quiet life” considerations.

¹⁸ The observations in Table 9 differ across columns due to a different number of missing values in the variables employed to construct each dependent variable. In untabulated tests, we have also explored the effect of incoming CEOs’ luck on corporate financial policies: our results do not indicate any significant impact on leverage, debt maturity and cash holdings.

INSERT TABLE 9 HERE

In closing, we provide evidence bridging the relationship between lucky CEOs' pay and their underperformance at the new firm. Specifically, we are interested in understanding whether the performance gap between high-luck and low-luck incoming CEOs increases with the level of pay they receive. Arguably, high-paid lucky CEOs face more misaligned incentives and can enjoy personal benefits at the expense of firm performance. To test this argument, we compare the profits generated by incoming CEOs across the distribution of pay at the new firm. The left part of Figure 3 plots the average profitability at the new firm separately for low-luck and high-luck CEOs (i.e. below or above the median luck).¹⁹ As shown, the performance difference between low-luck and high-luck CEOs are negligible in the 1st to 3rd quartile of the pay distribution pay ($n = 286$). Large differences exist, however, for top-paid CEOs who lie in the 4th quartile of the pay distribution ($n = 101$), where lucky CEOs generate about 3 percentage points less profits. In the right part of Figure 3, we compute the CEO compensation needed for generating one percentage point of ROA. Overall, Figure 3 illustrates that agency problems arise especially at the high-end of the pay distribution and reinforce the notion that, from a firm's perspective, hiring lucky CEOs with generous pay-packages is the costliest option to generate accounting returns.

INSERT FIGURE 3 HERE

¹⁹ In Figure 3, we measure profitability again as EBITDA/total assets. CEO pay per unit of return is computed as $\text{tdc1 over (EBITDA*100)/total assets}$. EBITDA contains 24 negative values.

6. Conclusion

CEOs occupy the quintessential position of modern corporations and have a vast influence on the firms they lead. Empirical evidence has confirmed that CEOs matter a great deal for corporate policies (Bertrand and Schoar 2003) and, more generally, firm performance (e.g., Bennedsen et al. 2020). At the same time, it has been shown how CEOs that are not subject to proper corporate governance mechanisms may use their power to derive private benefits at the expense of shareholders (Core et al. 1999). A common way for CEOs to enjoy rent consists in devising compensation structures that tilts incentives toward their personal benefits rather than shareholder value (Morse et al. 2011). For instance, celebrated CEOs by the media have been shown to gain a larger compensation and, at the same time, underperform (Malmendier and Tate 2009).

Within this research, a large literature has focused on the relationship between CEO pay and favorable events (i.e. luck) outside of a CEO's control. Simple principal-agent notions suggest that an optimal compensation aimed at incentivizing effort provision should not reward CEOs for exogenous events such as luck (Holmstrom and Milgrom 1987). Yet, the existing evidence suggests that pay-for-luck is prevalent, possibly owing to the ability of CEOs to control the pay setting (Bertrand and Mullainathan 2001) or because luck increases the labor market opportunities of CEOs (whose supply is limited) and thus induce shareholders to increase CEOs' pay to retain them (Oyer 2004; Rajgopal et al. 2006).

In this paper, we have provided four novel findings to the literature on pay-for-luck and firm performance surrounding CEO changes. First, CEOs hit by a luck shock are more likely to change company and, when joining a new firm, they are more likely to be appointed as both CEO and board chairman. Second, CEOs hit by a luck shock are more likely to match with companies that have lower analyst coverage and that operate in more concentrated industries – features which exacerbate agency problems. Third, the total pay of CEOs that

move to a new company increases with their exposure to luck at the previous firm, and this pay increase comes mostly from non-cash items; lucky CEOs moving to a new company also earn more than their industry peers. Fourth, appointing a lucky CEO harms firm performance, mostly due to a lower ability of lucky CEOs to control cost and use efficiently corporate assets.

Collectively, our results point to the existence of informational frictions in the hiring process of weakly-governed firms, and underscore the importance of accurately searching for the right CEO profile in order to make shareholders able to secure the benefits of turnover at the helm of the company.

References

- Abadie A., Drukker D., Herr J.L., Imbens G.W. 2004. Implementing matching estimators for average treatment effects in Stata. *The Stata Journal* 4: 290-311.
- Abernethy M., Kuang Y., Qin B. 2015. The influence of CEO power on compensation contract design. *Accounting Review* 90: 1265-1306.
- Adams R., Keloharju M., Knupfer S. 2018. Are CEOs born leaders? Lessons from traits of a million individuals. *Journal of Financial Economics* 130: 392-408.
- Albuquerque A., Bennett B., Custodio C., Cvijanovic D. 2020. CEO compensation and real estate prices: Pay for luck or pay of action? Working paper.
- Allgood S., Farrell K. 2003. The match between CEO and firm. *Journal of Business* 76: 317-341.
- Amman M., Horsch P., Oesch D. 2016. Competing with superstars. *Management Science* 62: 2765-3084.
- Bebchuk L., Grinstein Y., Peyer U. 2010. Lucky CEOs and lucky directors. *Journal of Finance* 65: 2363-2401.
- Bennedsen M., Perez-Gonzalez F., Wolfenzon D. 2020. Do CEOs matter? Evidence from hospitalization events. *Journal of Finance*, forthcoming.
- Bereskin F., Cicero D. 2013. CEO compensation contagion: Evidence from an exogenous shock. *Journal of Financial Economics* 107: 477-493.
- Bertrand M., Mullainathan S. 2001. Are executives paid for luck? The ones without principals are. *Quarterly Journal of Economics* 116: 901-932.
- Bertrand M., Mullainathan S. 2003. Enjoying the quiet life? Corporate governance and managerial preferences. *Journal of Political Economy* 115: 1043-1075.
- Bertrand M., Schoar A. 2003. Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics* 118:1169-1208.
- Bertrand M. 2009. CEOs. *Annual Review of Economics* 1: 121-150.
- Bizjak J., Lemmon M., Naveen L. 2008. Does the use of peer groups contribute to higher pay and less efficient compensation? *Journal of Financial Economics* 90: 152-168.
- Campbell C., Thompson M.E. 2015. Why are CEOs paid for good luck? An empirical comparison of explanations for pay for luck asymmetry. *Journal of Corporate Finance* 35: 247-264.
- Chhaochharia V., Grinstein Y. 2009. CEO compensation and board structure. *Journal of Finance* 64: 231-261.
- Chang X., Dasgupta S., Hilary G. 2006. Analyst coverage and financing decisions. *Journal of Finance* 61: 3009-3048.
- Chang Y., Dasgupta S., Hilary G. 2010. CEO ability, pay, and firm performance. *Management Science* 56: 4-72.
- Chen T., Harford J., Lin C. 2015. Do analysts matter for governance? Evidence from natural experiments. *Journal of Financial Economics* 115, 383-410.
- Choi J.H., Gipper B., Shi S. 2019. Executive pay for luck: New evidence over the last twenty years. Working Paper.
- Core J., Holthausen R., Larcker D. 1999. Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics* 51: 371-406.

- Cziraki P., Jenter D. 2020. The market for CEOs. Working paper.
- Davis L., Hausman C. 2020. Are energy executives rewarded for luck? *Energy Journal*, forthcoming.
- DeVaro J., Kim J.H., Vikander N. 2018. Non-performance pay and relational contracting: Evidence from CEO compensation. *Economic Journal* 128: 1923-1951.
- Dittmar A., Duchin R. 2016. Looking in the rearview mirror: The effect of managers' professional experience on corporate financial policy. *Review of Financial Studies* 29: 565-602.
- Eisfeldt A., Kuhnen C. 2013. CEO turnover in a competitive assignment framework. *Journal of Financial Economics* 109: 351-372.
- Engelberg J., Gao P., Parsons C. 2013. The price of a CEO's rolodex. *Review of Financial Studies* 26: 79-114.
- Falato A., Li D., Milbourn T. 2015. Which skills matter in the market for CEOs? Evidence from pay for CEO credentials. *Management Science* 61: 2845-2869.
- Fee C., Hadlock C. 2003. Raids, rewards, and reputations in the market for managerial talent. *Review of Financial Studies* 16: 1315-1357.
- Fee C., Hadlock C. 2004. Management turnover across the corporate hierarchy. *Journal of Accounting and Economics* 37: 3-38.
- Fee C., Hadlock C., Pierce J. 2018. New evidence on managerial labor markets: An analysis of CEO retreads. *Journal of Corporate Finance* 48: 428-441.
- Feriozzi F. 2011. Paying for observable luck. *RAND: Journal of Economics* 42: 387-415.
- Frydman C., Saks R.E. 2010. Executive compensation: A new view from a long-term perspective, 1936–2005. *Review of Financial Studies* 23: 2099-2138.
- Frydman C. 2019. Rising through the ranks: the evolution of the market for corporate executives, 1936–2003. *Management Science* 65: 4951-4979.
- Gabaix X., Landier A. 2008. Why has CEO pay increased so much? *Quarterly Journal of Economics* 123: 49-100.
- Garvey G.T., Milbourn T.T. 2006. Asymmetric benchmarking in compensation: Executives are rewarded for good luck but not penalized for bad. *Journal of Financial Economics* 82: 197-225.
- Giroud X., Mueller H. 2010. Does corporate governance matter in competitive industries? *Journal of Financial Economics* 95: 312-331.
- Gormley T., Matsa D. 2013. Common errors: How to (and not to) control for unobserved heterogeneity. *Review of Financial Studies* 27: 617-661.
- Graham J., Li S., Qiu J. 2012. Managerial attributes and executive compensation. *Review of Financial Studies* 25: 144-186.
- Graham J., Kim D., Kim H. 2019. Executive mobility in the United States, 1920 to 2011. Working paper.
- Hall B., Liebman J. 1998. Are CEOs really paid like bureaucrats? *Quarterly Journal of Economics* 113: 653-691.
- Hartzell J., Starks L. 2003. Institutional investors and executive compensation. *Journal of Finance* 58: 2351-2374.

- Holmstrom B., Milgrom P. 1987. Aggregation and linearity in the provision of intertemporal incentives. *Econometrica*: 303-328.
- Huson M., Malatesta P., Parrino R. 2004. Managerial succession and firm performance. *Journal of Financial Economics* 74: 237-275.
- Jenter D., Kanaan F. 2015. CEO turnover and relative performance evaluation. *Journal of Finance* 70: 2155-2184.
- Jung H.W., Subramanian A. 2017. CEO talent, CEO compensation, and product market competition. *Journal of Financial Economics* 125: 48-71.
- Kaplan S., Klebanov M., Sorensen M. 2012. Which CEO characteristics and abilities matter? *Journal of Finance* 67: 973-1007.
- Karuna C. 2007. Industry product market competition and managerial incentives. *Journal of Accounting and Economics* 43: 275-297.
- Larcker D., Ormazabal G., Taylor D. 2011. The market reaction to corporate governance regulation. *Journal of Financial Economics* 101: 431-448.
- Malmendier U., Tate G. 2009. Superstar CEOs. *Quarterly Journal of Economics* 124: 1593-1638.
- Milbourn T. 2003. CEO reputation and stock-based compensation. *Journal of Financial Economics* 68: 233-262.
- Morse A., Nanda V., Seru A. 2011. Are incentive contracts rigged by powerful CEOs? *Journal of Finance* 66: 1779-1821.
- Naveen D., Li Y., Naveen L. 2020. Symmetry in pay for luck. *Review of Financial Studies*, forthcoming.
- Nguyen B.D., Nielsen K.M. 2014. What death can tell: Are executives paid for their contributions to firm value? *Management Science* 60: 2994-3010.
- Ortiz-Molina H. 2007. Executive compensation and capital structure: The effects of convertible debt and straight debt on CEO pay. *Journal of Accounting and Economics* 43: 69-93.
- Oyer P. 2004. Why do firms use incentives that have no incentive effects? *Journal of Finance* 59: 1619-1650.
- Rajgopal S., Shevlin T., Zamora V. 2006. CEOs' outside employment opportunities and the lack of relative performance evaluation in compensation contracts. *Journal of Finance* 61: 1813-1844.
- Salas J.M. 2010. Entrenchment, governance, and the stock price reaction to sudden executive deaths. *Journal of Banking & Finance* 34: 656-666.
- Schoar A., Zuo L. 2017. Shaped by booms and busts: How the economy impacts CEO careers and management styles. *Review of Financial Studies* 30: 1425-1465.
- Yermack D. 2006. Flights of fancy: Corporate jets, CEO perquisites, and inferior shareholder returns. *Journal of Financial Economics* 80: 211-242.
- Yonker S.E. 2017. Geography and the market for CEOs. *Management Science* 63: 609-630.

Figure 1. Relationship between former luck shocks and new CEO compensation

This figure illustrates the linear relationship between a CEO's luck at his/her departing firm and (the logarithm of) CEO compensation at the new firm.

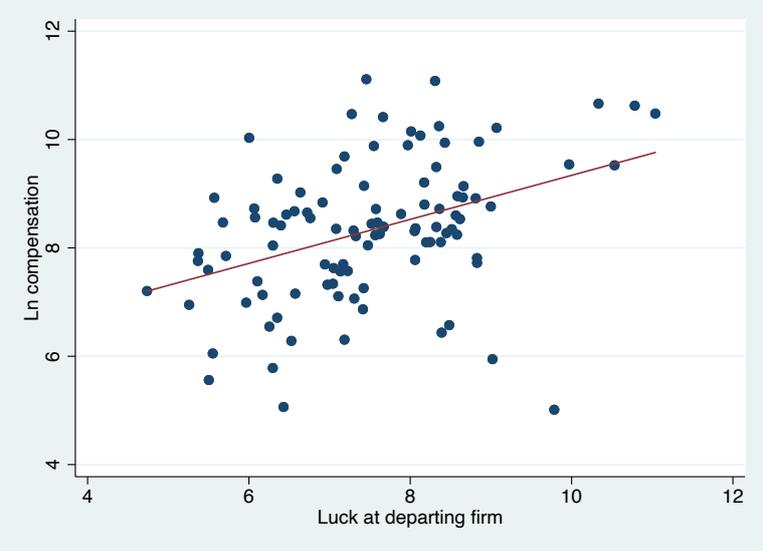


Figure 2. Performance change around CEO transitions

This figure illustrates the average profitability (ROA measured as EBIT/total assets) in each of the four years before and after a CEO appointment separately for incoming low-luck and high-luck CEOs (i.e. CEOs above or below the median luck at their previous firm).

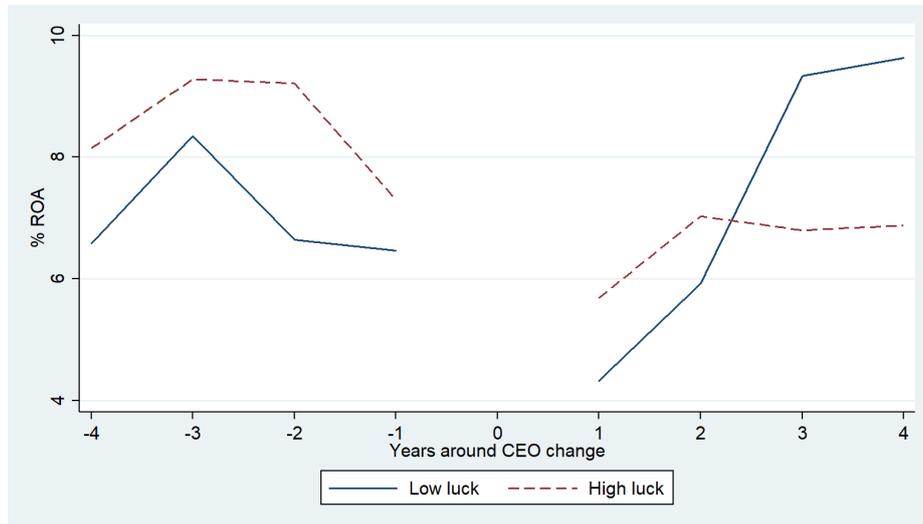


Figure 3. Relationship between CEO luck, pay and profitability at the new firm

This figure illustrates profitability (measured as EBITDA/total assets) generated by moving CEOs at their new firm. The left part shows averages by quartiles of the pay distribution (Q1-3 and Q4). The two left bars show the means across CEOs conditional on that their compensation at the new firm falls in the first three quartiles of pay. The right bars show means generated by CEOs whose income at the new firm falls in the highest quartile. The right part plots averages of CEO compensation per percentage point of profitability generated at the new firm ($\text{tdc1 over (EBITDA*100)/total assets *100}$). Averages are taken over the first four years after a CEO appointment. Low luck and high luck are relative to the median.

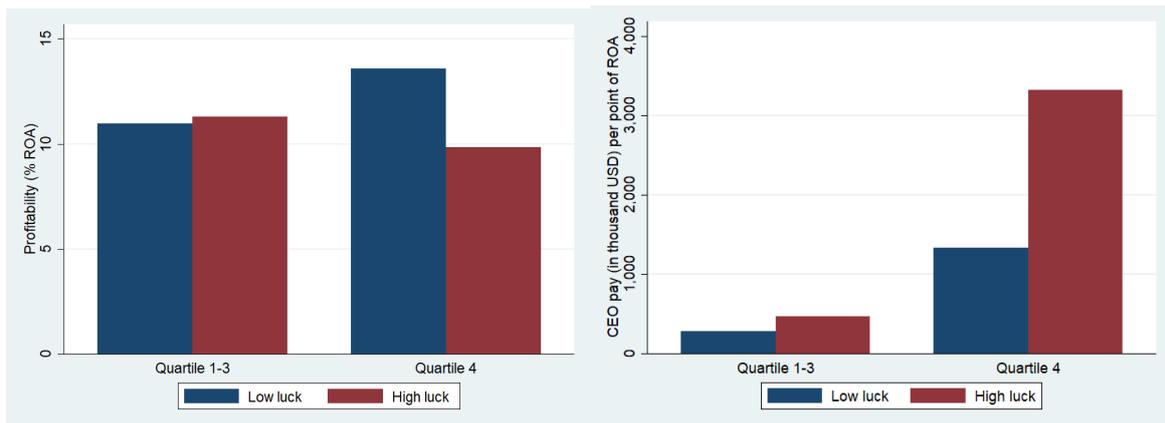


Table 1. Frequency of CEO transitions

Panel A reports the number of observations for CEO transitions recorded within Execucomp and for observations in Execucomp where no transition occurred (a CEO remained at his/her firm from one year to the next). The number of observations are reported for the full sample and conditional on the availability of our main control variables Ln tenure, Ln age, market to book, Ln size, and ROA. The availability of control variables relates to the year of CEO departure from his/her originating firm. Panel B presents numbers separating all CEO transitions by position at the new firm, again unconditional and conditional on the availability of control variables. Panel C depicts a further breakdown of observations for all CEO-to-CEO transitions within Execucomp. Because we estimate effects of CEO-to-CEO transitions both at the departing and at the new firm, this breakdown is presented conditional on having available the control variables at the departing and at the hiring firm.

	Obs.	Percent
Panel A. Full sample (31,365 obs.)		
No CEO transition	31,020	98.9
CEO transition within Execucomp	345	1.1
<i>with available controls at originating firm (30,116 obs.)</i>		
No CEO transition	29,785	98.9
CEO transition within Execucomp	331	1.1
Panel B. CEO transitions within Execucomp (345 obs.)		
CEO to non-CEO	176	51.0
CEO to non-CEO Chairman	63	18.3
CEO to CEO	106	30.7
<i>with available controls at originating firm (331 obs.)</i>		
CEO to non-CEO	168	50.8
CEO to non-CEO Chairman	60	18.1
CEO to CEO	103	31.1
Panel C. CEO to CEO transitions within Execucomp (106 obs.)		
CEO to CEO	58	54.7
CEO to CEO-Chairman	48	45.3
<i>with available controls at originating firm (103 obs.)</i>		
CEO to CEO	56	54.4
CEO to CEO-Chairman	47	45.6
<i>with available controls at hiring firm (101 obs.)</i>		
CEO to CEO	55	54.5
CEO to CEO-Chairman	46	45.5

Table 2. Summary statistics

Panel A reports the average firm and CEO characteristics using four different samples. In Column (1) we use CEO-firm observations in which the CEO did not change. In Column (2) we use all CEO-firm observations in which the CEO changed (i.e. the firm involved in the CEO-firm match experienced a change in the CEO). In Column (3) we use the CEO-firm observations in which the CEO changed toward a non-CEO position at another Execucomp firm (i.e. the firm involved in the CEO-firm match experienced a change in the CEO and that CEO subsequently landed a non-CEO job). In Column (4) we use the CEO-firm observations in which the CEO changed toward a CEO position at another Execucomp firm (i.e. the firm involved in the CEO-firm match experienced a change in the CEO and that CEO subsequently landed a CEO job). The averages involving the CEO transitions in Panel A are computed using the firm at the time of the CEO transition. Panel B presents the comparison of average firm and CEO characteristics using the CEO-firm observations in which the CEO changed toward a non-CEO position at another Execucomp firm (i.e. the firm involved in the CEO-firm match experienced a change in the CEO and that CEO subsequently landed a non-CEO job). Specifically, the table compares the average of firm or CEO characteristics in the firm of departure vs. the new firm (which the former CEO of a firm joined with a non-CEO position). Column (3) of this table presents the results of t-tests (with standard errors in parenthesis). Panel C presents the comparison of average firm and CEO characteristics using the CEO-firm observations in which the CEO changed toward a CEO position at another Execucomp firm (i.e. the firm involved in the CEO-firm match experienced a change in the CEO and that CEO subsequently landed a CEO job). Specifically, the table compares the average of firm or CEO characteristics in the firm of departure vs. the new firm (which the former CEO of a firm joined with a CEO position). Column (3) of this table presents the results of t-tests (with standard errors in parenthesis).

	No CEO transition	All CEO transitions	CEO to non-CEO transitions	CEO to CEO transitions
	(1)	(2)	(3)	(4)
<i>Firm characteristics</i>				
Market to book	1.465	1.261	1.248	1.289
Ln size	1.532	1.468	1.457	1.495
ROA	0.089	0.070	0.072	0.064
Analyst coverage	10.351	11.460	11.475	11.420
Industry HHI	0.157	0.113	0.131	0.133
<i>CEO characteristics</i>				
Ln tenure	2.054	1.010	0.977	1.082
Ln age	4.003	3.970	3.962	3.974
Ln compensation	7.867	8.020	7.948	8.180
Ln cash compensation	6.702	6.673	6.635	6.758
Ln non-cash compensation	6.957	7.189	7.108	7.370

Panel B. Average differences in CEO to non-CEO transitions

	Departing firm	Hiring firm	Difference
	(1)	(2)	(1)-(2)
Market to book	1.248	1.175	0.073 (0.073)
Ln size	1.457	2.177	-0.720 (0.151)
ROA	0.072	0.065	0.006 (0.008)
Analyst coverage	11.475	12.045	-0.571 (0.792)
Industry HHI	0.131	0.133	0.003 (0.002)
Ln compensation	7.948	7.934	0.014 (0.118)
Ln cash compensation	6.635	5.826	0.809 (0.132)
Ln non-cash compensation	7.108	7.115	-0.008 (0.218)

Panel C. Average differences in CEO to CEO transitions

	Departing firm	Hiring firm	Difference
	(1)	(2)	(1)-(2)
Market to book	1.290	1.221	0.069 (0.197)
Ln size	1.495	1.576	-0.082 (0.257)
ROA	0.064	0.051	0.013 (0.012)
Analyst coverage	11.420	9.798	1.622 (1.179)
Industry HHI	0.133	0.137	-0.004 (0.017)
Ln compensation	8.180	8.323	-0.143 (0.167)
Ln cash compensation	6.758	6.581	0.191 (0.165)
Ln non-cash compensation	7.370	7.615	-0.245 (0.295)

Table 3. The general effect of luck on CEO transitions

This table provides the result of a OLS regression estimated on the sample of all CEOs. The dependent variable is a dummy equal to one if a CEO departed from a CEO position at a company, and zero otherwise (i.e. CEOs that maintained their CEO job). Each explanatory variable is described in detail in Appendix A. Robust standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: CEO Transition	
	(1)
Luck	0.0012** (0.0005)
Match quality	-0.0022 (0.0014)
Market to book	0.0000 (0.0005)
Ln size	0.0004 (0.0005)
ROA	-0.0088 (0.0080)
Ln tenure	-0.0352*** (0.0022)
Ln age	-0.0125*** (0.0042)
Year dummies	Yes
Observations	30,116

Table 4. The effect of luck on job titles conditional on CEO turnover

This table provides the result of OLS regressions estimated on the sample of departing CEOs. In column (1), the dependent variable is a dummy equal to one if a CEO departed from a company and became chairman (but no CEO) at a new company, and zero if a CEO departed from a company and got any Execucomp (non-CEO and non-chairman) position at a new company. In column (2), the dependent variable is a dummy equal to one if a CEO departed from a company and became CEO but no chairman at a new company, and zero if a CEO departed from a company and got any Execucomp (non-CEO and non-chairman) position at a new company. In column (3), the dependent variable is a dummy equal to one if a CEO departed from a company and became CEO and Chairman at a new company, and zero if a CEO departed from a company and got any Execucomp position (non-CEO and non-chairman) at a new company. Each explanatory variable is described in detail in Appendix A. Robust standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable:	CEO to Chairman transition (1)	CEO to CEO transition (2)	CEO to CEO- Chairman transition (3)
Luck	0.0361 (0.0272)	0.0362 (0.0560)	0.1362* (0.0800)
Match quality	0.0534 (0.0337)	-0.0132 (0.0746)	0.2556** (0.1014)
Market to book	0.0283 (0.0256)	0.0611 (0.0719)	-0.0752 (0.0994)
Ln size	0.0184 (0.0246)	-0.0332 (0.0499)	0.0116 (0.0718)
ROA	-0.5701 (0.3928)	-0.1626 (0.7773)	-2.7059** (1.1167)
Ln tenure	0.0302 (0.0461)	0.1305 (0.1055)	-0.2259 (0.1388)
Ln age	0.7057*** (0.2468)	0.2409 (0.5106)	1.1314 (0.6927)
Year dummies	Yes	Yes	Yes
Observations	228	224	215

Table 5. Luck and the informational context of the destination firms

This table provides the result of OLS regressions estimated on the sample of departing CEOs subsequently hired as CEO at another firm. In Column (1), the dependent variable is the difference between the number of analysts covering the new firm and the number of analysts covering the old firm (higher values indicate a relatively larger analyst coverage at the new firm). In Column (2), the dependent variable is the difference between the HHI in the 3-digit SIC industry of the new firm and the HHI in the 3-digit SIC industry of the old firm (higher values indicate a relatively more concentrated industry at the new firm). Estimates are based on HHI values between 0 and 1. Each explanatory variable is described in detail in Appendix A. Robust standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable:	Delta analyst coverage (1)	Delta industry HHI (2)
Luck	-1.5160* (0.8001)	0.0271* (0.0144)
Match quality	-0.0947 (1.0822)	-0.0424* (0.0232)
Market to book	0.05 (0.8718)	0.0075 (0.0109)
Ln size	1.1339** (0.4328)	-0.0192* (0.0096)
ROA	4.969 (11.1649)	0.2552* (0.1351)
Ln tenure	-2.0427 (1.8056)	0.027 (0.0225)
Ln age	-8.4945 (9.0278)	0.0412 (0.124)
Year dummies	Yes	Yes
Observations	101	101

Table 6. Effect of luck on CEO pay at the new firm

This table provides the result of OLS regressions estimated on the sample of departing CEOs subsequently hired as CEO at another firm. In Columns (1)-(5), the dependent variable is the logarithm of CEO compensation at the new firm. In Column (6), the dependent variable is the ratio between CEO compensation at the new firm and the mean compensation of other CEOs in the same 3-digit industry and year. Each explanatory variable is described in detail in Appendix A. Robust standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable:	Ln compensation					Relative compensation
	(1)	(2)	(3)	(4)	(5)	(6)
Luck	0.3911*** (0.1132)	0.2779** (0.1155)	0.2927** (0.1192)	0.3940*** (0.1132)	0.3902*** (0.116)	1.5144*** (0.3248)
Match quality		0.1205 (0.1789)	0.112 (0.1635)	0.1681 (0.1466)	0.1566 (0.1507)	0.2826 (0.4562)
Market to book		-0.1921 (0.1141)	-0.1902* (0.1106)	-0.1879* (0.1260)	-0.1903 (0.1248)	-0.1875 (0.3641)
Ln size		0.0834 (0.0563)	0.0856 (0.0584)	0.0087 (0.064)	0.0107 (0.065)	-0.0631 (0.2075)
ROA		2.3979 (1.4401)	2.4630* (1.4456)	2.6888* (1.5073)	2.7848* (1.5334)	1.419 (5.2219)
Ln tenure		0.3067 (0.2054)	0.3088 (0.2073)	0.2115 (0.187)	0.2023 (0.1887)	1.1542* (0.5865)
Ln age		-1.2745 (1.1093)	-1.4404 (1.0638)	-1.0674 (1.1072)	-1.1615 (1.1114)	0.4706 (3.2789)
Industry pay difference			0.0001 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)	-0.0001 (0.0003)
Executive pay difference				0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Luck difference				0.1742 (0.1341)	0.1694 (0.1332)	0.7801** (0.3892)
Share of CEO equity					0.2023 (0.4366)	-0.2381 (1.397)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	106	101	101	100	100	100

Table 7. Effect of luck on CEO' compensation structure at the new firm

This table provides the result of OLS regressions estimated on the sample of departing CEOs subsequently hired as CEO at another firm. In Columns (1)-(3), the dependent variable is the logarithm of a CEO's cash compensation (namely salary and bonus) at the new firm. In Columns (4)-(6), the dependent variable is a CEO's non-cash compensation (namely totally compensation minus cash and bonus) at the new firm. Each explanatory variable is described in detail in Appendix A. Robust standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable:	Ln cash compensation			Ln non-cash compensation		
	(1)	(2)	(3)	(4)	(5)	(6)
Luck	0.2097 (0.1746)	0.1723 (0.1768)	0.1934 (0.1735)	0.6025*** (0.1800)	0.3981** (0.1603)	0.4647*** (0.1743)
Match quality		-0.2577 (0.1611)	-0.2188 (0.1600)		0.1683 (0.2479)	0.1684 (0.2338)
Market to book		0.074 (0.1009)	0.1636 (0.1453)		-0.4984** (0.2428)	-0.4809* (0.2525)
Ln size		0.0828 (0.0875)	0.0209 (0.0920)		0.069 (0.0902)	0.0176 (0.1027)
ROA		2.1887 (1.4693)	1.8789 (1.1851)		4.2453 (2.6825)	4.7199 (2.9167)
Ln tenure		0.1791 (0.2841)	0.1098 (0.2610)		0.3641 (0.2838)	0.2838 (0.2881)
Ln age		-3.8464** (1.6953)	-3.9430** (1.7063)		0.1032 (2.0567)	-0.2443 (2.1069)
Industry pay difference			-0.0002 (0.0002)			0.0001 (0.0002)
Executive pay difference			0.0000* (0.0000)			0.0000 (0.0000)
Luck difference			-0.0936 (0.2126)			0.0819 (0.2045)
Share of CEO equity			0.1174 (0.6433)			0.5077 (0.8534)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	106	101	100	106	101	100

Table 8. Effect of lucky CEOs on the performance of the new firm

This table provides the result of OLS regressions estimated on the panel dataset of firms that hire a new CEO. All regressions in this table use ROA as dependent variable. In the left panel, the main explanatory variables are the Post dummy, equal to one for the years after a CEO hire, and zero for the years before; the Luck variable, measuring the extent of incoming CEOs' luck at their previous firm; and the interaction between the two. Columns (3) and (4) of this panel use the dependent variable ROA computed as EBITDA/total assets. In the right panel, the Post dummy is replaced with a set of dummies corresponding to the years around the new CEO's hire, from four years earlier (used as baseline group) to four or more years later. Each explanatory variable is described in detail in Appendix A. Firm-clustered standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: ROA					Dependent variable: ROA	
	(1)	(2)	(3)	(4)		(1)
Post	0.2358** (0.1116)	0.2256** (0.1127)	0.2703** (0.1253)	0.2611** (0.1247)	Post $t=-3 \times$ Luck	-0.0154 (0.0220)
Post \times Luck	-0.0348** (0.0151)	-0.0331** (0.0154)	-0.0387** (0.0168)	-0.0371** (0.0169)	Post $t=-2 \times$ Luck	-0.0029 (0.0232)
Ln size		-0.0017 (0.0154)		0.0055 (0.0139)	Post $t=-1 \times$ Luck	-0.0190 (0.0220)
Ln tenure		0.0127 (0.0102)		0.0115 (0.0101)	Post $t=0 \times$ Luck	-0.0170 (0.0211)
Ln age		-0.0546 (0.0722)		-0.0653 (0.0679)	Post $t=1 \times$ Luck	-0.0363* (0.0213)
Firm fixed effects	Yes	Yes	Yes	Yes	Post $t=2 \times$ Luck	-0.0430* (0.0221)
Industry \times Year dummies	Yes	Yes	Yes	Yes	Post $t=3 \times$ Luck	-0.0515** (0.0225)
Observations	634	634	634	634	Post $t=4+ \times$ Luck	-0.0584** (0.0239)
					Ln size	-0.0075 (0.0176)
					Ln tenure	0.0091 (0.0102)
					Ln age	-0.0488 (0.0650)
					Firm fixed effects	Yes
					Industry \times Year dummies	Yes
					Observations	634

Table 9. Effect of lucky CEOs on corporate outcomes

This table provides the result of OLS regressions estimated on the panel dataset of firms that hire a new CEO. The main explanatory variables are the Post dummy, equal to one for the years after a CEO hire, and zero for the years before; the Luck variable, measuring the extent of incoming CEOs' luck at their previous firm; and the interaction between the two. Each dependent and explanatory variable is described in detail in Appendix A. Firm-clustered standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dependent variables:	Asset efficiency	Cost of goods solds	Administra- tive costs	R&D	Capex	Asset growth
	(1)	(2)	(3)	(4)	(5)	(6)
Post	0.9530** (0.4421)	-0.2557*** (0.0787)	0.0729 (0.0936)	0.1053 (0.0645)	0.0797 (0.0578)	0.4036 (0.8179)
Post × Luck	-0.1343** (0.0618)	0.0368*** (0.0104)	-0.0115 (0.0121)	-0.0132* (0.0071)	-0.01 (0.0078)	-0.0208 (0.1084)
Ln size	-0.021 (0.1058)	-0.0115 (0.0235)	-0.0248 (0.0184)	-0.0151 (0.0091)	0.0038 (0.0037)	0.3887 (0.2876)
Ln tenure	0.0572 (0.0549)	0.0055 (0.0087)	-0.0096 (0.0096)	0.0031 (0.0082)	-0.0011 (0.0045)	-0.1226 (0.1591)
Ln age	-0.5731 (0.3727)	-0.0431 (0.0583)	0.0136 (0.0821)	-0.0496 (0.0389)	-0.0176 (0.0211)	0.8434 (0.8707)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	656	613	540	426	651	603

Appendix A. Variable description

Variable	Definition
Luck	Fitted values from regressing the market value on lucky events. See Section 2.3 for a full description of the methodology
Match quality	The residual of luck and market value. See Section 2.3 for a full description of the methodology
Ln tenure	Logarithm of CEO tenure as reported in Execucomp
Ln age	Logarithm of CEO age as reported in Execucomp
Ln compensation	Logarithm of CEO total compensation (<i>tdc1</i>)
Ln cash compensation	Logarithm of salary plus bonus in USD (+1 USD)
Ln non-cash compensation	Logarithm of total pay minus salary and bonus in USD (+1 USD)
Ln size	Logarithm of a firm's employees as reported in Compustat
Market to book	Market value of equity scaled by the book value of equity. Values winsorized between 0 and 10
Operating profitability	Return on assets, computed either as EBIT/total assets or EBITDA/total assets as specified in the relevant tables
Asset efficiency	Sales over total assets
Cost of goods sold	Costs of goods sold to revenues
Administrative cost	Administrative costs to revenues
R&D	Research and development expenditures to total assets
Capex	Capital expenditures to total assets
Asset growth	$(\text{Total assets}_t - \text{total assets}_{t-1}) / \text{total assets}_{t-1}$
Industry pay difference	Average CEO pay in new the industry minus the average CEO pay in old industry defined at the 3-digit SIC level and year

Executive pay difference	Sum of pay of four highest paid executives (excl. CEO) at new firm minus same measure at old firm
Analyst coverage	Number of analyst covering a firm, yearly (averaged across months), from I/B/E/S
Delta analyst coverage	Difference in the analyst coverage from new to old firm
Industry HHI	Annual 3-digit SIC Herfindahl-Hirschman Index computed using revenues and the primary SIC as reported in Compustat. Values are normalized between 0 and 1.
Delta industry HHI	Difference in the industry HHI from old to new firm
Share of CEO equity	Shares owned by CEO (excl. options) relative to sum of shares held by all executives as reported in Execucomp
