DOI: 10.1111/fima.12370

Financial Management | WILEY

ORIGINAL ARTICLE

The influence of learning and bargaining on CEO–chair duality: Evidence from firms that pass the baton

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Abstract

Some firms combine CEO and board chair positions after observing CEO performance. We propose that this approach, known as "passing the baton" (PTB), enables the board to learn about the ability and suitability of the CEO before awarding additional title of board chair. Consistent with learning, idiosyncratic stock-return volatility declines following the CEO–chair combination. The market responds positively (Cumulative Abnormal Return (CAR) = 1.31%) to early promotions, suggesting that early promotions reveal directors' private information about CEO quality. Compared to a matched benchmark, we observe no decline in firm's accounting performance in subsequent years. Although match-adjusted stock returns begin to decline 2 years after combination in homogeneous industries, there is no stock-return decline in heterogeneous industries where learning is more important. The evidence reveals the potential for entrenchment over time, but we find no evidence to suggest that CEO–chair combinations in PTB firms result from agency problems. Our results underscore the importance of balancing both learning and agency problems in corporate governance.

KEYWORDS
agency problems, bargaining, CEO–chair duality, corporate governance, learning

JEL CLASSIFICATION
G23, G30

1 | INTRODUCTION

In the aftermath of the governance failures of the early 2000s and the financial crisis of 2008, governance activists have renewed calls to separate the roles of CEO and chair of the board.[1] Despite the widespread opinions of governance activists and the normative implications of agency theory, empirical evidence on the influence of CEO–chair duality on firm performance is inconclusive.[2] Indeed, Brickley et al. (1997) examine firms that award the CEO the additional position of board chair after a probationary period, which Vancil (1987) calls "passing the baton" (PTB) and conclude (i) that many firms classified as having separate CEO–chair structures ultimately combine both roles as part of the succession process and (ii) that the costs of separating the two roles are larger than the benefits for many firms. They frame their conclusions primarily within an agency framework in which firms balance the agency costs of singular or combined leadership roles with the need for CEOs who possess firm-specific knowledge.

We focus more extensively on the PTB process and propose learning as a new rationale that informs on the observed cross-section of singular and combined CEO–chair positions. Empirically, we follow Pan et al. (2015) and use the reduction in idiosyncratic stock volatility as a proxy for learning about the CEO. For firms that follow a PTB process, we find that idiosyncratic stock-return volatility declines following the combination of the two roles, consistent with learning. Benchmark-adjusted accounting performance increases in the short term and is unaffected in the long term. Adjusted stock price performance is unchanged in the short term and declines in the long term. The long-run decline is concentrated in homogeneous industry firms, where learning is less important, and in environments more conducive to agency problems. We find no drop in match-adjusted stock returns for firms in heterogeneous industries where learning is expected to be more important or in environments less likely to have agency problems. Thus, although there is the potential for long-run entrenchment for firms with weak governance, the data suggest that learning is an important consideration that shapes some firms' decisions on when and whether to combine the CEO and chair positions.

Theoretical research (e.g., Hermalin & Weisbach, 2014, 2017) stresses the importance of learning to understand observed governance outcomes. However, we are not aware of any study that focuses directly on the role of learning in the decision to combine the roles of CEO and board chair. To inform on this premise, we use the practice of awarding the CEO the additional role of chair after a period of observation to examine the role of learning in the decision to combine the two roles. We argue that the board learns about the ability and fit of the CEO before awarding the additional position of board chair. Failing to incorporate the role of learning in corporate governance paradigms can lead to an incomplete understanding of widely observed governance practices, such as combining the roles of CEO and board chair, that seem to conflict with simple normative predictions from agency theory. Our research sheds light on the importance of learning in corporate governance and provides new evidence on the efficacy of combining the CEO and chair positions in some firms.

The need for learning is likely to vary by industry and by firm. Our empirical results suggest that when choosing their CEO–chair leadership structure, firms seek to balance agency problems from alternative leadership structures with the need for a CEO with firm-specific knowledge. We believe that these complex tradeoffs help explain the divergent evidence and conclusions in the literature. In support of our viewpoint, Krause et al. (2014) survey the literature and

[1] Proponents argue that combining the two roles exacerbates conflicts of interest between shareholders and the CEO as there is no arms-length monitoring of the CEO by an independent chair. In support of this view, agency theory suggests that boards, as monitors for shareholders, should be independent from the management of the firm (Fama and Jensen, 1983a, 1983b).

[2] See Dey et al. (2011), Grinstein and Valles (2008), Linck et al. (2008), Goyal and Park (2002), and Core et al. (1999).

find that no consensus evidence emerges to suggest either a negative or positive influence.[3] The aggregate evidence lead Krause et al. to conclude that mandates that require separation of the two roles would be unwise, "… not because the issue of CEO duality is unimportant, because it is too important and too idiosyncratic for all the firms to adopt the same structure under the guise of best practices…. boards should be left free to adopt the structure they deem to be strategically beneficial for their firms."[4]

Our approach to duality draws on the conceptual framework of Hermalin and Weisbach (1998, 2003), which argues that observed board structures are endogenous equilibrium outcomes that represent constrained optimal responses to agency problems. We posit that the inconclusive and context-specific evidence in the literature arises from endogenous self-selection that complicates empirical identification strategies and the ability to properly benchmark performance. Moreover, most analyses of CEO–chair duality rely primarily on predictions derived from basic agency theory and do not consider the importance to certain firms of using a governance structure that facilitates learning about the CEO. Hermalin and Weisbach (2014) argue that a learning perspective provides insight into phenomena such as executive selection and turnover. Building on this idea, we propose hypotheses based on learning and focus specifically on the group of firms that initially separate the roles of CEO and chair, and combine them only after a probationary period during which the board of directors observe the new CEO's actions and the firm's performance.

We posit that firms will use PTB to learn about the CEO's ability when benchmarking against other CEOs is more difficult, for instance in more heterogeneous industries. After learning about the ability of the CEO, the board will award the additional position of board chair if the CEO demonstrates sufficient talent. By awarding the CEO with board chair, the firm also increases the likelihood of retaining a valuable CEO. Following promotion based on achieving a performance standard, one would expect regression to the mean to result in an unadjusted performance decline following promotion (Lazear, 2004). Taken at face value, unadjusted performance could therefore lead to an erroneous conclusion. Thus, we identify benchmark firms based on prior performance and propensity-score matching to examine changes in performance, and other firm characteristics.

For our empirical analysis, we assemble a sample of over 18,000 firm–year observations for CEO–chair combinations over 1995–2010 and follow outcomes through the end of the CEO's tenure or through 2018 (up to 24 years), to examine our predictions about learning in PTB. An initial examination of the data reveals that many firms, at least over our 16-year combination period, never combine both roles or always combine both roles. These two groups of dichotomous firms have strikingly different firm characteristics, indicative of selection issues that would make it difficult to interpret the results from cross-sectional regressions. Our primary focus is on the third group—the PTB firms—that initially separate the roles of CEO and chair and combine them only after a probationary period during which the board of directors observe the new CEO's actions and the firm's performance. In addition to the learning hypothesis, we consider alternative factors that could drive PTB and promotion decisions. For instance, boards could provide an incentive benefit prior to appointment by using promotion to the chair position as a reward for strong performance. Alternatively, a coopted, compromised board may hasten the promotion to chair and allow the CEO to further consolidate power and perquisites. Overall, we find that the PTB process is more consistent with optimal learning and retention of high-quality CEOs than with the alternative explanations.

As the first step in our empirical analysis, we examine differences between firms that always combine both roles, pass the baton, or always separate the roles. Of particular note, we find that PTB firms are more likely to be present in industries that are less homogenous than firms that always combine or never combine the two roles. In less homogenous industries, CEO performance is difficult to benchmark to industry peers (Parrino, 1997), which is consistent with the premise that there is benefit to using PTB to learn about CEO ability in these industries. We also use a hazard model to analyze the determinants of awarding both titles as opposed to keeping them separate. Supporting the premise that

[3] Their analysis shows that 33.3% of the studies find no relation between firm performance and duality, 16.7% report an unambiguous negative relation, and 16.7% report an unambiguous positive relation. Other studies report results that are context specific. For instance, 19.4% of the performance studies reviewed by Krause et al. report a positive influence only under certain situations and 13.9% find a negative influence only for specific firm environments.

[4] A related meta-analysis of 31 studies by Dalton et al. (1998) concludes that the duality of the firm leadership structure does not affect firm performance.

firms award both titles after a probationary period in which the CEO proves her ability, we find that CEOs who exhibit superior industry-adjusted performance receive the chair title more quickly. However, we also find that good industry performance hastens the award of the additional title. This result suggests that firms combine the two roles to retain CEOs when industry conditions create better outside employment opportunities, in line with a retention rationale for awarding the chair.[5] Ceteris paribus, older firms take longer to award the title of chair, while firms with multiple segments combine both titles more quickly. The latter result suggests that more complex organizations may be better served on the margin by combining the roles of the CEO and the chair, which is consistent with the conclusions of other studies (Faleye, 2007; Dey et al., 2011; Palmon and Wald, 2002). We also find that promotion occurs more quickly when the board is not coopted, which is inconsistent with the alternative explanation that agency considerations and CEO influence are central to the CEO being appointed chair.

To study the consequences of combining the two roles on firm performance, we estimate CEO–firm pair fixed effect regressions in which dummy variables for the year of the combination and as many as 24 subsequent years measure the effect of the decision to combine the roles. To distinguish between learning about the CEO and potential entrenchment, we examine outcomes for the short term (2 years) and the long term (all subsequent years). Consistent with the learning hypotheses, we find a significant decline in idiosyncratic stock volatility following the combination in both the short term and the long term. Our results indicate positive abnormal returns prior to the award. A naïve analysis of the post-chair appointment performance, one that fails to control for selection issues and mean reversion in performance data, indicates a significant drop in firm performance relative to the pre-chair period. However, to properly specify a test to discern whether the drop in performance can be attributed to the promotion or to conditions under which promotions tend to occur, we need to benchmark the post-promotion performance appropriately. As the pre-chair appointment period is characterized by strong performance, we use propensity score matching to construct a matched sample of firms where the matching criteria includes similar pre-appointment performance and firm attributes that predict a high propensity for using a PTB succession strategy. We draw the matched sample from the set of firms that always or never award the chair to the CEO.

For benchmark-adjusted accounting performance, we find post-appointment outperformance in the short term and no difference in adjusted performance over the long term. For match-adjusted stock returns the data exhibit no change in performance for the first 2 years following the award of the additional title. However, there is a drop in match-adjusted stock returns beyond 2 years. The drop in match-adjusted stock returns is driven by the firms in homogeneous industries, firms with coopted boards, and combinations before the implementation of Sarbanes–Oxley (SOX). We observe no longer term performance decline in heterogeneous industries where learning is more important or for firms where agency problems are less likely. As learning about the ability of CEO by the board is more important in heterogeneous industries, our results are consistent with learning being an important consideration for some firms that follow a PTB process.

We also examine alternative explanations, based on incentives and agency, for the board's decision of when (and whether) to award the title of chair to the CEO. First, we consider the possibility that boards use the additional role of board chair strictly as an incentive mechanism. If a main purpose of the PTB policy is to learn about managerial quality and retain talented CEOs, good performance in the initial years may be sufficient to persuade the board of the CEO's quality. An incentive rationale for PTB would not generally imply an early promotion: as a promotion would tend to weaken incentives after the award, it could be suboptimal to award the chair relatively early. Second, we consider the possibility that the promotion exacerbates agency problems and CEO entrenchment. If the promotion exacerbates agency problems, an early promotion might have worse implications for firm value. To examine these alternative explanations, we separate our sample into two groups. The first (second) group consists of CEOs who are awarded (are not awarded) their additional title within 3 years of becoming the CEO, which is the median in our sample. We find no significant decline in match-adjusted stock Return on Assets (ROA) for either of the groups. There is also no decline

[5] This interpretation is in the spirit of Oyer (2004), who argues that firms optimally pay CEOs for good luck to retain CEOs when industry performance is good and competitors have the resources to hire away talented CEOs.

in match-adjusted stock returns for the early recipients. However, there is a decline in match-adjusted stock performance for the late recipients. CEOs who receive the chair position later have longer tenures and possibly greater CEO power, which could lead to greater entrenchment. In general, these findings are consistent with the learning hypothesis, though we cannot rule out the possibility of some decline in stock performance for late recipients due to incentives or agency effects.

The stock market's response to the CEO being appointed chair provides additional evidence that is consistent with the learning hypothesis. If the PTB process is intended to provide ex ante incentives or indicates greater CEO entrenchment and agency problems, we would expect a negative reaction to the chair appointment. Similarly, if the pre-appointment process is perceived by the market as a lucky outcome rather than ability, we would expect a muted or even negative reaction to the appointment. On the other hand, if the promotion is regarded as the board's vote of confidence on CEO ability, we expect a positive stock market response. We find that the market responds positively (CAR = 1.31%) to early promotions, which suggests that early promotions reveal directors' private information about the quality of the CEO to the market. On the other hand, the market response to late promotions is statistically insignificant from zero. The lack of a response to late promotions suggests there is little surprise at the announcement since the market (like the board) has observed the CEO's performance over a relatively long period of time.

The CEO's total compensation and the sensitivity of compensation to stock price performance are largely unchanged following the award of the additional title. Likewise, we observe no change in annual compensation or the sensitivity of compensation to stock price performance relative to the matched benchmark. Additional analysis also reveals that the change in annual compensation is not sensitive to whether the boards have been coopted by the CEO (see Coles et al., 2014), which fails to support an alternative agency-based hypothesis. However, as measured by the portfolio of security holdings, the sensitivity of the CEO's wealth to stock price (delta) and stock volatility (vega) increases in both an unadjusted basis and an adjusted basis. Although the increase in the portfolio delta holds only in the short term, the increase in vega is long term. This result indicates that CEOs who obtain both roles tend to retain stock and stock options rather than cash out, which increases their incentive alignment with shareholders and encourages risk-taking, thereby balancing any incentive to become complacent after receiving the chair position. The option retention may serve as a bonding mechanism on the part of the CEO, or it may result from explicit or implicit pressure from the board or external monitors. Nonetheless, the consistent increase in incentive alignment is likely to serve as a mechanism that alleviates the agency problems that could arise from the combination of the CEO and the board chair positions. Moreover, the increase in vega strengthens our finding that the decrease in firm-specific volatility reveals learning since CEOs actually face opposing incentives to increase volatility.

By introducing learning as a primary motivation for the PTB process, our study builds on Brickley et al. (1997), who argue that separation has both potential costs and potential benefits. Brickley et al. conclude that the costs of separation are larger than benefits for most large firms. Additionally, they argue that if the CEO is not awarded both titles, she would be less motivated to work hard, and that firms that perform well reward the CEO with the additional title. Using a sample of 661 large publicly traded US firms in 1988, they find that firms with separate CEO and board chairs do not perform any better than the firms that have these roles combined. Their event study evidence suggests that market response is insignificant when the firms combine or split the two roles. The authors suggest that their results are best characterized by the "PTB" process proposed by Vancil (1987), in which the new CEO serves a probationary period under a separate chair who is generally the prior CEO. If the new CEO clears this hurdle, then she earns the additional title of board chair and the old chair resigns. Also, consistent with the PTB argument, Fahlenbrach et al. (2011) find that firms with the old CEO on the board monitor the new CEO more intensely and achieve better performance. Palmon and Wald (2002), however, document that the market reaction to combining or splitting the roles of CEO and chair is negative for small firms, positive for large firms, and unrelated to proxies for PTB progression.

The results of our analysis also relate to Dahya et al. (2002), who study the impact of the Cadbury Committee report on the *Code of Best Practices* on British firms. One important feature of the *Code* is its recommendation that

the position of the board chair and CEO be held by different individuals.[6] They find that the relation between CEO turnover and performance becomes stronger following the issuance of the *Code*. They also report that the increased sensitivity of turnover to performance was concentrated among the firms that adopted the *Code*. However, Dahya and McConnell (2007) find that performance improvements related to adoption of the *Code* result from additions of independent directors to the board; they find no influence of separating the roles of CEO and chair on firm performance. More recently, Yang and Zhao (2014) report that firms with combined titles of CEO and chair are valued 6% higher than firms with separate titles. Fauver et al. (2017) examine governance reforms in 41 countries and find no impact on firm value of separating the roles of CEO and chair. We note that these studies all classify firms as either separate or combined. Thus, our research complements the dichotomous classification scheme in these studies by examining PTB firms, which have periods of separation and combination, as a distinct group

Overall, our research provides three main contributions. First, our analysis offers evidence on the importance of learning in observed governance structures, specifically the PTB process. Second, our research design and findings help researchers to better interpret the divergent evidence in the literature about the merit of CEO–chair duality. Third, our findings indicate that the CEO–chair combination is not necessarily detrimental to shareholders and that a single governance structure is likely not appropriate for all firms. More broadly, our results support the conceptual arguments in Hermalin and Weisbach (1998, 2003) that observed that persistent board structures are likely to be equilibrium outcomes, and the results emphasize the role of learning in shaping these equilibrium outcomes. Thus, our evidence suggests that we should exercise caution in the rush to separate the role of board chair from that of the CEO. Forcing separation by fiat may push many firms away from their optimal equilibrium structures.

2 | EMPIRICAL PREDICTIONS

In this section, we develop empirical predictions based on the learning hypothesis and alternative explanations for PTB. For additional intuition, Appendix A presents a simple model of the PTB process based on learning and incomplete contracting.

2.1 | Firm complexity and industry homogeneity

Our first prediction draws on two underlying assumptions about PTB firms. The first assumption is that firms adopting PTB strategies will tend to be firms in which CEO ability is not easily discerned. Thus, significant learning may occur over time. The second assumption is that PTB firms operate in environments in which firm-specific information is more important.

It follows from the first assumption that PTB firms can be expected to be somewhat more complex than firms that always separate the two roles. The literature suggests that firm complexity is associated with characteristics such as: a larger board and firm size, a higher percentage of inside directors, higher financial leverage, and greater R&D intensity. In our tests we examine whether PTB firms have attributes usually associated with firm complexity.

The second assumption suggests that PTB firms are likely to be more prevalent in environments in which it is difficult to benchmark the CEO against industry peers. In particular, we expect PTB firms to be less common in homogenous industries (as defined by Parrino (1997)), as CEO performance is easier to benchmark to industry peers in such industries. Further, we expect CEOs who have a weaker relationship with the board (e.g., board is not coopted) to be more concerned about enhancing power relative to the rest of the board. A non-coopted board also means that the majority of directors observe the CEO from the beginning of his tenure, which would facilitate learning at a quicker

[6] Unlike in the United States, the UK Corporate Governance Code sets out a clearer role for the board chair. It has also been noted in the press and the academic literature that the chair plays a more visible role among UK firms.

rate. In contrast, the majority of directors on a coopted board would have observed only a portion of the CEO's tenure.[7] Hence, if the CEO faces a more independent board that is not coopted, we expect promotion to occur more rapidly if the CEO is to be retained. Finally, when the board has greater information about CEO ability, for example, when the CEO is an internal appointment, we would expect promotions to occur over a shorter horizon (see the discussion following equation (2) of our model presented in Appendix A). These arguments lead to our first prediction.

Prediction 1:

- *Firms that are more complex and less transparent and that belong to less homogenous industries are more likely to follow a PTB strategy in appointing CEOs to chair positions.*
- *Firms that follow a PTB strategy will more rapidly promote CEOs to chair positions when the board is more independent and not coopted or when the CEO is internally sourced.*

We consider two alternative hypotheses for firms to follow PTB strategies. Our first alternative hypothesis is that the possibility of being promoted to chair could provide the CEO with strong promotion incentives. The promotion–incentive hypothesis would be consistent with more complex and less transparent firms adopting PTB, as incentive contracting might be difficult in such firms. Later, we develop other predictions that will allow us to test the learning–retention hypothesis against the promotion–incentive hypothesis.

Our second alternative hypothesis is that CEO entrenchment and agency problems could be primarily responsible for promotion to chair. Some aspects of Prediction 1 allow us to distinguish between the learning–retention and the agency hypothesis. In particular, if agency problems drive the promotion to chair, we would expect CEOs to be more rapidly promoted in firms with boards that are coopted, contrary to Prediction 1. Alternatively, if learning drives the promotion to chair, we expect coopted boards to take longer to promote the CEO because most directors observe only a part of the CEO's tenure. Hence, the learning hypothesis predicts that CEOs in firms with coopted boards are less likely to be promoted more rapidly and the agency explanation predicts that CEOs with coopted boards would be promoted sooner.

2.2 | Post-promotion performance

We argue that if learning about managerial quality is an important factor underlying the PTB strategy, then promotion to board chair is likely to be preceded by strong firm performance. As noted by Lazear (2004), promotion based on performance indicates that a standard has been met, but a natural outcome of the statistical process is regression to the mean, which suggests that performance will decline after promotion. Firms will optimally account for such regression in their promotion decisions. This rationale underlies the following prediction. For a formal proof based on our model, see Section A.2 of Appendix A.

Prediction 2:

In the period prior to the CEO being appointed chair, the firm's performance is expected to be strong. The performance is expected to be greater than the average subsequent performance exhibited by the firm. Hence, the average performance post-chair promotion will tend to decline.

Prediction 2 indicates that constructing a matched benchmark is critical to assessing the value implications of CEO duality. In a setting with learning about managerial ability, a finding that firm performance drops subsequent to chair promotion does not imply that duality has negative value consequences. In our empirical analysis, we test for the performance effects of duality by matching the post-promotion performance of PTB firms to a control group of non-PTB firms (i.e., always or never have duality) predicted to have a high propensity to follow PTB and that exhibit a

[7] We thank Jarrad Harford for this observation.

performance similar to the pre-appointment performance of PTB firms. The control sample is one in which there is no promotion to chair, but the implications in terms of CEO future performance are likely to be similar.

Prediction 2 provides us with a way to distinguish between the learning–retention hypothesis and alternative hypotheses. Unlike the learning hypothesis, if ex ante promotion incentives are strong, we would expect to observe a drop in firm performance (given loss of the promotion incentive), relative to an appropriate matched sample of non-PTB firms. Further, given the anticipated decline in performance, it is not obvious that it would be optimal for CEOs to be promoted following a strong performance or promoted relatively early in their tenures. Similarly, if the promotion was hastened by agency considerations and worsened CEO entrenchment, we would expect there to be a drop in firm performance. Further, a positive stock market reaction to promotion announcements when it is relatively early in the CEO's tenure would suggest that ex ante incentives were unlikely to be the main purpose of chair promotions.

2.3 | Change in CEO compensation after promotion and firm-specific volatility

We next turn to the anticipated change in CEO compensation and incentives following promotion to chair. As the CEO has demonstrated her ability and enhanced her bargaining power following a period of high performance (see Hermalin & Weisbach, 1998), we expect the CEO's bargaining power and compensation to increase following the combination of the two roles.

Under the alternative hypothesis of promotion–incentives, we would expect there to be an increase in CEO compensation incentives following promotion to chair. Such an increase in compensation incentives could help to offset the loss in promotion–incentives following the CEO's elevation to chair. If there is found to be no increase (or even a decrease) in incentive pay, this would support the learning–retention hypothesis over the promotion–incentive hypothesis.

If agency issues are an important factor in CEO promotion, however, we might expect to find compensation increases to be larger in firms in which boards are more dependent and coopted (e.g., boards for which a larger percentage of directors have less tenure than the CEO). A finding that there is no relation (or negative relation) between compensation change and more dependent and coopted boards would suggest that agency issues are not central to the compensation change. In particular, lack of correlation between board cooption and compensation would be consistent with our learning–retention hypothesis.

Our learning hypothesis also provides predictions with regard to changes in firm-specific stock volatility over time such as, for instance, in the period before and after the CEO's promotion to chair as the decision to combine both roles conveys the information that the board has learned to outside investors. As investors gain more information about the CEO's ability, the market reaction to firm's performance will become more subdued. To see this, note that when there is greater uncertainty about CEO ability, the market's reaction to firm performance will be stronger because of what is also revealed about CEO ability—and, hence, the longer term expected performance of the firm. This effect will be diminished as learning proceeds and there is less uncertainty about managerial ability. These changes are expected to be reflected as a reduction in firm-specific volatility following the combinations of the CEO and chair positions. This rationale offers no prediction regarding the firm's systematic risk.

Our argument is similar to that in Pastor and Veronesi (2003) that also predicts that market learning about the CEO will be reflected in lower firm idiosyncratic volatility. Recent evidence presented by Pan et al. (2015) supports this prediction. We note that the alternative promotion–incentive and agency hypotheses do not have clear predictions regarding changes in firm-specific volatility over time.

Prediction 3:

The learning hypothesis predicts:

- *An increase in CEO compensation following promotion.*
- *A reduction in firm-specific volatility following promotion.*

2.4 | Stock market reaction to announcement of CEO promotion

If the objective of the PTB is to learn about managerial ability, then the chair appointment could communicate positive news about the board's evaluation of CEO ability. Our discussion (following equation (2)) allows for the possibility that board may have more precise information about CEO's ability, because they tend to receive sharper signals about the CEO's performance. As a result, we expect there to be an information gap between outside investors and the firm's insiders. Hence, we would expect a positive market reaction as investors updated their beliefs about the CEO's ability and likelihood of retention. At the same time, there may be little surprise or market reaction if the CEO has been in position for a relatively long period.

Alternative hypotheses do not predict a positive stock market reaction. The promotion–incentive hypothesis, for instance, would imply a drop in CEO incentives and a negative market reaction. Likewise, if there are concerns about an increase in agency costs the market reaction would be negative as well.

Prediction 4:

The stock market's reaction to the announcement of CEO appointment to chair will tend to be positive if it is relatively early in the CEOs tenure. We expect the market reaction to be more muted when it occurs later in the CEO's tenure.

3 | SAMPLE AND DATA

To examine CEO–chair combinations, we obtain an initial sample of all firms in the ExecuComp database from 1995 to 2010. We read proxy statements from 1995 to 2002 to obtain CEO/chair duality status, board characteristics, and CEO characteristics. These data come from the Corporate Library database after 2002. The initial sample comprises 2960 firms and 22,283 firm years. For our analysis, we remove financial firms (SIC 6000–6799) and regulated utility firms (SIC 4910–4949), which results in a sample of 18,023 firm years, 2092 firms, and 3972 CEO–firm pairs. We obtain financial data from Compustat and stock return data from CRSP.

In Table 1, we present descriptive statistics on the prevalence of CEO–chair duality. During our combination period of 1995–2010, there is a declining trend of dual CEO–chairs. In 1995, the percentage of CEOs having the additional title of chair was about 69%. That percentage has steadily declined over the 16-year period to 55%. Average firm age increased from 23.91 years to 27.02 years, while there was a small decline in average CEO tenure from 8.65 to 8.27 years over this period. In the second panel of the same table, we provide industry distributions. The substantial differences across industries, suggest that part of the trend in dual CEO–chairs could be due to changes in industry composition over time. Finally, the third panel shows that CEO tenure when the CEO–chair is separate is 4.66 years, substantially less than the 9.86 years for the sample of combined CEO–chairs. The substantially lower CEO tenure when chair is separate comes from the fact that these firms tend to be younger and, in many cases that the CEO is in the pre-appointment phase of the PTB process.

Table 2 presents descriptive statistics for the firms in the combination period. Industry-adjusted statistics are based on a firm's three-digit historical SIC code. We winsorize all our data at the 1% level to limit the influence of outliers in our analysis. Appendix B provides variable definitions. The sample return data are skewed with a mean (median) annual industry-adjusted stock return of 8.2% (0.34%). Firms in our sample have a mean asset size of $5363 million and a mean board size of nine. For each industry, we construct an industry homogeneity measure using the method proposed by Parrino (1997). This proxy measures the correlation between common stock returns within two-digit SIC industries. We classify an industry as homogeneous if its homogeneity measure is above the sample median. Following Coles et al. (2014), we define a director as coopted if the CEO's tenure exceeds the director's tenure, and a board as coopted if it consists of a majority of coopted directors. We use the percentile rank of a firm's foreign tax to total tax as a proxy for the extent of its foreign operations. The median number

TABLE 1 Combined CEO/chair roles, CEO tenure, and firm age over time and by industry

Year	Observations	Percentage of combined CEO–chairs	CEO tenure	Firm age
1995	993	68.68	8.65	23.91
1996	1075	68.84	8.48	22.62
1997	1148	69.77	8.48	22.62
1998	1175	68.60	8.48	22.25
1999	1179	67.77	8.40	22.39
2000	1111	69.04	8.14	22.44
2001	1092	66.21	7.74	23.10
2002	1101	66.76	7.71	23.90
2003	1160	68.79	7.56	23.89
2004	1177	66.61	7.94	24.33
2005	1181	63.08	7.74	24.90
2006	1102	60.25	7.57	24.90
2007	1240	57.18	7.69	25.27
2008	1160	58.53	7.77	26.10
2009	1098	56.38	7.83	27.11
2010	1031	55.00	8.27	27.02
All years	18,023	64.46	8.01	24.21
Industry (single-digit SIC)	**Observations**	**Percentage of combined CEO–chairs**	**CEO tenure**	**Firm age**
Agriculture, forestry, and fishing (0)	59	81.36	10.81	59.58
Mining and construction (1)	1200	65.25	8.45	23.17
Manufacturing (2)	3697	71.11	7.51	30.71
Manufacturing (3)	6288	63.93	7.82	25.64
Transportations and public utilities (4)	1129	63.86	9.37	21.98
Wholesale and retail trade (5)	2568	63.20	8.31	22.36
Services (7)	2306	55.98	7.63	16.33
Health services (8)	720	63.75	9.32	13.09
Other (9)	56	78.57	8.79	49.16
CEO–chair status	**Observations**		**CEO tenure**	**Firm age**
Combined CEO/chair	11,618		9.86	26.26
Separate	6405		4.66	20.50

Note: This table presents summary statistics on the percentage of firms with CEOs who are also chair of the board of directors, mean CEO tenure, and mean firm age. The sample excludes financial firms (SIC 6000–6799) and regulated utility firms (SIC 4910–4949). We provide statistics over time from 1995 to 2010 and across industry at the SIC code single-digit level.

TABLE 2 Summary statistics

	Mean	Median	Minimum	Maximum	SD
Combined CEO/chair (0/1)	0.645	1	0	1	0.479
Passing the baton strategy (0/1)	0.440	0	0	1	0.496
Annual ind.-adjusted stock return	0.082	0.003	−0.772	1.877	0.436
Annual Stock Return	0.173	0.103	−0.761	2.357	0.524
Annual ind.-adjusted ROA	0.0218	0.012	−0.210	0.259	0.078
Annual ROA	0.148	0.143	−0.116	0.414	0.088
Assets ($ millions)	5363.1	1210.5	84.7	151,193	14,922.9
Sales ($ millions)	4617.6	1222.3	57.5	67.8	10,064.2
Firm Age	24.197	18	3	81	18.744
Homogeneous industry (0/1)	0.438	0	0	1	0.496
Board size	9.091	9	5	17	2.412
Percentage Insider Directors	0.220	0.182	0.067	0.600	0.123
Coopted Board (0/1)	0.285	0	0	1	0.451
% Foreign Tax (Percentile Rank)	63.237	58.913	43.799	100	18.988
Number of Business Segments	2.669	2	1	8	1.833
Capital Expenditures/Sales	0.076	0.041	0	0.733955	0.115
R&D expense/sales	0.043	0.004	0	0.402431	0.078
Leverage Ratio	0.213	0.201	0	0.751625	0.174
CEO Ownership (%)	2.443	0.334	0	33.63	5.773
CEO Tenure	7.960	5	0	37	7.868
CEO Age	55.468	55	39	76	7.344
Insider CEO (0/1)	0.830	1	0	1	0.375

Note: This table presents summary statistics for 18,023 firm years, 2092 firms, and 3972 CEO–firm pairs over 1995–2010. The sample excludes financial firms (SIC 6000–6799) and regulated utility firms (SIC 4910–4949). Industry adjustments are based on a firm's three-digit historical SIC code. We classify an industry as homogeneous if its homogeneity measure (Parrino, 1997) is above the sample median. We use the sample percentile rank of a firm's foreign tax to total tax as a proxy for the extent of foreign operations. Leverage is the book value of total debt divided by the book value of total assets. All variables are winsorized at the 1% and 99% levels.

of business segments for an average firm in our sample is 2. The mean tenure of a CEO in our sample is 7.96 years.[8]

As the first step in our analysis, we compare firm characteristics by looking at the firm's history of combining the CEO and chair roles over our sample period. We divide the sample into three groups: (i) firms that always combine the two roles, (ii) firms that always separate the two roles, and (iii) firms that follow a PTB strategy. To ensure clean comparisons, we remove 303 firms composed of 2994 firm years and 758 CEO—firm pairs that, over our sample period, combined or separated the two roles at different times, but did not follow PTB in awarding both roles after a period of observation. However, the results of our comparison are qualitatively unaffected if we assign these firms to any of the three categories. The comparative statistics are presented in Table 3.

[8] When comparing statistics in Table 2 to statistics in Table 1, note that the data in Table 1 describe the initial sample and are not winsorized, but the data in Table 2 are winsorized for use in our analysis. Thus, some means are not identical across the two tables. For instance, the mean CEO tenure in Table 1 is 8.01, and the winsorized mean CEO tenure in Table 2 is 7.96.

TABLE 3 Comparison of firm characteristics by history of combining the CEO and chair roles

	(1)	(2)	(3)	*t*-Statistics for differences		
	Roles always Combined	CEO earns both Roles	Roles Always Separate	(1) – (2)	(1) – (3)	(2) – (3)
Combined CEO/chair (0/1)	1	0.599	0	72.899***	NA	NA
Tobin's Q	1.959	2.011	2.120	2.355**	4.456***	3.108***
Annual ind.-adjusted stock return	0.072	0.079	0.094	0.963	1.821*	1.276
Annual Stock Return	0.170	0.167	0.181	0.346	0.767	1.021
Annual ind.-adjusted ROA	0.022	0.023	0.019	0.699	1.336	1.788*
Annual ROA	0.150	0.149	0.144	1.140	2.370**	1.750*
Assets ($ millions)	7243.0	5.379.3	2720.4	6.124***	12.583***	9.261***
Sales ($ millions)	57636.5	4907.0	2323.9	4.379***	14.490***	12.267***
Firm Age	27.098	26.131	16.066	2.610***	28.127***	31.039***
Homogeneous industry (0/1)	0.476	0.396	0.491	9.016***	1.107	7.443***
Board size	9.134	9.275	8.481	3.207***	10.881***	14.224***
Percentage Insider Directors	0.215	0.216	0.227	0.075	3.686***	3.812***
Coopted Board (0/1)	0.371	0.247	0.267	14.915***	8.585***	1.699*
% Foreign Tax (Percentile Rank)	63.268	63.637	60.152	1.090	6.267***	7.432***

(Continues)

TABLE 3 (Continued)

	(1) Roles always Combined	(2) CEO earns both Roles	(3) Roles Always Separate	*t*-Statistics for differences		
				(1) – (2)	(1) – (3)	(2) – (3)
Number of Business Segments	2.811	2.641	2.508	5.098***	6.336***	2.968***
Capital Expenditures/Sales	0.079	0.072	0.086	3.473***	2.079***	4.407***
R&D expense/sales	0.032	0.044	0.057	10.386***	10.505***	5.236***
Leverage Ratio	0.225	0.212	0.188	4.263***	7.777***	5.333***
CEO Ownership (%)	3.954	1.838	1.151	18.051***	23.378***	8.323***
CEO Tenure	10.662	6.709	5.602	27.514***	30.199***	7.863***
CEO Age	56.887	55.341	52.430	12.214***	24.256***	16.827***
Observations	5194	7929	1906			

Note: This table presents firm, industry, and CEO characteristics for 15,029 firm years, 1.789 firms, and 3214 CEO–firm pairs over 1995–2010. We segregate the sample by the firm's history of always combining the roles of CEO and board chair over our sample period, always separating the two roles over our sample period, or allowing the CEO to receive both roles after a period of observation. In our sample, 745 firms (1048 CEO–firm pairs) always combine both roles, 356 firms (519 CEO–firm pairs) always separate both roles, and 688 firms (1647 CEO–firm pairs) award the CEO the additional position of board chair after a period of observation. Industry adjustments are based on a firm's three-digit historical SIC code. The sample excludes financial firms (SIC 6000–6799) and regulated utility firms (SIC 4910–4949). We classify an industry as homogeneous if its homogeneity measure (Parrino, 1997) is above the sample median. We use the sample percentile rank of a firm's foreign tax to total tax as a proxy for the extent of foreign operations. Leverage is the book value of total debt divided by the book value of total assets. All variables are winsorized at the 1% and 99% levels.

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

For many firm attributes, such as firm size (by assets and by sales), leverage, firm age, number of segments, the pass-the-baton firms (column 2) tend to fall between the always-combined firm (column 1) and the never-combined firms (column 3). These characteristics seem reasonable in light of the Coles et al. (2008) argument that firm attributes such as size and leverage reflect firm complexity and explain why these firms might choose particular governance structures such as board size. Hence, the pattern indicated in Table 3 appears largely consistent with the notion that some types of firms benefit substantially from CEO–chair duality and will always combine the CEO–chair roles. These firms tend to be more complex in terms of having a larger size, more segments, and greater leverage. On the other hand, there is an intermediate group of firms that appears to benefit from combining the positions but find it beneficial to rely on the PTB process. There is also a third group for which the costs of duality appear to outweigh the benefits.

There are some revealing attributes for the PTB firms that do not fall between the other two groups. In particular, PTB firms are much less likely to be in a homogeneous industry (consistent with Prediction 1) and are less likely to have a coopted board (inconsistent with an agency explanation). In a homogeneous industry, it is easier to benchmark CEOs against other CEOs in the industry. In a less homogeneous industry such benchmarking is more difficult, which creates greater concerns about giving the CEO more power as chair without first obtaining more confidence in her ability. Hence, as discussed in developing our predictions, it seems reasonable to conjecture that the boards of firms in less homogenous industries would be more likely to want to use the PTB process to assess the ability of the CEO before awarding the additional title of chair.

To effectively evaluate the CEO for promotion to chair likely requires a board in which directors have a diverse set of skills and appropriate incentives. Research suggests that larger boards possess a wider array of skills and are more appropriate for firms that have greater advising needs (Coles et al., 2008) and that coopted boards are likely to be less independent and subject to influence by the CEO (Coles et al., 2014). Thus, our comparative results are consistent with the premise that firms that follow PTB do so because it is optimal in their situation. Altogether, the comparison strongly indicates that firms that always combine the CEO and chair positions, firms that award the chair position via a pass-the-baton approach, or firms that always separate the two positions possess significantly different firm, board, and industry characteristics.

4 | DETERMINANTS OF PTB

To further examine the differences between firms with alternative leadership structures, we estimate multinomial logistic models. Table 4 presents the results of our analysis. We present the coefficient estimates from a multinomial logit model of the propensity to reward the CEO with both functions after a period of evaluation on the vector of performance, firm, CEO, and industry characteristics. To allow for a comparison of PTB firms against all other firms, we present estimates with both "always separate" and "always combined" as the base case. For each base case model, we present results with and without year dummy variables and industry dummy variables.

The results of the multivariate analysis largely confirm the univariate comparisons that suggest that PTB firms have characteristics that typically fall between those of firms that always combine both positions and firms that always separate both positions. However, for PTB firms, the coefficient on firm age is positive and statistically significant, and the coefficient on homogeneous industry is negative and significant for both base cases of "always separate" and "always combined."[9] These findings suggest that, as indicated by univariate comparisons, older firms in more heterogeneous industries are more likely to adopt the PTB strategy. The coefficient on firm size confirms the univariate evidence that larger firms are likely to always combine both roles. More generally, the results are consistent with the argument that the choice of dual structure depends on the complexity and the scope of the organization (Fama and Jensen, 1983). Larger firms are likely to be more complex than smaller firms. CEOs of complex organizations are likely to have firm-specific knowledge that makes it valuable for them to assume the additional role of board chair. The coefficients on

[9] Industry dummy variables will partially subsume the influence of the homogeneous industry dummy.

TABLE 4 Multinomial logistic analysis of combining CEO and board chair roles after a probationary period

	Base case: *Always separate*				Base case: *Always combined*			
	Passing the baton	*Always combined*	*Passing the baton*	*Always combined*	*Passing the baton*	*Always separate*	*Passing the baton*	*Always separate*
Tobin's Q	0.018	0.039	−0.006	0.006	−0.022	−0.039	−0.012	−0.006
	(0.651)	(0.374)	(0.884)	(0.890)	(0.543)	(0.347)	(0.738)	(0.890)
Ln(Assets)	0.352***	0.474***	0.399***	0.533***	−0.123***	−0.474***	−0.134***	−0.533***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	(0.002)	(0.000)
Ln(Firm Age)	0.595***	0.468***	0.626***	0.492***	0.127*	−0.468***	0.134*	−0.492***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.095)	(0.000)	(0.092)	(0.000)
Homogeneous industry (0/1)	−0.397***	−0.212	−0.190	0.068	−0.185*	0.212	−0.258**	−0.068
	(0.002)	(0.135)	(0.304)	(0.733)	(0.081)	(0.135)	(0.049)	(0.733)
Ln(board size)	−0.155	−0.632**	−0.282	−0.932***	0.477**	0.632**	0.650***	0.932***
	(0.581)	(0.038)	(0.341)	(0.004)	(0.026)	(0.038)	(0.004)	(0.004)
Inside directors (%)	0.028	−1.007*	−0.989*	−2.277***	1.035***	1.007*	1.288***	2.277***
	(0.953)	(0.061)	(0.061)	(0.000)	(0.006)	(0.061)	(0.003)	(0.000)
Coopted Board (0/1)	−0.322***	−0.267**	−0.091	0.171	−0.054	0.267**	−0.261***	−0.171
	(0.003)	(0.018)	(0.470)	(0.216)	(0.466)	(0.018)	(0.007)	(0.216)
% Foreign Tax (Percentile Rank)	0.005*	0.008**	0.006*	0.009**	−0.003	−0.008**	−0.003	−0.009**
	(0.081)	(0.015)	(0.094)	(0.018)	(0.252)	(0.015)	(0.228)	(0.018)
Number of Business Segments	−0.152***	−0.108***	−0.190***	−0.141***	−0.044*	0.108***	−0.048*	0.141***
	(0.000)	(0.007)	(0.000)	(0.001)	(0.082)	(0.007)	(0.079)	(0.001)

(Continues)

TABLE 4 (Continued)

	Base case: *Always separate*				Base case: *Always combined*			
	Passing the baton	*Always combined*	*Passing the baton*	*Always combined*	*Passing the baton*	*Always separate*	*Passing the baton*	*Always separate*
Capital Expenditures/Sales	−0.669	−0.746	−1.197**	−1.082*	0.076	0.746	−0.115	1.082*
	(0.175)	(0.143)	(0.046)	(0.087)	(0.861)	(0.143)	(0.815)	(0.087)
R&D expense/sales	−0.601	−3.006***	−1.027	−3.439***	2.405***	3.006***	2.412***	3.439***
	(0.451)	(0.001)	(0.220)	(0.000)	(0.001)	(0.001)	(0.002)	(0.000)
Leverage Ratio	−0.115	0.319	−0.337	−0.075	−0.434	−0.319	−0.263	0.075
	(0.757)	(0.426)	(0.344)	(0.848)	(0.106)	(0.426)	(0.346)	(0.848)
CEO Ownership (%)	0.095***	0.132***	0.098***	0.136***	−0.037***	−0.132***	−0.038***	−0.136***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(CEO Tenure)	0.027	0.602***	0.027	0.561***	−0.575***	−0.602***	−0.533***	−0.561***
	(0.721)	(0.00)	(0.716)	(0.000)	(0.000)	(0.00)	(0.000)	(0.000)
Ln(CEO Age)	2.134***	2.197***	1.905***	1.877***	−0.062	−2.197***	0.028	−1.877***
	(0.000)	(0.000)	(0.001)	(0.002)	(0.880)	(0.000)	(0.947)	(0.002)
Constant	−10.672***	−12.253***	−11.262***	−10.161***	1.581	12.253***	−1.101	10.161***
	(0.000)	(0.00)	(0.000)	(0.000)	(0.328)	(0.000)	(0.536)	(0.000)
Year dummies (0/1)	No	No	Yes	Yes	No	No	Yes	Yes
Industry dummies (0/1)	No	No	Yes	Yes	No	No	Yes	Yes
Pseudo R^2	0.0925		0.1107		0.0925		0.1107	

Note: This table presents coefficient estimates from a multinomial logistic model of the propensity to combine the functions of the CEO and board chair for a sample of 15,029 firm years, 1.789 firms, and 3214 CEO–firm pairs over 1995–2010. The dependent variable is 0 if a firm always separates the roles of CEO and board chair, 1 if a firm follows a practice of awarding CEOs both titles after a period of serving as only CEO, and 2 if the firm always combines the two roles. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base *p*-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level.

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

CEO tenure also suggest that CEOs who always have both roles tend to have longer tenures. Overall, the data support Prediction 1, which states that firms that are more complex, less transparent, and that are in heterogeneous industries are likely to follow PTB.

Next, we use a hazard model to estimate the propensity to combine the CEO and chair roles. We focus on PTB firms and exclude the firms that always separate or always combine the CEO–chair roles during the sample period. Most CEOs who receive the additional title of board chair receive the additional role after only a few years of observation, which limits the number of years for which we can follow performance prior to the combination. The median time for combination of the two roles is 3 years. Thus, we examine the 2 years of firm performance prior to the combination of the two roles. We also add a dummy variable that indicates whether the CEO is an outsider in order to examine our prediction that outsiders will receive both positions less quickly. As longstanding insider CEOs tend to have long tenures that are mechanically related to their insider status, we create an orthogonal transformation of CEO tenure by regressing CEO tenure on the CEO outsider status. We then use the residuals from this regression as our control for CEO tenure. As expected, CEO tenure has a strong negative relation to CEO outsider status (the coefficient is –0.338, significant at the 0.001 level).

Table 5 presents the results of our hazard model using different proxies for firm performance. Model 1 uses industry-adjusted stock returns and Model 2 uses industry median stock returns. Model 3 and Model 4 use industry-adjusted accounting returns (ROA) and industry median accounting returns, respectively. Model 5 combines industry-adjusted stock returns with industry-adjusted ROA, and Model 6 combines industry median stock returns with industry median ROA.

In support of the learning hypothesis (Prediction 2), the industry-adjusted performance of the CEO in the previous 2 years is a significant predictor of whether or not she receives the additional title of chair. The coefficients on industry-adjusted stock performance over the previous 2 years are jointly significant at the 1% level (Model 1) and the coefficients on industry-adjusted ROA are jointly significant at the 5% level (Model 3) Older firms are slower to reward CEOs with the additional title. Firms with multiple segments are more likely to reward the CEO with the additional title of chair. Insider dominated boards are also more likely to reward the CEO with the additional title, which could suggest an agency problem or underscore the importance of firm-specific human capital. However, coopted boards are less likely to combine the two roles, which is inconsistent with the agency interpretation and consistent with our prediction that more independent boards will promote CEOs to chair earlier. Also consistent with our prediction, inside CEOs are more likely to be promoted earlier (Prediction 1). Firms with larger capital expenditures as a percentage of sales and higher leverage ratios are more likely to reward the CEO with the additional titles. These results support the argument that more complex organizations are often better served by combining the roles of the CEO and the chair.

To gain additional insight, we also include industry performance over the prior 2 years as covariates. The coefficients on the previous 2-year industry median stock performance (Model 2) and the previous 2-year industry median ROA (Model 4) are both jointly significant at the 1% level. One interpretation of these results is that both "luck" and "skill" influence the outcome. For instance, Oyer (2004) argues that firms optimally reward CEOs for luck for retention purposes when the industry performs well and competitors have additional resources to hire away a talented CEO. Alternatively, these results may indicate that the board learns about the ability of the CEO to operate effectively in the current industry environment. Recent evidence suggests that industry performance matters for CEO dismissal, which suggests that boards assess a CEO's ability to adapt to industry dynamics (Kaplan & Minton, 2012; Eisfeldt & Kuhnen, 2013; Jenter & Kanaan, 2015). We note that the two explanations are not mutually exclusive.

When we include both industry-adjusted stock returns and industry-adjusted ROA in the same specification (Model 5), it appears that the stock price performance dominates the accounting performance as a predictor of quick promotion to board chair. While the coefficients on the lagged industry-adjusted stock returns are jointly significant at the 5% level, the coefficients on the lagged industry-adjusted ROA are not jointly significant at standard significance levels. Similarly, Model 6 reveals that lagged industry median stock returns dominate the industry median ROA. While the coefficients on lagged industry median stock returns are jointly significant at the 1% level, the coefficients on the lagged industry median ROA are not jointly significant at standard significance levels. Altogether, results in Table 5

TABLE 5 Hazard model for propensity to combine the CEO and board chair functions

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Industry-adjusted stock return$_{-1}$ (β_1)	1.106**				1.085	
	(0.039)				(0.108)	
Industry-adjusted stock return$_{-2}$ (β_2)	1.184***				1.157***	
	(0.000)				(0.003)	
Industry median stock return$_{-1}$ (β_3)		1.385***				1.347***
		(0.000)				(0.000)
Industry median stock return$_{-2}$ (β_4)		2.517***				2.482***
		(0.000)				(0.000)
Industry-adjusted ROA$_{-1}$ (β_5)			2.839***		2.175**	
			(0.006)		(0.048)	
Industry-adjusted ROA$_{-2}$ (β_6)			0.721		0.814	
			(0.363)		(0.571)	
Industry median ROA$_{-1}$ (β_7)				1.160		0.875
				(0.709)		(0.726)
Industry median ROA$_{-2}$ (β_8)				2.275***		1.786*
				(0.010)		(0.076)
Ln(Assets)	0.980	0.982	0.975	0.982	0.975	0.983
	(0.520)	(0.566)	(0.427)	(0.575)	(0.437)	(0.582)
Ln(Firm Age)	0.882*	0.886*	0.878*	0.868**	0.886*	0.884*
	(0.071)	(0.076)	(0.060)	(0.040)	(0.082)	(0.071)
Homogeneous industry (0/1)	0.924	0.912	0.930	0.918	0.932	0.911
	(0.340)	(0.263)	(0.385)	(0.303)	(0.401)	(0.258)
Ln(board size)	1.488**	1.429**	1.472**	1.471**	1.476**	1.422**
	(0.026)	(0.043)	(0.029)	(0.031)	(0.028)	(0.046)
Inside directors (%)	5.136***	5.225***	5.382***	5.416***	5.179***	5.234***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Coopted Board (0/1)	0.707***	0.676***	0.706***	0.699***	0.706***	0.678***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% Foreign Tax (Percentile Rank)	0.998	0.999	0.998	0.998	0.998	0.999
	(0.321)	(0.669)	(0.416)	(0.342)	(0.400)	(0.692)
Number of Business Segments	1.045**	1.035*	1.047**	1.045**	1.046**	1.036*
	(0.035)	(0.099)	(0.025)	(0.019)	(0.031)	(0.088)
Capital Expenditures/Sales	1.855**	1.618**	1.993***	1.8280**	1.921***	1.592**
	(0.011)	(0.039)	(0.003)	(0.012)	(0.006)	(0.045)
R&D expense/sales	1.106	1.390	1.149	1.408	1.123	1.531
	(0.827)	(0.461)	(0.771)	(0.461)	(0.807)	(0.347)
Leverage Ratio	1.963***	1.898***	1.919***	1.919***	2.002***	1.925***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)

(Continues)

TABLE 5 (Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Outsider CEO (0/1)	0.733***	0.739***	0.738***	0.737***	0.739***	0.740***
	(0.006)	(0.007)	(0.007)	(0.005)	(0.007)	(0.007)
CEO Ownership (%)	0.992	0.992	0.992	0.992	0.992	0.992
	(0.355)	(0.330)	(0.365)	(0.334)	(0.378)	(0.329)
Residual Ln(CEO Tenure)	1.693***	1.739***	1.697***	1.718***	1.690***	1.740***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(CEO(Age)	0.996	0.949	0.988	0.986	0.999	0.955
	(0.992)	(0.877)	(0.971)	(0.966)	(0.997)	(0.892)
Pseudo R^2	0.0126	0.0162	0.0125	0.0126	0.0127	0.0163
Joint ψ^2 for $\beta_1 = 0$ and $\beta_2 = 0$	12.711***				9.051**	
Joint ψ^2 for $\beta_3 = 0$ and $\beta_4 = 0$		173.359***				159.318***
Joint ψ^2 for $\beta_5 = 0$ and $\beta_6 = 0$			7.412**		3.919	
Joint ψ^2 for $\beta_7 = 0$ and $\beta_8 = 0$				10.428***		3.503

Note: This table presents estimates of hazard ratios from a Cox proportional hazard model of the propensity to combine the CEO and board chair functions for 1646 CEO–firm pairs and 688 firms that follow a "passing the baton" strategy. The sample comprises 7929 firm years over 1995–2010. Firms that always separate or always combine the CEO–chair roles during the sample period are excluded. The dependent variable equals 1 if the CEO receives both titles after a period of observation, and 0 if not. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base *p*-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level.
***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

suggest that CEOs receive the board chair title more quickly following superior firm-specific performance and superior industry performance.

In untabulated results, we also estimate the hazard model on a sample that includes the firms that always separate or always combine the CEO–chair roles during the sample period, allowing for a different baseline probability for each category. The results are qualitatively similar to those presented in Table 5. These findings suggest that our results are robust to alternative specifications of the hazard function. Overall, it appears that both the performance relative to industry (Prediction 2) and the industry performance play a role in the CEO's elevation to chair.

5 | OUTCOMES ASSOCIATED WITH PTB

5.1 | Investor reactions to combination of CEO and chair roles

As the first step in our analysis of the outcomes associated with combining the two roles, we examine the valuation impact of the announcement to award the title of board chair to the CEO. For the sample of firms for which we can identify the news releases associated with the award of the additional title, we examine the stock price reaction to the announcement. We follow the event study method of Patell (1976) based on the market model and use the value-weighted CRSP index as the proxy for the market.

We present the results of our event study analysis in Table 6. For the full sample, the cumulative abnormal returns for the 3-day window of −1 to +1, is 0.35%, which is not statistically different from zero. However, the market response to sample firms that promote their CEOs in less than 4 years is 1.09% and is statistically significant at the 1% level. This result suggests that early promotions reveal directors' private information about the quality of the CEO to the market.

TABLE 6 Investor reactions to the announcement that a CEO will become chair of the board

	Observations	CAR (t_{-1} – t_{+1})	Patell *Z*-score	Sign rank test
All announcements	213	0.35%	0.96	0.47
Receive tenure < 4 years	119	1.09%	2.71***	2.27***
Receive tenure ≥ 4 years	94	−0.59%	−1.60	−1.27
Homogeneous industry	74	0.15%	0.36	0.28
Heterogeneous industry	139	0.44%	0.96	1.32
Non-coopted boards	152	−0.15%	−0.06	0.17
Coopted boards	61	1.58%	1.89*	0.61
Before Sarbanes–Oxley Act	139	0.09%	0.18	−0.10
After Sarbanes–Oxley Act	74	0.82%	1.24	0.94
CEO is insider	187	0.39%	1.30	0.86
CEO is outsider	26	0.00%	−0.75	−0.95

Note: This table presents event study results around the announcement that a CEO will be awarded the additional title of board chair. We use the event study method of Patell (1976) based on the market model and the value-weighted CRSP index. The sample excludes financial firms (SIC 6000–6799) and regulated utility firms (SIC 4910—4949). ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

This evidence is consistent with our Prediction 4. The market response to late promotions is statistically insignificant from zero, which suggests the market has already assessed the quality of these longer serving CEOs and has incorporated any incentive effects of combining both roles.

We also segregate the sample based on (i) whether the firm is in a homogeneous industry or in a heterogeneous industry, (ii) whether the board is coopted or not coopted, (iii) whether the combination occurred before or after the implementation of SOX, and (iv) whether the CEO is an insider or outsider. Though not statistically significant, the CAR for CEOs promoted in a heterogeneous industry is higher than for the CEOs promoted in a homogeneous industry (0.44% vs. 0.15%) as is predicted by learning hypothesis. Possibly, as firms promote CEOs after superior performance and learning is more important in heterogeneous industries, the market partially anticipates that the CEOs in heterogeneous industries will receive both roles, which would dampen the market reaction to the announcement. Our analysis of coopted and non-coopted boards provides no support for the agency explanation. In fact, there is weak evidence of a positive market reaction when boards are coopted. Whether the CEO is an insider or outsider or whether the combination occurs before or after the implementation of SOX does not appear to influence the market reaction.

5.2 | Univariate comparison of firm performance and policies before and after combining the roles

The results presented in Tables 3–5 suggest that firms that choose different leadership structures are significantly different along many other dimensions. These differences suggest that we should carefully construct our research design to consider these sample selection issues and identify benchmark firms that allow us to draw proper inferences.

We draw our benchmark firms from the set of firms that either always combine or separate the roles of CEO and chair, and use a two-step process to identify the matching firm as of the year prior to the combination of the two positions. First, to control for mean reversion in performance, we require that the matching firm be in the two-digit SIC code industry and the same decile of stock return in the year prior to combining the two positions as the treated firm. An abnormally strong performance—as occurs prior to the chair award—would be expected to be followed by a reversion to the mean. Second, from among the subset of firms with similar performance and in similar industries, we

TABLE 7 Comparison of firm characteristics after propensity score matching

	Mean		Paired *t*-test	Median		Paired sign test
	PTB	Matched	*p*-Value	PTB	Median	*p*-Value
Stock return (%)	19.715	20.091	0.704	11.635	11.855	0.903
Return on assets (%)	15.019	15.186	0.474	14.587	14.103	0.479
Tobin's Q	2.066	2.152	0.268	1.622	1.574	0.462
Ln(Assets)	7.265	7.278	0.886	7.067	7.047	0.653
Ln(Firm Age)	2.957	2.978	0.625	3.000	3.000	0.482
Homogeneous industry (0/1)	0.398	0.442	0.115	0.000	0.000	0.129
Ln(Board Size)	2.217	2.213	0.808	2.197	2.197	0.862
Percent inside directors (%)	23.903	23.753	0.824	21.825	21.429	0.769
Coopted Board (0/1)	0.157	0.185	0.091	0.000	0.000	0.111
% Foreign Tax (Percentile Rank)	62.752	63.202	0.688	58.715	58.178	1.000
Number of Business Segments	2.603	2.638	0.740	2.000	2.000	0.218
Capital Expenditures/Sales	0.078	0.084	0.352	0.041	0.423	0.838
R&D expense/sales	0.044	0.042	0.709	0.005	0.002	1.000
Leverage Ratio	0.223	0.229	0.498	0.218	0.219	0.870
CEO Ownership (%)	1.386	1.500	0.524	0.213	0.168	0.391
Ln(CEO Tenure)	1.294	1.301	0.703	1.386	1.099	1.000
Ln(CEO Age)	3.971	3.963	0.260	3.980	3.970	0.801

estimate propensity scores for the likelihood of a firm choosing the PTB strategy based on the predictors in Table 4. We then use the nearest neighbor approach to identify a matched sample.

Table 7 presents a comparison of characteristics for PTB and matched firms. In stark contrast to the univariate comparisons in Table 3, the PTB and matched firms have very similar characteristics that are not statistically different. We note that the means for the coopted board dummy variable are statistically different at the 0.091 level and the difference in the medians is marginally insignificant with a *p*-value of 0.111. The propensity to be in a homogenous industry is marginally insignificant with *p*-values of 0.115 and 0.129, respectively, for the means and medians. As discussed later, we present robustness tests along these dimensions in Table 10 and for a variety of financial policy variables in Table 11. The robustness tests confirm our primary results.

To examine the consequences of combining the CEO and chair roles, we follow the CEO–firm pairs throughout the post-combination period through 2018. The minimum post-combination period comprises 2 years and the maximum period is 24 years. We directly examine evidence on stock-return volatility in Panel A of Table 8 by comparing total stock return volatility, market risk, and firm-specific volatility in the pre- and post-combination periods. We find that total volatility declines significantly. In support of learning, the decline in total volatility results from a significant reduction in firm-specific volatility—CAPM market risk actually increases slightly, consistent with the use of greater leverage. This finding is consistent with the learning hypothesis but, from Prediction 3, this finding does not necessarily rule out the promotion–incentive alternative. Later, we will use fixed-effects specifications with matched benchmark firms to further examine these results.

In Panel B of Table 8, we present univariate results for firm performance before and after receiving the chair position. As expected, without adjusting for the matched firms, results based on mean stock returns suggest a statistically significant performance decline from 20.189% to 13.780%. However, when we focus on the results based on match-adjusted stock returns, we do not observe a statistically significant decline in performance. We also find similar results

TABLE 8 Firm outcomes and policies before and after receiving both CEO and chair positions

	Observations	Before combiningCEO and chair	After combining CEO and chair	*p*-Value for difference	Entireperiod
Panel A: Comparison of firm stock risk					
Total risk	4826	0.462*** (0.409)***	0.334*** (0.323)***	0.000*** (0.000)***	0.378*** (0.356)***
CAPM market risk	4826	0.985*** (0.862)***	1.100*** (1.050)***	0.000*** (0.000)***	1.059*** (0.999)***
Firm-specific risk	4826	0.418*** (0.370)***	0.285*** (0.274)***	0.000*** (0.000)***	0.331*** (0.310)***
Panel B: Comparison of firm performance					
Stock returns	4903	20.189%*** (12.446%)***	13.780%*** (9.479%)***	0.000*** (0.004)***	15.975%*** (10.296%)***
Match-adjusted stock returns	4903	1.327% (0.278%)	0.109%(0.000%)	0.483(0.441)	0.526%(0.115%)
Return on assets	4903	15.506%*** (15.184%)***	14.628%*** (13.882%)***	0.000*** (0.000)***	14.93%(14.31%)
Match-adjusted return on assets	4903	0.593%* (1.133%)***	0.301% (0.175%)**	0.460 (0.272)	0.401%** (0.469%)***

(Continues)

TABLE 8 (Continued)

	Observations	Before combiningCEO and chair	After combining CEO and chair	*p*-Value for difference	Entireperiod
Panel C: Comparison of firm policies					
CAPEX/Sales	4903	0.084*** (0.035)***	0.080*** (0.036)***	0.436(0.000)***	0.082*** (0.038)***
Match-adjusted CAPEX/Sales	4720	−0.001 (0.000)	0.0110*** (0.001)**	0.003*** (0.168)	0.006*** (0.000)
R&D/Sales	4903	0.044*** (0.001)***	0.041*** (0.002)***	0.235(0.851)	0.042*** (0.002)***
Match-adjusted R&D/Sales	4778	−0.000 (0.000)	−0.001(0.00)	0.469(0.352)	−0.001(0.00)
Leverage	4903	0.209*** (0.201)***	0.227*** (0.219)***	0.000*** (0.000)***	0.221*** (0.214)***
Match-adjusted leverage	4718	−0.008** (0.000)	−0.001(0.00)	0.145(0.166)	−0.004* (0.000)
Business segments	4903	2.395*** (2.000)***	2.715*** (2.000)***	0.000*** (0.000)***	2.605(2.000)
Match-adjusted business segments	4783	0.256*** (0.000)***	0.186*** (0.000)***	0.104(0.041)**	0.2105*** (0.000)***

Note: This table presents mean (median) firm stock and accounting performance before and after awarding the CEO the position of board chair. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels.

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 9 Outcomes associated with combining the CEO and board chair functions

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test ∑(*Y1 – Y2*)	*F*-test ∑ (*>Y2*)
Panel A: Firm stock volatility analysis								
Total volatility	4826	−0.015**	−0.028***	−0.023**	−0.027**	−0.022	9.232***	3.724*
		(0.012)	(0.002)	(0.029)	(0.035)	(0.168)	(0.003)	(0.054)
CAPM market risk	4826	−0.009	−0.008	−0.002	−0.045	−0.032	0.120	0.529
		(0.681)	(0.789)	(0.585)	(0.325)	(0.581)	(0.730)	(0.468)
Firm-specific volatility	4826	−0.013**	−0.026***	−0.023**	−0.027**	−0.022	9.861***	4.874**
		(0.014)	(0.001)	(0.016)	(0.015)	(0.110)	(0.002)	(0.028)
Panel B: Performance analysis								
Stock return	4903	−0.023	−0.090***	−0.063**	−0.116***	−0.133***	6.920***	14.114***
		(0.369)	(0.001)	(0.029)	(0.000)	(0.000)	(0.009)	(0.002)
Match-adj. stock return	4903	−0.026	−0.051	−0.095**	−0.118***	−0.111**	2.128	8.796***
		(0.417)	(0.134)	(0.017)	(0.005)	(0.020)	(0.147)	(0.003)
ROA	4903	0.003	0.004	0.001	−0.001	−0.008	0.769	0.192
		(0.393)	(0.410)	(0.906)	(0.857)	(0.344)	(0.381)	(0.661)
Match-adj. ROA	4903	0.008	0.011*	0.004	0.005	0.007	3.011*	0.318
		(0.121)	(0.091)	(0.625)	(0.594)	(0.591)	(0.083)	(0.573)

(Continues)

TABLE 9 (Continued)

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test ∑(*Y1 – Y2*)	*F*-test ∑ (>*Y2*)
Panel C: Policy analysis								
Capex/Sales	4903	0.000	0.002	0.006	0.004	0.102*	0.178	2.046
		(0.945)	(0.526)	(0.185)	(0.436)	(0.085)	(0.674)	(0.153)
Match-adj. CAPEX/Sales	4720	0.005	0.006	0.009	0.003	0.014	1.500	1.274
		(0.234)	(0.271)	(0.148)	(0.765)	(0.152)	(0.221)	(0.259)
R&D/Sales	4903	−0.002	−0.002	−0.002	−0.003	0.000	1.824	0.037
		(0.189)	(0.211)	(0.836)	(0.297)	(0.612)	(0.177)	(0.848)
Match-adj. R&D/Sales	4778	−0.000	0.001	0.004	−0.000	−0.003	0.027	0.412
		(0.914)	(0.724)	(0.161)	(0.931)	(0.564)	(0.871)	(0.521)
Leverage Ratio	4903	0.009	0.023**	0.021*	0.021	0.029*	5.891**	3.395*
		(0.107)	(0.005)	(0.052)	(0.101)	(0.075)	(0.016)	(0.066)
Match-adj. leverage ratio	4718	0.001	0.008	−0.001	−0.003	−0.004	0.282	0.023
		(0.851)	(0.468)	(0.942)	(0.863)	(0.866)	(0.596)	(0.879)
Business segments	4903	0.059	0.060	0.048	0.060	0.178	1.175	0.953
		(0.219)	(0.374)	(0.573)	(0.554)	(0.150)	(0.279)	(0.329)
Match-adj. business segments	4783	0.059	−0.073	−0.107	−0.145	−0.114	0.009	0.933
		(0.361)	(0.437)	(0.347)	(0.283)	(0.470)	(0.926)	(0.334)

Note: This table presents our analysis of performance and policy variables after combining the CEO and the chair positions. Following the method in Pagano, Panetta, and Zingales (1998), we estimate the following specification for each dependent variable: $y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it}$, where u_i and d_t are CEO–firm pair and year fixed effects, respectively. $Combined_t$ is 1 if period t is after the CEO became board chair, and 0 otherwise. The sample comprises 600 CEO–firm pairs. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. *p*-values, in parentheses, are based on robust standard errors clustered by CEO–firm pair.
***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 10 Comparison of outcomes from CEO–chair combinations: robustness tests

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*–test∑ (>*Y2*)
Panel A: Firm-specific risk by homogeneous industries (241 firms) and heterogeneous industries (359 firms)							
Firm-spec. volatility (hom.)	−0.006	−0.008	−0.004	−0.002	0.009	0.604	0.004
	(0.423)	(0.504)	(0.769)	(0.902)	(0.633)	(0.438)	(0.947)
Firm-spec. volatility (het.)	−0.018**	−0.039***	−0.035***	−0.043***	−0.043**	11.055***	7.192***
	(0.015)	(0.000)	(0.007)	(0.005)	(0.025)	(0.001)	(0.008)
p-Value (*F*-test) for difference						0.091*	0.052*
Panel B: Firm performance by homogeneous industries (241 firms) and heterogeneous industries (359 firms)							
Match-adj. stk. ret. (hom.)	0.019	−0.110**	−0.177***	−0.200***	−0.192***	1.384	12.393***
	(0.715)	(0.019)	(0.005)	(0.003)	(0.005)	(0.241)	(0.001)
Match-adj. stk. ret. (het.)	−0.057	−0.018	−0.037	−0.058	−0.046	0.695	0.926
	(0.155)	(0.969)	(0.463)	(0.288)	(0.481)	(0.405)	(0.337)
p-Value (*F*-test) for difference						0.759	0.050**
Match-adj. ROA (hom.)	0.011	0.007	−0.007	−0.012	−0.020	1.070	0.968
	(0.196)	(0.484)	(0.558)	(0.409)	(0.234)	(0.302)	(0.326)
Match-adj. ROA (het.)	0.008	0.016*	0.014	0.020	0.029	2.973*	2.300
	(0.194)	(0.061)	(0.194)	(0.178)	(0.121)	(0.086)	(0.130)
p-Value (*F*-test) for difference						0.748	0.076*

(Continues)

TABLE 10 (Continued)

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*–test∑ (>*Y2*)
Panel C: Firm performance for early (<4 years, 298 CEOs) and late (≥ 4 years, 302 CEOs) combinations							
Match-adj. stk. ret. (early)	0.041	0.029	−0.034	−0.039	−0.055	0.028	0.858
	(0.366)	(0.499)	(0.479)	(0.466)	(0.398)	(0.866)	(0.355)
Match-adj. stk. ret. (late)	−0.077*	−0.045	−0.125**	−0.157**	−0.124*	2.591	6.573**
	(0.087)	(0.359)	(0.042)	(0.012)	(0.063)	(0.109)	(0.011)
p-Value (*F*-test) for difference						0.193	0.186
Match-adj. ROA (early)	0.015**	0.012	−0.000	0.003	0.004	3.398*	0.023
	(0.026)	(0.170)	(0.993)	(0.845)	(0.854)	(0.066)	(0.880)
Match-adj. ROA (late)	−0.001	0.006	0.001	−0.004	−0.002	0.140	0.001
	(0.941)	(0.506)	(0.930)	(0.979)	(0.916)	(0.708)	(0.977)
p-Value (*F*-test) for difference						0.323	0.896
Panel D: Firm performance by non-coopted (486 firms) and coopted (114 firms) boards at combination							
Match-adj. stk. ret. (non-coopted)	−0.020	−0.020	−0.046	−0.057	−0.053	0.449	1.551
	(0.580)	(0.610)	(0.291)	(0.232)	(0.341)	(0.503)	(0.214)
Match-adj. stk. ret. (coopted)	−0.011	−0.113*	−0.206**	−0.231**	−0.121	1.433	5.300**
	(0.854)	(0.084)	(0.046)	(0.019)	(0.226)	(0.234)	(0.023)
p-Value (*F*-test) for difference						0.478	0.138
Match-adj. ROA (non-coopted)	0.009	0.010	−0.001	0.001	0.002	2.546	0.001
	(0.106)	(0.157)	(0.920)	(0.961)	(0.918)	(0.111)	(0.971
Match-adj. ROA (coopted)	−0.001	0.007	0.014	0.010	0.004	0.058	0.224
	(0.923)	(0.645)	(0.432)	(0.628)	(0.881)	(0.811)	(0.637)
p-Value (*F*-test) for difference						0.640	0.691

(Continues)

TABLE 10 (Continued)

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*–test∑ (>*Y2*)
Panel E: Firm performance for CEO ownership below median (300 CEOs) and above median (300 CEOs)							
Match-adj. stk. ret. (below med.)	−0.008	−0.057	−0.070	−0.038	−0.031	0.715	0.733
	(0.862)	(0.229)	(0.212)	(0.540)	(0.662)	(0.399)	(0.393)
Match-adj. stk. ret. (above med.)	−0.037	−0.032	−0.100*	−0.164***	−0.151**	0.885	7.134***
	(0.38)	(0.519)	(0.084)	(0.007)	(0.024)	(0.348)	(0.008)
p-Value (*F*-test) for difference						0.982	0.219
Match-adj. ROA (below med.)	0.006	0.010	−0.006	−0.007	−0.001	0.891	0.080
	(0.437)	(0.327)	(0.633)	(0.674)	(0.973)	(0.346)	(0.777)
Match-adj. ROA (above med.)	0.008	0.012	0.013	0.170	0.012	1.983	1.302
	(0.205)	(0.173)	(0.231)	(0.219)	(0.428)	(0.160)	(0.255)
p-Value (*F*-test) for difference						0.872	0.357
Panel F: Firm performance for combinations before (397 CEOs) and after (203 CEOs) Sarbanes–Oxley							
Match-adj. stk. ret. (before SOX)	−0.0478	−0.060	−0.109**	−0.121**	−0.129*	2.242	5.064**
	(0.288)	(0.185)	(0.037)	(0.049)	(0.059)	(0.135)	(0.025)
Match-adj. stk. ret. (after SOX)	0.004	−0.006	−0.059	−0.085	−0.025	0.001	0.654
	(0.922)	(0.932)	(0.437)	(0.280)	(0.771)	(0.990)	(0.420)
p-Value (*F*-test) for difference						0.375	0.469
Match-adj. ROA (before SOX)	0.006	0.007	−0.014	−0.007	−0.002	0.924	0.355
	(0.309)	(0.410)	(0.155)	(0.612)	(0.917)	(0.337)	(0.551)
Match-adj. ROA (after SOX)	0.002	0.011	0.032*	0.023	0.025	0.383	1.936
	(0.826)	(0.400)	(0.054)	(0.277)	(0.305)	(0.537)	(0.166)
p-Value (*F*-test) for difference						0.985	0.137

Note: This table presents robustness tests for performance variables after combining the CEO and the chair positions. Following the method in Pagano, Panetta, and Zingales (1998), we estimate the following specification for each dependent variable: $y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it}$, where u_i and d_t are CEO–firm pair and year fixed effects, respectively. $Combined_t$ is 1 if period t is after the CEO became board chair, and 0 otherwise. The sample comprises 600 CEO–firm pairs and 4169 (4116) observations for stock return (ROA). Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base *p*-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 11 Policy changes and firm performance following combination of CEO and chair positions

	Match-adjusted stock return	*Match-adjusted stock return*	*Match-adjusted return on assets*	*Match-adjusted return on assets*
Year 1	−0.037		0.006	
	(0.481)		(0.558)	
Year2	−0.057		0.011	
	(0.310)		(0.314)	
Year3	−0.096		0.005	
	(0.105)		(0.671)	
Year4	−0.123**		0.006	
	(0.049)		(0.670)	
>Year5	−0.104		0.010	
	(0.121)		(0.510)	
All years post-combination (0/1)		−0.048		0.008
		(0.333)		(0.455)
Capital Expenditures/Sales	−1.117***	−1.126***	−0.041	−0.040
	(0.000)	(0.000)	(0.345)	(0.365)
R&D/Sales	−1.123***	−1.129***	−0.708***	−0.707***
	(0.005)	(0.004)	(0.000)	(0.000)
Leverage	−0.220*	−0.228*	−0.135***	−0.133***
	(0.071)	(0.063)	(0.000)	(0.000)

(Continues)

TABLE 11 (Continued)

	Match-adjusted stock return	*Match-adjusted stock return*	*Match-adjusted return on assets*	*Match-adjusted return on assets*
Number of Business Segments	0.002	0.003	0.004	0.004
	(0.860)	(0.788)	(0.138)	(0.128)
*CAPEX/Sales*Combined*	0.149	0.149	−0.018	−0.018
	(0.363)	(0.366)	(0.582)	(0.569)
*R&D/Sales*Combined*	−0.249	−0.244	0.103	0.102
	(0.339)	(0.350)	(0.112)	(0.119)
*Leverage*Combined*	0.048	0.049	0.032	0.031
	(0.693)	(0.684)	(0.209)	(0.225)
*No. bus. segments*Combined*	−0.001	−0.002	−0.003	−0.003
	(0.959)	(0.835)	(0.143)	(0.129)
Constant	0.085	0.101	0.067***	0.066***
	(0.290)	(0.194)	(0.000)	(0.000)
F-test for ∑(Controls)[a]	0.113	0.128	2.327	2.186
	(0.737)	(0.721)	(0.128)	(0.140)
Firm- and year-fixed effects	Yes	Yes	Yes	Yes
Observations	4903	4903	4903	4903
Firms	600	600	600	600
R^2	0.022	0.021	0.070	0.070

Note: This table present our analysis of the influence of policy changes on firm performance after combining the CEO and the chair positions. Following the method in Pagano, Panetta, and Zingales (1998), we estimate the following specification for each dependent variable: $y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it}$, where u_i and d_t are CEO–firm pair and year fixed effects, respectively. $Combined_t$ is 1 if period t is after the CEO became board chair, and 0 otherwise. The sample comprises 600 CEO–firm pairs. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base *p*-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level.

[a]We base the *F*-test on the sum of the coefficients on the post-combination control variables at the sample mean in the post-combination period.

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

for accounting performance. For instance, the mean accounting return declines from 15.506% to 14.628%, significant at the 1% level, but match-adjusted returns are not statistically different. Thus, the univariate performance comparisons are consistent with the learning hypothesis.

One could argue that there is an optimum time frame by which the CEO is rewarded with the additional title. If the board delays the award of the title, the CEO could threaten to quit.[10] On the other hand, awarding the additional title too soon, would mean that the CEO receives the additional role of chair prior to adequate learning. To examine the implications of timing, we separate our sample into two groups. The first group consists of CEOs who receive the additional title of board chair within 3 years (sample median) of becoming the CEO. The other group consists of CEOs who get the additional title in 4 years or more. In untabulated univariate results, we find no material differences in the post-award firm performance following early or late combinations.

In Panel C of Table 8, we provide univariate results of firm financial policies before and after combining the CEO and the board positions. We present results for capital expenditures as a fraction of sales, R&D expense as a fraction of sales, financial leverage, and the number of business segments. For policies, we follow a similar matching process as described above, but we require the PTB firm and the matched firm to be in the same decile by policy level. We focus our attention on match-adjusted results as discussed above. As a fraction of sales, the data suggest that match-adjusted capital spending increases but that match-adjusted R&D does not change.

5.3 | Multivariate fixed-effects analysis of firm outcomes

Ideally, we would like to compare the ex post financial performance of the firms that combine the two roles relative to otherwise identical firms that do not combine the two roles. We broadly follow the empirical strategy used by Pagano et al. (1998) to examine the decision by the firm to go public. We investigate the ex post consequences by estimating fixed effect regressions in which the effect of the decision to combine the two roles is captured by dummy variables for the year of the combination and the three subsequent years. By using firm fixed effects, each CEO–firm pair prior to the CEO receiving both roles serves as its own control for the period after the CEO assumes both roles. We also use a match-adjusted CEO–pair firm to carry out the analysis for performance and policies, which are subject to mean reversion. The analysis of unadjusted data provides a test of differences and the analysis of match-adjusted data provides a test of differences in differences. Specifically, we estimate the following specification for each performance or policy variable:

$$y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it},$$

where u_i and d_t are CEO–firm pair and year fixed effects, respectively. Combined_t is an indicator variable that is 1 if period t is after the CEO became board chair, and 0 otherwise.

We present the first set of multivariate firm fixed-effect regression results in Table 9. We also use multivariate fixed-effects analysis to examine changes in total firm stock volatility, CAPM systematic risk, and firm-specific volatility. These results are similar to univariate results discussed earlier. We segregate our post-combination period into two groups: short term (first 2 years) and long term (from Year 3 until we can no longer follow the CEO–firm pair). In the last two columns of the Table 9, we provide the results of *F*-tests. The first *F*-test reports the results for the test of whether the sum of coefficients of Year 1 plus Year 2, the short-term outcome, is equal to 0. The second *F*-test reports the results for the test of whether the sum of coefficients of Years 3, 4, and beyond, the long-term outcome, is equal to 0.

[10] The CEO of HSBC, Michael Geoghegan, threatened to quit if he was not promoted to board chair (*Sunday Times*, 9/26/2010)

Panel A presents our analysis of stock-return volatility. The results indicate that following the combination of the roles of CEO and chair, total stock volatility and firm-specific volatility declines significantly both in the short term and in the long term. There is no significant change in systematic risk, so we conclude that the change in total risk derives from the reduction in firm-specific volatility. These results are consistent with the learning hypothesis as outlined in Prediction 3.

We present the results for performance following the combination of the two roles in Panel B. When we do not control for a matched firm, the data reveal significant declines for stock returns both in the short term and in the long term. Following the combination of the two roles, we observe no change in unadjusted ROA, an increase in short-term adjusted ROA, significant at the 10% level, and no change in long-term adjusted ROA. The data exhibit no change in match-adjusted stock returns for the first 2 years following the combination of the roles (p-value of 0.147), but a significant decline in stock return over from Year 3 and beyond (p-value of 0.003). Taken together, the results are consistent with learning, but also suggest the potential for entrenchment following the combination as we follow the CEO for longer periods of time and the CEO's tenure continues to increase.[11] As we will see in Table 10, the decline in match-adjusted stock returns is driven by firms in homogenous industries, CEOs of firms with coopted boards, and CEO–chair combinations that occur later in the CEO's tenure, and combinations that occur prior to the implementation of SOX. Previously, we established an economic rationale for why learning of CEO ability is more crucial in heterogeneous industries. Additionally, some of the CEOs who are promoted later might already be entrenched.

Next, we examine firm policy variables in Panel C of Table 9. We again present results for unadjusted variables and for match-adjusted variables. After controlling for firm- and year-fixed effects, we find no evidence of any influence in investment policy as measured by unadjusted or match-adjusted capital expenditures or R&D. Firms appear to significantly increase their leverage after the award year, but there is no significant change in match-adjusted leverage both in the short term and long term. Furthermore, we find no evidence of diversifying activities. There is no significant change in the number of business segments after combining the CEO–chair roles in either the unmatched or match-adjusted analysis.

Table 10 presents robustness results of our analysis of outcomes segmented by factors that could influence the decision to combine the two roles or affect the performance of the CEO following the combination of roles. We again partition our post-combination period into two groups: short term (first 2 years) and long term (from Year 3 until we can no longer follow the CEO–firm pair). In the last two columns of the Table 10, we provide the results of F-tests. The first F-test reports the results for the test of whether the sum of coefficients of Year 1 plus Year 2 is equal to 0. The second F-test reports the results for the test of whether the sum of coefficients of Years 3, 4, and beyond is equal to 0.

Our conceptual arguments and empirical evidence presented earlier suggest that firms in more homogeneous industries are less likely to follow a PTB strategy. To further examine the interaction between the role of learning and industry characteristics, we analyze firm-specific volatility segregated by industry homogeneity/heterogeneity in Panel A and match-adjusted performance following the combination in Panel B. Consistent with our expectation, firm-specific volatility is unchanged for firms in homogeneous industries, but declines significantly in each post-combination year for firms in heterogeneous industries with p-values ranging from 0.000 to 0.025. Additional tests reveal that the decline in firm-specific volatility is significant at the 1% level in the short term and in the long term. Moreover, Chow tests, based on interactions between the coefficients across the two populations, indicate that the decline in firm-specific volatility in heterogeneous is persistently different from the post-combination firm-specific volatility in homogeneous industries with a p-value of 0.091 for the sum of the first 2 years and a p-value of 0.052 for Year 3 and beyond.

In Panel B, we turn to firm performance following the combination of the two roles and find that there is no change in match-adjusted stock returns for the CEOs promoted in the heterogeneous industries both in the short term and in the long term. In contrast, we find that stock price performance declines beginning in Year 2 and over the long term

[11] We thank the referee and the editor for their suggestions to follow the CEOs for a longer period of time, which allowed us to gain a more complete understanding of PTB.

in homogeneous industries (*p*-value of 0.001). Moreover, the long-term performance is statistically different across the two groups (*p*-value of 0.050). Thus, we can infer that the decline in adjusted stock-return performance following the combination of the two roles occurs primarily in homogeneous industries. This result is not consistent with our learning hypothesis because, as we argued earlier, learning is more valuable in heterogeneous industries when it is more difficult for the board to learn about the ability and fit of the CEO. For accounting performance, we observe a positive short-term, match-adjusted ROA in heterogeneous industries, but no long-term changes.

We next examine other factors that could influence match-adjusted stock and ROA performance. These factors include: (i) combinations that occur early or late in the CEO's tenure, (ii) combinations that occur when the board is coopted or not coopted, (iii) CEO ownership at the time of the combination, and (iv) combinations that occur before or after the implementation of the SOX Act.

To examine early versus late promotions, we separate our sample into two groups. The first group consists of CEOs who get awarded their additional title in within 3 years (the sample median) of becoming CEO. The other group consists of CEOs who get the additional title in Year 4 or later. Panel C of Table 10 presents our results on performance differentials. We find no significant decline in match-adjusted stock ROA for either group. There is no decline in match-adjusted stock returns for the early recipients, but match-adjusted stock returns decline for the late recipients in the short run. However, *F*-tests indicate that there are no differences between the two groups. Although we find some weak evidence that CEOs who receive both titles later, and therefore have greater tenure, may be entrenched, the findings are generally consistent with the learning hypothesis.

Our multinomial logit (Table 4) suggests that coopted boards are less likely to use a PTB process, and our hazard model (Table 5) suggests that coopted boards are less likely to award both roles early. However, it is possible that a co-opted board, in conjunction with combining the roles of CEO and board chair, could exacerbate agency problems. To examine this possibility, we examine the match-adjusted performance results for coopted and non-coopted boards and present the results in Panel D. The empirical estimates confirm our base results. We document no impact of combining the two positions on match-adjusted stock returns or accounting returns for non-coopted boards. The results for coopted boards offer weak support at best for the alternative agency explanation of CEO–chair duality. Although CEOs with coopted boards exhibit poor stock-return performance in long term (*p*-value of 0.023), the Chow test for difference across the two groups has a *p*-value of 0.478 and 0.138 in the short run and in the long run. Thus, we cannot reject the null hypothesis that CEOs across the two groups have the same performance.

Research suggests that higher levels of CEO ownership can both align the CEO's incentives with shareholders and exacerbate agency problems by entrenching the CEO (e.g., Morck et al., 1998; McConnell & Servaes, 1990). Thus, we examine performance after combining the two rows by CEO ownership above the sample median and below the sample median. Panel E contains the results of the analysis segregated by CEO ownership level. Again, the robustness tests confirm our base results. When we look at the group of CEOs with below median ownership, there is no decline in match-adjusted stock returns or accounting returns. The group of CEOs who have above median ownership seems to show a decline in match-adjusted stock returns beyond 3 years. However, the sum of the coefficients is not statistically different across the two groups in a Chow test. Potentially, the poor performance by CEOs with high ownership could reflect family-managed firms in which family executives maintain higher ownership, but in which promotions are less likely to depend on learning about CEO ability.

In Panel F, we present separate results based on CEO–chair combinations that occurred before or after the implementation of SOX. As is well-recognized, SOX resulted in some significant changes in accounting practices, corporate governance rules, and regulations. Moreover, SOX and the events surrounding the passage of SOX increased external scrutiny and focused more shareholder attention on corporate governance. We find that the decline in match-adjusted stock performance occurs primarily in the pre-SOX sample. In the post-SOX period, we find no statistically significant decline in match-adjusted stock returns or in accounting returns. Thus, our results suggest that the implementation of SOX had the intended consequence of reducing agency problems. This is consistent with our finding that it is only in subsamples suggestive of agency, such as relatively late promotions, homogenous industries, and coopted boards,

where we find a decline in post-promotion performance. Based on a Chow test, however, we cannot reject the null hypothesis that the sum of the coefficients is different across the two groups (p-value of 0.469)

A possible concern with the fixed effects method is that observable policy variables may not be fixed within firms over time. As an additional test, we estimate multivariate regressions to understand the impact of policy changes on stock returns following the combination of the two positions. These results are presented in Table 11. We estimate two specifications for adjusted stock returns and adjusted ROA, respectively. The first specification is similar to that presented in Tables 9 and 10, and the second specification replaces the individual year dummy variables with one post-combination dummy variable. The results for match-adjusted stock returns appear in the first two columns, and the results for match-adjusted accounting returns appear in the last two columns. After allowing for interactions with policies, the data fail to reject the null hypothesis that stock returns are influenced by combining the two roles. Capital expenditures, R&D, and leverage all appear to be negatively related to firm performance prior to combining the two roles, but these policies do not appear to have a differential effect on stock return performance after combining the two positions—all individual interactions with the post combination dummy variable are insignificant. As an additional test of whether any differential policies impact our general conclusions, we estimate a joint test of significance for the sum of the coefficients on the post-combination policy variables multiplied by the respective means of the policy variables in the post-combination period. In each case, we cannot reject the null hypothesis that the linear combination of these effects is different from zero. The p-values are 0.737 and 0.721, respectively, for the two stock-return specifications and 0.128 and 0.140, respectively, for the two ROA specifications. Thus, our results appear robust to any policy changes that might occur in the post-combination period.

5.4 | Multivariate fixed-effects analysis of CEO compensation and incentives

Subsequent to the award of the additional title, the CEO may be able to use her increase in bargaining power to boost her own pay or decouple her pay from performance. If so, we expect to see an increase in compensation levels or a decrease in compensation incentives. In addition, the level of total compensation and alignment incentives could both be related to potential agency problems associated with the combination of the two roles. To shed light on these possibilities, we conduct additional exploratory analysis of the relation between combining the role of CEO and board chair in a PTB process and subsequent changes in CEO compensation. We again use the fixed effects regression method in Pagano et al. (1998) to examine the actual and match-adjusted compensation levels and incentives provided to the CEO. Each PTB firm is matched to a firm that is (i) in the same decile by total compensation and (ii) the nearest neighbor based on propensity scores.

To estimate compensation levels and performance-based incentives, we use the adjustment techniques recommended by Coles et al. (2013) to account for changes in compensation reporting created by FAS 123R. The natural logarithm of TDC1 from the ExecuComp database, modified as necessary to adjust for FAS 123R, serves as our measure of total compensation. TDC1 combines compensation from salary, cash bonuses, stock options, restricted stock, and long-term incentive plans to estimate the CEO's total compensation. Following Core and Guay (2002) and Coles et al (2006), we compute the compensation delta as the dollar change in the executive's annual compensation with respect to a 1% change in stock price. In a given year, an executive's compensation delta is the sum of the delta of new restricted stock grants and the delta of new option grants. The delta of restricted stock grants equals the number of restricted stock grants multiplied by the stock price times 0.01, and the delta of option grants is the number of option grants multiplied by the change in the Black–Scholes option value for a 1% change in stock price.

We estimate an executive's risk-taking incentives as the sensitivity of the executive's Black–Scholes value of new option grants with respect to a 0.01 change in stock volatility (vega). We do not estimate the vega of stock grants since Guay (1999) documents that the vega of stock is insignificant compared to the vega of options. Because founding families tend to have large equity ownerships in their firms, family executives' total wealth will be more sensitive to changes in stock price and volatility than the wealth of executives in nonfamily firms. To capture executives' existing

incentive from their portfolio holdings, we calculate the portfolio delta and portfolio vega based on the executives' existing equity holdings at the beginning of the year following the approximation method of Core and Guay (2002). To estimate the risk-free rate used in vega and delta computations, we use the 10-year treasury notes constant maturity series available from the Federal Reserve Bank's official website.

Table 12 presents the base results of our compensation analysis. As before, we segregate our post-combination period into two groups: short term (first 2 years) and long term (from Year 3 until we can no longer follow the CEO–firm pair). In the last two columns of the Table 12, we provide the results of *F*-tests. The first *F*-test reports the results for the test of whether the sum of coefficients of Year 1 plus Year 2 is equal to 0. The second *F*-test reports the results for the test of whether the sum of coefficients of Years 3, 4, and beyond is equal to 0.

As shown in Panel A of Table 12, neither the unadjusted nor the adjusted total compensation significantly increases following the award of the additional title.[12] Panels B, C, D, and E present the results for the annual compensation delta, the total portfolio delta, the annual compensation vega, and the total portfolio vega. A perusal of the results reveals that the unadjusted annual compensation delta and annual compensation vega are largely unchanged following the combination of leadership roles both in the short and long term (Panels B and D). However, the total portfolio delta increases on an unadjusted basis (Panel C) in the short term, and the portfolio vega increases on both unadjusted and adjusted basis in short run and long run. (Panel E). The sum of the coefficients in the post-combination period is significant at less than the 1% level for unadjusted delta measures in the short term. The sum of the coefficients in the post-combination period is significant at less than the 1% level for unadjusted portfolio vega measures both in the short term and the long term and significant at the 10% level for adjusted portfolio vega. These results suggest that CEOs who obtain both roles tend to retain stock options and shares rather than cash out, which increases their incentive alignment with shareholders. The option and share retention may serve as a bonding mechanism on the part of the CEO, or it may result from explicit or implicit pressure from the board or external monitors. In either case, the consistent increase in incentive alignment is likely to serves as a mechanism that alleviates agency problems that could arise from the combination of the CEO and the board chair positions. Moreover, the increase in vega strengthens our finding that the decrease in firm-specific volatility reveals learning as CEOs actually face incentives to increase volatility.

In Table 13, we divide our sample into homogeneous and heterogeneous industries. Our earlier results for firm outcomes provide support for the learning hypothesis. Comparisons of matched-firm compensation results for CEOs in homogeneous and heterogeneous industries suggests that there are no substantial differences across the two groups in total compensation, compensation delta, portfolio delta, and compensation vega. The match adjusted portfolio vega shows a significant increase for CEOs in homogeneous industries in both the short term (*p*-value of 0.013) and the long term (*p*-value of 0.026). As noted, the increase in vega strengthens our finding that the decrease in firm-specific volatility reveals learning as CEOs face incentives to increase volatility. Based on a Chow test, however, we cannot reject the null hypothesis that the sum of the coefficients is different across the two groups (*p*-values of 0.235 and 0.136 in the short term and long term, respectively).

In Table 14, we report matched-firm compensation results for early and late CEO–chair combinations. The results in Panel A indicate that over the long term, match-adjusted compensation increases for CEOs who receive both titles later. The *p*-value for the difference between the two groups is 0.014. As shown in Panels B and D, we find no short-term or long-term increase in annual incentive awards as measured by delta or vega. Thus, total compensation increases in the long term for CEOs who receive both titles later without a corresponding increase in compensation incentives. For these CEOs, it appears that longer tenure coupled with dual titles allows entrenched CEOs to influence their total compensation without a corresponding increase in pay-for-performance sensitivity. We do find that the CEOs who receive both roles later also face greater risk-taking incentives from their total portfolios, which would counteract incentives to be complacent and "enjoy the quiet life" (e.g., Bertrand & Mullainathan, 1993). However, Chow tests cannot reject the null hypotheses that total vega incentive differ between early and late combinations, either in the short term or the long term.

[12] We note that the specifications contain both firm- and time-fixed effects, so the results adjust for inflationary and other time series trends.

TABLE 12 Comparison of change in compensation for CEO–chair combinations

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel A: Analysis of Ln(Total Compensation)								
Total compensation	4900	0.029	0.024	−0.020	0.037	−0.069	0.520	0.084
		(0.417)	(0.590)	(0.705)	(0.546)	(0.360)	(0.471)	(0.771)
Match-adj. total comp.	4705	−0.020	−0.059	−0.068	−0.031	−0.131	0.525	0.546
		(0.705)	(0.383)	(0.406)	(0.753)	(0.365)	(0.469)	(0.460)
Panel B: Analysis of Ln(Compensation Delta)								
Compensation delta	4900	0.056	−0.014	−0.020	0.055	−0.119	0.091	0.068
		(0.420)	(0.862)	(0.830)	(0.626)	(0.383)	(0.763)	(0.794)
Match-adj. comp. delta	4705	0.025	−0.065	−0.079	0.223	−0.114	0.043	0.004
		(0.803)	(0.580)	(0.566)	(0.201)	(0.579)	(0.836)	(0.951)
Panel C: Analysis of Ln(Total Portfolio Delta)								
Portfolio delta	4900	0.116***	0.147***	0.188***	0.146*	0.089	8.320***	2.618
		(0.003)	(0.009)	(0.008)	(0.092)	(0.444)	(0.004)	(0.106)
Match-adj. portfolio delta	4705	0.138*	0.138	0.179	0.179	0.46	2.794*	0.796
		(0.058)	(0.171)	(0.157)	(0.242)	(0.813)	(0.095)	(0.372)

(Continues)

TABLE 12 (Continued)

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel D: Analysis of Ln(Compensation Vega)								
Compensation vega	4900	0.015	−0.028	−0.043	0.037	−0.187	0.008	0.277
		(0.842)	(0.755)	(0.677)	(0.783)	(0.247)	(0.929)	(0.597)
Match-adj. comp. vega	4705	0.053	0.070	0.028	0.180	−0.071	0.284	0.052
		(0.621)	(0.632)	(0.873)	(0.402)	(0.784)	(0.594)	(0.820)
Panel E: Analysis of Ln(Portfolio Vega)								
Portfolio vega	4900	0.179**	0.271***	0.2296***	0.399***	0.2356**	11.241***	8.894***
		(0.003)	(0.001)	(0.003)	(0.001)	(0.018)	(0.001)	(0.003)
Match-adj. portfolio vega	4705	0.188**	0.258**	0.183	0.446**	0.321*	4.965**	2.877*
		(0.039)	(0.031)	(0.217)	(0.020)	(0.191)	(0.026)	(0.090)

Note: This table present our analysis of CEO compensation after combining the COE and the chair positions. Following the method in Pagano, Panetta, and Zingales (1998), we estimate the following specification for each dependent variable: $y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it}$, where u_i and d_t are CEO–firm pair and year fixed effects, respectively. $Combined_t$ is 1 if period t is after the CEO became board chair, and 0 otherwise. The sample comprises 600 CEO–firm pairs. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base p-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level.

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 13 Comparison of matched-firm compensation results for homogeneous and heterogeneous industries

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel A: Analysis of match-adjusted Ln(Total Compensation)								
Hom. Ind. (241 CEOs)	1888	−0.001	−0.063	−0.037	−0.080	−0.159	0.29	0.708
		(0.987)	(0.455)	(0.725)	(0.488)	(0.256)	(0.663)	(0.401)
Het. Ind. (359 CEOs)	2817	−0.025	−0.050	−0.070	0.012	−0.074	0.216	0.089
		(0.746)	(0.614)	(0.549)	(0.933)	(0.711)	(0.643)	(0.765)
p-Value (*F*-test) for difference							0.960	0.794
Panel B: Analysis of match-adjusted Ln(Current Delta)								
Hom. ind. (241 CEOs)	1888	0.005	0.003	−0.174	0.132	−0.244	0.001	0.129
		(0.973)	(0.987)	(0.443)	(0.654)	(0.452)	(0.979)	(0.719)
Het. ind. (359 CEOs)	2817	0.054	−0.092	0.005	0.313	0.004	0.025	0.302
		(0.681)	(0.526)	(0.976)	(0.138)	(0.989)	(0.874)	(0.583)
p-Value (*F*-test) for difference							0.906	0.538
Panel C: Analysis of match-adjusted Ln(Portfolio Delta)								
Hom. ind. (241 CEOs)	1888	0.164	0.119	0.241	0.234	0.229	1.329	1.264
		(0.128)	(0.436)	(0.223)	(0.304)	(0.346)	(0.250)	(0.262)
Het. ind. (359 CEOs)	2817	0.131	0.165	0.154	0.165	−0.049	1.711	0.175
		(0.185)	(0.233)	(0.361)	(0.433)	(0.864)	(0.192)	(0.676)
p-Value (*F*-test) for difference							0.967	0.628

(Continues)

TABLE 13 (Continued)

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel D: Analysis of match-adjusted Ln(Compensation Vega)								
Hom. ind. (241 CEOs)	1888	0.113	0.147	0.021	0.015	−0.328	0.472	0.087
		(0.514)	(0.541)	(0.943)	(0.967)	(0.427)	(0.493)	(0.768)
Het. ind. (359 CEOs)	2817	0.045	0.048	0.065	0.325	0.125	0.106	0.507
		(0.738)	(0.790)	(0.757)	(0.213)	(0.698)	(0.745)	(0.477)
p-Value (*F*-test) for difference							0.723	0.510
Panel E: Analysis of match-adjusted Ln(Portfolio Vega)								
Hom. ind. (241 CEOs)	1888	0.310**	0.444**	0.445*	0.866***	0.697*	6.239**	5.051**
		(0.025)	(0.018)	(0.057)	(0.005)	(0.083)	(0.013)	(0.026)
Het. ind. (359 CEOs)	2817	0.120	0.157	0.033	0.201	0.548	1.086	0.199
		(0.321)	(0.313)	(0.864)	(0.400)	(0.790)	(0.298)	(0.656)
p-Value (*F*-test) for difference							0.235	0.136

Note: This table presents our analysis of CEO compensation for homogeneous and heterogeneous industries. Following the method in Pagano, Panetta, and Zingales (1998), we estimate the following specification for each dependent variable: $y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it}$, where u_i and d_t are CEO–firm pair and year fixed effects, respectively. $Combined_t$ is 1 if period t is after the CEO became board chair, and 0 otherwise. The sample comprises 600 CEO–firm pairs. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base *p*-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level.

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 14 Comparison of matched-firm compensation results for early and late CEO–chair combinations

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel A: Analysis of match-adjusted Ln(Total Compensation)								
Early comb. (298 CEOs)	2052	0.041	0.055	0.167	0.308*	0.289	0.328	2.056
		(0.600)	(0.595)	(0.217)	(0.067)	(0.250)	(0.567)	(0.153)
Late comb. (302 CEOs)	2653	−0.054	−0.104	−0.210**	−0.243**	0.312**	1.486	5.620**
		(0.391)	(0.227)	(0.032)	(0.035)	(0.023)	(0.224)	(0.018)
p-Value (*F*-test) for difference							0.230	0.014**
Panel B: Analysis of match-adjusted Ln(Current Delta)								
Early comb. (298 CEOs)	2052	−0.809	0.036	0.054	0.526**	0.027	0.023	0.610
		(0.584)	(0.838)	(0.794)	(0.050)	(0.938)	(0.880)	(0.436)
Late comb. (302 CEOs)	2653	0.131	−0.131	−0.177	−0.019	−0.155	0.000	0.275
		(0.336)	(0.429)	(0.376)	(0.940)	(0.580)	(0.998)	(0.600)
p-Value (*F*-test) for difference							0.911	0.350
Panel C: Analysis of match-adjusted Ln(Portfolio Delta)								
Early comb. (298 CEOs)	2052	0.078	0.081	0.121	0.143	0.061	0.399	0.054
		(0.458)	(0.613)	(0.575)	(0.605)	(0.881)	(0.528)	(0.816)
Late comb. (302 CEOs)	2653	0.164*	0.168	0.197	0.195	0.171	2.217	1.079
		(0.095)	(0.215)	(0.242)	(0.310)	(0.434)	(0.138)	(0.300)
p-Value (*F*-test) for difference							0.605	0.299

(Continues)

TABLE 14 (Continued)

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel D: Analysis of match-adjusted Ln(Compensation Vega)								
Early comb. (298 CEOs)	2052	−0.011	0.093	0.127	0.321	−0.069	0.048	0.119
		(0.946)	(0.692)	(0.661)	(0.390)	(0.887)	(0.827)	(0.730)
Late comb. (302 CEOs)	2653	0.088	0.017	−0.145	−0.047	−0.158	0.120	0.199
		(0.543)	(0.929)	(0.543)	(0.868)	(0.639)	(0.729)	(0.656)
p-Value (*F*-test) for difference							0.960	0.589
Panel E: Analysis of match-adjusted Ln(Portfolio Vega)								
Early comb. (298 CEOs)	2052	0.089	0.221	0.164	0.370	0.259	1.052	0.653
		(0.491)	(0.248)	(0.516)	(0.256)	(0.547)	(0.306)	(0.420)
Late comb. (302 CEOs)	2653	0.237*	0.286*	0.214	0.605**	0.548	3.544*	2.994*
		(0.060)	(0.081)	(0.300)	(0.024)	(0.122)	(0.061)	(0.085)
p-Value (*F*-test) for difference							0.602	0.648

Note: This table presents our analysis of CEO compensation for early and late CEO–chair combinations. Following the method in Pagano, Panetta, and Zingales (1998), we estimate the following specification for each dependent variable: $y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it}$, where u_i and d_t are CEO–firm pair and year fixed effects, respectively. $Combined_t$ is 1 if period t is after the CEO became board chair, and 0 otherwise. The sample comprises 600 CEO–firm pairs. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base *p*-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level.

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 15 Comparison of matched-firm compensation results for coopted and non-coopted boards

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel A: Analysis of match-adjusted Ln(Total Compensation)								
Non-coopted board (486 CEOs)	3594	−0.031	−0.083	−0.044	−0.026	−0.050	0.430	0.033
		(0.959)	(0.314)	(0.653)	(0.830)	(0.772)	(0.512)	(0.855)
Coopted board (114 CEOs)	1111	−0.144	−0.074	−0.252	−0.349	−0.417*	0.955	2.913*
		(0.179)	(0.597)	(0.181)	(0.122)	(0.065)	(0.330)	(0.091)
p-Value (*F*-test) for difference							0.607	0.174
Panel B: Analysis of match-adjusted Ln(Compensation Delta)								
Non-coopted board (486 CEOs)	3594	−0.018	−0.202	−0.159	0.217	−0.121	0.947	0.011
		(0.871)	(0.146)	(0.331)	(0.299)	(0.638)	(0.331)	(0.915)
Coopted board (114 CEOs)	1111	−0.051	0.103	0.090	0.053	−0.192	0.017	0.003
		(0.815)	(0.672)	(0.769)	(0.886)	(0.603)	(0.896)	(0.959)
p-Value (*F*-test) for difference							0.549	0.990
Panel C: Analysis of match-adjusted Ln(Portfolio Delta)								
Non-coopted board (486 CEOs)	3594	0.043	−0.003	−0.043	0.046	−0.151	0.038	0.011
		(0.622)	(0.982)	(0.789)	(0.816)	(0.565)	(0.845)	(0.917)
Coopted board (114 CEOs)	1111	0.382***	0.551***	0.565**	0.503*	0.581*	8.414***	4.087**
		(0.009)	(0.006)	(0.020)	(0.093)	(0.082)	(0.004)	(0.046)
p-Value (*F*-test) for difference							0.019**	0.089*

(Continues)

TABLE 15 (Continued)

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel D: Analysis of match-adjusted Ln(Compensation Vega)								
Non-coopted board (486 CEOs)	3594	−0.051	−0.054	0.015	0.041	−0.251	0.141	0.062
		(0.691)	(0.758)	(0.946)	(0.879)	(0.462)	(0.708)	(0.803)
Coopted board (114 CEOs)	1111	0.327	0.146	−0.438	0.146	−0.212	0.773	0.151
		(0.180)	(0.677)	(0.306)	(0.739)	(0.691)	(0.381)	(0.699)
p-Value (*F*-test) for difference							0.337	0.838
Panel E: Analysis of match-adjusted Ln(Portfolio Vega)								
Non-coopted board (486 CEOs)	3594	0.194*	0.198	0.167	0.433**	0.317	3.008*	2.042
		(0.058)	(0.145)	(0.325)	(0.046)	(0.260)	(0.083)	(0.154)
Coopted board (114 CEOs)	1111	0.168	0.415	0.212	0.501*	0.188	1.473	0.532
		(0.442)	(0.150)	(0.530)	(0.261)	(0.715)	(0.227)	(0.467)
p-Value (*F*-test) for difference							0.717	0.991

Note: This table presents our analysis of CEO compensation after combining the CEO and chair positions for firms with coopted boards and with non-coopted boards. Following the method in Pagano, Panetta, and Zingales (1998), we estimate the following specification for each dependent variable: $y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it}$, where u_i and d_t are CEO–firm pair and year fixed effects, respectively. $Combined_t$ is 1 if period t is after the CEO became board chair, and 0 otherwise. The sample comprises 600 CEO–firm pairs. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base *p*-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level.
***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 16 Comparison of matched-firm compensation results before and after Sarbanes–Oxley (SOX)

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel A: Analysis of match-adjusted Ln(Total Compensation)								
Before SOX (397 CEOs)	2975	−0.067	−0.094	−0.118	−0.092	−0.139	0.944	0.558
		(0.371)	(0.369)	(0.344)	(0.548)	(0.507)	(0.332)	(0.456)
After SOX (203 CEOs)	1730	0.061	0.043	0.139	0.2333	0.131	0.442	1.265
		(0.401)	(0.672)	(0.281)	(0.141)	(0.491)	(0.507)	(0.262)
p-Value (*F*-test) for difference							0.244	0.188
Panel B: Analysis of match-adjusted Ln(Compensation Delta)								
Before SOX (397 CEOs)	2975	−0.017	−0.033	−0.256	0.152	0.022	0.023	0.037
		(0.897)	(0.839)	(0.180)	(0.552)	(0.946)	(0.878)	(0.848)
After SOX (203 CEOs)	1730	0.055	−0.171	0.266	0.320	−0.032	0.111	0.386
		(0.751)	(0.421)	(0.317)	(0.292)	(0.935)	(0.740)	(0.535)
p-Value (*F*-test) for difference							0.878	0.579
Panel C: Analysis of Ln(Portfolio Delta)								
Before SOX (397 CEOs)	2975	−0.017	−0.145	−0.129	−0.336	−0.516*	0.502	1.951
		(0.865)	(0.306)	(0.489)	(0.115)	(0.094)	(0.479)	(0.163)
After SOX (203 CEOs)	1730	0.102	0.207	0.169	0.396	0.394	1.451	1.994
		(0.373)	(0.189)	(0.395)	(0.105)	(0.154)	(0.230)	(0.159)
							0.170	0.047**

(Continues)

TABLE 16 (Continued)

	Observations	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year > 4*	*F*-test∑(*Y1 – Y2*)	*F*-test∑ (*>Y2*)
Panel D: Analysis of Ln(Compensation Vega)								
Before SOX (397 CEOs)	2975	−0.007	−0.106	0.083	0.159	0.021	0.105	0.098
		(0.961)	(0.571)	(0.720)	(0.588)	(0.954)	(0.746)	(0.754)
After SOX (203 CEOs)	1730	−0.054	−0.388	−0.577	−0.445	−0.722	0.620	1.702
		(0.798)	(0.300)	(0.139)	(0.335)	(0.194)	(0.432)	(0.194)
							0.400	0.203
Panel E: Analysis of Ln(Portfolio Vega)								
Before SOX (397 CEOs)	2975	0.132	0.196	0.197	0.134	0.272	1.723	1.436
		(0.237)	(0.186)	(0.291)	(0.145)	(0.338)	(0.190)	(0.232)
After SOX (203 CEOs)	1730	0.179	0.300	0.048	0.574	0.420	1.861	1.111
		(0.249)	(0.182)	(0.850)	(0.106)	(0.325)	(0.174)	(0.293)
							0.725	0.841

Note: This table presents our analysis of CEO compensation after combining the CEO and the chair positions for combinations before implementation and after the implementation of Sarbanes–Oxley. Following the method in Pagano, Panetta, and Zingales (1998), we estimate the following specification for each dependent variable: $y_{it} = \beta_0 + \sum_{t=1}^{4} \beta_t Combined_t + \beta_5 Combined_{t>4} + u_i + d_t + \varepsilon_{it}$, where u_i and d_t are CEO–firm pair and year fixed effects, respectively. $Combined_t$ is 1 if period t is after the CEO became board chair, and 0 otherwise. The sample comprises 600 CEO–firm pairs. Variables are defined in Appendix B and are winsorized at the 1% and 99% levels. We base p-values, in parentheses, on robust standard errors clustered at the CEO–firm pair level.

***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 15 presents our compensation and incentive analysis for subsamples based on whether the board is coopted at the time of the combination. Comparison of matched-firm compensation results for coopted and non-coopted boards suggests that there are no substantial differences in total compensation, compensation delta, compensation vega, and portfolio vega for both groups (Panels A, B, D, and E). The CEOs of firms that had coopted boards at the time of the combination actually face a significant increase in total portfolio delta incentive (Panel C), statistically different between the two groups with *p*-values of 0.019 (0.089) in the short term (long term). Thus, we find no evidence from our analysis of compensation incentives to support an agency explanation for combining the two roles in a PTB process. If anything, the increase in portfolio delta provides greater incentive alignment between the CEO and shareholders.

In Table 16, we divide our sample into combinations that occur before the implementation of SOX and after the implementation of SOX. If combining the two roles enhances CEO power and allows the CEO to increase total pay without a corresponding increase in sensitivity of pay to stock price performance, we would expect to be more likely to observe evidence of the phenomenon in the pre-SOX period. Comparison of matched-firm compensation results for pre-SOX and post-SOX combinations suggests that there are no substantial differences in total compensation or compensation incentives following the combination, failing to support the proposition that CEOs use increased power from receiving both roles to increase their pay or reduce the sensitivity of their pay to stock price performance. Thus, the data do not support agency-model predictions that providing a CEO with the additional role of board chair, at least in the context of a PTB process, empowers the CEO to extract rents by influencing his compensation. However, we do find that the sensitivity of CEOs' total portfolio to stock price declines over the long term following combinations in the pre-SOX period. Thus, the evidence suggests that during the pre-SOX period, long term entrenchment may have allowed CEO's to reduce their total alignment with shareholders after receiving the additional role of board chair.

6 | CONCLUSION

We use a sample of over 18,000 firm–year observations and learning framework to examine CEO–chair duality when firms follow a "PTB" process that awards the chair position after a probationary period during which the board of directors observes the CEO. We argue that the board awards the additional position of board chair if the CEO demonstrates sufficient talent. Our analysis indicates that firms that always combine the two roles, firms that always separate the roles, or firms that award the additional title following a period of evaluation exhibit significantly different firm characteristics, which suggests self-selection. We find that PTB firms are more likely to be from industries that are less homogenous. This result supports the learning rationale underlying PTB strategies, as CEO performance is harder to benchmark and evaluate when industries are less homogeneous. We also find that larger firms are more likely to combine the two roles, which suggests that more complex organizations are better served by combining the roles of the CEO and the chair.

Overall, CEOs who receive the additional title of board chair outperform their industry benchmark before receiving both titles. For these firms, the award of chair is positively related to both firm and industry performance in the 2 years prior to the combination. We find little if any evidence to suggest that agency problems provide the impetus to combine the two roles for firms that follow a PTB process. Consistent with learning, we find that idiosyncratic stock-return volatility declines following the combination of the two roles. The decline in firm-specific volatility occurs only in heterogeneous industries, in which learning about the CEO is likely more important. We do not find any change in firm-specific volatility in homogeneous industries, in which in it is easier to benchmark CEOs against others in the industry.

A naïve analysis of the post-chair appointment performance, one that fails to control for selection issues and mean reversion in performance data, indicates a significant drop in firm performance relative to the pre-chair period. However, in a matched sample of firms where the matching criteria includes the pre-appointment performance and firm

attributes that predict a high propensity for using a PTB succession strategy, we find that there is no post-appointment underperformance in accounting returns. Match-adjusted stock returns do not reveal underperformance in the first 2 years following the combination. However, we document a significant drop in match-adjusted stock returns beyond 2 years. The drop in match-adjusted stock returns is driven primarily by the firms in homogeneous industries, where learning about the CEO is less important and combinations are likely to depend on other factors. Thus, the performance outcomes suggest that the data are more consistent with the learning hypothesis and suggest that the pass-the-baton succession process appears to be an equilibrium mechanism in which some firms optimally use the PTB structure to learn about the CEO and then award the additional title of board chair to increase the odds of retaining talented CEOs.

Ceteris paribus, talented CEOs in a weaker bargaining position relative to the board will tend to be promoted to chair more quickly as vulnerable CEOs are more likely to pursue outside opportunities. In support of this logic, we find that when the board is more independent and not coopted– the promotion to chair occurs more quickly. These findings are also counter to the notion that agency considerations and influence are central to the CEO being appointed chair. We also show that stockholders react positively to combinations that occur early in the CEO's tenure, which suggests that early promotions reveal directors' private information about the quality of the CEO to the market. This is inconsistent with alternative explanations such as an incentive rationale for PTB or agency problem, as both of these alternatives would suggest a negative market reaction to such promotions.

We do not interpret our results to indicate that there are no agency problems associated with combining the CEO and the chair position. Indeed, our analysis suggests that over the long term, match-adjusted stock performance declines following the combination of the CEO and chair roles for firms more prone to agency problems, and that CEOs in these firms appear to become entrenched. However, the data do not suggest that PTB combinations result from agency problems or that all firms incur declines in performance. Furthermore, in many cases the total portfolios incentives of CEOs who receive both positions become more closely aligned with the incentives of shareholders through personal wealth that is increasingly sensitive to share-price performance and stock-return volatility, which seems to be an equilibrium mechanism to mitigate potential agency problems that might arise from combining the two roles. When one considers the benefits of learning to many firms and the need to retain talented CEOs, we conclude that the process of combining the two roles after a period of observation is likely advantageous for these firms.

An implication of our analysis for researchers is that one should consider learning mechanisms and retention objectives when evaluating various board structures. Structures that are seemingly incompatible with effective monitoring in a simple agency model may in fact be optimal for many firms when one considers the impact of learning on CEO–chair combination and CEO retention. For governance activists and policy makers, the implications of our analysis are straightforward: the results call into question the prevailing wisdom that suggests that shareholders will always be better served by separating the roles of CEO and board chair. Thus, those who seek to reform governance should be cautious in proposing to unambiguously separate the two roles. Forcing separation by fiat is likely not an ideal policy. Overall, our evidence suggests that having one type of executive and board leadership structure is not optimal for all firms.

ACKNOWLEDGMENTS

The authors would like to thank seminar participants at the India Finance Conference, the 2015 *Financial Management Association* Meetings, the 2016 *Financial Management Association* European Meetings, the 2016 Midwest Finance Association Meetings, the 2016 *Summer Research Conference* at the Indian School of Business, the 2017 Magnolia Finance Conference at Mississippi State University, the Georgia Institute of Technology, the Hanken School of Economics, and the University of Connecticut for helpful comments. They are particularly grateful for the useful comments by an anonymous reviewer, Rajkamal Iyer (Editor), Vikas Agarwal, Hang Bai, Tom Berglund, Naveen Daniel, Dave Dennis, Radha Gopalan, Jarrad Harford, Narasimhan Jegadeesh, Ravi Jagannathan, Jayant Kale, Omesh Kini, Kalpana

Narayanan, Alvara Taboada, John Wald, and Tina Yang. They appreciate research assistance from Mahnaz Parsanasab, Honglin Ren, and Mo Shen. The authors assume responsibility for any errors.

REFERENCES

Adams, R., & Ferreira, D. (2007). A theory of friendly boards. *Journal of Finance*, *62*, 217–250.

Almazon, A., & Suarez, J. (2003). Entrenchment and severance pay in optimal governance structures. *Journal of Finance*, *58*, 519–548.

Brickley, J., Coles, J., & Jarrell G. (1997). Leadership structure: Separating the CEO and chairman of the board. *Journal of Corporate Finance*, *3*, 189–220.

Bertrand, M., & Mullainathan, S. (1993). Enjoying the quiet life? Corporate governance and managerial objectives. *Journal of Political Economy*, *111*, 1043–1075.

Chow, P. (1960). Tests of equality between sets of coefficients in two linear regressions. *Econometrica*, *28*, 591–605.

Coles, J., Daniel, N., & Naveen, L. (2006). Managerial incentives and risk-taking *Journal of Financial Economics*, *79*, 431–468.

Coles, J., Daniel, N., & Naveen, L. (2008). Boards: Does one size fit all? *Journal of Financial Economics*, *87*, 329–356.

Coles, J., Daniel, N., & Naveen, L. (2013). Calculation of compensation incentives and firm-related wealth using ExecuComp: data, program, and explanation. Unpublished manuscript.

Coles, J., Daniel, N., & Naveen, L. (2014). Coopted boards, *Review of Financial Studies*, *27*, 1751–1796.

Core, J., & Guay, W. (2002). Estimating the value of employee stock options portfolios and their sensitivities to price and volatility, *Journal of Accounting Research*, *40*(3), 613–630.

Core, J., Holthausen, R., & Larcker, D. (1999). Corporate governance, chief executive officer compensation, and firm performance, *Journal of Financial Economics*, *51*, 371–406.

Dahya, J., McConnell, J., & Travlos, N. (2002). The Cadbury committee, corporate performance, and top management turnover, *Journal of Finance*, *57*, 461–483.

Dahya, J., & McConnell, J. (2007). Board composition, corporate performance, and the Cadbury committee recommendation, *Journal of Financial and Quantitative Analysis*, *42*, 535–564.

Dalton, D., Daily, C., Ellstrand, A., & Johnson, E. (1998). Meta-analytic reviews of board composition, Leadership structure, and financial performance. *Strategic Management Journal*, *19*, 269–290.

Dey, A., Engel, E., & Liu, G. (2011). CEO and board chair roles: To split or not to split? *Journal of Corporate Finance*, *17*, 1595–1618.

Eisfeldt, A., & Kuhnen, C. (2013). CEO turnover in a competitive assignment framework, *Journal of Financial Economics*, *109*, 351–372.

Fahlenbrach, R., Minton, B., & Pan, C. (2011). Former CEO directors: Lingering CEOs or valuable resources, *Review of Financial Studies*, *24*, 3486–3518.

Fama, E., & Jensen, M. (1983a). Separation of ownership and control. *Journal of Law and Economics*, *26*, 301–325.

Fama, E., & Jensen, M., (1983b). Agency problems and residual claims. *Journal of Law and Economics*, *26*, 327–349.

Faleye, O. (2007). Does one hat fit all? The case of corporate leadership structure, *Journal of Management and Governance*, *11*, 239–259.

Fauver, L., Hung, M., Li, X., & Taboada, A. (2017). Board reforms and firm value: Worldwide evidence, *Journal of Financial Economics*, *125*(1), 120–142.

Goyal, V., & Park, C. W. (2002). Board leadership structure and CEO turnover, *Journal of Corporate Finance*, *8*, 49–66.

Grinstein, Y., & Valles, Y. (2008). *Separating the CEO from the chairman position: Determinants and changes after the new corporate governance Regulation*. Working Paper, Cornell University.

Guay, W. (1999). The sensitivity of CEO wealth to equity risk: An analysis of the magnitude and determinants. *Journal of Financial Economics*, *53*(1), 43–71.

Harris, M., & Holmstrom B. (1982). A theory of wage dynamics. *The Review of Economic Studies*, *49*, 315–333.

Hart, O., & Moore, J. (1990). Property rights and the nature of the firm. *Journal of Political Economy*, *98*, 1119-1158.

Hermalin, B., & Weisbach M. (1998). Endogenously chosen boards of directors and their monitoring of the CEO. *American Economic Review*, *88*, 96–118.

Hermalin, B., & Weisbach M. (2003). Boards of directors as an endogenously determined institution: A survey of the economic literature. *Economic Policy Review*, *9*, 7–26.

Hermalin, B., & Weisbach M. (2014). *Understanding corporate governance through learning models of managerial competence*, NBER Working Paper 20028.

Hermalin, B., & Weisbach, M. (2017). *Assessing managerial ability: Implications for corporate governance*. NBER Working Paper 23121.

Jenter, D., & Kanaan, F. (2015). CEO turnover and relative performance evaluation. *Journal of Finance*, *70*, 2155–2184.

Kaplan, S., & Minton, B. (2012). How has CEO turnover changed? *International Review of Finance*, *12*, 57–87.

Krause, R., Semadeni M., & Cannella, A. (2014). CEO duality: A review and research agenda. *Journal of Management*, *40*, 252–282.
Lazear, E. (2004). The Peter principle: A theory of decline. *Journal of Political Economy*, *112*, S141–S163.
Linck, J., Netter J., & Yang T. (2008). The determinants of board structure. *Journal of Financial Economics*, *87*, 308–328.
McConnell, J., & Servaes, H. (1990). Additional evidence on equity ownership and corporate value. *Journal of Financial Economics*, *27*, 595–612.
Morck, R., Shleifer, A., & Vishny R. (1998). Management ownership and market valuation: An empirical test. *Journal of Financial Economics*, *20*, 293–315.
Murphy, K. J. (1986). "Incentives, learning, and compensation: A theoretical and empirical investigation of managerial labor contracts. *The Rand Journal of Economics*, 59–76.
Oyer, P. (2004). Why do firms use incentives that have no incentive effects? *Journal of Finance*, *59*, 1619–1649.
Pagano, P., Panetta, F., & Zingales, L. (1998). Why do companies go public? An empirical analysis. *Journal of Finance*, *53*, 27–64.
Palmon, O., & Wald, J.K. (2002). Are two heads better than one? The impact of changes in management structure on firm performance by firm size, *Journal of Corporate Finance*, *8*, 213–226.
Pan, Y., Wang, T., & Weisbach, M. (2015). Learning about CEO ability and stock return volatility, *Review of Financial Studies*, *28*, 1623–1666.
Parrino, R. (1997). CEO turnover and outside succession: A cross-sectional analysis, *Journal of Financial Economics*, *46*, 165–197.
Pastor, L., & Veronesi, P. (2003). Stock valuation and learning about profitability, *Journal of Finance*, *58*, 1749–1789.
Patell, J. M. (1976). Corporate forecasts of earnings per share and stock price behavior: Empirical test, *Journal of Accounting Research*, *14*, 247–276.
Vancil, R. F. (1987). *Passing the baton: Managing the process of CEO succession*. Harvard Business School Press.
Williamson, O. (2008). Corporate boards of directors: In principle and in practice. *Journal of Law, Economics, and Organization*, *24*, 247–270.
Yang, T., & Zhao, S. (2014). CEO duality and firm performance: Evidence from an exogenous shock to the competitive environment. *Journal of Banking and Finance*, *49*, 534–552.

How to cite this article: Jayaraman N, Nanda V, Ryan HE. The influence of learning and bargaining on CEO-chair duality: evidence from firms that pass the baton. *Financial Management*. 2022;*51*:297–350. https://doi.org/10.1111/fima.12370

APPENDIX A

A SIMPLE MODEL OF LEARNING AND DUALITY

A.1 | The model

We propose a simple learning model of the decision to award the board chair position to corporate CEOs. We show that it may be optimal to award the chair contingent on the performance of the CEO. Among the implications of the model, post-award performance is expected to be lower than the strong performance prior to appointment. The CEO's compensation and promotion decisions are made by the firm's board of directors acting in the interest of the firm's shareholders. We argue that an important reason to award the chair position might be to increase the CEO's bargaining power relative to the board: This could mitigate CEO concerns about reneging by the board, given the inherently incomplete nature of compensation contracts (e.g., Hart & Moore, 1990). However, the award, which increases the CEO's bargaining power, is also likely to increase CEO compensation. We also attempt to characterize conditions under which firms are more likely to adopt PTB strategies and discuss tests to distinguish between learning and alternative factors that could affect the appointment process.

We consider a two-period set-up in which a new CEO is hired on date $t = 0$. The first output is produced on date $t = 1$ and a second output is delivered on date $t = 2$. All agents are risk-neutral and there is no discounting between time periods. Corporate insiders, that is, the board and the CEO, are symmetrically informed and update their beliefs

about the CEO's ability, denoted by α, upon observing the firm's output.[13] We will allow for the possibility that other agents in the market may have noisier updates about managerial ability than the firm's insiders because they receive a relatively noisier signal about the firm's performance.

The firm's output on date t is denoted by $y_{t,}$ such that:

$$y_t = \alpha + \epsilon_t. \tag{A.1}$$

Equation (A.1) indicates that the output is equal to the manager's ability α plus random noise ϵ_t. Manager's ability is not directly observed. However, agents have a common prior on the manager's ability at the time of hiring ($t = 0$), and will update their beliefs based on firm performance. The common prior on manager's ability is a normal distribution $\alpha \sim N(\alpha_0, \sigma_0^2)$, where α_0, σ_0^2 represent the mean and variance of manager's ability as of $t = 0$. The noise term is assumed to be drawn from a normal distribution with zero mean and variance σ_ϵ^2, that is, $\epsilon_t \sim N(0, \sigma_\epsilon^2)$.

The timing of events is as follows. After being hired, the manager delivers his first output y_1 at $t = 1$. From standard results, if the manager produces an output y_1 the posterior distribution $N(\alpha_1, \sigma_1^2)$ from the perspective of the board and CEO will be such that:

$$\alpha_1 = w_1 (\alpha_0) + (1 - w_1) y_1, \tag{A.2}$$

where $w_1 = \frac{\sigma_\epsilon^2}{\sigma_0^2 + \sigma_\epsilon^2}$. The conditional variance is given by: $\sigma_1^2 = \left(\frac{1}{\sigma_0^2} + \frac{1}{\sigma_\epsilon^2}\right)^{-1}$.

The process of learning may not be identical across agents. In particular, we allow for the possibility that there are differences in the way learning occurs across firm insiders and outside investors. For instance, the board may have more precise information regarding the CEO's performance than outside investors. To model this we assume that outside market participants receive a somewhat noisier signal of the firm's performance than the board. The signal received by outsiders can then expressed as:

$$y_t^a = \alpha + \epsilon_t + \mu_t, \text{ with } \mu_t \sim N(0, \sigma_\mu^2).$$

In this case, outsiders' posterior on the CEO's ability is similar to equation (A.2), except with σ_ϵ^2 replaced by $(\sigma_\epsilon^2 + \sigma_\mu^2)$, which captures the notion that outsiders may have a noisier assessment of managerial ability, relative to insiders.

There may be other differences as well, such as in the priors regarding managerial ability and in the process by which learning occurs. For instance, the board could have sharper priors and be better able to discern the success and effort of an internally sourced CEO, relative to that of an external hire. This may reasonably be interpreted as the output of an internal CEO having a lower σ_ϵ^2, implying more rapid learning about CEO ability.

There are four possible outcomes contingent on the outcome y_1 : (i) a sufficiently poor performance could lead to the CEO being replaced by the board, (ii) the CEO could leave the current firm for outside opportunities, (iii) CEO could continue with the firm without being awarded the chair, and finally (iv) she could continue with the firm and be awarded the chair. To discuss outcomes, we first characterize the compensation process. We assume that when it is difficult to write sufficiently complete contracts, the CEO's compensation is determined as the outcome of a Nash bargaining game between the CEO and a board that acts in the interests of shareholders (e.g., Hart & Moore, 1990). When the CEO is initially hired, her bargaining power is denoted by β_0, where $1 > \beta_0 \geq 0$. The initial bargaining power may reflect, for instance, the nature of CEO's connections with the board, for example, if she is an inside appointment or if the board is coopted.

[13] We follow Harris and Holmstrom (1982), Murphy (1986), and others in assuming that learning about managerial ability occurs in a setting with symmetric information, that is, the CEO learns of his ability along with other agents.

We assume that the CEOs receive their compensation at some stage after the period begins but before the realization of the output.[14] Wage contracts are inherently incomplete and the compensation that the CEO receives is subject to renegotiation on these dates (see, e.g., Hart & Moore, 1990). Hence, the compensation that the CEO receives is not constrained by prior wage agreements.

In the above setting, the CEO's compensation will be determined by her bargaining power, her reservation wage, and the value she is expected to generate. To conserve on notation, we normalize the CEO's reservation wage to 0. Further, we assume that if a CEO is fired on an intermediate date, the output produced in the period will be zero, consistent with a replacement CEO having expected ability 0. Under these assumptions, the outside options of both the CEO and board are equal to 0. Hence, the surplus the CEO produces in the first period is α_0, relative to the zero value of outside options. As a result of bargaining, the CEO receives a fraction β_0 of the surplus and her period-1 wage is: $W_1 = \beta_0\alpha_0$. In the second period, if the CEO's bargaining power remains at β_0 (and she remains with the firm), her expected compensation will be $W_2 = \beta_0\alpha_1$. The CEO's bargaining power is not fixed however and can be enhanced by promotion to chair. The benefit to the firm is that by yielding more power to the CEO is that it can dissuade a well-performing CEO from (costly) exploring of outside opportunities prior to the second period—as the CEO is more reassured about future treatment by the board. Note that the board has an incentive to give the CEO greater bargaining power because contracts are incomplete, and the board cannot credibly commit to a compensation contract.

Alternatively, the CEO could bargain for the additional position of board chair following strong performance to weaken the ability of the board to monitor, similar to the arguments in Hermalin and Weisbach (1998). In our model, the decision to award the position of chair under the PTB is the ex post realization of an ex ante process after the board learns about the talent of the CEO. The CEO values the chair role as insurance against reneging on compensation under incomplete contracting. Failing to award the additional position of board chair could result in the loss of a talented CEO who is a good fit for the firm. Although not important for analyzing the promotion decision, we can easily characterize the conditions under which the firm chooses to dismiss the CEO. Under the assumption that it is virtually costless to find a new CEO and dismiss the current CEO,[15] the decision will depend on the posterior assessment of the CEO's ability α_1 and the expected ability of the replacement CEO. If the prior on a replacement CEO is $\alpha_R \sim N(0, \sigma_R^2)$, the current CEO will be dismissed after the first period if: $\alpha_1 < 0$.

More interesting for our purposes is the decision to increase the likelihood of retaining a talented CEO by promoting her to chair. We model the retention decision as follows: After market participants have observed y_1, the CEO may choose to explore outside opportunities. In particular, we assume that with probability $f(\alpha_1)$ the CEO can locate another firm that is seeking a CEO and where her perceived ability is valued more than at her current firm. The probability $f(\alpha_1)$ is increasing in α_1, as a strong performance makes the CEO more attractive to other firms. We take $f(0) = 0$ and $f(\alpha_1) \to 1$ as $\alpha_1 \to \infty$. Her search comes at a personal cost of k.

If the CEO does find such an external position, we assume that her current firm competes with the new firm in trying to retain/attract the CEO. We take the outcome of bidding between the firms to be resemble an English auction. Hence, the CEO switches to the new firm (as the CEO is assumed to be more valuable in the new firm) and her compensation is driven up to the highest value her current firm is willing to pay.[16] We take this to be the entire value (α_1) that the CEO could have brought to her current firm.

On the other hand, if the CEO fails to find an alternative position, we assume she is retained at his current firm. To capture the notion that the CEO has a limited time to decide whether to remain with the firm or leave, we assume that she can engage in such a search only once prior to the start of the second period. If her search fails, the firm has no incentive to offer her more than what she would receive with her current bargaining power. Hence, if the search fails, the CEO can expect to receive $\beta_0\alpha_1.\alpha_1.\alpha_1\ \beta_0\alpha_1\alpha_1$. Given her personal search cost of k, her expected compensation

[14] This is for simplicity but is without loss of generality because the CEOs are risk-neutral and incentives do not affect the output.

[15] Dismissal and search costs can be introduced easily but would contribute little to the discussion.

[16] We are implicitly assuming that the current firm has some way to commit to paying α_1. If the most that the current firm can commit to paying is $M_1 < \alpha_1$, then this could limit the most that the CEO obtains in a bidding contest between the current and new firm.

from searching can be expressed as: $f(\alpha_1)\alpha_1 + (1 - f(\alpha_1))\beta_0\alpha_1 - k$. This represents a gain of $f(\alpha_1)\alpha_1(1 - \beta_0) - k$ over her expected compensation $\beta_0\alpha_1$ in the absence of a search. Hence, the CEO will search as long as:

$$f(\alpha_1)\,\alpha_1\,(1 - \beta_0) - k \geq 0\,. \tag{A.3}$$

Let us denote by α_1^* the value of α_1 such that equation (A.3) is just satisfied as an equality. In other words, for $\alpha_1 > \alpha_1^*$, the CEO is expected to engage in a search for outside opportunities, unless she is offered an alternative arrangement at her current firm. By our assumption about the ability of replacement CEOs (i.e., $\alpha_R \sim N(0, \sigma_R^2)$), it is in the interest of the current firm to retain the CEO as long as it can offer her compensation that is less than the surplus α_1 she is expected to produce. We have assumed that contracts are always subject to renegotiation, so that unless there is a change in the CEO's bargaining power, she expects to receive $\beta_0\alpha_1$. Hence, if the CEO's perceived ability after the first period is $\alpha_1 \geq \alpha^*$, she will search unless there is some means of committing to compensate her at least as much as she expects to receive from searching. Our contention is that appointing the CEO to chair serves as a way to commit to a better subsequent treatment by the board and can, therefore, be used to retain the CEO. We are assuming here that it is optimal for the firm to commit to the higher compensation to retain the CEO. Further, as noted, if it were possible to write credible contracts, it would not be necessary to promote the CEO to chair. A credible contract would be possible if the compensation were, for instance, tied to performance measures that could be verified.

The notion that yielding greater power to the CEO can be beneficial and reduce CEO concerns has been made elsewhere.[17] We denote the bargaining power after promotion to be $\beta_1 > \beta_0$.[18] As a result of bargaining power β_1, the expected compensation to the CEO in the next period is $\beta_1\,\alpha_1$. Hence, if the CEO is promoted to chair (conditional on not searching) she will accept the chair and not search as long as:

$$\beta_1\,\alpha_1 \geq f(\alpha_1)\,\delta\alpha_1 + (1 - f(\alpha_1))\,\beta_0\alpha_1 - k. \tag{A.4}$$

For our analysis, we assume that equation (A.4) is satisfied and that the promotion to chair is effective in inducing the CEO with $\alpha_1 > \alpha_1^*$ from engaging in costly search. Next, we discuss some of the testable implications of our model.

A.2 | Proof of Prediction 2

Prediction 2:

In the period prior to the CEO being appointed chair, the firm's performance is expected to be strong (y_t will exceed a^*). The performance (y_t) is expected to be greater than the average subsequent performance exhibited by the firm. Hence, the average performance post-chair promotion will tend to decline.

Proof: Prediction 2 follows from the updating equation (A.2). Suppose that the manager's expected ability at $t-1$ is a_{t-1}. We expect $a_{t-1} < a^*$, otherwise the CEO would already be chair. Now, if the CEO is appointed chair following date t performance, it must be because $a_t \geq a^*$ and $y_t > a^*$ as:

$$a_t = w_t\,a_{t-1} + (1 - w_t)\,y_t \geq a^*\;\; y_t > a^*.$$

As $a_t \geq a_{t-1}$, the updating equation above implies $y_t > a_t$. Hence, the average subsequent performance (as a_t represents expected ability and expected subsequent performance) will tend to be below y_t.%■

[17] See, for example, Hermalin and Weisbach (1998), Almazon and Suarez (2003), Adams and Ferreira (2007), and Williamson (2008).

[18] The bargaining level β is not necessarily unique to duality and may be determined by a host of factors such as the ease of replacing the CEO, the committees to which the CEO is appointed, the number of insiders, and the relationship of board members to the CEO among other considerations.

APPENDIX B: DEFINITIONS AND DATA SOURCE FOR VARIABLES

Variable	Source	Definition
Combined CEO/Chair Positions	Proxy Statements, Corporate Library	CEO also chairs the board
Annual Stock Return	Compustat	$(PRCCF_t - PRCCF_{t-1} + DVPSX\_F)/PRCCF_{t-1}$
Annual Return on Assets	Compustat	(Operating Income before Depreciation and Amortization)/(Book Value of Total Assets); OIBDP/AT
Assets	Compustat	AT
Sales	Compustat	REVT
Firm Age	CRSP	First listing date on CRSP
Homogeneous Industry (0/1)	Calculated from CRSP data	Takes the value 1 if the Industry Homogeneity Measure (Parrino, 1997) is above the industry median
Board Size	Proxy Statements, Corporate Library	Number of directors on the board
Percentage Insider Directors	Proxy Statements, Corporate Library	Percentage of directors who work for the firm, are retired from the firm, or have an immediate family member who works or retired from the firm
Coopted Board (0/1)	Proxy Statements, Corporate Library	Equals 1 if the percentage of coopted directors is above the sample median. A director is coopted if the CEO has been in place longer than the director (Coles et al., 2014)
% Foreign Tax (Percentile Rank)	Compustat	The percentile rank of Foreign Tax/Total Tax
Number of Business Segments	Compustat	The number of reported business segments
Capital Expenditures/Sales	Compustat	CAPX/REVT
R&D/Sales	Compustat	RDIP/REVT
Leverage Ratio	Compustat	Total Debt/Total Assets (DLTT+DLC)/(AT)
CEO Ownership (%)	Proxy Statements, ExecuComp	(Shares owned by the CEO)/)*100%
CEO Tenure	Proxy Statements, ExecuComp	Number of Years the CEO has been CEO
CEO Age	Proxy Statements, ExecuComp	Age of the CEO
Insider CEO (0/1)	Proxy Statements	Equals 1 if the CEO is promoted from within the firm
Total Compensation	ExecuComp	The sum of salary, bonus, other annual compensation, total value of restricted stock granted, total value of options granted, long-term incentive payouts, and all other total compensation (TDC1) corrected post 2006 per the method in Coles et al. (2013)
Compensation Delta	Calculated from ExecuComp data	The dollar change in current CEO compensation for a 1% change in stock price (Coles et al., 2013)
Portfolio Delta	Calculated from ExecuComp data	The dollar change in the CEO's portfolio holdings for a 1% change in stock price (Coles et al., 2013)

(Continues)

Variable	Source	Definition
Compensation Vega	Calculated from ExecuComp data	The dollar change in the CEO's Black–Scholes value of new option grants with respect to a 0.01 change in stock volatility (Coles et al., 2013)
Portfolio Vega	Calculated from ExecuComp data	The dollar change in the CEO's Black–Scholes value of option portfolio with respect to a 0.01 change in stock volatility (Coles et al., 2013)