CEO Turnovers Due to Poor Industry Performances: An Examination of the Boards' Retention Criteria

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Abstract This study investigates how CEO turnovers relate to firm-specific (*i.e.*, idiosyncratic) and industry peer performances from the perspective of price informativeness. For CEO turnover events that occur during recessions, idiosyncratic stock returns carry more weight for the retention decisions than industry peer returns, whereas, the opposite is true during booms. Moreover, stock prices are more reflective of CEOs' abilities during recessions than in booms. The weight assigned to idiosyncratic stock returns is subdued when stock prices are more synchronous with the industry and overall market, whereas, the weight assigned to industry returns is weakened when accounting numbers are more value relevant. Price informativeness therefore has a significant impact on the weights assigned to the performance measures used by the boards in making CEO retention decisions. Our findings indicate that the boards' CEO retention decisions are rationally made and rely to a large extent on the informativeness of stock prices.

Keywords: CEO turnovers, idiosyncratic return, industry return, industry condition, price informativeness, value relevance

JEL: G3, G30, M4, M40

1. Introduction

Changing chief executive officers (CEOs) is one of the most crucial matters confronting board of directors in modern firms, given that CEOs play a central role in designing a firm's strategic direction, setting its financial policy, making acquisitions, and conducting other investment activities. Despite this, studies show that CEO turnovers have become increasingly frequent in modern firms over the past decades, making the profession highly risky.[1] Given the high frequency of CEO turnovers and the importance of this position, it is of particular importance to check how boards of directors assess their CEOs in retention decisions.

The topic of CEO turnovers has attracted numerous empirical works across accounting, finance and management. Early studies largely document a negative association between CEO replacement and a firm's stock performance, implying that firm-specific performance plays a determinant role in the board's CEO retention decisions (*e.g.*, Kini, Kracaw, and Mian, 2004; Franks, Mayer, and Renneboog, 2001; Denis, Denis, and Sarin, 1997; Warner, Watts, and Wruck, 1988). However, recent studies by Jenter and Kanaan (2015) and Kaplan and Minton (2012) have challenged these results by presenting evidence that CEOs are more likely to be dismissed due to poor industry performance that is beyond their control. Nevertheless, it is unclear why company boards place high value on the poor performance by the CEOs' peers while firing their CEOs and whether such decisions are proportionate or erroneous. Therefore, Jenter and Kanaan (2015) call for further studies to identify the root cause of the peer performance effect on CEO turnovers.

[1] A report by Challenger, Gray & Christmas Inc. (released on October 9, 2019) claims that as of September 2019, 1,160 CEOs have left their posts within a year of joining the firms. This is the highest total CEO turnovers in the first nine months of a year since they began tracking CEO turnovers in 2002. Challenger is a global outplacement and executive coaching firm that tracks CEO turnovers at companies that have been in business for at least two years, with a minimum of ten employees. A detailed report on the CEO turnovers for each month of the past decade is available at their website: https://www.challengergray.com.

To have a more nuanced understanding of CEO retention decisions in modern firms, this study investigates how CEO turnovers relate to firm-specific (*i.e.*, idiosyncratic) and industry peer performances. In agency models with multiple performance measures, Holmstrom and Milgrom (1991) and Banker and Datar (1989) argue that an optimal contract should place more weights on performance measures that are more precise and more sensitive to the agent's efforts. We apply these arguments to CEO retention decisions and examine if the usefulness of idiosyncratic and industry peer performances in CEO turnovers is determined by the informativeness of a firm's stock price in revealing its CEO's efforts and ability.

We start the examination with a replication of the findings of the previous studies with a large sample of CEO turnovers during 1993–2019. We find that CEO turnovers are negatively related to both idiosyncratic stock returns and industry peer stock returns and such negative relationships are more evident in forced CEO departures. Moreover, for the whole sample of forced CEO departures, the magnitude of the coefficient of industry stock returns is less than that of idiosyncratic stock returns, conforming to previous studies.

Next, given the nonnegligible impact of industry performance on CEO turnovers, we check if, and if so how, such impact might vary with the industry conditions. Eisfeldt and Kuhnen (2013) propose that industry conditions determine the most desirable managerial skill sets while appropriately matching firms with the right managers. In their model, the firm-manager matching during industrial recessions is not as good as in industrial booms and CEOs are more likely to be fired during recessions than during booms. In actuality, a high frequency of CEO turnovers in the recession years also implies that the information content of a firm's stock performance regarding its CEO's ability is different between industrial booms and recessions. Applying Holmstrom and Milgrom's (1991) contracting theory to CEO turnover events, if retention decisions are made optimally, the weights placed on firm-

specific and industry peer performances in CEO turnover events are expected to be different, conditional upon the industry's boom-and-bust cycles.

The results confirm our expectation. In forced CEO turnover events, we find that corporate boards place a larger weight on idiosyncratic stock returns during recessions, whereas, the weight placed on industry returns is larger during booms. Obviously, firm-specific performance plays a determinant role in CEO turnover events during an industrial downturn, whereas industry performance is more important during prosperous conditions. Strikingly, we also find that powerful CEOs can adapt with the industrial environment to moderate the role of the performance measures used by the boards in their retention decisions. By contrast, such function of the performance measures is strengthened with the existence of blockholders in a firm. These pieces of evidence suggest that CEO retention decisions are sensibly made by the boards based on idiosyncratic and industry performances. Clearly, the boards have their own concern when making these decisions.

Then, we go a step further and explore the underlying mechanism that gives rise to this difference of weights placed on performance measures. Specifically, we examine the role of the informativeness of stock prices regarding turnover events. In keeping with the contracting theories (Holmstrom and Milgrom, 1991; Banker and Datar, 1989), we propose that the weights assigned to performance measures in CEO turnover events are determined by the informativeness of stock price in revealing CEOs' efforts, wherein a firm's stock return is more reflective of CEOs' abilities and efforts during recession periods than in booms. The function of price informativeness in CEO retention decisions analyzed here is similar as that discussed by incentive literature in CEO's compensation construction, [2] given that CEO turnover could be taken as an extreme incentive consideration.

[2] The incentive literature documents that CEO's pay is strongly and positively related to a firm's sector performance, which is outside the CEO's control (e.g., Garvey and Milbourn, 2003; Aggarwal and Samwick, 1999; Janakiraman, Lambert, and Larcker, 1992; Antle and Smith, 1986). Kang and

To test this proposition, we evaluate price informativeness from two perspectives. First, the synchronicity of a firm's stock return with the industry peers and the overall market. Second, the value relevance of a firm's accounting numbers. If a firm's stock price is more informative about a CEO's efforts and talents, it should be less synchronous with the market, but more representative of its accounting numbers.

We first test the association between price informativeness and industry conditions. The results show that the stock return synchronicity is approximately 30% smaller, while the value relevance of accounting numbers is 30% larger during recessions than in booms. The evidence confirms that stock prices are more revealing about CEOs' abilities during recessions than in booms. Second, we examine the impact of price informativeness on the weights placed on performance measures in CEO retention decisions. After incorporating the proxies for price informativeness, we find that the weight assigned to idiosyncratic stock returns is significantly reduced when a firm has greater stock price synchronicity, whereas, the weight assigned to industry returns is largely weakened when a firm's accounting numbers are more value relevant. Further analysis shows that the moderation of the weights caused by price informativeness is economically meaningful regarding the likelihood of forced departure for a CEO. The evidence confirms that the boards' CEO retention decisions rely to a large extent, although not exclusively, on the informativeness of stock prices.

Our findings shed light on the issue of the proportionate retribution for CEOs' poor industry performances (Jenter and Kanaan, 2015; Eisfeldt and Kuhnen, 2013; Cornelli, Kominek, and Ljungqvist, 2013; Kaplan and Minton, 2012). Jenter and Kanaan (2015) do not examine the informativeness of stock prices varying with the industry's boom-and-bust cycles, and thus, do not offer a definitive conclusion on whether the boards' decisions on

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Liu (2008) posit that the extent to which CEO's pay is based on stock price is determined by the informativeness of a firm's stock returns relative to the industry peer returns.

CEO turnovers are made rationally.[3] In Eisfeldt and Kuhnen's (2013) model, industry shocks signal that a CEO's abilities do not match with the firm's requirements; however, they also do not examine the function of price informativeness coherent with industry condition in turnover decisions. Moreover, while the Eisfeldt-Kuhnen model provides an explanation for the high frequency of CEO turnovers during industrial recessions, the model does not tell why peer performance becomes even more important in turnover decisions during industrial booms. Our study addresses these gaps from the perspective of the price informativeness regarding CEO turnovers. Our analysis confirms Jenter and Kanaan's (2015) conjecture that a firm's stock price better reflects a CEO's abilities during recessions than in booms. More importantly, we show that price informativeness has a significant impact on the weights placed on firm-specific performance compared to industry peer performance in CEO turnover events. The evidence demonstrates that the boards' CEO retention decisions are made rationally based on the informativeness of stock prices to a large extent.

Our study builds on and extends the stream of research on how boards of directors assess their CEOs while undertaking retention decisions. Defond and Hung (2004) and Engel, Hayes, and Wang (2003) compare the importance of stock performance against accounting performance as the determining factor of CEO turnovers. However, we go a step further by decomposing stock performance into idiosyncratic and industry returns and compare their functions in CEO retention decisions for varying industry conditions. Our study shows that during industrial recessions, when the information about a CEO's abilities and efforts is more apparent, idiosyncratic stock returns play a determinant role in turnover events, whereas industry returns are only a marginal consideration for decision making. Conversely, during

[3] Nonetheless, Jenter and Kanaan (2015) conjecture that the information content of stock price could be a determining factor of the peer performance effect on CEO turnovers. They conclude their study with two competing propositions — "More research is needed to conclusively identify the cause of the peer performance effect on CEO turnover. Our results are consistent with the idea that boards mistakenly credit and blame CEOs for performance beyond their control, but also with the idea that performance in recessions reveals more (or more important) information about CEO quality than performance in booms." (p.2181).

industrial booms, when idiosyncratic stock returns are more synchronous with the industry peer returns and less informative about a CEO's abilities and efforts, its impact on CEO turnovers decreases and industry returns become more relevant to turnover decisions.[4] Our evidence is consistent with the informativeness principle in contracting theories, which argues that an optimal contract should place larger weight on performance measures that are more precise and sensitive to the agent's efforts (Holmstrom and Milgrom, 1991; Banker and Datar, 1989).

Regarding the informativeness of stock prices, previous works have examined its function in various contexts of corporate operation, including initial public offerings (Michaely and Shaw, 1994; Jegadeesh, Weinstein, and Welch, 1993), compensation construction (Gopalan, Milbourn, and Song, 2010; Kang and Liu, 2008), mergers and acquisitions (Edmans, Goldstein, and Jiang, 2012; Luo, 2005), and corporate investment (Bakke and Whited, 2010; Chen, Goldstein, and Jiang, 2007), etc. Our study adds to this line of research by documenting an important role of price informativeness in the board's CEO retention decisions. Additionally, it has long been documented in accounting studies that the value relevance of the accounting numbers experiences a continuous decline over the past decades (e.g., Srivastava, 2014; Donelson, Jennings, and McInnis, 2011; Lev and Zarowin, 1999; Francis and Schipper, 1999). The deterioration in relevance to investors' decisions leads certain accounting scholars (e.g., Lev and Gu, 2016) to conclude that financial reports have become useless in capital market decisions. Recently, Fung, Su, and Zhu (2010) contend that the value relevance of accounting information does not decline over time; instead, driven by noise trading, the stock prices show a greater deviation from fundamental values in more

[4] Extremely, if a firm's stock price is completely synchronous with the industry and overall market, then no firm-specific information is needed for the board to consider on the CEO performance. Under such circumstance, the boards do not need firm-specific return but can rely solely on industry return when making CEO retention decisions.

recent periods.[5] In this study, the association between stock returns and accounting numbers is used to evaluate the informativeness of stock prices, which is found to impact CEO retention decisions significantly. While our aim is not to examine the value relevance of accounting numbers, the function of price informativeness in CEO turnover events documented here confirms the usefulness of accounting numbers in major decisions. Our study, therefore, also makes a valuable contribution to this strand of accounting literature.

This paper is organized as follows. Section 2 reviews the related literature and develops the hypotheses. Section 3 describes the data and the research design. Section 4 presents the main findings. Section 5 explores the role of price informativeness, and Section 6 summarizes and concludes.

2. Literature Review and Hypothesis Development

2.1 Literature review

There is a large body of literature exploring CEO turnovers in modern firms. Early studies have documented that firm-specific performance plays a determinant role in CEO retention decisions, wherein underperforming CEOs are likely to be fired by the boards (Kato and Long, 2006; Kini, Kracaw, and Mian, 2004; Volpin, 2002; Franks, Mayer, and Renneboog, 2001; Denis, Denis, and Sarin, 1997; Murphy and Zimmerman, 1993; Warner, Watts, and Wruck, 1988, among others). Contrasting this viewpoint, Jenter and Kanaan (2015) document that CEOs are more likely to be dismissed after a bad industry or a bad market performance, irrespective of their tenure, even though longer-tenure CEOs should have already proven their quality. Therefore, they conjecture that the boards mistakenly credit and

[5] The deviation of stock prices from fundamental values is also documented in corporate finance literature. For instance, Rhodes-Kropf and Viswanathan (2004) show that corporate takeovers are fundamentally affected by deviations between market value and intrinsic value on both sides of the transaction.

blame CEOs for performance that are beyond their control. However, Jenter and Kanaan's sample excludes external turnovers, or turnovers due to corporate takeovers. This could be important because the takeover literature shows that when a target firm is acquired, its CEO tends to be removed and replaced by a new one (Li, Tong and Cheng, forthcoming; Hartzell, Ofek, and Yermack, 2004; Agrawal and Walkling, 1994).

Kaplan and Minton (2012) focuses on both internal and external turnovers with a sample of Fortune 500 companies from 1992 to 2007. They find that CEO turnovers are more frequent in the more recent years (2001–2007) of their study. More importantly, they also observe firms firing their CEOs not only have poor firm performance but also have poor industry and market performance. Furthermore, they find that turnover-performance sensitivity is related to an increase in block holdings and director independence.

Observing a large sample of American listed firms during 1992–2006, Eisfeldt and Kuhnen (2013) also document that company boards do not filter out industry peer performance during CEO retention decisions. Their competitive assignment model matches CEOs and firms based on multiple characteristics, including industry conditions. The model predicts that an industry shock increases the possibility of a CEO-firm mismatch, thus making the CEOs more likely to be fired during an industry shock or a macroeconomic setback.

Cornelli, Kominek, and Ljungqvist (2013) provide an opposite view while examining a unique sample consisting of private-sector companies from Central and Eastern Europe and Central Asia, funded by private equity fund-holders with large shares and having a board representation. Their sample provides hard information regarding the management's annual performance against the board's expectations (such as sales and profit targets, as well as the strategic and investment plans) set at the beginning of each fiscal year. It also provides soft information on how a fund manager views the CEO's competency and whether the firm's

underperformance is caused by the CEO's bad decisions or by factors beyond the management's control. Their comprehensive data reveal that CEOs are not fired for bad performances due to factors beyond their control, nor are they fired for making "honest mistakes". They also observe an improved performance following forced CEO turnovers. However, their findings may not be generalized easily due to the uniqueness of the sample.

The motivation for this study comes from the intriguing but mixed findings on the circumstances and factors determining forced CEO turnovers. Our research works on the assumption that firms make rational decisions, and that while making an important decision of terminating their CEOs, firms must have a "good" rationale for considering peer performance as a criterion for turnover decisions. Jenter and Kanaan (2015) propose that market structure and/or unobservable factors impinging on business cycles could explain why boards do no filter out peer performance for CEO retention decisions. In a similar vein, in Eisfeldt and Kuhnen's (2013) model, industry shocks increase the possibility of the CEO-firm mismatch, thereby leading towards poor firm performance, driving CEO turnovers. Following their direction, we continue the exploration on the pattern of CEO turnovers, conditional upon the industry's boom-and-bust cycles.

2.2 Hypothesis development

In contracting theories, using agency models with multiple performance measures, Banker and Datar (1989) and Holmstrom and Milgrom (1991) argue that an optimal contract should place more weight on performance measures that are more precise and sensitive to the agent's efforts. Applying these arguments to CEO retention decisions, Engel, Hayes, and Wang (2003) propose that in CEO turnover events, the board would prefer using performance measures that are more informative regarding the CEO's efforts and abilities. Empirically, they document that accounting-based measures receive greater weight during turnover

decisions when accounting-based information are more precise and sensitive. Additionally, when accounting-based information are more sensitive to the CEO's abilities, market-based performance measures have less weight in turnover decisions. Building on these studies, we examine if the usefulness of idiosyncratic and industry peer performances in CEO turnovers is determined by the informativeness of stock price in revealing CEOs' efforts and ability.

In Eisfeldt and Kuhnen's (2013) model, industry conditions determine the most desirable managerial skill sets and industry shock or macroeconomic setbacks reveal the incumbent CEO's inability to match the new operational environment. The model predicts that the CEO-firm mismatch during recessions is likely to result in the CEO's dismissal. However, stock returns are also more predictable in recession times compared to prosperous periods, as documented by asset pricing literature (e.g., Cujean and Hasler, 2017; Dangl and Halling, 2012; Henkel, Martin, and Nardari, 2011; Rapach, Strauss, and Zhou, 2010). In keeping with this strand of studies, a high frequency of CEO turnovers in Eisfeldt-Kuhnen model *per se* implies that the firm's performance is more informative and valuable during an industrial recession compared to a boom, especially in testing the CEO's abilities. In the boom stage, it is not rare that a mediocre CEO performs even better than an otherwise excellent CEO,[6] possibly due to an optimism/overconfidence about the firm and/or the industry's future,[7] more courage for risk-taking, or simply good luck. Accordingly, it is hard to infer a CEO's real ability from the performance in the boom stage. Since a firm's performance during the boom stage is less revealing about a CEO's ability, the weight placed on it will be weakened in CEO retention decisions.

[6] A similar case occurs when the market is in a bull stage, and rookie investors often defeat professional investors. Warren Buffett, a world-renowned value investor, says that "Only when the tide goes out do you discover who's been swimming naked".

[7] In Goel and Thakor's (2008) model, high overconfidence can destroy firm's value, but moderate overconfidence has a beneficial effect on corporate operations. Hirshleifer, Low, and Teoh (2012) and Galasso and Simcoe (2011) show that overconfident managers are more suitable for undertaking innovative projects that are riskier and more challenging. Phua, Tham, and Wei (2018) show that overconfident CEOs can maintain supplier relationships.

Industry returns can also reveal important information for the boards' decision making, including regarding CEO turnovers. In their incentive model, Gopalan, Milbourn and Song (2010) argue that the sector performance should not be filtered out while deciding on the CEO's compensation as it is reflective of the CEO's strategic decisions in corporate operations. In their model, a firm's exposure to sector movements is under the CEO's control, to a large extent, although the industry or market forces are not. Therefore, the boards of directors might want to incentivize the CEOs based on their sector performance in cases where the shareholders expect the CEOs to optimally direct the firms' exposure to the industry (which refers to "strategy"). Therefore, applying their theory to CEO turnover events, we assume that during the boom period, the boards of directors would naturally expect their firms to be exposed to the sector movements and incentivize CEOs to do so through their retention decisions.[8] A CEO who does not conform with the board's expectation to expose the firm to the sector movement during the boom period is likely to be fired; and the greater the industrial boom, the more likely is the CEO's dismissal. Therefore, in the booming period, industry performance plays a greater role in CEO turnover decisions, and the turnover-industry performance sensitivity will be strengthened.

Taken together, we derive the following hypotheses regarding the weights placed on the firm-specific and the industry peer returns by the boards in their CEO turnover decisions, conditional upon the industry's boom-and-bust cycles:

Hypothesis 1 (H1): In the boom periods, idiosyncratic stock returns carry a smaller weight compared to industry returns.

Hypothesis 2 (H2): In the recession periods, idiosyncratic stock returns carry a greater weight compared to industry returns.

[8] The rationale becomes clearer when CEO turnovers are taken only as an extreme incentive consideration.

3. Research Design

3.1. Sample selection

CEO turnovers are initially identified using the Standard & Poor's ExecuComp dataset. Details about the turnover are explored with the Factiva news database. Following previous studies (Huson, Parrino, and Starks, 2001; Parrino, 1997), CEO departures are classified as forced if the incumbent CEO departs prior to age 60 and does not leave for other employment or for health reasons or if the press articles report that the CEO was forced from the position. All the other turnovers are classified as voluntary. The data on accounting and stock market information are obtained from Compustat and Center for Research on Security Prices (CRSP), respectively. The data on the CEO and director characteristics are mainly collected from ExecuComp and BoardEx. The data on the institutional shareholders are collected from the Securities Exchange Commission's (SEC) Form 13F filings. We try to ensure that our observations do not miss any data necessary to conduct this study. For observations that are not included in the datasets used in this study, the data needed are collected manually from the proxy statements and the 10-K forms on EDGAR. Finally, we get 3,675 voluntary and 1,236 forced CEO departures out of a total sample of 44,582 CEO-firm-year observations during 1993–2019. [9]

3.2. Regression model

[9] We are also grateful to Eisfeldt and Kuhnen (2013) and Jenter and Kanaan (2015) for sharing their data on CEO turnovers during 1992–2006 and 1993–2009, respectively. Our sample period is longer than theirs. Nonetheless, we conduct robustness tests with their data on forced CEO departures and our main results (unreported) are qualitatively unchanged.

We test the relationship between the performance measures and the CEO turnover events using the following basic logit model: [10]

$$Turnover_{i,t} = \alpha_0 + \alpha_1 ExRET_{i,t-1} + \alpha_2 IndRET_{i,t-1} + \alpha_3 ExROA_{i,t-1} + \alpha_4 IndROA_{i,t-1} + \alpha_5 ExRET1_{i,t-2} + \alpha_6 IndRET1_{i,t-2} + \alpha_7 ExROA1_{i,t-2} + \alpha_8 IndROA1_{i,t-2} + \alpha_9 IndCond_{i,t-1} + \alpha_{10} CEO\_Power_{i,t-1} + \alpha_{11} Blockholder_{i,t-1} + \alpha_{12} Control\ Variable_{i,t-1} + \epsilon_{i,t-1} \quad (1)$$

In model (1), the dependent variable *Turnover* is a dummy variable that equals one if a CEO turnover is observed in a fiscal year, and zero otherwise.

ExRET represents a firm's annual stock return in the year before a CEO turnover, adjusted with the value-weighted industry stock return using three-digit SIC industry definitions. [11]

ExROA represents a firm's accounting return on assets (ROA) in the year before a CEO turnover, adjusted with the industrial median ROA, where the ROA is defined as the ratio of net income to the total assets.

IndRET represents the value-weighted industry stock return in the year before a CEO turnover.

IndROA represents the industrial median ROA in the year before a CEO turnover, where the ROA is obtained as the ratio of net income to the total assets.

[10] In model (1), we define firm-specific and industry returns using Eisfeldt and Kuhnen's (2013) approach. We also construct both performance measures using Jenter and Kanaan's (2015) approach (reported in Section 4.2.3), our results remain the same, qualitatively.

[11] Throughout this study, we categorize the firms using three-digit SIC industry definitions. Our results are qualitatively the same if the categorization is performed with the Fama-French 48-industry classification scheme.

ExRET1, *ExROA1*, *IndRET1* and *IndROA1* are the lagged measures of the corresponding variables in the preceding year.

IndCond is a dummy variable for a firm's industry condition. Following Eisfeldt and Kuhnen (2013), we define an industry to be in a boom (recession) stage for an observation year if the average industry ROA in the preceding three years is above (below) the corresponding average industry ROA in the preceding ten years. [12]

CEO_Power is a categorical variable for a CEO's power in a firm. Following Adams, Almeida, and Ferreira (2005), we measure the CEOs' power through the number of titles they possess. Specifically, *CEO_Power* equals one if the CEO does not have any position on the board, two if the CEO holds the position of the Chairman of the board, and three if the CEO holds both the positions of the Chairman of the board and President. A CEO, therefore, is more powerful if he/she has more titles in the firm. [13]

Blockholder represents the number of institutional shareholders holding more than 5% of shares. The *Control variables* include various firm, CEO, and board characteristics.

The main test variables in the model are *ExRET*, *ExROA*, *IndRET* and *IndROA*. The estimated coefficients for these variables represent the relative weights placed by the boards of directors in CEO turnover decisions on the firm-specific and industry peer performance. We use no turnover events as the reference group and separately estimate the logit regression for voluntary and forced departures.

[12] Economists do not reach an agreement on the definition of business cycle. While some (e.g., Sims, 1980) view the state of economy as continuously evolving, others (e.g., Hamilton, 1989) see it in discrete terms. In the model, we simply adopt the approach of Eisfeldt and Kuhnen (2013) to define industry conditions. We believe that this problem is not large enough to be consequential. Our aim in the regression is to show that the weights assigned to performance measures vary with the industry conditions, whereas our final goal is to explore the underlying mechanism that gives rise to such differences, as shown in Section 5.

[13] Finkelstein (1992) identifies four sources of power: ownership power, expert power, structural power, and prestige power. Our measure of CEO power consists of only one dimension, and therefore, it is not surprising that our results may be not applicable to other dimensions of CEO power, which were investigated by Jenter and Kanaan (2015).

4. Results

4.1 Summary statistics

(Insert Table 1 here)

We begin our analyses with the descriptive statistics of the sample's turnover events. Table 1 reports the summary statistics for CEO turnover events in the sample. Regardless of the turnover type, the majority of the outgoing CEOs are replaced by internally promoted successors from within the firm. Moreover, compared to forced departures, a CEO with a voluntary departure is more likely to be succeeded by a company insider. These results are generally consistent with the evidence documented in the prior literature.[14]

The CEO turnovers vary according to the industry conditions. Compared with an industrial boom, CEOs are more likely to be fired and less likely to leave voluntarily during an industrial recession, consistent with Eisfeldt and Kuhnen (2013).

Additionally, CEO's power has a significant impact on turnover events. Across both voluntary and forced departures, the turnover frequency is significantly lower for more powerful CEOs, implying that they are able to hold on to their position longer than their less powerful counterparts.

Large institutional shareholding is associated with significantly higher forced turnover frequency. This evidence confirms that blockholders play an effective role in monitoring the CEOs within the governance mechanisms of modern firms, consistent with prior literature (e.g., Edmans, 2014; Cronqvist and Fahlenbrach, 2009).

[14] For a sample during 1993–2005, Cremers and Grinstein (2014) find that 71% of new CEOs come from internal promotions.

(Insert Table 2 here)

Table 2 presents the descriptive statistics of the firm and the CEO characteristics based on the turnover type. To avoid outliers, we drop 1% of the observations from each of the four main performance measures; firm-specific stock returns (*ExRET*), firm-specific accounting returns (*ExROA*), industry stock returns (*IndRET*), and industry accounting returns (*IndROA*).

In Panel A, the no turnover group experiences a significantly higher idiosyncratic stock return (mean *ExRET* = 0.026) in the year before a CEO turnover compared to the groups containing voluntary (*ExRET* = –0.041) and forced CEO departures (*ExRET* = –0.087). This pattern also extends to the industry stock return *IndRET*, confirming Jenter and Kanaan's (2015) finding that CEO turnovers occur more frequently in firms with poor industry performance.

The events of forced CEO departures are more likely to occur during industry recessions (mean *IndCond* = 0.645) than voluntary CEO departures (*IndCond* = 0.525), once again confirming Eisfeldt and Kuhnen's (2013) proposition that an industry shock increases the possibility of a CEO-firm mismatch and drives CEO dismissals.

Forced departure group has the lowest percentage of independent directors on the board (mean *DirectorRatio* = 0.69) and directors have the shortest working period in the position (mean *DirectorTenure* = 7.84), compared to no turnover and voluntary departure groups. Nonetheless, there are more institutional shareholders (mean *Blockholder* = 2.32) in the forced departure group.

Finally, compared to the counterparts in the no turnover and voluntary departure groups, the CEOs in the forced departure group are relatively younger (mean *CEO_Age* = 52.9) and have a shorter period in the position (mean *CEO_Tenure* = 5.68). They are also less powerful

(mean *CEO_Power* = 1.66), less likely to be a founder of the firm (mean *Founder* = 0.067) and hold the lowest percentage of shares (mean *CEO_Share* = 0.656).

Panel B reports the descriptive statistics of the performance measures by industry conditions. In the year before CEO turnovers, industry stock return *IndRET* and accounting return *IndROA* are both significantly larger (at the 1% level) during booms than in recessions. Apparently, firms overall perform better during an industrial boom compared to a recession. As for firm-specific returns *ExRET* and *ExROA*, they are not statistically different between recessions and booms.

4.2 Regression analysis

4.2.1 Relationship between CEO turnovers and performance measures

We then perform regressions to test the relationship between CEO turnover events and performance measures using model (1). Table 3 reports the regression results.

(Insert Table 3 here)

In the voluntary departures subsample, the results for specification (1) show that only the idiosyncratic stock return *ExRET* is significantly associated with turnover decision (coefficient = –0.007, *t*-value = –2.65). Regarding the forced CEO departures, the results for specification (4) suggest that the likelihood of a CEO being fired is significantly and negatively related to both the idiosyncratic stock return *ExRET* with an estimated coefficient of –0.043 (*t*-value = –13.04) and the industry peer stock return *IndRET* with an estimated coefficient of –0.016 (*t*-value = –2.07). The fact that the coefficient of *ExRET* has a larger magnitude than *IndRET* suggests that boards assign a larger weight to idiosyncratic stock

return than to the industry peer return in their CEO turnover decisions, consistent with the finding of Jenter and Kanaan (2015). In terms of the accounting performance, both the firm-specific and the industry peer ROA measures are also negatively related (at the 5% level) to the forced CEO departures with the coefficient for the former (coefficient = –0.025) being double that of the latter (coefficient = –0.013).

For specification (5), we test the impact of the CEO's power on the boards' CEO turnover decisions. The estimated coefficient for *CEO_Power* is negative (–0.019) and significant (*t*-value = –4.29), indicating that powerful CEOs are less likely to be fired. Moreover, the interaction of *CEO_Power* with *ExRET* is significantly positive with an estimated coefficient of 0.016 and a *t*-value of 2.39. *CEO_Power* also positively interacts with *IndRET*, with an estimated coefficient of 0.013 and a *t*-value of 1.79. Apparently, the importance of performance measures to the considerations of forced departure is moderated by the powerful CEOs.

For specification (6), we test the impact of the institutional shareholders on the CEO turnover events. The variable *Blockholder* is significantly positive (coefficient = 0.005, *t*-value = 2.68), indicating that the firms with more institutional shareholders are more likely to fire underperforming CEOs. In addition, the interactions of *Blockholder* with both *ExRET* and *IndRET* are significantly negative, suggesting that the weights placed on performance measures in forced turnover decisions are strengthened by the existence of institutional shareholders.

Overall, the evidence is consistent with Eisfeldt and Kuhnen (2013) and Jenter and Kanaan's (2015) findings, showing that the boards place a larger weight on stock returns than on accounting returns, and idiosyncratic performance than on industry performance as important factors in their decisions on forced CEO turnovers.

4.2.2 Impact of industry condition on CEO turnover decisions

Next, we further test the relationship between CEO turnover events and performance measures by partitioning the sample based on industry conditions. We conduct separate logit regressions for industrial booms and recessions. Table 4 reports the regression results.

(Insert Table 4 here)

In Table 4, Panel A presents the results for industrial booms. The result on the relative magnitude of the estimated coefficients of *ExRET* and *IndRET* particularly stands out. For all the specifications in Panel A, the magnitude of the estimated coefficient of *IndRET* is larger than that of *ExRET*. This finding holds true regardless of whether the incumbent CEO leaves the firm voluntarily or is fired. Note that for all the tests by Jenter and Kanaan (2015), the magnitude of the coefficient of industry returns is less than that of the firm-specific returns. Our evidence shows that for CEO turnover events during an industrial boom, the weight placed on industry performance increases, while that on firm-specific performance reduces. For example, for specification (4), the coefficient of *ExRET* is –0.049 (*t*-value = –8.12), while that of *IndRET* is –0.074 (*t*-value = –3.55), indicating that the risk of being fired for a CEO rises by 0.49 percent if the firm-specific return decreases from, say 30 percent to 20 percent, whereas, such risk rises by 0.74 percent if the industry return decreases ten percent. The difference between them is statistically significant with a *t*-value of 2.11, as reported at the bottom of Panel A. These figures are also economically meaningful. Note that for the whole sample, the total forced frequency is only 2.3 percent for industry booms, as reported in Table 1. Therefore, a ten-percent decline for idiosyncratic return can increase 21.3% likelihood of a forced departure, while the same magnitude of industry return decline can increase 32.2% likelihood for a CEO to be fired. Apparently, a CEO's departure is more sensitive to the

change of industry return. The board has greater reliance on the industry performance rather than the firm-specific performance while making CEO retention decisions during an industrial boom. Overall, the results support H1.

Powerful CEOs continue to exert their influence on the board's decision to change the top manager. For both specifications (2) and (5), *CEO_Power* is significantly negative, indicating that more powerful CEOs are less likely to depart from their positions compared to their less powerful counterparts. Moreover, when the industry performance becomes more important in the CEO turnover decisions, the interaction of *CEO_Power* with *IndRET* is significantly positive for both specifications, suggesting that the sensitivity of CEO turnover to industry performance is weakened by powerful CEOs. [15]

Large shareholders have a positive and significant role in forcing an incumbent CEO's departure, as indicated by specification (6). The negative and significant coefficients for the interactions of *Blockholder* with *ExRET* and *IndRET* provide further evidence that the sensitivity of a forced CEO departure to the performance measures is stronger for firms with large shareholders.

In Panel B, there is a different picture for industrial recessions. Across all the specifications for the forced departures subsample, the magnitude of the coefficient of *IndRET* is less than that of *ExRET*. Apparently, idiosyncratic stock returns carry a larger weight compared to industry peer returns for CEO turnover decisions made during industrial recessions. For example, for specification (10), the coefficient of *ExRET* is –0.071 (*t*-value = –10.33), while that of *IndRET* is –0.028 (*t*-value = –2.42), indicating that the risk of being fired for a CEO rises by 0.71 percent if the idiosyncratic return experiences a ten-percent decline, whereas, such risk rises by 0.28 percent if the industry return decreases ten percent.

[15] Using the same measure of CEO power, Morse, Nanda, and Seru (2011) document that powerful CEOs can induce the boards to shift the weight of the performance measures towards better performing measures in compensation design, thereby rigging their pay incentives to support their interests.

The difference between them is highly significant with a *t*-value of 2.75, as reported at the bottom of Panel B. Note that the total forced frequency is 3.1 percent for industry recessions, as reported in Table 1. Therefore, a ten-percent decline for idiosyncratic return can increase 23% likelihood of a forced departure, while the same magnitude of industry return decline can increase only 9% likelihood for a CEO to be fired. Apparently, a CEO's departure is more sensitive to the change of idiosyncratic return. Firm-specific performance, therefore, plays a determinant role in the CEO retention decisions when the whole industry is under a recession. Thus, the results support H2.

Interestingly, during industrial recessions, when idiosyncratic stock returns become important in CEO turnover events, its effect is additionally moderated by powerful CEOs, as evidenced by the positive coefficient in the interaction between *CEO_Power* and *ExRET* for specification (11). In contrast, the effect is intensified by large shareholders, showing a negative coefficient in the interaction between *Blockholder* and *ExRET* for specification (12).

4.2.3 Alternative performance measures

To ensure that our main results are not sensitive to the return metrics used, we conduct robustness tests by adopting Jenter and Kanaan's (2015) approach to construct alternative performance measures for idiosyncratic and industry peer stock returns. Specifically, the industry and idiosyncratic stock returns are calculated as the predicted (*RET_Peer*) and the residual (*RET_Idiosyn*) values, respectively, from the following model:

$$R_{i,t-1} = a_0 + a_1 * R_{peer\ group,t-1} + v_{i,t-1} \quad (2)$$

where $R_{i,t-1}$ is firm *i*'s stock return in year *t-1* and $R_{peer\ group,t-1}$ is industry-median return in year *t-1*.

We rerun the regression model (1) with alternative performance measures. The regression results for the forced CEO turnover events are reported in Table 5.

(Insert Table 5 here)

During industrial booms (*IndCond* = 0), both the idiosyncratic and the industry peer returns are significantly and negatively correlated to forced CEO departures. In fact, the magnitude of the coefficient of *RET_Peer* (–0.056) is larger than that of *RET_Idiosyn* (–0.041), and the difference between them is statistically significant with a *t*-value of 1.81. The evidence suggests that industry returns has a larger role in influencing forced turnover decisions during the boom periods, consistent with H1.

During industry recessions (*IndCond* =1), idiosyncratic stock return *RET_Idiosyn* is significantly and negatively correlated to the forced CEO departure with an estimated coefficient of –0.063 and a *t*-value of –10.33. Nonetheless, the estimated coefficient for industry peer return *RET_Peer* is –0.009 and is not statistically significant (*t*-value= –0.90). The difference between the two coefficients is highly significant with a *t*-value of 3.31. The evidence confirms that during recessions, the idiosyncratic stock returns carry a larger weight in CEO retention decisions than the industry returns, supporting H2.

5. Price Informativeness

Our study shows that the weights placed on the idiosyncratic and industry stock returns for CEO turnover decisions varies with the industry conditions. We presume that the different weights placed on the two performance measures depend on the informativeness of a firm's stock price, wherein stock price is more reflective of a CEO's abilities during the recession

periods than during booms. In this section, we particularly examine the informativeness of a firm's stock price, conditional upon industry boom-and-bust cycles. We perform the analysis from two perspectives; the synchronicity of a firm's stock returns, and the value relevance of a firm's accounting returns.

5.1 The synchronicity of stock returns

The stock performance plays a significant role in evaluating a CEO's quality. A firm's stock returns can be thought of as comprising of both the industry return-related component, and the idiosyncratic return component. Logically, the idiosyncratic component, rather than the industry-related component best reveals a CEO's abilities and efforts. A firm's stock return is more informative for the board of directors to evaluate the CEO's efforts if it captures a larger portion of the idiosyncratic component instead of the industry-related component; that is, when it is less synchronous with the industry peers. The stock return synchronicity, can therefore, reflect the informativeness of the stock price.

The stock return synchronicity can be measured with the R^2 value of the regression of a firm's stock return on the industry and/or market return. A lower R^2 implies that a firm's stock return is less synchronous with the overall market; that is, the variation in the stock price is mostly idiosyncratic. Since the idiosyncratic return volatility reflects the idiosyncratic component's event intensity, the R^2 value obtained in this way is also widely used to measure price informativeness — a lower R^2 means a firm's stock price is more informative (Wang and Yu, 2015; Xu, Chan, Jiang, and Yi, 2013; Kim and Shi, 2012; Gul, Kim and Qiu, 2010; Jin and Myers, 2006; Morck, Yeung, and Yu, 2000; Roll, 1988, among others). Durnev, Morck, Yeung, and Zarowin (2003) believe that the elevated idiosyncratic return event intensity, that is, a lower R^2, reflects a more informed and efficient stock pricing. Hutton, Marcus and Tehranian (2009) document a negative relationship between the idiosyncratic

variation and accrual management, which vanished with the passage of the Sarbanes-Oxley Act (2002) that limited earnings manipulation.

Therefore, following these studies, we use the stock return synchronicity to measure the informativeness of a firm's stock price and get the adjusted R-squared, *RSQ_Ind*, from the following model: [16]

$$RET_{i,t} = \alpha_0 + \alpha_1 * IRET_{i,t} + \alpha_2 * MRET_{i,t} + \partial_0 \quad (3)$$

where $RET_{i,t}$ is the daily raw stock return for firm *i* in the year *t*, $IRET_{I,t}$ is the median daily raw stock return of the firm *i*'s industry peers in the year *t*, $MRET_{I,t}$ is the daily value-weighted market return in the year *t*. We perform regressions using equation (3) for each firm-year with all firms in the CRSP database.

A higher value of *RSQ_Ind* indicates that the industry and market returns have a larger explanatory power for a firm's stock performance. Under such circumstance, if the CEO retention decision is made based on the firm's stock performance, it is inevitable that industry and market returns will have a larger impact on such a decision, while the idiosyncratic stock return will play a relatively smaller role. Given our earlier finding that industry return plays a more important role in CEO turnover events in the boom stage, we expect that the value of *RSQ_Ind* will be larger during the boom period compared to the recession period.

5.2 Value relevance of accounting returns

A company's accounting performance is widely used to evaluate managerial capacity and plays a prominent role in incentivizing CEOs (Angelis and Grinstein, 2015; Dechow,

[16] Our results are qualitatively the same if we drop market return from model (3).

1994; Healy, Palepu and Ruback, 1992).[17] Compared with stock return, accounting performance is less likely to be affected by market-based factors (*e.g.*, momentum) but reflects more about a CEO's efforts. Lev and Zarowin (1999) and Francis and Schipper (1999) document a decline in the value relevance of the accounting numbers over the past decades. In contrast, Fung, Su, and Zhu (2010) show that the value relevance of accounting information does not decline over time; instead, driven by noise trading, the stock prices show a greater deviation from fundamental values.[18] If a firm's stock price is less synchronous with the overall market, it becomes more reflective of its fundamentals, and the accounting numbers are more value relevant. Therefore, the value relevance of the accounting numbers could be a relevant indicator of the informativeness of the stock price.

To examine the value relevance of accounting numbers, we regress the firms' stock returns on their accounting earnings with the following model:[19]

$$RETURN_{i,t} = \beta_0 + \beta_1 * EARN_{i,t} + \beta_2 * \Delta EARN_{i,t} + \gamma_0 \quad (4)$$

where $RETURN_{i,t}$ is firm *i*'s annual raw stock returns in the fiscal year *t* and $EARN_{i,t}$ ($\Delta EARN_{i,t}$) is the firm *i*'s earnings (change in earnings) before extraordinary items in year *t* scaled by its market value at the end of year *t–1*. We estimate model (4) for the most recent

[17] Angelis and Grinstein (2015) document that 79% of the estimated value of performance-based awards relies on accounting performance measures, whereas only 13% relies on stock performance measures.

[18] Devenow and Welch (1996) and Kindleberger (1978) document that noise trading can cause a high market-wide stock volatility. According to DeLong, Shleifer, Summers, and Waldmann's (1990) model, noise trading is synchronous, and drives the whole market to unrealistic heights or depths.

[19] Our results are qualitatively the same if we regress stock price on earnings plus book value; that is, $P_{i,t} = \rho_0 + \rho_1 * E_{i,t} + \rho_2 * BV_{i,t} + \varphi_0$, where $P_{i,t}$ is the share price of firm *i* at end of year *t*, $E_{i,t}$ is the earnings per share of firm *i* in year *t*, and $BV_{i,t}$ is the book value of equity per share of firm *i* at end of year *t*.

ten-year period for each sample firm-year, provided that the data for at least eight of those ten years are available.

The R-squared obtained from model (4) has been widely used to measure the value relevance of a firm's earnings (*e.g.*, Francis, Lafond, Olsson, and Schipper, 2004; Bushman, Chen, Engel, and Smith, 2003; Francis and Schipper, 1999; Lev and Zarowin, 1999; Collins, Maydew, and Weiss, 1997). A larger R-squared typically implies that the earnings are more value-relevant and useful in decision making. It also indicates that a firm's accounting performance has a larger explanatory power for its stock performance; thus, indicating that the stock returns are less synchronous with the overall markets and more representative of a CEO's abilities and efforts.

Apart from the R-squared, accounting studies also use model (4)'s estimated earnings coefficient to measure the value relevance of a firm's accounting numbers. A large value of coefficient suggests the earnings are more relevant and useful for shareholders.

In this study, we use the value of the adjusted R-squared, *RSQ_Earn*, and the earnings response coefficient, *ERC*, from model (4) to measure the informativeness of a firm's stock price. Following Lev and Zarowin (1999), *ERC* is calculated as the sum of the estimated regression coefficients of $EARN_{i,t}$ and $\Delta EARN_{i,t}$, that is, $\beta_1 + \beta_2$. A larger value of *RSQ_Earn* or *ERC* indicates that the accounting numbers are more value relevant, and thus the firms' stock returns are more informative about the CEOs' abilities. Given our earlier finding that idiosyncratic stock returns play a dominant role in CEO turnover events during an industry downturn, we expect both *RSQ_Earn* and *ERC* to be larger during recessions than in booms.

5.3 Empirical results

We begin our analyses with the sample descriptive statistics of the price informativeness measures. To avoid outliers, we drop 1% of the observations from each of the three measures of informativeness; stock return synchronicity (*RSQ_Ind*), the value relevance of accounting earnings (*RSQ_Earn*), and the earnings response coefficient (*ERC*). The results are presented in Table 6.

(Insert Table 6 here)

In Table 6, Panel A reveals that the median value of *RSQ_Ind*, the first measure of price informativeness, drops from 0.308 during booms to 0.233 (*z*-value = 16.5) during recessions. Obviously, *RSQ_Ind* is significantly larger (by 30%) during industrial booms than during recessions. In contrast, *RSQ_Earn,* the second measure of informativeness, shows the opposite trend; its median value during booms is 0.131, which is significantly smaller (by 30%) than the median value of 0.168 during recessions (z-value = –4.58). The evidence indicates that while a firm's stock price is more synchronous with its industry peers, it does not contain enough accounting information during prosperous industrial conditions, compared to periods of downturn.[20] *ERC*, the third measure of informativeness, is significantly smaller (at the 1% level) during industrial booms than in recessions, once again implying that a firm's stock returns are more reflective of its fundamentals when the whole industry is in a downturn.

In Table 6, Panel B presents the Pearson correlations between the industry conditions and the informativeness measures. *IndCond* is negatively correlated with *RSQ_Ind*, but positively correlated with *RSQ_Earn* and *ERC*. All the correlations are significant at the 1% level. The

[20] Boudoukh, Feldman, Kogan, and Richardson (2013) document that stock return synchronicity is related with the release of news. Their median estimated R^2 down from 28% on "no news days" to 16% on "news days". The stock return synchronicity is also lower when firms have a higher quality of financial disclosure (Kim and Shi, 2012; Lau, Ng, and Zhang, 2012).

evidence confirms again our estimation that stock returns are more revealing about a CEO's efforts during recessions than in booms.

Next, we go a further step by examining the impact of price informativeness on the board's CEO retention decisions. After adding the price informativeness measures to logit model (1), we test their interactions with the performance measures while controlling for the variability of the informativeness measures.[21] Table 7 reports the regression results.

(Insert Table 7 here)

Similar to Table 3, the results in Table 7 show that the idiosyncratic stock returns carry a larger weight compared to the industry peer returns in forced CEO turnover decisions, and the estimated coefficients are also larger and more significant for forced departures than for voluntary events.

Regarding the effect of the informativeness measures on CEO turnover decisions, the coefficient for *RSQ_Ind* is negative and significant in both the subsamples of CEO turnovers. As discussed earlier, a higher value of *RSQ_Ind* suggests that the stock returns are more synchronous with the markets and are less reflective of CEOs' abilities. Therefore, other things equal, a negative coefficient for *RSQ_Ind* would imply a lower likelihood of a CEO turnover when a firm's stock return is less informative about its CEO's abilities and efforts.

More importantly, for specification (4), the interaction between *ExRET* and *RSQ_Ind* is significantly positive (coefficient = 0.052, *t*-value = 3.73), in contrast to the estimations for *ExRET* (coefficient = –0.050). This evidence indicates that, for forced CEO turnover decisions, the weight placed on the firm-specific performance is largely moderated if the

[21] Our research approach follows that of Engel, Hayes, and Wang (2003), which compare the importance of stock performance against accounting performance as the determining factor of CEO turnovers.

stock returns are not significantly informative about the CEOs' efforts. For one standard deviation change in price informativeness, the estimated coefficient of *ExRET* decreases to –0.032, and the magnitude is then smaller than that of the coefficient of *IndRET* (–0.034). Accordingly, industry return instead of idiosyncratic return would play a key role in CEO turnover events. Moreover, the moderation of the weight assigned to idiosyncratic return *ExRET* indicates that the likelihood of forced departure for a CEO decreases 21.5% for one standard deviation change in *ExRET*, given that the total forced departure frequency is 2.8% for the whole sample, as reported in Table 1. Therefore, the impact of price informativeness on CEO turnover events is economically meaningful.

Regarding specification (5), *RSQ_Earn*, the second measure of informativeness, does not seem to be significant alone.[22] Nevertheless, the interaction terms between *RSQ_Earn* and both industry performance measures, *i.e.*, *IndRET* and *IndROA*, are significantly positive. For one standard deviation change in price informativeness, the estimated coefficient of *IndRET* drops to –0.009 from initial –0.016, suggesting that the weight placed on the industry performance is largely moderated when a firm's accounting numbers are more value relevant. Again, the moderation of the weight caused by price informativeness is economically meaningful, implying that the likelihood of forced departure for a CEO decreases 8.7% for one standard deviation change in *IndRET*.

For specification (6), *ERC* alone is significant and positive for forced CEO departures (coefficient = 0.001, *t*-value = 2.23), suggesting that a CEO is more likely to be fired when a firm's stock return is more reflective of its accounting numbers. The interaction terms between *ERC* and both the industry performance measures are significantly positive, again

[22] The observations used in the regressions are significantly reduced for price informativeness measures *RSQ_Earn* and *ERC*, our construction of these two measures in model (4) requires that the data are available for at least preceding eight years for each firm-year observation.

implying that a smaller weight is placed on industry performance when stock price is more informative.

Overall, a firm's stock price is more revealing about a CEO's abilities during recession periods than during booms. The weight assigned to idiosyncratic stock returns is subdued when a firm's stock price is more synchronous with the industry and overall market while that assigned to industry returns is weakened when the accounting numbers are more value relevant. The evidence confirms that price informativeness has a significant impact on the weights placed on the performance measures used in the boards' evaluation of CEOs' efforts in turnover decisions.

6. Conclusion

Through this study, we seek to understand the assessment criteria used by the boards to make their CEO turnover decisions. We examine the weights placed on firm-specific and industry peer performances during CEO turnover events, conditional upon the industry's boom-and-bust cycles. We propose that the usefulness of a firm's stock performance in CEO turnover decisions is determined by its informativeness in reflecting the CEO's efforts, and the board places more weight on the performance measure that is more reflective of the CEO's abilities and efforts when making turnover decisions.

Our proposition is confirmed through evidence from a large sample of CEO turnovers between 1993 and 2019. After demarcating the samples according to industry conditions, we find that idiosyncratic stock returns carry more weight than industry peer returns do, provided that the industry is experiencing a recession, while the opposite is true during industrial booms. Through further analysis, we find that a firm's stock return is less synchronous with the industry and overall market but is more reflective about the firm's fundamentals during

recessions than in booms. Moreover, after incorporating the proxies of price informativeness in the analysis, we find that a smaller weight is assigned to idiosyncratic stock returns when a firm's stock price synchronicity is higher. In contrast, the weight assigned to industry returns is weakened if a firm's accounting numbers are more value relevant. We also find that the weights assigned to performance measures used by the boards are moderated by powerful CEOs but strengthened by large shareholders.

Our findings indicate that CEO turnover decisions are made rationally by the boards based on the informativeness of performance measures. Our study contributes to the understanding of how CEOs are assessed by the boards, shedding light on the issue of whether CEOs are proportionately punished for poor industry performance through turnover decisions.

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Table 1
Summary statistics for CEO turnovers

CEO turnover events include 3,675 voluntary and 1,236 forced departures in a total sample of 44,582 CEO-firm-year observations during 1993–2019. CEO replacements are classified as from inside the company, outside the company but inside the industry, or from outside the industry. *IndCond* is a dummy variable that equals one for an observation year if the average industry ROA in the preceding three years is below the corresponding average industry ROA in the preceding ten years, and zero otherwise, where firms are categorized using three-digit SIC industry definitions. *CEO_Power* equals one if a CEO does not hold any board position, two if the CEO is also the Chairman of the board, and three if the CEO is both the Chairman of the board and the President. *Blockholder* is the number of institutional shareholders holding more than 5% of shares in the company. *, **, and ***, respectively indicate the significance at the 10%, 5%, and 1% levels, for the *t*-test.

	Total turnover	Voluntary	Forced	*T*-test (Voluntary – Forced)
By Source of CEO Successor:				
Overall	4,911 (100%)	3,675 (100%)	1,236 (100%)	
Company insider	3,900 (79.4%)	2,994 (81.5%)	906 (73.3%)	5.78***
Company outsider, industry insider	296 (6%)	199 (5.4%)	97 (7.8%)	–2.86***
Company outsider, industry outsider	715 (14.6%)	482 (13.1%)	233 (18.9%)	–4.61***
	Total turnover frequency	Voluntary frequency	Forced frequency	
Overall (44,582 obs.)	11%	8.2%	2.8%	
By Industry Condition:				
IndCond = 0 (boom, 17,824 obs.)	11.9%	9.6%	2.3%	
IndCond = 1 (recession, 26,758 obs.)	10.4%	7.3%	3.1%	
T-test (boom *vs*. recession)	4.81***	8.30***	–5.10***	
By CEO Power:				
CEO_Power = 1 (weak, 17,932 obs.)	12.8%	9.3%	3.5%	
CEO_Power = 2 (neutral, 18,618 obs.)	10.6%	8.2%	2.4%	
CEO_Power = 3 (strong, 8,032 obs.)	8%	6%	2%	
T-test (weak *vs.* strong)	12.3***	9.72***	7.20***	
By Blockholder:				
≤ median (low, 25,594 obs.)	10.6%	8.1%	2.5%	
> median (high, 18,988 obs.)	11.6%	8.5%	3.1%	
T-test (low *vs*. high)	–3.48***	–1.55	–3.99***	

Table 2
Descriptive statistics of CEO-firm-year sample

This table presents the descriptive statistics for 3,675 voluntary and 1,236 forced departures in a total sample of 44,582 CEO-firm-year observations during 1993–2019. In Panel A, the sample firm-year observations are divided into three groups based on turnover events: no turnover (N), voluntary departures (V), and forced departures (F). In Panel B, the sample firm-year observations are divided into two groups based on industry conditions: industrial boom and industrial recession. The industry condition, *IndCond*, is a dummy variable that equals one for an observation year if the average industry ROA in the preceding three years is below the average industry ROA in the preceding ten years, and zero otherwise, where firms are categorized using three-digit SIC industry definitions. The definitions of other variables are reported in Appendix A. *, **, and ***, respectively indicate significance at the 10%, 5%, and 1% levels, for the *t*-test and the two-tailed Wilcoxon test.

Panel A: Sample firm-year observations by turnover events

	No turnover		Voluntary departures		Forced departures		N – V		N – F	
Variables	Mean	Median	Mean	Median	Mean	Median	*t*-statistic	*z*-statistic	*t*-statistic	*z*-statistic
ExRET	0.026	0.013	–0.041	–0.033	–0.087	–0.086	6.27***	4.98***	12.41***	12.35***
IndRET	0.136	0.128	0.112	0.111	0.115	0.115	2.98***	3.15***	3.81***	3.85***
ExROA	0.058	0.027	0.052	0.024	0.025	0.005	1.83*	1.58	7.83***	6.25***
IndROA	0.012	0.014	0.014	0.013	0.010	0.012	–1.71*	0.63	1.79*	1.86*
ExRET1	–0.001	0.007	0.006	–0.003	–0.057	–0.045	–0.58	0.95	5.39***	6.22***
IndRET1	0.141	0.137	0.115	0.127	0.114	0.119	3.91***	2.33**	3.94***	2.86***
ExROA1	0.059	0.028	0.054	0.027	0.023	0.014	1.68	0.14	8.96***	2.99***
IndROA1	0.013	0.015	0.015	0.015	0.011	0.013	–1.49	0.03	1.81*	1.83*
IndCond	0.606	1	0.525	1	0.645	1	9.37***	9.54***	–2.77***	–2.69***
Leverage	0.556	0.558	0.580	0.580	0.558	0.556	–3.16***	–3.08***	–0.39	0.18
FirmSize	7.536	7.447	7.952	7.819	7.632	7.480	–6.71***	–6.53***	–1.99**	–1.41
BoardSize	10.15	10	10.34	10	10.14	10	–1.32	–2.05**	0.13	0.35
DirectorRatio	0.72	0.75	0.73	0.75	0.69	0.71	–2.47**	–1.50	5.16***	4.65***
Directorship	6.09	5.82	6.06	5.88	6.20	6.00	0.16	–0.07	–1.33	–1.33
DirectorShare	0.112	0	0.109	0	0.103	0	0.57	0.58	0.98	1.30
DirectorTenure	8.59	8.11	8.44	8.15	7.84	7.42	0.89	–0.71	5.90***	5.60***

GenderRatio	0.87	0.89	0.88	0.89	0.87	0.89	–0.84	–0.69	1.08	0.57
Blockholder	2.09	2	2.14	2	2.32	2	–1.97*	–1.45	–2.84***	–1.87*
Founder	0.129	0	0.151	0	0.067	0	–2.05**	–1.99**	5.26***	4.15***
CEO_Tenure	6.67	5	9.98	8	5.68	4	–12.66***	–15.17***	2.32**	1.47
CEO_Age	53.9	55	61.1	62	52.9	53	–28.12***	–26.28***	3.41***	4.06***
CEO_Share	1.268	0.029	1.527	0.116	0.656	0	–2.36**	–3.29***	4.93***	3.86***
CEO_Power	1.79	2	1.71	2	1.66	2	3.69***	2.06**	7.56***	6.62***

Table 2 (cont.)

Panel B: Sample firm-year observations by industry conditions

	IndCond = 0 (boom)		IndCond = 1 (recession)		Boom *vs*. Recession	
Variables	Mean	Median	Mean	Median	*t*-statistic	*z*-statistic
ExRET	0.015	–0.001	0.018	0.009	–0.86	–1.26
IndRET	0.144	0.141	0.126	0.113	6.22***	10.26***
ExROA	0.056	0.026	0.055	0.024	1.32	1.65
IndROA	0.020	0.024	0.006	0.004	10.07***	11.15***
ExRET1	–0.003	–0.004	–0.004	0.009	0.33	–1.32
IndRET1	0.146	0.135	0.133	0.123	4.58***	4.13***
ExROA1	0.058	0.028	0.056	0.027	1.46	0.56
IndROA1	0.021	0.025	0.007	0.005	10.87***	11.02***
Leverage	0.568	0.566	0.549	0.554	6.15***	5.54***
FirmSize	7.654	7.557	7.489	7.391	6.95***	6.85***
BoardSize	10.39	10	9.98	9	7.14***	6.28***
DirectorRatio	0.74	0.75	0.70	0.73	18.36***	15.95***
Directorship	6.30	6	5.92	5.71	8.60***	8.23***
DirectorShare	0.082	0	0.134	0	–10.94***	–10.42***
DirectorTenure	8.55	8.12	8.53	8.02	0.32	1.11
GenderRatio	0.87	0.88	0.89	0.89	–9.16***	–9.24***
Blockholder	2.25	2	2.07	2	8.77***	7.85***
Founder	0.132	0	0.126	0	0.99	1.25
CEO_Tenure	6.80	5	6.85	5	–0.95	–1.66
CEO_Age	54.7	56	54.0	55	4.89***	5.61***
CEO_Share	1.271	0.087	1.256	0	3.82***	10.93***
CEO_Power	1.76	2	1.79	2	–2.82***	–3.51***

Table 3
Logit models for CEO turnovers on performance and corporate governance characteristics

This table reports the regression results of CEO turnovers on performance and corporate governance characteristics for a total sample of 44,582 CEO-firm-year observations during 1993–2019, including 3,675 voluntary and 1,236 forced CEO departures. The analysis includes all the firm-year observations, regardless of whether a CEO turnover is observed. The reference group represents the group with no turnover observations. The variable definitions are reported in Appendix A. The *t*-statistics are reported in the parentheses. *, **, and ***, respectively indicate the significance at the 10%, 5%, and 1% levels (two-tailed), based on the standard errors corrected for heteroscedasticity and autocorrelations.

	Voluntary			Forced		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	–0.364***	–0.322***	–0.397***	–0.180***	–0.160***	–0.202***
	(–18.30)	(–13.69)	(–17.15)	(–7.13)	(–4.32)	(–7.02)
ExRET	**–0.007*** **	**–0.017***	**–0.009***	**–0.043*** **	**–0.083*** **	**–0.031*** **
	(–2.65)	**(–1.70)**	**(–1.77)**	**(–13.04)**	**(–7.21)**	**(–5.66)**
IndRET	–0.007	–0.031	–0.003	**–0.016****	**–0.040*** **	**–0.052*** **
	(–1.09)	(–1.52)	(–0.25)	**(–2.07)**	**(–2.99)**	**(–3.72)**
ExROA	–0.009	–0.005	–0.010	**–0.025****	–0.037	0.014
	(–0.92)	(–0.22)	(–0.60)	**(–2.08)**	(–1.40)	(0.71)
IndROA	–0.007	–0.001	–0.007	**–0.013****	–0.025*	0.002
	(–1.50)	(–0.06)	(–1.13)	**(–2.53)**	(–1.69)	(0.22)
IndCond	–0.005*	–0.004	–0.005*	0.007***	0.009**	0.007*
	(–1.69)	(–1.21)	(–1.80)	(2.59)	(1.98)	(1.84)
ExRET1	–0.002	–0.003	–0.001	–0.016***	–0.022***	–0.016***
	(–0.78)	(–1.01)	(–0.28)	(–5.28)	(–5.49)	(–5.01)
IndRET1	–0.006	–0.013	–0.007	0.007	–0.006	–0.002
	(–1.22)	(–1.37)	(–1.17)	(1.09)	(–0.75)	(–0.24)
ExROA1	0.016*	0.014	0.021*	–0.015	–0.019	–0.004
	(1.69)	(1.18)	(1.76)	(–1.17)	(–1.15)	(–0.25)
IndROA1	0.008*	0.009	0.009	0.002	0.004	0.006
	(1.86)	(1.55)	(1.64)	(0.45)	(0.50)	(0.85)
Leverage	0.008	0.008	0.008	0.015*	0.015	0.007
	(1.23)	(0.94)	(1.12)	(1.77)	(1.49)	(0.76)
FirmSize	0.001	–0.0002	0.002	0.0003	–0.005***	0.001
	(1.46)	(–0.19)	(1.32)	(0.25)	(–3.51)	(0.66)
BoardSize	0.0008	0.0001	0.0001	0.0009	0.0009	0.001
	(0.69)	(0.07)	(0.07)	(0.93)	(0.88)	(0.98)

DirectorRatio	0.001	0.015	0.016	0.097	0.098	0.097
	(0.06)	(0.78)	(0.84)	(1.07)	(1.10)	(1.08)
Directorship	–0.0001	–0.0006	–0.0005	–0.001	–0.001	–0.001
	(–0.16)	(–0.63)	(–0.62)	(–1.34)	(–1.33)	(–1.30)
DirectorShare	0.002	0.008	0.009	0.003	0.003	0.003
	(0.27)	(0.96)	(1.00)	(0.28)	(0.26)	(0.24)
DirectorTenure	–0.003***	–0.003***	–0.003***	–0.006***	–0.006***	–0.006***
	(–4.62)	(–5.37)	(–5.44)	(–8.01)	(–7.92)	(–7.95)
GenderRatio	–0.012	–0.022	–0.023	–0.040	–0.039	–0.038
	(–0.47)	(–0.88)	(–0.91)	(–1.28)	(–1.25)	(–1.24)
Founder	0.012	0.009	0.009	–0.020***	–0.020***	–0.020***
	(0.62)	(0.47)	(0.47)	(–2.84)	(–2.87)	(–2.87)
CEO_Tenure	0.005***	0.003***	0.003***	0.003	0.003	0.003
	(7.03)	(6.54)	(6.55)	(1.60)	(1.59)	(1.53)
CEO_Age	0.006***	0.006***	0.006***	0.004	0.004*	0.004*
	(33.08)	(29.21)	(30.99)	(1.46)	(1.92)	(1.75)
CEO_Share	–0.0003	–0.001**	–0.0004	–0.001*	–0.002***	–0.001*
	(–0.96)	(–2.37)	(–0.99)	(–1.84)	(–4.51)	(–1.73)
CEO_Power		**–0.017*** **			**–0.019*** **	
		(–4.86)			**(–4.29)**	
*CEO_Power*ExRET*		0.005			**0.016****	
		(0.93)			**(2.39)**	
*CEO_Power*IndRET*		0.011			**0.013***	
		(1.49)			**(1.79)**	
*CEO_Power*ExROA*		0.0005			0.005	
		(0.04)			(0.68)	
*CEO_Power*IndROA*		–0.002			0.008	
		(0.33)			(0.98)	
Blockholder			0.002			**0.005*** **
			(1.22)			**(2.68)**
*Blockholder*ExRET*			–0.0001			**–0.007*** **
			(–0.07)			**(–2.80)**
*Blockholder*IndRET*			–0.003			**–0.007***
			(–0.92)			**(–1.94)**
*Blockholder*ExROA*			0.0003			–0.014**
			(0.06)			(–2.15)
*Blockholder*IndROA*			0.002			–0.006*
			(0.54)			(–1.72)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes

Observations	41,612	41,612	41,612	39,270	39,270	39,270
F-value	20.70***	14.55***	17.32***	10.93***	9.68***	9.28***
Adj *R*-sq	0.101	0.109	0.108	0.091	0.096	0.095

Table 4
Logit models for CEO turnovers by industry conditions

This table reports the regression results of CEO turnovers on performance and corporate governance characteristics by industry conditions for a total sample of 44,582 CEO-firm-year observations during 1993–2019, including 3,675 voluntary and 1,236 forced CEO departures. The analysis includes all firm-year observations regardless of whether a CEO turnover is observed. The observations are first divided into two parts based on industry condition, and then each part is divided based on CEO turnover events. The reference category is no turnover observations. Panel A reports the regression results for industry boom and Panel B reports the regression results for industry recession. The differences of estimated coefficients for performance measures *ExRET* and *IndRET* upon industry condition are reported at the bottom of each panel. The industry condition, *IndCond*, is a dummy variable that equals one for an observation year if the average industry ROA in the preceding three years is below the average industry ROA in the preceding ten years, and zero otherwise, where firms are categorized using three-digit SIC industry definitions. The definitions of other variables are reported in Appendix A. The *t*-statistics are reported in the parenthesis. *, **, and ***, respectively indicate the significance at the 10%, 5%, and 1% levels (two-tailed), based on the standard errors corrected for heteroscedasticity and autocorrelations.

Panel A: IndCond = 0 (boom)

	Voluntary			Forced		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	–0.423***	–0.328***	–0.438***	–0.177***	–0.106**	–0.191***
	(–12.78)	(–8.61)	(–11.67)	(–4.67)	(–2.40)	(–4.54)
ExRET	–0.009*	–0.021	–0.019	**–0.049*** **	**–0.079*** **	**–0.021** **
	(–1.65)	(–1.22)	(–1.02)	**(–8.12)**	**(–4.17)**	**(–2.01)**
IndRET	**–0.026** **	**–0.081*** **	**–0.020** **	**–0.074*** **	**–0.102*** **	**–0.038*** **
	(–1.98)	**(–2.90)**	**(–2.05)**	**(–3.55)**	**(–3.14)**	**(–2.73)**
ExROA	0.002	–0.059	–0.018	–0.022	–0.040	0.016
	(0.12)	(–1.42)	(–0.61)	(–1.00)	(–0.82)	(0.50)
IndROA	–0.005	–0.016	–0.014	–0.017	–0.034	0.009
	(–0.52)	(–0.69)	(–0.84)	(–1.47)	(–1.28)	(0.47)
ExRET1	–0.004	–0.006	–0.003	0.015	–0.005	0.011
	(–1.02)	(–1.07)	(–0.71)	(1.16)	(–0.31)	(0.79)
IndRET1	0.002	–0.002	0.002	–0.016***	–0.024***	–0.017***
	(0.18)	(–0.13)	(0.19)	(–3.20)	(–3.83)	(–3.29)
ExROA1	0.022	0.025	0.025	–0.005	–0.017	0.005
	(0.99)	(0.96)	(1.07)	(–0.20)	(–0.57)	(0.21)
IndROA1	0.023*	0.022	0.022	–0.013	–0.020	–0.017

	(1.80)	(1.53)	(1.63)	(–0.93)	(–1.19)	(–1.11)
Leverage	0.026**	0.033**	0.027**	0.024*	0.041***	0.019
	(2.26)	(2.44)	(2.20)	(1.82)	(2.60)	(1.36)
FirmSize	–0.001	–0.002	–0.002	–0.003	–0.007***	–0.003**
	(–0.79)	(–1.48)	(–1.27)	(–1.63)	(–3.83)	(–1.98)
BoardSize	0.0003	0.0002	0.0002	0.002	0.002	0.002
	(0.21)	(0.14)	(0.16)	(1.19)	(1.11)	(1.20)
DirectorRatio	0.053	0.050	0.054	0.045	0.048	0.045
	(1.59)	(1.51)	(1.63)	(1.19)	(1.25)	(1.17)
Directorship	–0.001	–0.001	–0.001	0.0002	0.0003	0.0001
	(–0.76)	(–0.79)	(–0.81)	(0.14)	(0.17)	(0.09)
DirectorShare	–0.019	–0.020	–0.018	–0.024	–0.026	–0.023
	(–1.11)	(–1.16)	(–1.05)	(–1.28)	(–1.32)	(–1.21)
DirectorTenure	–0.004***	–0.004***	–0.004***	–0.008***	–0.008***	–0.008***
	(–3.55)	(–3.48)	(–3.58)	(–6.89)	(–6.80)	(–6.86)
GenderRatio	0.028	0.029	0.028	–0.029	–0.028	–0.029
	(0.73)	(0.75)	(0.70)	(–0.64)	(–0.62)	(–0.65)
Founder	0.026	0.026	0.027	–0.019**	–0.020**	–0.019**
	(0.82)	(0.83)	(0.84)	(–2.52)	(–2.53)	(–2.51)
CEO_Tenure	0.004***	0.004***	0.004***	0.004	0.004	0.004
	(5.20)	(5.25)	(5.30)	(1.09)	(1.11)	(1.09)
CEO_Age	0.007***	0.007***	0.008***	0.003*	0.003	0.003
	(22.04)	(19.40)	(21.37)	(1.79)	(1.34)	(1.45)
CEO_Share	–0.0001	–0.0005	–0.0003	–0.001	–0.002***	–0.001
	(–0.18)	(–0.67)	(–0.06)	(–1.16)	(–2.67)	(–1.55)
CEO_Power		**–0.034*** **			**–0.028*** **	
		(–6.20)			**(–4.42)**	
*CEO_Power*ExRET*		0.008			0.012	
		(0.86)			(1.14)	
*CEO_Power*IndRET*		**0.032** **			**0.029** **	
		(2.53)			**(2.13)**	
*CEO_Power*ExROA*		0.035			0.017	
		(0.84)			(0.71)	
*CEO_Power*IndROA*		0.010			0.013	
		(0.54)			(0.96)	
Blockholder			–0.001			**0.006** **
			(–0.33)			**(2.16)**
*Blockholder*ExRET*			0.004			**–0.006*** **
			(1.22)			**(–1.86)**
*Blockholder*IndRET*			–0.002			**–0.019*** **

			(–0.33)			**(–3.11)**
*Blockholder*ExROA*			0.006			–0.019*
			(0.65)			(–1.70)
*Blockholder*IndROA*			0.003			–0.011*
			(0.64)			(–1.96)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,717	16,717	16,717	15,468	15,468	15,468
F-value	10.57***	7.78***	9.21***	5.15***	5.00***	4.67***
Adj *R*-Sq	0.117	0.121	0.125	0.097	0.106	0.099
T-value: *ExRET= IndRET*	1.36	2.86***	0.35	2.11**	2.02**	2.35**

Table 4 (cont.)

Panel B: IndCond = 1 (recession)

	Voluntary			Forced		
	(7)	(8)	(9)	(10)	(11)	(12)
Intercept	–0.349***	–0.332***	–0.380***	–0.190***	–0.133***	–0.207***
	(–12.91)	(–10.54)	(–12.27)	(–5.19)	(–3.13)	(–5.00)
ExRET	–0.010***	–0.014	–0.004	**–0.071*** **	**–0.097*** **	**–0.049*** **
	(–2.67)	(–1.17)	(–0.62)	**(–10.33)**	**(–5.95)**	**(–4.48)**
IndRET	–0.002	0.010	0.008	**–0.028****	**–0.051***	**–0.025*** **
	(–0.26)	(0.48)	(0.69)	**(–2.42)**	**(–1.84)**	**(–3.31)**
ExROA	–0.01	0.031	0.001	–0.012	–0.010	0.019
	(–0.77)	(1.00)	(0.06)	(–0.68)	(–0.23)	(0.72)
IndROA	–0.005	0.007	–0.005	–0.006	–0.011	0.002
	(–0.80)	(0.44)	(–0.51)	(–0.78)	(–0.51)	(0.14)
ExRET1	–0.0002	–0.002	0.001	–0.015***	–0.021***	–0.015***
	(–0.09)	(–0.45)	(0.17)	(–4.06)	(–4.19)	(–3.67)
IndRET1	–0.007	–0.012	–0.004	0.006	–0.004	–0.003
	(–1.05)	(–1.53)	(–0.63)	(0.64)	(–0.43)	(–0.29)
ExROA1	0.016	0.013	0.021	–0.027	–0.040*	–0.023
	(1.23)	(0.81)	(1.49)	(–1.50)	(–1.94)	(–1.25)
IndROA1	0.006	0.007	0.006	0.004	0.002	0.005
	(0.96)	(0.97)	(0.95)	(0.44)	(0.25)	(0.62)
Leverage	–0.003	–0.007	–0.003	–0.0002	–0.002	–0.001
	(–0.44)	(–0.70)	(–0.36)	(–0.02)	(–0.16)	(–0.11)
FirmSize	0.003***	0.001	0.003***	0.003**	–0.003	0.004**
	(2.78)	(1.10)	(2.86)	(2.03)	(–1.54)	(2.36)
BoardSize	–0.0003	–0.0003	–0.0003	0.0003	0.0003	0.0003
	(–0.27)	(–0.32)	(–0.28)	(0.21)	(0.18)	(0.20)
DirectorRatio	–0.007	–0.008	–0.008	0.124**	0.123**	0.124**
	(–0.30)	(–0.34)	(–0.32)	(1.98)	(1.97)	(1.98)
Directorship	0.0003	0.0003	0.0003	–0.003**	–0.003**	–0.003*
	(0.24)	(0.29)	(0.26)	(–2.02)	(–2.03)	(–1.96)
DirectorShare	0.019*	0.019*	0.019*	0.019	0.019	0.018
	(1.93)	(1.96)	(1.91)	(1.48)	(1.48)	(1.43)
DirectorTenure	–0.003***	–0.003***	–0.003***	–0.005***	–0.005***	–0.005***
	(–4.20)	(–4.18)	(–4.16)	(–4.62)	(–4.60)	(–4.54)
GenderRatio	–0.062*	–0.063*	–0.063*	–0.036	–0.035	–0.034
	(–1.91)	(–1.92)	(–1.91)	(–0.82)	(–0.81)	(–0.78)

Founder	0.028	0.029	0.029	–0.025***	–0.026***	–0.026***
	(1.26)	(1.29)	(1.27)	(–2.84)	(–2.86)	(–2.87)
CEO_Tenure	0.002***	0.002***	0.002***	0.003	0.003	0.003
	(4.06)	(4.07)	(4.05)	(1.43)	(1.39)	(1.41)
CEO_Age	0.006***	0.006***	0.006***	0.004*	0.004*	0.004
	(23.72)	(21.72)	(22.33)	(1.81)	(1.75)	(1.28)
CEO_Share	–0.001	–0.001**	–0.0005	–0.001	–0.002***	–0.001
	(–1.58)	(–2.54)	(–1.16)	(–1.10)	(–3.42)	(–1.04)
CEO_Power		–0.003			**–0.012****	
		(–0.56)			**(–1.99)**	
*CEO_Power*ExRET*		0.003			**0.019****	
		(0.42)			**(2.14)**	
*CEO_Power*IndRET*		–0.006			0.012	
		(–0.67)			(0.89)	
*CEO_Power*ExROA*		–0.022			–0.004	
		(–1.48)			(–0.18)	
*CEO_Power*IndROA*		–0.007			0.002	
		(–0.90)			(0.14)	
Blockholder			**0.005****			**0.005***
			(2.18)			**(1.78)**
*Blockholder*ExRET*			–0.003			**–0.007****
			(–1.13)			**(–2.12)**
*Blockholder*IndRET*			–0.004			0.001
			(–0.96)			(0.22)
*Blockholder*ExROA*			–0.005			–0.012
			(–0.69)			(–1.31)
*Blockholder*IndROA*			–0.0001			–0.003
			(–0.01)			(–0.66)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,895	24,895	24,895	23,802	23,802	23,802
F-value	10.47***	7.74***	9.04***	6.82***	6.22***	5.99***
Adj *R*-Sq	0.096	0.098	0.102	0.092	0.098	0.094
T-value: *ExRET= IndRET*	1.23	0.78	0.28	2.75***	2.47**	2.53**

Table 5
Logit models for forced CEO turnovers by industry conditions using alternative performance measures

This table reports the regression results of 1,236 forced CEO departures on the firm-specific and industry peer performances by industry conditions for a total sample of 44,582 CEO-firm-year observations during 1993–2019. The analysis includes all firm-year observations regardless of whether a CEO turnover is observed. The reference group is the group with no turnover observations. The sample is divided into two parts based on the industry condition. *IndCond* is a dummy variable that equals one for an observation year if the average industry ROA in the preceding three years is below the average industry ROA in the preceding ten years, and zero otherwise. *RET_Peer* and *RET_Idiosyn* are the predicted and the residual values, respectively, from the regression model $R_{i,t-1} = a_0 + a_1 * R_{peer\ group,t-1} + v_{i,t-1}$, where $R_{i,t-1}$ is firm *i*'s stock return in year *t-1* and $R_{peer\ group,t-1}$ is industry-median return in year *t-1*. *RET_Peer1* and *RET_Idiosyn1* are the corresponding lagged measures of *RET_Peer* and *RET_Idiosyn* in the preceding year. The differences of estimated coefficients for performance measures *RET_Peer* and *RET_Idiosyn* upon industry condition are reported at the bottom of the table. Firms are categorized using three-digit SIC industry definitions. The definitions of other variables are reported in Appendix A. The *t*-statistics are reported in the parentheses. *, **, and ***, respectively indicate the significance at the 10%, 5%, and 1% levels (two-tailed), based on the standard errors corrected for heteroscedasticity and autocorrelations.

	Total sample	*IndCond* = 0 (boom)	*IndCond* = 1 (recession)
Intercept	–0.131***	–0.107**	–0.106*
	(–3.40)	(–2.03)	(–1.88)
RET_Idiosyn	**–0.043*** **	**–0.041*** **	**–0.063*** **
	(–12.99)	**(–7.89)**	**(–10.33)**
RET_Peer	**–0.016****	**–0.056*** **	–0.009
	(–2.12)	**(–2.98)**	(–0.90)
ExROA	–0.027**	–0.034	–0.018
	(–2.09)	(–1.56)	(–1.09)
IndROA	–0.015**	–0.023**	–0.009
	(–2.44)	(–2.05)	(–1.22)
RET_Idiosyn1	–0.015***	–0.015***	–0.015***
	(–5.22)	(–3.03)	(–4.05)
RET_Peer1	0.007	0.013	0.009
	(1.14)	(1.04)	(1.13)
ExROA1	–0.015	–0.011	–0.032*
	(–1.09)	(–0.46)	(–1.84)
IndROA1	0.002	–0.019	0.001
	(0.37)	(–1.32)	(0.13)
Leverage	0.015*	0.031**	0.005
	(1.75)	(2.36)	(0.42)
FirmSize	0.0003	–0.003**	0.003*
	(0.26)	(–2.12)	(1.95)
BoardSize	0.0009	0.002	0.0003
	(0.93)	(1.19)	(0.21)
DirectorRatio	0.097	0.045	0.124**

	(1.07)	(1.19)	(1.97)
Directorship	–0.001	0.0002	–0.003**
	(–1.34)	(0.14)	(–2.02)
DirectorShare	0.003	–0.025	0.019
	(0.28)	(–1.27)	(1.47)
DirectorTenure	–0.006***	–0.008***	–0.005***
	(–8.01)	(–6.89)	(–4.62)
GenderRatio	–0.040	–0.029	–0.036
	(–1.27)	(–0.64)	(–0.82)
Blockholder	0.006**	0.004**	0.009**
	(2.44)	(2.37)	(2.47)
Founder	–0.019***	–0.019**	–0.026***
	(–2.84)	(–2.51)	(–2.84)
CEO_Tenure	0.003	0.004	0.003
	(1.60)	(1.09)	(1.43)
CEO_Age	0.004	0.003*	0.004*
	(1.46)	(1.86)	(1.85)
CEO_Share	–0.001*	–0.001	–0.001
	(–1.84)	(–1.27)	(–1.43)
CEO_Power	–0.012***	–0.016***	–0.009***
	(–3.31)	(–3.82)	(–3.52)
Year dummy	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes
Observations	39,270	15,468	23,802
F-value	10.91***	5.19***	7.17***
Adj *R*-Sq	0.091	0.097	0.093
T-value (*RET_Idiosyn=RET_Peer*)	2.51**	1.81*	3.31***

Table 6
Informativeness of stock price by industry conditions

The Panel A presents the descriptive statistics of price informativeness measures by industry conditions for a total sample of 44,582 CEO-firm-year observations during 1993–2019, which includes 3,675 voluntary and 1,236 forced CEO departures. Panel B presents the Pearson correlations among the key variables with *p*-values reported below the coefficients. *IndCond* is a dummy variable that equals one for an observation year if the average industry ROA in the preceding three years is below the corresponding average industry ROA in the preceding ten years, and zero otherwise. *RSQ_Ind* is the adjusted R-squared obtained from the model $RET_{i,t} = \alpha_0 + \alpha_1 * IRET_{i,t} + \alpha_2 * MRET_{i,t} + \partial_0$ over the sample period, where $RET_{i,t}$ is the daily raw stock return for firm *i* in year *t*; $IRET_{I,t}$ is the median daily raw stock return of firm *i*'s industry peers in year *t*; $MRET_{I,t}$ is the daily value-weighted market return in year *t*. *RSQ_Earn* is the adjusted R-squared obtained from the model $RETURN_{i,t} = \beta_0 + \beta_1 * EARN_{i,t} + \beta_2 * \Delta EARN_{i,t} + \gamma_0$, where $EARN_{i,t}$ and $\Delta EARN_{i,t}$ are the level and change of annual earnings of firm i in year *t*. Both $EARN_{i,t}$ and $\Delta EARN_{i,t}$ are scaled by the market value of equity at the beginning of year *t*. *ERC* is the combined slope coefficients or the "earnings response coefficients", obtained as the sum of the estimated regression coefficients of $EARN_{i,t}$ and $\Delta EARN_{i,t}$, that is, $\beta_1 + \beta_2$. Firms are categorized using three-digit SIC industry definitions. The definitions of other variables are reported in Appendix A. *, **, and ***, respectively indicate the significance at the 10%, 5%, and 1% levels, for the *t*-test and the two-tailed Wilcoxon test.

Panel A: Descriptive statistics

	IndCond = 0 (boom)		*IndCond* = 1 (recession)		Boom *vs*. Recession	
Variables	Mean	Median	Mean	Median	*t*-statistic	*z*-statistic
RSQ_Ind	**0.311**	**0.308**	**0.261**	**0.233**	16.70***	16.50***
RET_Stdev	0.026	0.022	0.027	0.023	–7.43***	–7.87***
IRET_Stdev	0.012	0.009	0.011	0.009	8.55***	2.22**
MRET_Stdev	0.011	0.010	0.010	0.010	7.24***	1.51
RSQ_Earn	**0.178**	**0.131**	**0.208**	**0.168**	–5.11***	–4.58***
RETURN_Stdev	0.632	0.382	0.731	0.381	–1.39	1.82*
Earn_Stdev	3.735	0.039	4.323	0.039	–0.14	0.65
ΔEarn_Stdev	2.332	0.048	2.689	0.048	–0.17	–0.76
ERC	**4.313**	**2.759**	**4.744**	**2.916**	–4.03***	–3.19***

Panel B: Pearson correlation

	RSQ_Ind	*RSQ_Earn*	*ERC*	*IndCond*
RSQ_Ind	1	–0.075***	0.023***	–0.089***
		<.0001	0.0031	<.0001
RSQ_Earn	—	1	0.258***	0.019***
			<.0001	<.0001
ERC	—	—	1	0.030***
				<.0001
IndCond	—	—	—	1

Table 7
Logit models for CEO turnovers on performance and price informativeness

This table reports the regression results of CEO turnovers on performance and stock price informativeness for a total sample of 44,582 CEO-firm-year observations during 1993–2019, including 3,675 voluntary and 1,236 forced CEO departures. The analysis includes all the firm-year observations, regardless of whether a CEO turnover is observed. The reference group constitutes the group with no CEO turnover observations. *RSQ_Ind* is the adjusted R-squared obtained from the model $RET_{i,t} = \alpha_0 + \alpha_1 * IRET_{i,t} + \alpha_2 * MRET_{i,t} + \partial_0$ over the sample period, where $RET_{i,t}$ is the daily raw stock return for firm *i* in year *t*; $IRET_{I,t}$ is the median daily raw stock return of firm *i*'s industry peers in year *t*; $MRET_{I,t}$ is the daily value-weighted market return in year *t*. *RSQ_Earn* is the adjusted R-squared obtained from the model $RETURN_{i,t} = \beta_0 + \beta_1 * EARN_{i,t} + \beta_2 * \Delta EARN_{i,t} + \gamma_0$, where $EARN_{i,t}$ and $\Delta EARN_{i,t}$ are the level and change of annual earnings of firm *i* in year *t*. Both $EARN_{i,t}$ and $\Delta EARN_{i,t}$ are scaled by the market value of equity at the beginning of year *t*. *ERC* is the combined slope coefficients or the "earnings response coefficients", obtained as the sum of the estimated regression coefficients of $EARN_{i,t}$ and $\Delta EARN_{i,t}$, that is, $\beta_1 + \beta_2$. Firms are categorized using three-digit SIC industry definitions. The definitions of other variables are reported in Appendix A. The *t*-statistics are reported in parentheses. *, **, and ***, respectively indicate the significance at the 10%, 5%, and 1% levels (two-tailed), based on the standard errors corrected for heteroscedasticity and autocorrelations.

	Voluntary			Forced		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	–0.372***	–0.325***	–0.324***	–0.181***	–0.200***	–0.196***
	(–11.70)	(–19.69)	(–19.29)	(–7.26)	(–9.69)	(–9.49)
ExRET	–0.006**	–0.001	–0.005	**–0.050*** **	**–0.026*** **	**–0.029*** **
	(–1.98)	(–0.28)	(–1.57)	**(–9.87)**	**(–6.96)**	**(–7.93)**
IndRET	–0.014	–0.005	–0.009	**–0.034*** **	**–0.016*** **	**–0.014***
	(–1.54)	(–0.84)	(–1.47)	**(–2.77)**	**(–3.25)**	**(–1.92)**
RSQ_Ind	**–0.022** **			**–0.056*** **		
	(–2.12)			**(–4.27)**		
*ExRET*RSQ_Ind*	–0.001			**0.052*** **		
	(0.07)			**(3.73)**		
*IndRET*RSQ_Ind*	0.021			0.019		
	(0.85)			(0.61)		
RET_Stdev	0.031			1.21***		
	(0.28)			(8.41)		
IRET_Stdev	0.678**			–0.398		
	(2.48)			(–1.12)		
MRET_Stdev	1.731			–1.426		
	(0.74)			(–0.93)		
RSQ_Earn		0.002			–0.002	
		(0.57)			(–0.39)	
*ExRET*RSQ_Earn*		0.012			–0.005	
		(1.02)			(–1.56)	
*IndRET*RSQ_Earn*		0.001			**0.021** **	
		(0.07)			**(2.36)**	

ERC			–0.0001			**0.001****
			(–0.55)			**(2.23)**
*ExRET*ERC*			0.0002			0.006
			(0.54)			(1.08)
*IndRET*ERC*			0.0008			**0.003****
			(1.26)			**(2.05)**
RETURN_Stdev		0.0002	0.0004		0.003	0.004*
		(0.16)	(1.27)		(1.48)	(1.89)
Earn_Stdev		–0.004	–0.004		–0.003	–0.005
		(–0.73)	(–0.68)		(–0.50)	(–0.74)
Δ*Earn_Stdev*		0.004	0.004		0.006	0.005
		(1.12)	(1.13)		(1.46)	(1.25)
ExROA	–0.010	0.008	0.008	–0.013**	–0.012**	–0.006
	(–0.99)	(0.90)	(0.91)	(–2.18)	(–2.19)	(–1.58)
IndROA	–0.008	–0.002	–0.002	–0.015	–0.012	–0.005
	(–1.59)	(–0.49)	(–0.49)	(–1.44)	(–1.09)	(–0.98)
*ExROA*RSQ_Ind*	–0.008			–0.032		
	(–0.27)			(–0.85)		
*IndROA*RSQ_Ind*	0.003			0.009		
	(0.20)			(0.40)		
*ExROA*RSQ_ Earn*		0.006			0.027	
		(0.34)			(1.33)	
*IndROA*RSQ_ Earn*		0.011			**0.023***	
		(1.14)			**(1.89)**	
*ExROA*ERC*			0.0002			0.001
			(0.29)			(1.34)
*IndROA*ERC*			0.0001			**0.001***
			(0.11)			**(1.70)**
IndCond	–0.005*	–0.0005	–0.002	0.005	0.009**	0.009**
	(–1.86)	(–0.12)	(–0.49)	(1.34)	(2.14)	(2.15)
ExRET1	–0.001	–0.0004	–0.0004	–0.001*	–0.001	–0.001
	(–0.23)	(–0.72)	(–0.73)	(–1.74)	(–1.56)	(–1.58)
IndRET1	–0.007	–0.006	–0.006	0.007	0.006	0.006
	(–1.29)	(–1.38)	(–1.42)	(1.01)	(1.25)	(1.24)
ExROA1	0.020*	–0.002	–0.002	–0.003	0.003	0.005
	(1.85)	(–0.29)	(–0.20)	(–0.20)	(1.27)	(1.46)
IndROA1	0.012**	0.006	0.006	0.007	0.006	0.007
	(2.22)	(1.39)	(1.38)	(1.07)	(1.23)	(1.38)
Leverage	0.006	0.002	0.002	–0.001	0.002	0.002
	(0.87)	(0.27)	(0.29)	(–0.08)	(0.31)	(0.21)
FirmSize	0.002**	0.003***	0.003***	0.006***	0.003***	0.003***
	(2.09)	(4.09)	(4.00)	(4.85)	(4.04)	(3.75)
BoardSize	0.0001	0.001	0.001	0.0009	0.001	0.001
	(0.08)	(0.82)	(0.80)	(0.91)	(0.96)	(0.95)
DirectorRatio	0.017	0.005	0.004	0.096	0.112*	0.113*
	(0.86)	(0.21)	(0.18)	(1.02)	(1.92)	(1.94)
Directorship	–0.0006	0.0003	0.0002	–0.002	–0.002	–0.002
	(–0.65)	(0.23)	(0.21)	(–1.49)	(–1.18)	(–1.19)
DirectorShare	0.008	0.004	0.005	0.004	–0.0002	–0.0001
	(0.99)	(0.40)	(0.50)	(0.38)	(–0.02)	(–0.01)

DirectorTenure	–0.003***	–0.003***	–0.003***	–0.006***	–0.005***	–0.005***
	(–5.37)	(–4.13)	(–4.18)	(–7.71)	(–4.89)	(–4.88)
GenderRatio	–0.022	–0.048	–0.049	–0.039	–0.051	–0.051
	(–0.88)	(–1.53)	(–1.53)	(–1.27)	(–1.32)	(–1.32)
Blockholder	0.001	0.001	0.001	0.012**	0.009**	0.010**
	(1.51)	(1.10)	(1.09)	(2.32)	(2.06)	(2.15)
Founder	0.009	0.027	0.027	–0.020***	–0.028**	–0.028**
	(0.50)	(1.19)	(1.21)	(–2.86)	(–2.04)	(–2.05)
CEO_Tenure	0.003***	0.003***	0.003***	0.003	0.002**	0.002**
	(6.52)	(5.80)	(5.81)	(1.58)	(1.99)	(1.97)
CEO_Age	0.006***	0.006***	0.006***	0.004*	0.003	0.003
	(32.86)	(28.29)	(28.26)	(1.78)	(1.56)	(1.49)
CEO_Share	–0.0003	–0.001***	–0.002***	–0.001*	–0.001***	–0.001**
	(–0.88)	(–3.60)	(–3.62)	(–1.85)	(–2.65)	(–2.56)
CEO_Power	–0.011***	–0.012***	–0.012***	–0.009***	–0.011***	–0.010***
	(–3.65)	(–3.15)	(–3.20)	(–5.42)	(–4.46)	(–4.53)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,178	30,694	30,694	38,861	28,868	28,868
F-value	19.3***	19.28***	19.26***	11.14***	13.22***	13.38***
Adj *R*-Sq	0.116	0.128	0.127	0.123	0.146	0.145

Appendix A: Variable definitions

Turnover	A dummy variable that equals one if a CEO turnover is observed in the fiscal year, and zero otherwise.
ExRET	A firm's annual stock returns in the year before a CEO turnover, adjusted with the three-digit SIC industry value-weighted portfolio returns.
ExRET1	The lagged measure of *ExRET* in the preceding year.
IndRET	The three-digit SIC industry value-weighted portfolio stock returns in the year before a CEO turnover.
IndRET1	The lagged measure of *IndRET* in the preceding year.
ExROA	A firm's accounting ROA in the year before a CEO turnover, adjusted with three-digit SIC industry median ROA, where the ROA is obtained as the ratio of net income to total assets.
ExROA1	The lagged measure of *ExROA* in the preceding year.
IndROA	The three-digit SIC industry median accounting ROA in the year before a CEO turnover, where the ROA is obtained as the ratio of net income to total assets.
IndROA1	The lagged measure of *IndROA* in the preceding year.
IndCond	A dummy variable that equals one for an observation year if the average industry ROA in the preceding three years is below the corresponding average industry ROA in the preceding ten years, and zero otherwise, where firms are categorized using three-digit SIC industry definitions.
Leverage	The book value of liability to the book value of total assets.
FirmSize	The logarithm of total assets.
BoardSize	The number of directors on the board.
DirectorRatio	The proportion of independent directors on the board.
Directorship	The average number of boards that directors have served on.
DirectorShare	The average percentage of a firm's shares held by directors.
DirectorTenure	The average number of years that directors have served in the position.
GenderRatio	The proportion of male directors on the board.
Blockholder	The number of institutional shareholders holding more than 5% of the firm's shares.
Founder	A dummy variable that equals one if a CEO is a founder of the current firm, and zero otherwise.
CEO_Tenure	The number of years the CEO has served in the position.
CEO_Age	The CEO's age in the fiscal year.
CEO_Share	The percentage of a firm's shares held by the CEO.
CEO_Power	Equals one if a CEO does not hold any board position, two if the CEO is also the Chairman of the board, and three if the CEO is both the Chairman of the board and the President.
RET_Peer	The industry return in the year before a CEO turnover obtained as the predicted value from the regression model $R_{i,t-1} = a_0 + a_1 * R_{peer\ group,t-1} + v_{i,t-1}$, where $R_{i,t-1}$ is firm *i*'s stock return in year *t*-

	1 and $R_{peer\ group,t-1}$ is industry-median return in year *t-1*. Firms are categorized using three-digit SIC industry definitions.
RET_Peer1	The lagged measure of *RET_Peer* in the preceding year.
RET_Idiosyn	A firm's idiosyncratic stock return in the year before a CEO turnover obtained as the residual from the regression model $R_{i,t-1} = a_0 + a_1 * R_{peer\ group,t-1} + v_{i,t-1}$, where $R_{i,t-1}$ is firm *i*'s stock return in year *t-1* and $R_{peer\ group,t-1}$ is industry-median return in year *t-1*. Firms are categorized using three-digit SIC industry definitions.
RET_Idiosyn1	The lagged measure of *RET_Idiosyn* in the preceding year.
RSQ_Ind	The adjusted R-squared obtained from the model $RET_{i,t} = \alpha_0 + \alpha_1 * IRET_{i,t} + \alpha_2 * MRET_{i,t} + \partial_0$ over the sample period, where $RET_{i,t}$ is the daily raw stock return for firm *i* in year *t*; $IRET_{I,t}$ is the median daily raw stock return of firm *i*'s industry peers in year *t*; $MRET_{I,t}$ is the daily value-weighted market return in year *t*. Firms are categorized using three-digit SIC industry definitions.
RET_Stdev	The standard deviation of a firm's daily raw stock returns $RET_{i,t}$ in year *t*.
IRET_Stdev	The standard deviation of the median daily industry peer stock returns $IRET_{i,t}$ in year *t*.
MRET_Stdev	The standard deviation of the daily value-weighted market returns $MRET_{i,t}$ in year *t*.
RSQ_Earn	The adjusted R-squared obtained from the model $RETURN_{i,t} = \beta_0 + \beta_1 * EARN_{i,t} + \beta_2 * \Delta EARN_{i,t} + \gamma_0$, where $EARN_{i,t}$ and $\Delta EARN_{i,t}$ are the level and change of annual earnings of firm *i* in year *t*. Both $EARN_{i,t}$ and $\Delta EARN_{i,t}$ are scaled by the market value of equity at the beginning of year *t*.
RETURN_Stdev	The standard deviation of annual raw stock returns $RETURN_{i,t}$ over the preceding ten years for each firm-year observation.
Earn_Stdev	The standard deviation of annual earnings $EARN_{i,t}$ over the preceding ten years for each firm-year observation.
ΔEarn_Stdev	The standard deviation of change in annual earnings $\Delta EARN_{i,t}$ over the preceding ten years for each firm-year observation.
ERC	The combined slope coefficients or the "earnings response coefficients", obtained as the sum of the estimated regression coefficients of $EARN_{i,t}$ and $\Delta EARN_{i,t}$, that is, $\beta_1 + \beta_2$.