Growing Pains or Confidence? CEO Relative Age, Stress, and Firm Performance

Abstract

CEOs face tremendous stress at work. Motivated by the psychological literature that self-efficacy helps people overcome stress, we examine if self-efficacy of CEOs alleviates their stress and improve their firms' performance. Using CEOs' relative age, i.e., age in kindergarten due to state-level eligibility cutoff date, as a proxy for the CEOs' self-efficacy, we find that CEOs with higher self-efficacy generate better firm performance, especially in high-stress situations such as industry downturn, expansion into a new sector, mergers and acquisitions, and innovation. While existing literature documents negative impacts of CEO overconfidence, our findings suggest that confidence of CEOs can be beneficial to their firms.

Keywords: Relative age, Self-efficacy, CEO confidence, CEO stress, Firm performance, Corporate Investment, Corporate innovation.

JEL Classification: G32; G34; G41

CEOs face tremendous stress as they are always involved in high stakes decisions, complicated tasks, and unexpected situations. CEOs' stress from work can extend into a prolonged period and have a significant impact. For example, Borgschulte et al. (2021) find that shocks that elevate CEOs' stress, such as takeover threats or industry-wide downturn, significantly reduce CEOs' life expectancies and increase their mortality risk. Given the large influence of CEOs' stress on their personal lives, an important but underexplored question is whether CEOs' stress negatively impacts their work performance.

In this paper, we examine if CEO self-efficacy helps CEOs handle stress and in turn increase their firms' performance, especially when CEOs face high-stress tasks. Our research question is motivated by the ample psychological evidence that self-efficacy, defined as an individual's confidence in her ability to achieve a specific goal, helps a person handle stress and perform high-stress tasks (e.g., Bandura 1994, 1997).[1] Despite the large literature on CEO characteristics and preferences, there has been little research on how CEO stress, or CEOs' ability to handle stress, affect their firms' operation and performance. This question is worth exploring because stress is a very common emotion that CEOs experience at work.

CEO self-efficacy (confidence) is related to but different from CEO overconfidence. Since the pioneer work of Malmendier and Tate (2005a), researchers have found robust evidence that CEO *overconfidence* lead to undesirable consequences such as overinvestment, poor performance, and loose accounting practices.[2] Given the rich psychological literature that confidence is generally beneficial and increasing performance, CEO *confidence* may influence firms differently from CEO overconfidence. Therefore, our study on CEO self-efficacy complements the existing literature on CEO overconfidence and sheds new light on the general effect of CEO confidence.

[1] We review the psychological literature on self-efficacy and its positive effect on handling stress in Section 1.
[2] See, for example, Malmendier and Tate (2005a, 2005b, 2008), Billet and Qian (2008), Kolasinski and Li (2013), Schrand and Zechman (2012), Ahmed and Duellman (2013), Banerjee et al. (2017).

We measure CEO self-efficacy based on the CEO's childhood experience, particularly the CEO's relative age. Most of the U.S. states have a single cutoff date for school eligibility, and relative age is the difference (number of months) between a child's birth date and the cutoff date when she enters kindergarten.[3] Existing literature on economics, education, and psychology has linked relative age to an increased level of self-efficacy (or, more generally, self-confidence) developed through early life experience. For example, Crawford, Dearden, and Greaves (2011) show that children with higher relative age are more confident about their own ability and more likely to believe they could control their own destiny. Furthermore, the effect of relative age persists in grownups (e.g., Dhuey and Lipscomb, 2008). Bai, Ma, Mullally, and Solomon (2019) find that, consistent with a positive influence of self-confidence, mutual fund managers with high relative age deliver better fund returns than their low relative-age peers. We predict that the CEOs with high self-efficacy, as measured by high relative age, will outperform their peers especially when they conduct high-stress tasks.

To measure CEO relative age, we first collect personal information of CEOs from the Execucomp database (S&P 1500 firms), and merge with the BoardEx database to identify CEOs' months of birth. We then obtain the CEOs' states using the first five digits of their social security numbers collected from the LexisNexis Accurint database. Finally, we follow Bai et al. (2019) and use the cutoff months for school entry (Bedard and Dhuey, 2012) to calculate CEOs' relative age. Our final sample includes 22,687 firm-years from 1992 to 2019. The relative age of sample CEOs has a mean of 6.43 and a standard deviation of 3.42.[4]

We set the stage by studying the influence of relative age in a high-stress situation for CEOs: answering negative questions during conference calls. We expect CEOs with higher self-efficacy, as

[3] Relative age can generate a large difference in age when kids enter kindergarten. For example, kids with the highest relative age in kindergarten (born right after cutoff date) is 20% older than those with the lowest relative age (born right before cutoff date).

[4] The mean of 6.43 is very close to the mean of 6.40 reported by Bai et al. (2019) for mutual fund managers.

measured by higher relative age, to answer negative questions with a more positive tone. We conduct textual analysis on the transcripts of earnings conference calls obtained from the Seeking Alpha database. We find that while negative analyst questions generally trigger negative CEO responses, the responses from high relative-age CEOs are significantly more positive than their peers with low relative age. This finding provides preliminary evidence that self-efficacy helps CEOs handle stress in a positive way.

Next, we turn to examining the relation between CEO relative age and firms' operating performance. We estimate regressions of return on assets (ROA) on CEO relative age, controlling of a broad set of firm and CEO characteristics. We find that firms with higher relative-age CEOs exhibit significantly higher ROAs in the following three years. This result is also economically significant. For example, an increase in CEO relative age from the first quartile to the third quartile is associated with an increase of ROA by 5.7% of its mean. This finding suggests that, unlike CEO overconfidence, CEO confidence can benefit firms by generating better operating performance.

We further examine if the positive effect of CEO self-efficacy on performance is more pronounced when CEOs face high-stress tasks. We examine three settings of high-stress tasks associated with unexpected situations, non-routine operations, or risky projects: industry downturn, non-routine investments (expansion in to new sector, M&As), and innovation.

For the first setting, we follow Opler and Titman (1994) and define industry downturn as industry-years in which firms' median sales growth is negative and median stock return is below -30%. We estimate regressions of ROA on the interaction between the dummy of industry-downturn and CEO relative age. We find that the coefficient of the interaction is significantly positive, suggesting that the positive relation between CEO relative age and firm performance is much stronger during industry downturn than in normal times. Similarly, we find that firms with higher relative-age CEOs have higher stock returns in the downturn years relative to normal times. These results are consistent

with CEO self-efficacy helping CEOs perform high-distress tasks.

Our second test of high-stress task examines the effect of CEO self-efficacy in non-routine corporate investments vs routine corporate investment. Since non-routine investment is associated with greater stress than routine investment, we expect the higher relative-age CEOs to deliver superior performance when they conduct non-routine investment rather than routine investment. We examine two types of non-routine investment: expansion into a new sector (adding a segment that differs from the firm's existing industries), and mergers and acquisitions (M&A). We find that high relative-age CEOs exhibit significantly better performance in both types of high-stress investments than their low relative-age peers. In a sharp contrast, when we examine routine investment as measured by capital expenditures, we observe little difference in performance between high relative-age and low relative-age CEOs. Taken together, these results provide further evidence that CEO self-efficacy increases firm performance by helping CEOs handle high-stress operations.

For the third test of high-stress task, we examine a firm's innovation activity as innovation is a high-stress task associated with heightened uncertainties. We follow Hirshleifer, Hsu, and Li (2013) and construct two measures of innovation efficiency to evaluate the firms' innovation performance. The first measure is constructed as the number of patents granted in year t divided by total R&D expenditures of the past five-year period, and the second measure is similarly constructed but using the number of forward citations of patents granted in year t as the numerator. We find that high relative-age CEOs have significantly higher innovation efficiency than their low relative age peers. For example, a shift from the first quartile of relative age to the third quartile increases the innovation efficiency by 10.17% of its mean. These results support Hirshleifer, Low, and Teoh' (2012) finding that increased CEO confidence has a positive effect on innovation output.

We perform several robustness tests of our main analysis, including using the dummy variable for high relative age or using ranks of relative age rather than the raw relative age. We also examine

alternative measurement methods of relative ages based on alternative approaches of identifying school cutoff dates. Our results are robust in all these robustness tests.

Finally, given the large literature on CEO overconfidence, we investigate the relation between CEO self-efficacy (confidence) and CEO overconfidence. We follow the literature (e.g., Malmendier and Tate 2005a, 2005b, 2008) and construct a measure of CEO overconfidence using CEOs' option holdings. While relative age captures CEO's *innate* self-confidence, the overconfidence measure captures CEOs' *specific* over-optimism about their firms' prospects. We find that the correlation between relative age and overconfidence is positive but very weak (0.007, p-value 0.27), suggesting that CEOs with high self-efficacy (confidence) do not necessarily become overoptimistic about their firms' prospects.[5]

Previous studies document that overconfident CEOs conduct more corporate investment, takeovers, and innovation (e.g. Malmendier and Tate 2005a, 2008; Hirshleifer, Low, and Teoh, 2012). We find that, unlike overconfident CEOs, high relative-age CEOs do not invest more than their low relative-age peers. Additionally, previous studies show that overconfident CEO are more likely to issue managerial forecasts, especially the overoptimistic forecasts (e.g., Hribar and Yang 2016). We find that high relative-age CEOs do not issue more managerial forecasts or exhibit overoptimism relative to their low relative-age peers. In fact, there is weak evidence that higher relative-age CEOs are *less* likely to issue overoptimistic forecasts. These results demonstrate that CEO confidence and CEO overconfidence may have vastly difference effects on corporate policies.

Our paper is the first to show that CEO stress, and CEOs' ability to handle stress, can have significant impact on firm performance. Previous studies document that CEOs experience severe work stress (e.g., Bandiera et al., 2018; Bandiera et al., 2020; Porter and Nohria, 2018), and such stress

[5] In untabulated analysis, we control for the CEO overconfidence measure in the regression analysis and all of our findings hold after controlling for CEO overconfidence.

has a large influence on CEOs' personal lives (Borgschulte et al., 2021). We provide new evidence that CEOs' ability to handle stress, as measured by CEOs' relative age, is strongly related to firm performance, especially when CEOs perform high-stress operations. These findings show that CEOs' stress not only affect their personal lives, but also their work performance.

Our paper also contributes to the literature on how CEO beliefs affect corporate policy, especially the literature on CEO overconfidence started by the seminal studies of Malmendier and Tate (2005a, 2005b, 2008). In the framework of overconfidence, increased confidence leads to more biased beliefs and more suboptimal corporate policy. Motivated by the psychological evidence that confidence is *generally* beneficial and increasing performance, we examine the *general* effect of CEO confidence, and our findings suggest that CEO confidence can be beneficial to their firms.

Our findings are consistent with a closely related study by Bai et al. (2019) which documents that mutual fund managers with higher relative age deliver better fund returns. We differ from their study in that we investigate the confidence of CEOs rather than fund managers, with a focus on how self-efficacy helps CEO handle stress. Our paper is also related to several studies that document the benefits of CEO overconfidence such as better innovation efficiency (Hirshleifer, Low, and Teoh, 2012; Galasso and Simcoe 2011) and stronger leadership (Phua, Tham, and Wei, 2018).[6] While we focus on CEO confidence rather than CEO overconfidence, our results are consistent with their findings that increased confidence can be beneficial to the firms.

1. Related Literature

1.1 Self Efficacy and Stress

Since Bandura (1977), scholars in the fields of psychology and education have found that self-

[6] To explain the puzzle why firms would hire overconfident managers, Goel and Thakor (2008) and Gervais, Heaton, and Odean (2011) propose theoretical models in which CEO overconfidence can be beneficial when there are risky growth opportunities.

efficacy, the task-specific self-confidence that reflects a person's belief in her capacity to successfully achieve a particular goal, is a strong determinant of many aspects of people's lives and is positively related to work-related performance (e.g., Bandura 1997; Stajkovic and Luthans 1998). Self-efficacy is particularly important when people are in difficult environment or facing stressful tasks. According to Bandura (e.g., 1994, 1997), when confronting difficulties, people with high self-efficacy display high aspirations, good analytic thinking, strong perseverance, and feelings of calm, which pay off in performance. In contrast, people with low self-efficacy tend to exaggerate potential threats, exhibit low aspiration and reduced efforts, and give up more easily.

Many empirical studies provide evidence on the effect of self-efficacy on handling stress. For instance, Stumpf, Brief, and Hartman (1987) use job interviews as a setting of challenging task, and find that people with higher self-efficacy are more likely to deal with stressors and less likely to worry. Saks (1994) studies new job entry as an anxiety-producing experience, and documents a negative relation between self-efficacy and anxiety. Latack, Kinicki, and Prussia (1995) examine involuntary job loss as a stressful situation, and find that self-efficacy leads to the perception that the situation is under control, which help individuals pursue problem-focused coping strategies. Jex and Bliese (1999) find that people with higher level of self-efficacy exhibit less psychological and physical strains to stressful tasks, such as long work hours and heavy workload. Additionally, Shoji et al. (2016) find a significantly negative relation between self-efficacy and job burnout, a consequence of long-term or chronic work-related stress. Motivated by the rich literature that self-efficacy helps people handle stress, we study how CEOs' self-efficacy affect their work performance, especially in stressful situations.

1.2 Relative Age and Self-Efficacy

The effect of relative age has been extensively studied in educational and psychological literature (e.g., Barnsley and Thompson, 1988; Helsen et al., 2005; Bedard and Dhuey, 2006; Cobley et al., 2009; Lubotsky and Kaestner, 2016). Many studies document a strong effect of relative age on

children's self-efficacy: Children with low relative age tend to be less self-confident than their relatively older peers. For instance, Crawford, Dearden, and Greaves (2011) find that students with lower relative age display lower confidence on their own ability and how much difference can be made by their own actions. Dhuey and Lipscomb (2008) show that students with higher relative age believe that they own more leadership skills and take more leadership positions.

To date we have only limited evidence on the role of relative age in the finance world. Drawing on psychology literature, Bai et al. (2019) predict that mutual fund managers with higher relative age are more confident and therefore will have stronger performance. They provide novel evidence that, consistent with this prediction, fund managers with higher relative age make better stock selections and deliver higher fund returns. Du, Gao, and Levi (2012) find that a disproportionately low number of CEOs have low relative age, suggesting that high relative age helps CEOs move up the ladder of career path. They do not study how CEO relative age affects firm performance or corporate policy. Our study complements Bai et al. (2019) in that we examine CEOs rather than fund managers, and our investigations are centered on how self-efficacy helps CEO handle stress at work. Additionally, given the large literature on CEO overconfidence but little research on CEO confidence, our analysis can provide unique evidence on how CEO *confidence* affects corporate policy.

2. Data and Sample Construction

2.1 Construction of CEO Relative Age

To measure CEO relative age, we obtain the data of CEOs' birth months from multiple sources. We start with CEOs in the Execucomp database (S&P 1500 firms) from 1992 to 2017, and retain the CEOs whose firms appear in the CRSP-COMPUSTAT merged databases in the same period. Next, we merge the data with the "Individual Profile Employment" data from the BoardEx database to obtain CEOs' birth dates. For the sample CEOs whose birth date information is not available in

BoardEx, we manually identify these CEOs in the LexisNexis Accurint database using their names, birth years (if available), employment histories, and locations, and collect their birth date information. The LexisNexis Accurint database includes rich biographical information of individuals in the U.S. (e.g., full name; date of birth; current and historical addresses), and has been used by a number of financial studies (e.g., Pool et al. 2015; Bai et al. 2019, Liu et al. 2021).

To obtain CEOs' states of school entry, we follow the literature (e.g., Pool et al. 2015; Bai et al. 2019, Liu et al. 2021) and identify sample CEOs in the LexisNexis Accurint database to obtain the first three digits of their social security numbers (SSNs). We are able to collect the data for 5,398 sample CEOs and use the first three digits of SSN to identify the state where a given CEO attended kindergarten.[7]

For each sample CEO, we identify the cutoff month for school entry using the list in Table A1 of Bedard and Dhuey (2012). Similar to Bai et al. (2019), we exclude the cases where the cutoff dates are not available: (1) a state does not have a cutoff date for school entry (i.e., cutoff date is "none") and (2) a state allows local school districts to set their own cutoff dates (i.e., cutoff date is "LEA"). Some states set their cutoff dates at the beginning of school year (i.e., cutoff date is "ssy"), in which case we use September 1st as the cutoff date.

Since the list of cutoff date in Bedard and Dheuy (2012) starts from 1964, we follow their approach to further identify cutoff dates before 1964. Specifically, before the mid-1960s, most states allow children to enter school in the fall as long as they turn five years old before January 1 of the year (Angrist and Krueger 1991). Therefore, for the pre-1964 period, we assigned January 1st as the cutoff date except for the states that do not specify a cutoff date in 1964.[8]

[7] Before June 25, 2011, the first three digits of SSN reflected the state or territory where the SSN was assigned. After that date, the Social Security Administration randomizes the assignment approach and the first three digits are not area number anymore. Since our sample CEOs were all born before 2011, they are not subject to this randomization.

[8] In a robustness test, we use January 1st as the cutoff date in the pre-1964 period for (1) all states, or (2) states that were not "LEA" or "ssy" in 1964. The untabulated results show that our findings remain same.

Since the average age to attend kindergarten is five, we use the cutoff date in the year when a CEO turns five to determine her relative age. We construct the measure of relative age following Bai et al. (2019) as the difference in months between a CEO's birth month and the cutoff month:

$$Relative\ Age = \begin{cases} m_s - m_b, & m_b < m_s \\ 12 - (m_b - m_s), & m_b \geq m_s \end{cases} \quad (1)$$

where m_b is the CEO's birth month, and m_s is the school-entry cutoff month. For example, if the CEO's birth month is May and the cutoff month is September, then her relative age is 4 months (=9-5). If the CEO's birth month is May but the cutoff month is January, then her relative age is 8 months (=12-(5-1)). The relative age is higher in the latter case where the CEO would need to wait till next year to attend school.

After computing the relative age for each sample CEO, we merge the CEO data with the CRSP-COMPUSTAT merged database to form a panel dataset at the firm-year level. Our final sample includes a total of 22,687 firm-years from 1992-2019. Panel A of Table 1 reports the sample distribution of CEO relative age. Consistent with Bai et al. (2019), a slight majority (52%) of our sample CEOs are relatively younger in kindergarten (i.e., relative age ≤ 6 months). Panel B of Table 1 shows that the relative age has a mean of 6.430, which is very close to the 6.5 for a random distribution, and a standard deviation of 3.418. These results show a substantial variation in relative age across sample CEOs.

[Insert Table 1 Here]

2.2 Constructions of Other Variables and Summary Statistics

We obtain sample firms' financial information and stock returns from the CRSP-COMPUSTAT merged database, analyst forecasts and management forecasts from the I/B/E/S database, M&A deals from the Securities Data Corporation (SDC) database, and institutional ownerships from Thomson-Reuters 13F database. We also obtain the data of patents and citations

from Professor Noah Stoffman's data library.[9] The definitions of the variables used in this paper are provided in the Appendix.

For the analysis of CEO's earnings conference call, we pulled the text of earnings conference calls during 2006-2017 from the Seeking Alpha database. Following previous studies (e.g., Loughran and McDonald, 2011, 2016; Bodnaruk, Loughran and McDonald, 2015), we use the positive and negative word lists in the Loughran-McDonald (LM) world dictionary to measure the tone of each earnings call. We provide more details of constructions in the result discussion. Summary statistics of the main explanatory variables and dependent variables are presented in Panel B of Table 1, and those of the control variables are presented in Panel C of Table 1.

3. CEO Relative Age and Firm Performance

3.1 CEO Relative Age and Handling Stress: Negative Analyst Questions

To set the stage for our main analysis of firm performance, we first examine whether CEOs with high self-efficacy, as measured by high relative age, are better at handling stress relative to their low-relative age peers. Specifically, we examine a high-stress situation for CEOs: answering negative analysts' questions during earnings conference calls. If self-efficacy helps managers handle stress, then we expect the managers with higher self-efficacy to answer negative questions with more positive tones.

We take the text of earnings conference calls from the Seeking Alpha database and focus on the analyst questions and the CEOs' answers. We follow the literature and construct the tone measure for each question or answer (*Tone*) as the number of positive words from Loughran and McDonald's dictionary minus the number of negative words from the dictionary, scaled by the total number of words. For robustness, we construct three tone measures using the original text, text with

[9] We thank the authors of Kogan et al. (2017) for making the data publicly available.

lemmatization, or text with stemming.[10] We estimate the regression below:

$$CEO\ Tone_{ijt} = \beta_0 + \beta_1 Negative\ Analyst_{ijt} + \beta_2 Relative\ Ag_{it} + \beta_3 Negative\ Analyst_{ijt} \times Relative\ Age_{it} + \beta_4 Controls_{it} + \eta_m + \gamma_y + \varepsilon_{it} \quad (2)$$

where the dependent variable, $CEO\ Tone_{ijt}$, is the tone of CEO's answer to an analyst question *j* for firm *i* and quarter *t*. *Negative Analyst* is an indicator variable that equals to one if the tone of the analyst question is negative. *Relative Age* is the relative age of firm *i*'s CEO. Our main variable of interest is the interaction between *Negative Analyst* and *Relative Age*. A significantly positive coefficient on the interaction would indicate that CEOs with higher relative age answer negative questions with more positive tones. We control for a broad set of firm and CEO characteristics including firm size, profitability, earnings surprise, growth, M&A activity, earnings volatility, return over the past 12 months, leverage, market-to-book ratio, management forecast, analyst coverage, institutional ownership, CEO age, and CEO gender.[11] We also include for industry and year fixed effects (η_m and γ_y, respectively) to control for industry- and time-invariant characteristics.

Column (1) of Table 2 presents the regression of the *CEO Tone* measure based on the original text. The coefficient on *Negative Analyst* is significantly negative, indicating that negative analyst questions lead to more negative responses from CEOs. The coefficient on the interaction between *Negative Analyst* and *Relative Age* is positive and significant at the 1% level, suggesting that CEOs with higher self-efficacy answer negative questions with a more positive tone. We find similar results in Columns (2) and (3) which present regressions of the other two *CEO Tone* measures (*Lemmatized Tone* and *Stemmed Tone*). Overall, the results in Table 2 support the idea that CEOs with higher relative age

[10] The stem and the lemma of a given word are both obtained based on the approach provided by Natural Language Toolkit (NLTK).

[11] Control variables using financial and stock return data are calculated at the end of the fiscal quarter of the earnings. CEO characteristics are measured in the fiscal year to which a given fiscal quarter belongs.

handle stress in a more positive way.

[Insert Table 2 Here]

3.2 CEO Relative Age and Firm Performance

The results in Table 2 illustrate that CEOs with higher relative age are better at handling stressful situations. In this subsection, we examine if this effect translates into better firm performance. Specifically, we examine whether firms with higher relative-age CEOs have better performance by estimating the following regression:

$$ROA_{it+n} = \beta_0 + \beta_1 Relative\ Age_{it} + \beta_2 Control_{it} + \eta_m + \gamma_t + \varepsilon_{it} \qquad (3)$$

where the dependent variable is firm *i*'s return-on-assets (*ROA*) in the year t+1, t+2, or t+3. *ROA* is constructed as earnings before extraordinary items scaled by total assets in year *t*. The main variable of interest is *Relative Age*, which is the relative age of firm *i*'s CEO in year *t*. η_m and γ_t represent industry fixed effects and year fixed effects, respectively. We control for firm and CEO characteristics including firm size, leverage ratio, book-to-market ratio, CEO age, and CEO gender. All control variables are measured in year *t*.

[Insert Table 3 Here]

Table 3 reports the regression results. In all three columns, the coefficient on *Relative Age* is positive and significant at the 5% level, suggesting that high relative-age CEOs generate better firm performance than low relative-age CEOs for multiple years. These results are economically significant as well. For example, the coefficient of relative age in Column (1) indicates that a change in CEO relative age from the first quartile to the third quartile is associated with a 0.2 percentage point increase in *ROA* in year t+1, which represents a 5.7% increase from its mean.[12] Overall, the results in Table 3

[12] The coefficient of relative age is 0.0004. Therefore, an increase in CEO relative age from the first quartile to the third quartile (i.e., 5.00) is associated with a 0.2 percentage point (= 0.0004×5.00) increase of ROA in year t+1. Since the mean ROA is 3.5%. This increase represents a 5.7% (=0.2%/3.5%) increase from the mean.

suggests that self-efficacy has a positive influence on CEO's work performance and increases firm performance.

4. CEO Relative Age and CEO Performance: Stressful Operations

Our results so far document a positive relation between CEO self-efficacy and firm performance, which is consistent with self-efficacy helping CEOs handle stressful tasks and improving CEOs' performance. In this section, we use three settings to examine if the positive effect of CEO self-efficacy is indeed more pronounced when CEO face high-stress situations.

4.1 CEO Relative Age and Performance in Industry Downturn

Our first setting of stressful tasks is industry downturn, as negative economic conditions put tremendous pressure on CEOs. We predict that the superior performance of higher relative-age CEOs will be more pronounced during industry downturn than normal times. We follow Opler and Titman (1994) and classify an industry-year as industry downturn if the median sales growth of firms in the industry-year is negative and the median stock return is below -30%. We then estimate the following regression:

$$ROA_{it+n} = \beta_0 + \beta_1 Downturn_{it} + \beta_2 Relative\ Age_{it} + \beta_3 Relative\ Age_{it} \times Downturn_{it} + \beta_4 Control_{it-1} + \eta_m + \gamma_t + \varepsilon_{it} \quad (4)$$

This regression model is similar to Equation (3) except that we include an interaction between *Downturn* and *Relative Age*, where *Downturn* is an indicator that equals one if the industry of firm *i* experiences a downturn in year *t*, and zero otherwise. We predict the coefficient of this interaction to be significantly positive, i.e., the positive effect of relative age on performance to be more pronounced in industry downturn than in normal times.

[Insert Table 4 Here]

Columns (1) and (2) of Table 4 present the regressions of ROA in year *t* and year *t+1*, respectively. The coefficient of the interaction term is significantly positive in both models, suggesting that the advantage of higher relative-age CEOs is more pronounced in industry downturns than normal times. This effect is also economically large. For example, the coefficient of 0.019 in Column (1) indicates that a change in relative age from the first quartile to the third quartile is associated with an increase in ROA in the downturn year by 0.95 percentage point, or a 15.8% mitigation of the unconditional decline in ROA.[13] This mitigation effect is even larger for ROA in the year after downturn, as the coefficients in Column (2) indicate that a change in relative age from the first quartile to the their quartile is associated with a 29.3% mitigation of the unconditional decline in ROA_{t+1}.[14]

Next, we examine if stock market responses differ across the levels of CEO relative age. Column (3) of Table 4 presents the regression of stock return in year *t*, in which the coefficient on the interaction term is positive and significant at the 5% level. We further present the regression of stock return in year *t+1* in Column (4) and observe that the coefficient on the interaction term is insignificant (t-stat -0.04). Collectively, the results in Columns (3) and (4) suggest that investors fully recognize high relative-age CEOs' ability or actions to overcome the industry downturn and correctly incorporate the difference in expected performance into stock prices in the downturn year. As a result, we observe the return difference concentrates in year t but not t+1. Overall, the results in Table 4 are consistent with the notion that CEO self-efficacy helps CEOs handle stressful situations and increases their work performance.

[13] The coefficient of the interaction is 0.0019 in Column (1). Therefore, an increase in CEO relative age from the first quartile to the third quartile (i.e., 5.00) is associated with a 0.95 percentage point (= 0.0019×5.00) difference in ROA during industry downturn. Since the mean relative age is 6.40, and the coefficient of *Downturn* is -0.0723, the unconditional decline in ROA during industry downturn is 6.01 percentage point (= -0.0723 + 0.019×6.40). Therefore, the increase in relative age mitigates the unconditional ROA decline by 15.8% (=0.95/6.01).

[14] The coefficient of the interaction is 0.0019 in Column (2). Therefore, an increase in CEO relative age from the first quartile to the third quartile (i.e., 5.00) is associated with a 0.95 percentage point (= 0.0019×5.00) difference in ROA in year t+1. Since the mean relative age is 6.40, and the coefficient of *Downturn* is -0.0446, the unconditional decline in ROA during industry downturn is 3.24 percentage point (= -0.0446 + 0.019×6.40). Therefore, the increase in relative age mitigates the unconditional ROA decline by 29.3% (=0.95/3.24).

4.2 Non-Routine Investment vs. General Investment

Our second setting of high-stress tasks exploits the difference between non-routine investment and general investment. We examine two types of non-routine investment: expansion into a new sector and takeovers. Compared to general investment (capital expenditures), these non-routine investments are much more demanding and stressful. As a result, we expect the advantage of high relative-age CEOs to be much more important in the case of non-routine investment relative to general investment.

4.2.1 CEO Relative Age and Non-Routine Investment: New Industry Segment

When firms expand into a new industry, they have to operate in new environment, adopt new business model or technology, and develop new products or services. These uncertainties can arguably bring considerable stress to CEOs. We obtain the data on firms' segments from COMPUSTAT, and define a firm-year as expansion into a new sector if the firm creates a segment in the year that belongs an industry new to the firm. We then estimate the following regression:

$$ROA_{it+n} = \beta_0 + \beta_1 New\ Industry_{it} + \beta_2 Relative\ Age_{it} + Relative\ Age_{it} \times New\ Industry_{it} + \beta_4 Controls_{it-1} + \eta_m + \gamma_t + \varepsilon_{it} \quad (5)$$

This regression model is similar to Equation (3) except that we include an interaction between *New Industry* and *Relative Age*, where *New Industry* is an indicator variable that equals one if firm *i* expands into a new sector in year *t*, and zero otherwise. In Table 5, the coefficient of the interaction is significantly positive in all three regressions, suggesting that, consistent with our prediction, the positive effect of CEO self-efficacy is significantly stronger when firms enter a new sector. The coefficient of 0.0010 in Column (1) indicates that a change in relative age from the first quartile to the

third quartile is associated with an increase in ROA by 0.5 percentage point.[15] This effect is economically significant, as it mitigates 43.1% of the unconditional decline in ROA after entering a new industry (1.16 percentage point)[16] Overall, the results in Table 5 support our prediction that the advantage of high relative-age CEOs is more important when firms make non-routine investment.

[Insert Table 5 Here]

4.2.2 CEO Relative Age and Non-Routine Investment: Mergers and Acquisitions

We further examine mergers and acquisitions as the second type of non-routine investment. M&As are highly risky investments, and acquirers often suffer unexpected consequences and poor post-merger performance (e.g., Andrade, Mitchell, and Stafford, 2001; McGee, Thomas, and Thomson, 2015). M&A deals involve deal-specific knowledge, procedures, negotiations, and post-merger integration (e.g., Hoberg and Phillips 2017). Therefore, we examine if the positive effect of CEO self-efficacy on performance is stronger when firms engage in M&A deals. Following the literature (e.g., Chen 2019; Francis and Martin 2010; Harford et al. 2012), we examine the change in the bidder firm's ROA, and estimate the model below:

$$\Delta ROA_{it+n} = \beta_0 + \beta_1 Relative\ Age_{it} + \beta_2 Controls_{it} + \eta_m + \gamma_t + \varepsilon \qquad (6)$$

where the dependent variable, *ΔROA*, is the change in ROA over one of the three different time intervals: from *t-1* to *t+1*, from *t-2* to *t+2*, or from *t-3* to *t+3*, where *t* is the year of deal completion. In addition to the control variables in our baseline regressions (Equation 3), we further control for deal characteristics including deal size, relative size, and indicator variables for all cash deal, all stock deal, diversifying merger, hostile deal, and tender offer.

[15] Since the coefficient is 0.0010, an increase in CEO relative age from the first quartile to the third quartile (i.e., 5.00) is associated with a 0.5 percentage point (= 0.0019×5.00) difference in ROA in year t+1.

[16] Since the mean relative age is 6.40, and the coefficient of *New Industry* is -0.0180, the unconditional decline in ROA after entering a new industry 1.16 percentage point (= -0.0180 + 0.010×6.40). Therefore, the increase in relative age mitigates the unconditional ROA decline by 43.1% (=0.50/1.16).

[Insert Table 6 Here]

We present the regression results in Table 6, in which the coefficient on *Relative Age* is positive and significant at the 5% level in all three regressions. These results suggest that acquirers with higher relative-age CEOs experience a significantly higher ROA change after the mergers. This effect is also economically significant. For example, the coefficient of 0.0016 in Column (1) indicate that a shift in the CEO's relative age from the first quartile to the third quartile is associated with an increase in ΔROA of 0.8 percentage point, which is economically large given that the mean ΔROA is -3 percentage point for our sample deals.[17] Overall, the analysis on M&As provides supportive evidence that CEO self-efficacy, as measured by relative age, increases CEOs' ability to conduct non-routine investment.

4.2.3 CEO Relative Age and General Investment: Capital Expenditure

Our results in the previous two subsections show that, consistent with the positive effect of self-efficacy on handling stress, CEOs with higher relative age exhibit stronger performance in non-routine investment. For a comparison, we further examine the effect of CEO self-efficacy on general investment (capital expenditures), which is generally less stressful than non-routine investment. We predict the effect of CEO self-efficacy to be weaker in the case of capital expenditure than non-routine investment. To test our prediction, we estimate the following regression:

$$ROA_{it+n} = \beta_0 + \beta_1 CAPX_{it} + \beta_2 Relative\ Age_{it} + Relative\ Age_{it} \times CAPX_{it} + \beta_4 Controls_{it-1} + \eta_m + \gamma_t + \varepsilon_{it} \quad (7)$$

This equation is similar to Equation (3) except that we include an interaction of *CAPX* and *Relative Age*, where *CAPX* is a firm's capital expenditure scaled by total assets. Table 7 presents the

[17] Since the coefficient is 0.0016, an increase in CEO relative age from the first quartile to the third quartile (i.e., 5.00) is associated with a 0.8 percentage point (= 0.0016×5.00) difference in ΔROA.

regression results. The coefficient on the interaction is negative (rather than positive) and marginally significant in Column (1), and insignificant in Columns (2) and (3). Therefore, CEOs with high relative age do not outperform in general investment, which is a sharp contrast to their strong advantage in non-routine investment. Taken together, the results on corporate investment support the notion that high relative-age CEOs' main advantages come from handling stress instead of conducting routine activities.

[Insert Table 7 Here]

4.3 CEO Relative Age and Innovation Efficiency

Corporate innovation can be stressful for managers because innovation includes long-term projects with new technologies and high uncertainties. We therefore examine if CEO relative age affects innovation performance. This practice can also help us better understand the drivers of successful innovation.

We follow Hirshleifer, Hsu, and Li (2013) and construct two measures of innovation efficiency (*IE*) to evaluate how effectively firms generate patents, especially high quality ones, from innovation input. The first *IE* measure is constructed as the number of patents granted in a given year divided by the sum of R&D investment over the past five years.[18] The second *IE* measure is similarly constructed except the numerator is the number of forward citations received by patents granted in a given year. This measure captures the quality of a firm's patents. We then estimate the following regression:

$$IE_{it+n} = \beta_0 + \beta_1 Relative\ Age_{it} + \beta_2 Controls_{it-1} + \eta_m + \gamma_t + \varepsilon \qquad (7)$$

This regression model is similar to our baseline regression in Equation (3) except the dependent variable is one of the two IE measures in year *t+1*, *t+2*, or *t+3*. In addition to the controls in Equation (3), we further control for firm characteristics that might also influence corporate

[18] We follow Hirshleifer, Hsu, and Li (2013) and assume an annual depreciation rate of 20% for the R&D investment.

innovation, including Tobin's Q, ROA, cash holdings, asset tangibility (PPE/Employee), sales, sales growth, and stock return.

[Insert Table 8 Here]

Panel A of Table 8 presents the regressions of the first *IE* measure. In all three regression models, the coefficient on *Relative Age* is positive and significant at the 1% level, suggesting that CEOs with higher relative age exhibit higher innovation efficiency. This result is also economically significant. For example, the coefficient of 0.0024 in Column (1) indicates that a shift in *Relative Age* from the first quartile to the third quartile increase the innovation efficiency by 1.2 percentage point, or 10.2% of the mean innovation efficiency.[19]

In Panel B of Table 8, we replace the dependent variable with the second innovation efficiency measure. Consistent with results in Panel A, the coefficient on *Relative Age* is significantly positive across all three regression models. Overall, the results in Table 8 show that high relative-age CEOs deliver better innovation performance in both quantity and quality than their low relative-age peers.

4.4 Robustness Tests: Alternative Measure Constructions

We conduct robustness tests using several alternative constructions of the CEO relative age measure. First, instead of using the level of relative age, we use an indicator variable that equals one if the relative age is seven months or higher, or an indicator variable that equals one if the relative age is 10 months or higher. We also examine a rank variable that equals one if the CEO's relative age is three months or below, two if the CEO's relative age is four to six months, three if the CEO's relative age is seven to nine months, and four if the CEO's relative age is ten months or above. The untabulated results show that our findings are robust using these alternative measure constructions.

[19] Since the coefficient is 0.0024, an increase in CEO relative age from the first quartile to the third quartile (i.e., 5.00) is associated with a 1.2 percentage point (= 0.0024×5.00) increase in innovation efficiency. Given the mean innovation efficiency of 11.8 percentage points, the 1.2 percentage-point increase represents a 10.2% increase from the mean.

We also examine alternative identifications of school cutoff dates. As discussed in Section 2.1, we follow the literature and use the school-entry cutoff dates in Table A1 of Bedard and Dhuey (2012), where the data of cutoff dates start from 1964. Since most states use January 1st as their school entry cutoff date before mid-1960s (Bedard and Dhuey, 2012; Angrist and Krueger, 1991), we use January 1st as the states' cutoff dates before 1964 as long as the states have a valid cutoff date in 1964 (i.e., the cutoff dates in 1964 are not "none", "LEA", or "ssy"). For robustness, we examine two alternative approaches that use January 1st as the cutoff date for the pre-1964 period for: (1) all states, or (2) states that were not defined as "LEA" or "ssy" in 1964. In untabulated analyses, our findings hold using both of the alternative approaches.

5. CEO Self-Efficacy and CEO Overconfidence

Since the pioneer work of Malmendier and Tate (2005a, 2005b), researchers have documented that CEO overconfidence influences various aspects of corporate policy and firm performance. In this section, we study the relation between CEO self-efficacy (confidence) and CEO overconfidence, as well as compare the effects of these two CEO characteristics on corporate policy. This practice not only provides further evidence on how CEO self-efficacy affects corporate policy, but also improves our understanding of CEO confidence.

5.1 Does Higher CEO Self-Efficacy Indicate CEO Overconfidence?

Although CEO self-efficacy and CEO overconfidence are both associated with the confidence of CEO, they differ in two important ways. First, self-efficacy refers to a desirable level of confidence within the range of rationality, while overconfidence refers to an undesirable level of confidence beyond the range of rationality. Second, the CEO self-efficacy studied in our paper (as measured by relative age) is a personal trait developed from childhood experience, while CEO overconfidence

studied by the finance literature refers to CEOs' specific views about their firms, i.e., CEO overoptimism about their firms' prospects.

We start our analysis by examining the correlation between CEO self-efficacy and CEO overconfidence. We follow Malmendier and Tate (2008) and measure CEO overconfidence using CEOs' vested option holdings. Specifically, we obtain the option holdings data during 1992-2019 from the ExecuComp database, and construct the overconfidence measure, *Holder67*, as an indicator variable that equals one if a CEO holds vested options with average moneyness of 67 percent or more for at least twice during the sample period, starting from the first year the CEO displays this behavior. Interestingly, we find that *Holder67* and *Relative Age* have a very low correlation of -0.007 (p-value 0.27), which indicates that CEO self-efficacy is not strongly related to CEO overconfidence. We further control for *Holder67* in all our analyses in the paper, and our findings remain after controlling for overconfidence.

5.2 CEO Self-Efficacy and Corporate Policy

We further compare the effects of CEO self-efficacy on corporate policy with those of CEO overconfidence. We focus on the two well-established findings on CEO overconfidence. First, overconfident CEOs overestimate their ability and therefore overinvest in terms of general investment (capital expenditure), M&A, and R&D investment (e.g. Malmendier and Tate 2005a, 2008; Hirshleifer, Low, and Teoh, 2012). We therefore examine if CEO self-efficacy (confidence) also leads to such undesirable investment behavior. We estimate regressions of investment measures on CEO relative age, which are similar to our baseline regression in Equation (3) except the dependent variable is investment rather than performance.

[Insert Table 9 Here]

Column (1) of Table 9 presents the regression of capital expenditure, in which the coefficient on *Relative Age* is small and statistically insignificant (t-statistic -0.31), suggesting that, unlike CEO

overconfidence, CEO self-efficacy does not seem to generate overinvestment. Columns (2) and (3) present the regressions of R&D investment and number of M&A deals, respectively. We find that the coefficient on *Relative Age* is insignificantly negative in Column (2) and significantly negative in Column (2). Therefore, confident managers do not conduct more R&D than their peers, and even engage in less M&A activity than their peers. In untabulated analysis, we also estimate regressions of the investment measures on CEO overconfidence (*Holder67*), and find that, consistent with the existing literature, overconfidence is significantly positively related to investment. The contrast between the CEO self-efficacy and CEO overconfidence illustrates that the effect of increased confidence on corporate policy vary differ depending on if the CEO becomes overconfident.

The second established finding about CEO overconfidence is that overconfident CEOs, relative to their peers, are more likely to issue managerial forecasts, and their forecasts tend to be more overoptimistic (e.g., Hribar and Yang, 2016). We therefore examine if such pattern also exists for CEO self-efficacy. Following Hribar and Yang (2016), we construct three measures of managerial forecasts. *MF Issue* is an indicator variable that equals one if a firm issue at least one management forecast in a given year, and zero otherwise. *Miss MF* is an indicator variable that equals one if a firm's earnings miss its management forecast in a given year, and zero otherwise (i.e., overoptimistic managerial forecast). *MF Precision* is the width of a range forecast scaled by the firm's assets per share, multiplied by -1. Overconfident CEOs tend to issue forecasts with tighter range (higher precision) than their peers.

Panel B of Table 9 presents the regressions of the three managerial forecast measures on *Relative Age*, with controls of firm and CEO characteristics. We find that the coefficient of relative age is statistically insignificant in all three regressions. Therefore, unlikely CEO overconfidence, CEO self-efficacy does not lead to aggressive forecasting behaviors or overoptimistic managerial forecasts. These results, consistent with those in Panel A of Table 9, provide further evidence that the effect of

increased CEO confidence on corporate policy may depend on if the CEO is rationally confident or overconfident.

5. Conclusion

CEOs face tremendous stress at work, and recent studies show that CEOs' stress has a large impact on their personal lives. Motivated by the psychological literature that self-efficacy helps people overcome stress and conduct stressful tasks, we study the effect of CEO self-efficacy on CEO performance, especially in high-stress situations. We measure self-efficacy based on CEO's relative age, as psychological literature shows that people with higher relative age tend to develop higher levels of self-efficacy from their childhood experience.

We first show that in earnings calls, CEOs with higher self-efficacy answer negative analyst questions more positively, indicating a positive effect of self-efficacy on handling stress. More importantly, we find a significantly positive relation between CEO relative age and firm performance, suggesting that the positive influence of CEO self-efficacy also exist in CEOs' work performance. Furthermore, the advantage of high relative-age CEOs is much more pronounced in high-stress situations such as industry downturn, non-routine investment (expansion into new sector and M&A), and innovation. We also examine the relation between CEO self-efficacy (confidence) and CEO overconfidence, which has been widely documented to cause suboptimal CEO behaviors such as overinvestment and overoptimistic managerial forecasts. We find that unlike CEO overconfidence, CEO self-efficacy does not lead to overinvestment or overoptimistic forecasts.

Our paper provides novel evidence that CEO stress not only affects CEOs' personal lives (e.g., Borgschulte et al., 2021), but also have a significant impact on CEOs' work performance, especially when CEOs face stressful tasks. Our findings on the benefits of CEO self-efficacy extends the existing literature on CEO overconfidence by showing that rationally confident beliefs of CEOs may impact

firms differently from CEO overconfidence.

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Appendix
Variable Definitions

Variable	Definition
Key Variables	
Relative Age	The relative age of the CEO calculated as the difference in months between a given CEO's birth month and the state's school-entry cutoff month in the year when the CEO turned five.
ROA t+1	The return-on-assets in year t +1 calculated as earnings before extraordinary items divided by total assets in year t+1.
ROA t+2	The return-on-assets in year t +2 calculated as earnings before extraordinary items divided by total assets in year t+2.
ROA t+3	The return-on-assets in year t +3 calculated as earnings before extraordinary items divided by total assets in year t+3.
ROA	The return-on-assets in year t calculated as earnings before extraordinary items divided by total assets in year t.
Return t	Cumulative monthly stock return from the beginning to the end of year t.
Return t+1	Cumulative monthly stock return from the beginning to the end of year t+1.
⊿ROA t+1	The bidder's change in ROA from the one-year period prior to deal announcement to the one-year period after deal completion.
⊿ROA t+2	The bidder's change in average ROA from the two-year period prior to deal announcement to the two-year period after deal completion.
⊿ROA t+3	The bidder's change in average ROA from the three-year period prior to deal announcement to the three-year period after deal completion.
Tone	The number of positive words minus the number of negative words as defined in Loughran and McDonald (2011), divided by the total number of words at the speech level.
Lemmatized Tone	Lemmatized version of the number of positive words minus the number of negative words as defined in Loughran and McDonald (2011), divided by the total number of words at the speech level.
Stemmed Tone	Stemmed version of the number of positive words minus the number of negative words as defined in Loughran and McDonald (2011), divided by the total number of words at the speech level.
Negative Analyst	An indicator that equals one if the analyst's question preceding the CEO's answer has a negative net tone and zero otherwise.
New Industry	An indicator that equals one if the firm enters into a new industry segment in year t and zero otherwise.
Downturn	An indicator variable that equals one if the median sales growth is negative and the median return is below -30% within a 3-digit SIC industry according to the definition in Opler and Titman (1994) and zero otherwise.
IE Patent t+1	The number of patents granted to a company in year t+1 scaled by R&D capital from year t-5 to t-1.
IE Citation t+1	The number of patent citations of a company in year t+1 scaled by R&D capital from year t-5 to t-1
IE Patent t+2	The number of patents granted to a company in year t+2 scaled by R&D capital from year t-4 to t

Variable	Definition
IE Citation t+2	The number of patent citations of a company in year t+2 scaled by R&D capital from year t-4 to t.
IE Patent t+3	The number of patents granted to a company in year t+3 scaled by R&D capital from year t-3 to t +1
IE Citation t+3	The number of patent citations of a company in year t+3 scaled by R&D capital from year t-3 to t+1
Other Variables	
Number of M&A	The number of M&As a company completed in year t.
CAPX	The company's capital expenditure scaled by its total assets in year t.
R&D	The company's R&D spending scaled by its total assets in year t. Missing R&D expenses are replaced with zero.
MF Issue	An indicator equal to one if the company has issued at least one management forecast during the year and zero otherwise.
Miss MF	An indicator that equals one if the company misses its management forecast for year t and zero otherwise.
MF Precision	The width of a range forecast scaled by the company's assets per share, multiplied by -1.
Size	Natural logarithm of a company's total assets at the end of the fiscal period.
BTM	The book value of a company scaled by its market value at the end of the fiscal period.
Leverage	Total long-term debt divided by shareholders' equity measured at the end of the fiscal period.
CEO Age	The age of the CEO in year t.
Female CEO	An indicator that equals one if the CEO is female and zero otherwise.
Earnings	Earnings before extraordinary items scaled by the market value of equity for the firm at the end of the fiscal quarter
Earnings Surprise	Earnings before extraordinary items less earnings before unusual items in the same quarter of the prior year, scaled by the market value of equity for the firm at the end of the fiscal quarter.
Growth	The change in sales from the same quarter last year, scaled by sales from the same quarter last year.
M&A	An indicator variable equal to one if the firm reported a non-zero amount for acquisitions for the fiscal quarter.
Volatility	The standard deviation of the firm's quarterly earnings scaled by the market value of equity over the prior eight quarters.
IO	The average institutional ownership during the fiscal period.
All Cash	An indicator equal to one if the deal is financed by all cash and zero otherwise.
All Stock	An indicator equal to one if the deal is financed by all stock and zero otherwise.
Diversify	An indicator equal to one if the bidder and the target are from two different Fama-French 48 industries and zero otherwise.
Hostile	An indicator equal to one if the attitude of the deal is hostile and zero otherwise.
Tender	An indicator equal to one for tender offers and zero for merger deals.

Variable	Definition
Relative Size	The target firm's market value of equity divided by the bidder firm's market value of equity at the end of the most recent fiscal period prior to deal announcement.
Deal Size	Natural logarithm of the value of the deal in million dollars.
Cash	A company's cash holdings divided by assets at the end of year t.
PPE/Employee	The amount of net PP&E divided by the total number of employees at the end of year t.
Tobin's Q	Ratio of market value to book value of assets at the end of year t.
Sale	Natural logarithm of total sales for year t.
Change Earn	The change in EPS prior to extraordinary items from year t-1 divided by the company's stock price at the end of year t.
Sale Growth	The change in sales from year t-1 to year t, scaled by sales in year t-1.
Earn Vol	The standard deviation of return-on-assets over the last five years.
Analyst	Natural logarithm of one plus the number of analysts following the firm in year t.
MF Horizon	Natural logarithm of the number of days between actual earnings announcement and the management forecast date.

Table 1
Descriptive Statistics

This table presents sample distribution and summary statistics. Our sample period is from 1992 to 2019. Panel A presents the distribution of relative age in our sample. Panel B reports summary statistics for key independent and dependent variables. Panel C presents descriptive statistics for all other variables. All continuous variables are winsorized at the 1st and 99th percentiles. Variable definitions are provided in the Appendix.

Panel A: Relative Age Distribution

Relative Age	# of obs	% of sample
1	1,706	7.52%
2	2,068	9.12%
3	1,819	8.02%
4	2,057	9.07%
5	2,239	9.87%
6	1,969	8.68%
7	1,659	7.31%
8	1,784	7.86%
9	1,814	8.00%
10	2,029	8.94%
11	1,673	7.37%
12	1,870	8.24%
Total	22,687	100%

Panel B: Descriptive Statistics of Key Variables

Variable	N	Mean	SD	p25	median	p75
Relative Age	22,687	6.430	3.418	4.000	6.000	9.000
ROA t+1	22,687	0.035	0.099	0.011	0.039	0.078
ROA t+2	21,246	0.034	0.099	0.010	0.039	0.078
ROA t+3	19,642	0.034	0.097	0.010	0.039	0.077
ROA	23,092	0.037	0.096	0.011	0.041	0.080
Return t	23,061	0.150	0.403	-0.061	0.148	0.352
Return t+1	22,160	0.141	0.393	-0.063	0.144	0.344
ΔROA t+1	2,776	-0.030	0.113	-0.036	-0.003	0.005
ΔROA t+2	2,570	-0.027	0.100	-0.039	-0.003	0.006
ΔROA t+3	2,326	-0.024	0.089	-0.039	-0.004	0.005
Tone	413,268	0.017	0.079	0.000	0.000	0.016
Lemmatized Tone	413,268	0.020	0.084	0.000	0.000	0.024
Stemmed Tone	413,268	0.012	0.085	-0.006	0.000	0.014
Negative Analyst	413,268	0.183	0.387	0.000	0.000	0.000
New Industry	22,687	0.075	0.264	0.000	0.000	0.000
Downturn	23,092	0.030	0.169	0.000	0.000	0.000
IE Patent t+1	8,768	0.118	0.190	0.000	0.057	0.141
IE Citation t+1	8,768	2.016	5.217	0.000	0.247	1.622
IE Patent t+2	8,089	0.114	0.175	0.001	0.058	0.139

Variable	N	Mean	SD	p25	median	p75
IE Citation t+2	8,089	1.770	4.396	0.000	0.223	1.468
IE Patent t+3	7,387	0.112	0.168	0.003	0.058	0.137
IE Citation t+3	7,387	1.592	3.869	0.000	0.204	1.335
Number of M&A	21,705	0.113	0.398	0.000	0.000	0.000

Panel C: Descriptive Statistics of Other Variables

Variable	N	Mean	SD	p25	median	p75
Size	22,687	7.778	1.780	6.495	7.668	8.942
BTM	22,687	0.515	0.401	0.261	0.441	0.673
Leverage	22,687	0.914	1.923	0.115	0.508	1.076
CEO Age	22,687	56.070	7.472	51.000	56.000	61.000
Female CEO	22,687	0.026	0.160	0.000	0.000	0.000
Earnings	413,268	0.006	0.039	0.005	0.012	0.017
Earnings Surprise	413,268	-0.002	0.040	-0.004	0.001	0.004
Growth	413,268	0.077	0.232	-0.029	0.051	0.146
M&A	413,268	0.379	0.485	0.000	0.000	1.000
Volatility	413,268	1.894	1.110	1.112	1.586	2.337
IO	413,268	0.685	0.353	0.609	0.811	0.925
All Cash	2,776	0.279	0.449	0.000	0.000	1.000
All Stock	2,776	0.330	0.470	0.000	0.000	1.000
Diversify	2,776	0.357	0.479	0.000	0.000	1.000
Hostile	2,776	0.005	0.068	0.000	0.000	0.000
Tender	2,776	0.097	0.295	0.000	0.000	0.000
Relative Size	2,776	0.196	0.320	0.021	0.067	0.208
Deal Size	2,776	5.390	1.823	4.067	5.247	6.572
Cash	8,768	0.201	0.189	0.050	0.138	0.302
PPE/Employee	8,768	173.900	228.100	63.170	102.400	188.300
Tobin's Q	8,768	2.312	1.506	1.382	1.838	2.664
Sale	8,768	7.165	1.772	5.956	7.044	8.330
Change Earn	21,615	-0.009	0.166	-0.016	0.004	0.017
Sale Growth	21,615	0.112	0.251	-0.006	0.075	0.180
Earn Vol	21,615	0.048	0.074	0.010	0.023	0.051
Analyst	21,615	2.213	0.755	1.792	2.303	2.773
MF Horizon	7,312	4.643	0.669	4.522	4.654	4.796
CAPX	21,705	0.046	0.048	0.013	0.032	0.062
R&D	21,705	0.027	0.053	0.000	0.000	0.028
MF Issue	21,615	0.371	0.483	0.000	0.000	1.000
Miss MF	7,312	0.317	0.465	0.000	0.000	1.000
MF Precision	5,992	-1.742	3.480	-1.531	-0.555	-0.230

Table 2

CEO Relative Age and Stress Management: Negative Analyst Questions

This table reports results on the effects of relative age on managers' ability to handle negative analyst questions in conference calls. The dependent variable in Column (1), *Tone*, is the number of positive words minus the number of negative words divided by the total number of words at the speech level. In Column (2), the dependent variable is the lemmatized version of tone (*Lemmatized Tone*). In Column (3), the dependent variable is the stemmed version of tone (*Stemmed Tone*). The key independent is the relative age of the CEO (*Relative Age*) and an indicator that equals one if the analyst's question preceding the CEO's answer has a negative tone (*Negative Analyst*). All other variables are defined in the Appendix. Standard errors are clustered at the year level and t-statistics are reported in parentheses. ***, **, and * indicate statistical significances at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable		
	Tone	*Lemmatized Tone*	*Stemmed Tone*
	(1)	(2)	(3)
*Relative Age * Negative Analyst*	**0.0002*** **	**0.0002*** **	**0.0002** **
	(3.40)	**(3.46)**	**(2.54)**
Negative Analyst	-0.0193***	-0.0199***	-0.0219***
	(-8.82)	(-9.48)	(-9.25)
Relative Age	-0.0002***	-0.0002***	-0.0002***
	(-4.18)	(-4.57)	(-3.96)
Size	0.0006	0.0007*	0.0008*
	(1.56)	(1.78)	(2.07)
Earnings	-0.0019	-0.0033	-0.0033
	(-0.23)	(-0.42)	(-0.49)
Earnings Surprise	0.0121	0.0152*	0.0146**
	(1.66)	(1.91)	(2.31)
Growth	-0.0030**	-0.0027*	-0.0026*
	(-2.27)	(-1.94)	(-1.95)
M&A	0.0003	0.0002	0.0003
	(0.43)	(0.27)	(0.40)
Volatility	-0.0010***	-0.0010***	-0.0009***
	(-4.58)	(-4.31)	(-4.82)
Return 12m	0.0016*	0.0017*	0.0020**
	(1.79)	(1.84)	(2.32)
Leverage	-0.0002***	-0.0002***	-0.0002***
	(-3.29)	(-3.50)	(-3.43)
MTB	0.0003***	0.0002***	0.0003***
	(3.09)	(3.19)	(3.55)
MF	-0.0002	-0.0002	-0.0002
	(-0.44)	(-0.38)	(-0.35)
Analyst	-0.0009*	-0.0003	-0.0002
	(-1.96)	(-0.65)	(-0.62)
IO	-0.0008	-0.0009	-0.0003
	(-0.78)	(-0.86)	(-0.27)
CEO Age	-0.0000	-0.0000	-0.0001
	(-0.50)	(-0.17)	(-1.54)
Female CEO	0.0021**	0.0025***	0.0022***
	(2.95)	(3.04)	(3.09)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	413,268	413,268	413,268
Adjusted R-squared	0.021	0.019	0.0223

Table 3
CEO Relative Age and Firm Performance

This table reports results on the effects of CEO relative age on firm performance. The dependent variable in Column (1), *ROA t+1*, is the return-on-assets in year t+1. In Column (2), the dependent variable is the return-on-assets in year t+2 (*ROA t+2*). In Column (3), the dependent variable is the return-on-assets in year t+3 (*ROA t+3*). The key independent is the relative age of the CEO (*Relative Age*). All other variables are defined in the Appendix. Standard errors are clustered at the year level and t-statistics are reported in parentheses. ***, **, and * indicate statistical significances at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable		
	ROA_{t+1}	ROA_{t+2}	ROA_{t+3}
	(1)	(3)	(5)
Relative Age	**0.0004****	**0.0005****	**0.0004****
	(2.11)	**(2.60)**	**(2.10)**
Size	0.0047***	0.0044***	0.0047***
	(10.67)	(7.85)	(7.55)
Leverage	-0.0032***	-0.0030***	-0.0030***
	(-5.98)	(-6.30)	(-7.86)
BTM	-0.0814***	-0.0666***	-0.0575***
	(-15.21)	(-11.50)	(-11.19)
CEO Age	0.0006***	0.0006***	0.0005***
	(6.68)	(5.53)	(4.72)
Female CEO	0.0001	-0.0028	-0.0034
	(0.02)	(-0.66)	(-0.74)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	22,687	21,246	19,642
Adjusted R-squared	0.157	0.123	0.109

Table 4

CEO Relative Age and Economic Stress: Downturn Performance

This table reports results on the effects of relative age on managers' ability to handle economic stress during industry downturns. We examine accounting performance in Panel A. The dependent variable in Column (1), *ROA t*, is the return-on-assets in year t. In Column (2), the dependent variable is the return-on-assets in year t+1 (*ROA t+1*). The dependent variable in Column (3), *Return t*, is the annual return of a company in year t. In Column (4), the dependent variable is a company's return in year t+1. Key independent variables include the relative age of the CEO (*Relative Age*) and an indicator for economic downturn (*Downturn*) following the definition in Opler and Titman (1994). All other variables are defined in the Appendix. Standard errors are clustered at the year level and t-statistics are reported in parentheses. ***, **, and * indicate statistical significances at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable			
	ROA_t	ROA_{t+1}	$Return_t$	$Return_{t+1}$
	(1)	(2)	(3)	(4)
*Relative Age * Downturn*	**0.0019***	**0.0019*****	**0.0073****	**-0.0002**
	(1.76)	**(3.14)**	**(2.55)**	**(-0.04)**
Downturn	-0.0723***	-0.0446***	-0.2977***	0.1050**
	(-6.48)	(-3.20)	(-4.01)	(2.21)
Relative Age	0.0003**	0.0002	0.0002	0.0001
	(2.27)	(1.44)	(0.34)	(0.15)
Size	0.0037***	0.0046***	-0.0200***	-0.0137***
	(7.03)	(9.67)	(-5.65)	(-4.23)
Leverage	-0.0037***	-0.0037***	0.0046	0.0013
	(-6.55)	(-6.41)	(1.47)	(0.41)
BTM	-0.0833***	-0.0827***	0.1020***	0.0733**
	(-16.01)	(-15.04)	(2.98)	(2.34)
CEO Age	0.0005***	0.0006***	-0.0009*	-0.0008
	(5.82)	(6.58)	(-1.73)	(-1.36)
Female CEO	0.0027	-0.0006	-0.0094	-0.0076
	(0.73)	(-0.16)	(-0.66)	(-0.54)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	23,092	22,253	23,061	22,160
Adjusted R-squared	0.168	0.168	0.201	0.190

Table 5

CEO Relative Age and High-Stress Investment: New Industry Segment

This table reports results on the effects of relative age on managers' ability to enter into new industries. The dependent variable in Columns (1), *ROA t+1*, is the return-on-assets in year t+1. In Columns (2), the dependent variable is the return-on-assets in year t+2 (*ROA t+2*). In Columns (3), the dependent variable is the return-on-assets in year t+3 (*ROA t+3*). Key independent variables include the relative age of the CEO (*Relative Age*), and an indicator that equals one if the firm enters into a new industry segment in year t (*New Industry*). All other variables are defined in the Appendix. Standard errors are clustered at the year level and t-statistics are reported in parentheses. ***, **, and * indicate statistical significances at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable		
	ROA_{t+1}	ROA_{t+2}	ROA_{t+3}
	(1)	(2)	(3)
*Relative Age * New Industry*	**0.0010****	**0.0011***	**0.0015****
	(2.08)	**(1.83)**	**(2.19)**
New Industry	-0.0180***	-0.0137**	-0.0208***
	(-3.89)	(-2.74)	(-3.93)
Relative Age	0.0003	0.0004**	0.0003
	(1.68)	(2.11)	(1.52)
Size	0.0048***	0.0045***	0.0048***
	(10.93)	(8.08)	(7.71)
Leverage	-0.0032***	-0.0029***	-0.0030***
	(-5.97)	(-6.31)	(-7.77)
BTM	-0.0811***	-0.0664***	-0.0571***
	(-15.22)	(-11.46)	(-11.10)
CEO Age	0.0006***	0.0006***	0.0005***
	(6.60)	(5.47)	(4.72)
Female CEO	0.0000	-0.0029	-0.0034
	(0.01)	(-0.67)	(-0.77)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	22,687	21,246	19,642
Adjusted R-squared	0.158	0.123	0.110

Table 6

CEO Relative Age and High-Stress Investment: M&A Performance

This table reports results on the effects of CEO relative age on M&A performance. The dependent variable in Columns (1), Δ*ROA t+1*, is the bidder's change in ROA from the one-year period prior to deal announcement to the one-year period after deal completion. In Column (2), the dependent variable is the bidder's change in average ROA from the two-year period prior to deal announcement to the two-year period after deal completion (Δ*ROA t+2*). In Columns (3), the dependent variable is the bidder's change in average ROA from the three-year period prior to deal announcement to the three-year period after deal completion (Δ*ROA t+3*). The key independent variables include the relative age of the CEO (*Relative Age*). All other variables are defined in the Appendix. Standard errors are clustered at the year level and t-statistics are reported in parentheses. ***, **, and * indicate statistical significances at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable		
	ΔROA_{t+1}	ΔROA_{t+2}	ΔROA_{t+3}
	(1)	(2)	(3)
Relative Age	**0.0016****	**0.0022****	**0.0020****
	(2.17)	**(2.33)**	**(2.10)**
Deal Size	-0.0058***	-0.0048**	-0.0041**
	(-3.19)	(-2.46)	(-2.33)
All Cash	0.0056	0.0096**	0.0083
	(1.08)	(2.14)	(1.71)
All Stock	-0.0085	-0.0101	-0.0043
	(-0.99)	(-1.29)	(-0.60)
Diversify	0.0021	0.0030	0.0038
	(0.44)	(0.75)	(0.94)
Hostile	-0.0109	0.0028	-0.0033
	(-0.55)	(0.16)	(-0.21)
Tender	0.0083	-0.0004	-0.0030
	(0.90)	(-0.05)	(-0.33)
Relative Size	0.0086	0.0110	0.0106
	(0.76)	(1.00)	(1.09)
Bidder Size	0.0061**	0.0054**	0.0047*
	(2.08)	(2.14)	(1.90)
Bidder Leverage	0.0072***	0.0079***	0.0069***
	(2.90)	(3.22)	(3.17)
Bidder BTM	0.0413***	0.0396***	0.0324***
	(3.06)	(3.08)	(3.13)
CEO Age	0.0010	0.0008	0.0004
	(1.19)	(1.40)	(0.65)
Female CEO	0.0127	0.0062	-0.0036
	(0.97)	(0.55)	(-0.32)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	2,776	2,570	2,326
Adjusted R-squared	0.172	0.171	0.129

Table 7

CEO Relative Age and Low-Stress Investment: Capital Expenditure

This table reports results on the effects of CEO relative age on the efficiency of capital expenditure investment. The dependent variable in Column (1), *ROA t+1*, is the return-on-assets in year t+1. In Column (2), the dependent variable is the return-on-assets in year t+2 (*ROA t+2*). In Column (5), the dependent variable is the return-on-assets in year t+3 (*ROA t+3*). Key independent variables include the relative age of the CEO (*Relative Age*) and capital expenditure scaled by total assets in year t (*CAPX*). All other variables are defined in the Appendix. Standard errors are clustered at the year level and t-statistics are reported in parentheses. ***, **, and * indicate statistical significances at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable		
	ROA_{t+1}	ROA_{t+2}	ROA_{t+3}
	(1)	(2)	(3)
*Relative Age * CAPX*	**-0.0053***	**-0.0044**	**0.0007**
	(-1.76)	**(-1.18)**	**(0.14)**
CAPX	0.1401***	0.1141***	0.0324
	(5.35)	(3.10)	(0.73)
Relative Age	0.0006**	0.0007**	0.0004
	(2.65)	(2.54)	(1.66)
Size	0.0052***	0.0048***	0.0049***
	(10.79)	(8.85)	(7.89)
Leverage	-0.0033***	-0.0031***	-0.0031***
	(-5.48)	(-6.04)	(-7.79)
BTM	-0.0815***	-0.0668***	-0.0581***
	(-15.45)	(-11.51)	(-10.96)
CEO Age	0.0006***	0.0005***	0.0005***
	(6.35)	(5.52)	(4.69)
Female CEO	-0.0015	-0.0045	-0.0046
	(-0.40)	(-0.99)	(-0.96)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	21,705	20,336	18,795
Adjusted R-squared	0.1581	0.1234	0.1083

Table 8
CEO Relative Age and Innovation Creativity

This table reports results on the effects of CEO relative age on innovation efficiency. In Panel A, the dependent variable in Columns (1) is the number of patents granted to a company in year t+1 scaled by R&D capital from year t-5 to t-1 (*IE Patent t+1*). The dependent variable in Columns (2) of Panel A is the number of patents in year t+2 scaled by R&D capital from year t-4 to t (*IE Patent t+2*). The dependent variables in Columns (3) of Panel A is the number of patents in year t+3 scaled by R&D capital from year t-3 to t+1 (*IE Patent t+3*). We replace the number of patents with the number of citations to calculate the dependent variables in Panel B. The key independent variables include the relative age of the CEO (*Relative Age*). All other variables are defined in the Appendix. Standard errors are clustered at the year level and t-statistics are reported in parentheses. ***, **, and * indicate statistical significances at the 1%, 5%, and 10% levels, respectively.

Panel A: Relative Age and Innovation Efficiency based on the Number of Patents

	Dependent Variable		
	IE Patent$_{t+1}$	IE Patent$_{t+2}$	IE Patent$_{t+3}$
	(1)	(2)	(3)
Relative Age	**0.0024*** **	**0.0027*** **	**0.0028*** **
	(6.52)	**(6.68)**	**(7.34)**
Size	0.0061*	0.0087**	0.0080**
	(1.72)	(2.41)	(2.12)
Leverage	-0.0003	-0.0008	-0.0015
	(-0.23)	(-0.75)	(-1.38)
BTM	0.0022	-0.0024	-0.0000
	(0.32)	(-0.31)	(-0.00)
Tobin's Q	0.0064***	0.0046***	0.0044**
	(3.50)	(3.06)	(2.31)
ROA	0.0284*	0.0358**	0.0417**
	(1.96)	(2.58)	(2.18)
Cash	-0.0391**	-0.0316**	-0.0196
	(-2.64)	(-2.29)	(-1.09)
PPE/Employee	0.0000***	0.0000***	0.0000**
	(3.58)	(2.96)	(2.18)
Sale	-0.0131***	-0.0151***	-0.0141***
	(-3.13)	(-3.98)	(-3.48)
Sale Growth	0.0267***	0.0066	-0.0029
	(3.92)	(1.00)	(-0.38)
Return	-0.0086	-0.0018	0.0011
	(-1.52)	(-0.33)	(0.19)
CEO Age	-0.0010***	-0.0013***	-0.0016***
	(-3.53)	(-5.05)	(-6.57)
Female CEO	0.0169**	0.0277**	0.0353***
	(2.12)	(2.68)	(4.78)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	8,768	8,089	7,387
Adjusted R-squared	0.110	0.109	0.110

Panel B: Relative Age and Innovation Efficiency based on the Number of Citations

	Dependent Variable		
	IE Citation$_{t+1}$	IE Citation$_{t+2}$	IE Citation$_{t+3}$
	(1)	(2)	(3)
Relative Age	**0.0534*** **	**0.0505*** **	**0.0434*** **
	(4.54)	**(5.01)**	**(4.39)**
Size	0.3821***	0.2832***	0.2278**
	(3.38)	(3.66)	(2.72)
Leverage	0.0156	0.0299	0.0100
	(0.50)	(0.96)	(0.36)
BTM	-0.3543	-0.5755**	-0.3987
	(-1.59)	(-2.42)	(-1.58)
Tobin's Q	0.3747***	0.2327***	0.1872***
	(4.39)	(3.88)	(3.61)
ROA	1.3567***	0.9386***	0.9396***
	(4.18)	(3.46)	(2.89)
Cash	-1.0695***	-0.8670**	-0.5667*
	(-2.78)	(-2.38)	(-1.78)
PPE/Employee	0.0005**	0.0002	-0.0001
	(2.56)	(1.14)	(-0.46)
Sale	-0.6018***	-0.4654***	-0.3836***
	(-4.29)	(-4.90)	(-4.17)
Sale Growth	0.7730***	0.4639*	0.2449
	(3.44)	(1.87)	(0.99)
Return	-0.1829*	-0.1851*	-0.1574
	(-1.72)	(-1.93)	(-1.15)
CEO Age	-0.0487***	-0.0443***	-0.0408***
	(-3.90)	(-3.83)	(-4.19)
Female CEO	-0.0894	0.0708	0.2049
	(-0.44)	(0.46)	(1.54)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	8,768	8,089	7,387
Adjusted R-squared	0.1742	0.1869	0.2000

Table 9
Does CEO Relative Age Capture Overconfidence?

This table reports results on falsification tests where we examine whether relative age captures overconfidence instead of confidence. In Panel A, we test whether CEO relative age is related to overinvestment. The dependent variable in Column (1) is a company's capital expenditure scaled by total assets in year t (*CAPX*). The dependent variables in Column (2) of Panel A is the amount of R&D spending scaled by total assets in year t (*R&D*). The dependent variables in Column (3) of Panel A is the number of M&As a company has completed in year t (*M&A*). In Panel B, we study whether CEO relative age is related to management forecast attributes that are usually exhibited by overconfidence CEOs. The dependent variable in Column (1) is an indicator variable equal to one if the company has issued at least one management forecast during the year and zero otherwise (*MF Issue*). The dependent variable in Column (2) of Panel B is an indicator that equals one if the company misses its management forecast for year t and zero otherwise (*Miss MF*). The dependent variable in Column (3) of Panel B is management forecast precision computed as the range of the forecast scaled by assets per share multiplied by minus one (*MF Precision*). The key independent variables include the relative age of the CEO (*Relative Age*). All other variables are defined in the Appendix. Standard errors are clustered at the year level and t-statistics are reported in parentheses. ***, **, and * indicate statistical significances at the 1%, 5%, and 10% levels, respectively.

Panel A: CEO Relative Age and Overinvestment

	Dependent Variable		
	CAPX	*R&D*	*M&A*
	(1)	(2)	(3)
Relative Age	**-0.0000**	**-0.0000**	**-0.0016****
	(-0.31)	**(-0.16)**	**(-2.20)**
Size	-0.0028***	-0.0036***	0.0218***
	(-17.34)	(-18.99)	(6.40)
Leverage	-0.0007***	-0.0010***	-0.0059***
	(-4.50)	(-6.90)	(-4.90)
BTM	-0.0121***	-0.0177***	-0.0473***
	(-8.39)	(-16.06)	(-4.24)
ROA	0.0445***	-0.1087***	0.0764**
	(12.18)	(-16.69)	(2.49)
CEO Age	-0.0001***	-0.0003***	-0.0023***
	(-4.34)	(-8.56)	(-3.70)
Female CEO	0.0049***	-0.0036***	-0.0264*
	(5.40)	(-4.21)	(-1.92)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	21,705	21,705	21,705
Adjusted R-squared	0.422	0.495	0.040

Panel B: CEO Relative Age and Management Forecast Attributes

	Dependent Variable		
	MF Issue	*Miss MF*	*MF Precision*
	(1)	(2)	(3)
Relative Age	**-0.0005**	**-0.0018**	**0.0122**
	(-0.55)	**(-1.60)**	**(1.41)**
Size	0.0179***	-0.0031	-1.3270***
	(7.27)	(-0.48)	(-21.75)
BTM	-0.0492***	0.1253***	0.4241*
	(-3.95)	(6.52)	(2.05)
Leverage	0.0053***	0.0038	-0.0285
	(3.46)	(0.96)	(-0.98)
ROA	0.1927***	-0.5900***	-0.8761
	(4.88)	(-6.19)	(-0.86)
Change Earn	-0.1225***	-0.0340	1.3351**
	(-5.02)	(-0.92)	(2.65)
Sale Growth	-0.0069	-0.1891***	0.6882***
	(-0.37)	(-8.31)	(4.27)
Earn Vol	-0.6591***	-0.0270	-9.5456***
	(-12.87)	(-0.26)	(-10.44)
Analyst	0.0746***	-0.0323**	0.3680***
	(8.39)	(-2.56)	(6.04)
IO	0.1217***	-0.0678***	1.7770***
	(5.33)	(-2.94)	(7.37)
CEO Age	-0.0017***	-0.0007	-0.0008
	(-5.92)	(-1.16)	(-0.25)
Female CEO	0.0311**	0.0004	-1.2310***
	(2.42)	(0.01)	(-3.37)
MF Horizon		0.1412***	-0.6250***
		(12.22)	(-8.39)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	21,615	7,312	5,992
Adjusted R-squared	0.247	0.125	0.395