CEO AGE AND FIRM PERFORMANCE

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Keywords: CEO, Age, Firm Performance, Turnover, Governance
JEL Classification: G30, G32, G34

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Abstract

Using a sample of 1,940 CEOs in 1,390 industrial firms, we examine the relation between CEO age and firm performance. We find that CEO age is negatively associated with firm growth and firm market value, and the sensitivity of these two relations diminishes with CEO age. The association between age and firm profitability is conditional on firm size. Specifically, with respect to performance, we find a positive relation with profitability among younger CEOs in small firms and a negative relation among older CEOs in large firms. Given the physiological and psychological changes that occur with aging and the accompanying deterioration in productivity, we also examine what factors contribute to the likelihood of a CEO continuing beyond the normal retirement age of 65. Our empirical results show that CEO stock ownership increase the likelihood of delayed retirement, whereas firm-specific tenure and non-incentive compensation increase the likelihood of scheduled retirement at 65. In addition, we observe that CEOs in small firms and CEOs recruited from outside are more likely to stay longer in office. These results do not support CEO entrenchment as a possible motive to continue.

1. Introduction

The median age of the Chief Executive Officer (CEO) in the U.S. declined from 59 years in 1980 to 54 years in 2008.[1] Over this period, leadership in the growing proportion of young firms, especially in the tech sector, has mostly rested in the hands of younger CEOs. Whereas older CEOs have more experience and benefit from more extensive professional networks, younger CEOs tend to have more energy, drive and enthusiasm. A negative relation between age and job performance has been documented in the management, psychology and sociology literatures (Taylor, 1975; Verhaeghen and Salthouse, 1997; and Ebner, Freund and Baltes, 2006). The process of aging is associated with a number of physiological and psychological changes in an individual, such as cognitive abilities, disposition towards risk, motivation, enthusiasm, drive, passion, confidence, and life style preferences, and these potentially affect a manager's leadership and decision making abilities. In this paper we investigate the relation between a CEO's age and firm performance using a large sample of publicly traded U.S. firms.

At least two age related effects, career concerns and the horizon problem, have been identified in the management and financial economics literatures. A CEO several years from retirement has greater costs and benefits associated with decisions that affect the long-term value of the firm. For a young CEO, career concerns are potentially huge. However, young CEOs also have the incentive to engage in high risk decisions with a potential of high long-term payoff. Older CEOs, on the other hand, as they approach retirement, have an incentive to focus on the short-term impact of their decisions on firm value, the classic horizon problem.[2]

[1] SpencerStuart (2008).

[2] Some early work in the management science literature documents an association between management age, corporate strategy and organizational performance (Hart and Mellors, 1970; Child, 1974; Richard and Shelor, 2002). A youthful management is more likely to push for innovation and change in corporate strategy and challenge the

Research on how a CEO's age can affect corporate decisions and firm performance is beginning to emerge in the financial economics literature. Serfling (2014) shows that a CEO's risk taking decreases with age. Specifically, he finds that older CEOs invest less in research and development, make more diversified acquisitions, and manage firms with more diversified operations and low operating leverage. The negative age-risk relation holds for both total risk and idiosyncratic risk. Waelchli and Zeller (2013) survey 1,500 Chairpersons of the Boards (COBs) of unlisted firms in Switzerland and find a negative relation between the COB's age and firm performance, and attribute it to a deterioration in the cognitive abilities and motivation with age as the main drivers. Likewise, Goergen, Limbach and Scholz (2015) exploit the unique two-tier board structures in Germany and find that a greater difference in the age between the CEO and the COB results in larger cognitive conflicts between the two, leading to increased monitoring by the board and an increase in firm value.

CEO age has also been found to impact acquisition decisions. Yim (2013) finds that younger CEOs are more acquisitive compared to older CEOs, and offers an incentives-based explanation. Younger CEOs may have a greater incentive to pursue acquisitions as they stand to realize financial benefits over a longer career span. Gao (2010) likewise finds managers with a longer horizon (younger managers) make acquisitions that perform better in the long run compared to managers with a shorter horizon (near-retirement managers). Zhang et al. (2014) also find similar results using a sample of UK firms.

In this study we examine how overall firm performance varies with CEO age. The differences in risk taking capacity and investment behavior between younger and older CEOs

status quo (Wiersema and Bantel (1992)). In fact, the heterogeneity in attitudes and behaviors of managers is often attributed to the psychosocial effects of the aging process (Rhodes, 1983). Hambrick and Mason (1984) also suggest that strategic choice and organizational performance can be partially predicted by the characteristics of its management such as age.

observed in recent studies suggests that overall firm performance will vary with CEO age. The CEO age-firm performance relation for widely held publicly traded firms remains unexplored. Furthermore, despite the fact that aging is accompanied with physiological and psychological changes that mostly negatively affect productivity (such as decline in cognitive abilities, motivation, confidence, energy, etc.) we observe that 7 percent of the CEOs in our sample continue to work past the normal retirement age of 65. A firm's board may choose to retain a high performing CEO or a powerful CEO who is entrenched may be in a position to influence the board to continue. We investigate what factors contribute to a CEO's decision to continue past the normal retirement age of 65.

Our study is a cross-sectional analysis of age and firm performance. Both incentives and physiological and psychological changes, can affect CEO decisions. Our sample does not allow us to directly measure age related changes in physiological and psychological attributes such as cognitive abilities and motivation, as in Waelchli and Zeller (2013). These authors implement a survey to COBs of unlisted firms to gather this data. Instead, we focus on incentives and career concerns. Large career concerns provide the incentive to do the right thing. As career concerns diminish closer to retirement, the incentives to engage in self-serving behavior and moral hazard increase. We hypothesize a negative relation between career concerns and managerial agency costs. For young CEOs, both the potential large career costs of bad decisions and the long-term benefits of good decisions, suggest a mitigating affect on managerial agency costs, leading to a negative age-performance relation. A negative relation is also predicted based on the negative age-risk relation documented in Serfling (2014). Yim (2013) also provides evidence that younger CEOs are more acquisitive because of the potential long-term benefits from these investments. For CEOs approaching retirement, existing evidence suggests that they have the

incentive to make short-horizon decisions. For example, in the years leading up to retirement, the incentive to manipulate firm performance to lock in more favorable post-retirement benefits has been observed. Dechow and Sloan (1991) provide evidence that CEOs reduce R&D expenditure in the pre-retirement years to manage earnings and boost their earnings-based compensation.[3] Serfling (2014) also finds older CEOs spend less on R&D. However, this horizon problem is mitigated if the CEO is motivated to continue past the normal retirement age of 65. With a mandatory retirement policy, CEO career concerns should end around age 65 (Dechow and Sloan, 1991; Gibbons and Murphy, 1992; Murphy and Zimmerman, 1993; Brickley et al., 1999). Studies on management turnover find a high rate of CEO exit around age 65, and thus argue that age is more important than performance in explaining CEO departure (Barro and Barro, 1990; Murphy, 1999; Brickley, 2003). However, what factors contribute to a CEO's decision to continue past the normal retirement age remains unexplored. Both good performance (positive reason) and entrenchment (negative reason) can affect the decision to continue. In this study we examine the factors that affect the CEO's choice to continue in the leadership role.

Using a large sample of 1,390 industrial firms and 1,940 CEOs, we test the relation between age and three dimensions of firm performance: growth, profitability and market value. Our empirical results show a strong association between CEO age and firm performance. Specifically, we find that (1) the age-growth and age-market value relations are negative and stronger among younger CEOs, (2) the age-profitability relation is negative among older CEOs in large firms and positive among younger CEOs in small firms, and (3) CEO characteristics,

[3] Gibbons and Murphy (1992) suggest use of more stock-based incentives as a CEO approaches retirement. Smith and Watts (1982) and Bizjak et al. (1993) also recommend postponing the payment of incentive compensation into the post-retirement period to mitigate the horizon problem.

such as ownership, non-incentive based compensation and firm tenure, have interactive effects on the age-performance relation. We also find that CEOs with higher stock ownership and CEOs recruited from outside are more likely to work past age 65, whereas CEOs with longer firm tenure and CEOs with higher non-incentive compensations are more likely to retire on schedule. In addition, we find that CEOs of growing firms are more likely to delay their retirement whereas CEOs of large firms are more likely to leave at the normal retirement age. Our empirical evidence does not support CEO entrenchment as a possible reason for why a CEO continues to work past the normal retirement age.

The remainder of this paper is organized as follows: Section 2 reviews the literature and presents the testable hypotheses. Section 3 describes the data and empirical methodology. Section 4 reports and discusses the empirical results. Finally, section 5 concludes the study.

2. Literature Review and Testable Hypotheses

2.1 CEO Age, Career Concerns and the Horizon Problem

Career concerns change over an executive's life. Young managers at an early stage in their career potentially have substantial career concerns since they expect to stay in the managerial labor market for many years. The long term negative impact of adverse decisions and the positive impact of good decisions can both aid in reducing agency costs for younger managers. Closer to retirement, older managers have little, if any, career concerns and may thus indulge in opportunistic behavior to manipulate firm performance. This increased incentive to engage in self-dealing and moral hazard around retirement is often referred to as the horizon problem.

Fama (1980) was among the first to propose that executive career concerns can reduce the agency problem and thereby increase firm performance. Monitoring provided by both the external and internal labor markets impact managerial career concerns and discipline managers, leading to a reduction in agency costs of managerial discretion. Holmstrom (1982) shows career concern to be an important managerial incentive and suggests that managers work hard in early years when the labor markets are still assessing their capabilities, while not hard enough in later years.

The prevalence of a horizon problem around retirement has been extensively studied. For example, studies find that CEOs reduce discretionary expenditure such as R&D to boost earnings around retirement (Dechow and Sloan, 1991; Barker and Mueller, 2002; Puffer and Weintrop,1991; Brickley et al., 1999). This could be motivated either to increase the retirement benefits or with the aim of securing internal or external board service after retirement. Brickley et al. (1999) argue that the opportunity of post-retirement directorship provide CEO with new career concerns, and these concerns potentially offset at least part of the horizon problem during the CEO's final years in office.

Yermack (2006) finds that at retirement, CEOs can obtain extraordinary severance packages that may be related to pre-retirement firm performance. Performance-based incentive plans can sometimes have an adverse effect by motivating a CEO to manage short-term firm earnings around retirement, thus aggravating the horizon problem. Murphy and Zimmerman (1993), however, argue that discretionary expenditures such as R&D, advertising, capital, and accounting accruals are related to overall poor economic performance rather than the horizon problem.

2.2 CEO Age, Compensation and Turnover

A number of studies find that a decline in firm performance increases the probability of CEO departure (Coughlan and Schmidt, 1985; Warner et al., 1988; Weisbach, 1988; Jensen and Murphy, 1990a; Murphy, 1999). The performance-turnover relation has weakened over time (Murphy, 1999). There is also extensive evidence that firm performance is associated with executive compensation, although the evidence is mixed. While some studies find a positive relation between performance and pay (Murphy, 1985; Coughlan and Schmidt, 1985; Murphy, 1986; Abowd, 1990), others argue the performance-pay relation is weak (Jensen and Murphy, 1990a; Jensen and Murphy, 1990b; Gregg et al., 1993a; Main et al., 1995; Laing and Weir, 1999). Still others find little evidence in support of the performance-pay link (Leonard, 1990).

CEO age has been found to be linked to both turnover and compensation. Barro and Barro (1990) find that the probability of CEO departure first falls with age up to and including age 52, then rises with age and becomes particularly high at the normal retirement age of 65. Geddes and Vinod (1997) show that the probability of CEO turnover is positively related to age, and this relation is non-linear because of the mandatory retirement policy. They also show that the link between age and survival rate is negative and highly significant, implying that an older CEO has a higher chance of departure than a younger CEO. Murphy (1999) reexamines the age effect on the probability of turnover and documents that: a CEO around the normal retirement age is more likely to depart, although this has diminished over time; executives in poor-performing companies tend to depart at a younger age; and most importantly, executive turnover

is driven by age and not performance in large firms, whereas by performance and not (primarily) age in small firms[4].

Age also plays an important role in explaining executive remuneration. The evidence here again is mixed. Whereas Deckop (1988), Leonard (1990) and Ingham and Thompson (1993), find little evidence that age and pay are linked, Hogan and McPheters (1980) find the age-pay link to be both positive and significant. Monti-Belkaoui and Riachi-Belkaoui (1993) suggest that rather than affecting compensation directly, the association between executive age and pay occurs through tenure. Finkelstein and Hambrick (1989), Kostuik (1990) and Storey et al. (1995) report an inverted U-shaped relationship between age and compensation. Likewise, McKnight et al. (2000) not only report an inverted U-shape relation between age and bonus, but also predict that around age 53, the proportion of bonus in total pay reaches a maximum, and with age the relation between firm size and pay levels weakens. The curvilinear age-pay relation implies that "age may have a positive effect upon salaries up to a certain age after which greater age may have a zero or negative effect" (Storey et al., 1995).

2.3 Testable Hypotheses

Physiological and psychosocial changes along the aging process, career concerns and the horizon problem around retirement all affect managerial decisions. In this section we develop our testable hypotheses on the age-performance relation and the likelihood of CEO turnover at retirement. The age-performance relation is assumed to manifest through CEO wealth

[4] Brickley (2003) also finds that performance-turnover sensitivity is much higher in small firms compared to large firms.

concerns.[5] Further to the performance-turnover link and the age-turnover link that has been studied in the literature, we examine what determines why some CEOs continue past the normal retirement age.

While empirical studies show a dramatic decline in career concerns close to the regular retirement age of 65, we do not know how the these career concerns affect firm performance when the CEO is several years from retirement. We assume that CEO career concerns are closely tied to his/her wealth concerns. The expected value of total future compensation is a function of the performance-adjusted increase in current compensation and the expected number of years until the CEO leaves the labor force (retirement or dismissal). Since the collection of future compensation is contingent on current performance and the likelihood of future success, it can be viewed as uncertain or risky wealth. In this sense, CEO career concerns are actually their concerns on the uncollected future wealth, or in short, their wealth concerns. The greater the CEO wealth concerns, the less the agency problems. However, we do not rule out the possibility that some younger CEOs may take large risks with a higher expected payoff, which would suggest an increase in agency costs. Assuming that executive annual compensation is the only source of CEO income and CEO career horizon ends at the regular retirement age of 65, the total career income of a CEO is the sum of two parts: the sum of collected managerial annual pay (past compensation) and the sum of uncollected annual pay (future compensation). Thus, a CEO's total career income can be summarized as follows:

$$CEO\ Total\ Career\ Income = \sum_{A_0}^{A_t} \left(\begin{matrix} Collected \\ Annual\ Income \end{matrix} \right) + \sum_{A_{t+1}}^{65} \left(\begin{matrix} Uncollected \\ Annual\ Income \end{matrix} \right) \quad (1)$$

[5] We are unable to directly observe attributes such as changes in cognitive abilities or shifts in risk aversion given the secondary source of our data. Given the evidence in Waelchli and Zeller (2013), we assume that such changes are factored into the wealth concerns.

where $\mathbf{A_0}$ refers to the beginning age of CEO career horizon, and $\mathbf{A_t}$ refers to the CEO's current age. The considerable wealth concerns for younger CEOs reduces the agency costs of managerial discretion. Older CEOs have less wealth concerns and potentially higher agency costs. We, therefore, hypothesize an inverse relation between CEO age and firm performance.

We next argue that this negative age-performance relation will be more sensitive among younger CEOs while less sensitive among older CEOs. This is because performance-based turnover has been shown to be higher among younger CEOs compared to older CEOs (Murphy, 1999). The greater likelihood of performance-based turnover adds to the younger CEOs' uncertainty on future compensation. For older CEOs, there is less uncollected compensation as well as a lower likelihood of performance-based turnover, resulting in lower sensitivity of the negative age-performance relation.

Studies on CEO turnover show that the extremely high probability of CEO exit around age 65 can be attributed to scheduled retirement rather than performance-forced departure (Barro and Barro, 1990; Murphy, 1999; Brickley, 2003). Meanwhile, empirical evidence shows that some CEOs over age 70 or even 75 continue to head the enterprise. What motivates a CEO to continue working past the normal retirement age of 65? One possible explanation is higher managerial productivity and superior firm performance. Brickley et al. (1999) provide evidence that the probability of post-retirement directorship on inside or outside boards is strongly and positively related to the pre-retirement stock or accounting performance. CEOs wanting to extend their career horizon have to demonstrate their superior productivity to the board. On the other hand, the horizon problem suggests that CEOs intending to retire on schedule may also show superior pre-retirement earnings performance to boost their earnings-based compensation. However, since the higher firm earnings for the latter are the results of performance

manipulation rather than the outcomes of managerial productivity, the CEOs with the horizon problem are less likely to demonstrate the superior accounting and market performance at the same time. The relation between scheduled pre-retirement age firm performance and the likelihood of the CEO continuing past age 65 is, therefore, unclear.

Another possible explanation on why a CEO may continue past the regular retirement age is the strong CEO influence on board of directors. If pre-retirement CEOs are able to influence board decisions about scheduled retirement, then they probably have a bigger chance to continue in their current position. Such influence could be both explicit and implicit. The explicit influence stems from the CEO's stock ownership since higher ownership provides more voting rights. The implicit influence stems from the CEO's entrenchment associated with longer firm tenure. Long-term firm tenure may provide the CEO with enough time to develop informal relationship with board members. Morck et al. (1988) argue that some managers, because of their firm tenure, can be entrenched with relatively low stock ownership. Hill and Phan (1991) and Hambrick and Fukutomi (1991) suggest that CEOs' power tends to increase during their tenure, and this increased power entrenches their position with the board. Hermalin and Weisbach (1998) also argue that board independence declines over a CEO's tenure. Since CEOs with longer tenure in office are more entrenched and less disciplined by the mechanism of board monitoring, when approaching the regular departure age, they may use their influence with the board and seek to continue in the CEO position. Accordingly, we expect that for CEOs who can potentially influence the board through ownership and entrenchment (longer tenure), their scheduled retirements are more likely to be delayed.

3. Data and Methodology

3.1 Data Source and Variable Description

The total sample spans 15 years from 1992 to 2006 and consists of 9,051 fiscal-year-end annual observations. These observations represent 1,390 U.S. industrial firms[6] and 1,940 CEOs, and come from two sources, S&P ExecuComp[7] and S&P Compustat, respectively.

From ExecuComp, we download the data measuring CEO characteristics. The data include CEO age, number of common shares held by CEO, CEO annual salary, date an individual joined the firm, date an individual became the CEO, and date a CEO left the firm. The annual summary statistics on CEO age is reported in Table 1 Panel A. For each year, about 50% of the observations are between age 50 and age 60 (the second and third quartiles). The youngest CEO at age 29 appears in both 1994 and 1998, while the oldest CEO at age 86 appears in 2002. In addition, more than 7% of CEOs are older than age 65, implying that these CEOs continue to work even beyond the scheduled retirement age. From the Compustat database, we obtain the data on firm financial characteristics.

(Insert Table 1 here)

We define the variables and classify them into three different categories. (a) Firm performance variables include sales change, assets change, Tobin's Q and return on assets. These are defined as follows: SALESCHG is the annual percentage change of sales, ASSETSCHG is the annual percentage change of total assets, TOBINQ, according to Lewellen and Badrinath

[6] In this research, both financial sector (SIC code 6000 – 6999) and utility sector (SIC code 4900 – 4999) are excluded.

[7] ExecuComp contains the annual compensation information of top executives for companies among the S&P 500, S&P 400 MidCap and S&P 600 SmallCap Indexes.

(1997), is the market-to-book ratio of total assets[8], and ROA is the ratio of Operating Income Before Depreciation (OIBD) to total assets. (b) Firm characteristics variables include firm size (SIZE), financial leverage (LEVERAGE) and capital expenditure (CAPEX), where SIZE is the natural logarithm of total assets, LEVERAGE is the ratio of total debt to total assets, and CAPEXP is the ratio of capital expenditure to sales. (c) CEO characteristics variables include age, salary, ownership, CEO experience and Non-CEO experience. CEO age (AGE) is the CEO chronological age, salary (SALARY) is the CEO annual basic salary without any bonus, and in thousands of dollars, and ownership (OWNERSHIP) is the CEO's percentage holding of firm's total common shares[9]. As in Demsetz and Lehn (1985), OWNERSHIP is calculated by adding a constant of 10 to the value of CEO percentage stock holding, and then taking the natural logarithm to reduce the effect of skewness. CEO experience (CEOEXPER) is the number of years that an individual has been working as the CEO of a specific firm, while Non-CEO experience (NONCEOEXPER) is the number of years that the individual had been working in that firm before being promoted as the CEO.

Table 1 Panel B reports the summary statistics on each of the above variables. The highest CEO annual salary of $5,500,000 is more than 8 times of the average value. The average firm-specific CEO tenure is about 8 years, while the most experienced CEO held the position for 52 years. In addition, at least 25% of the total observations represent CEOs recruited from outside (Q1 of NONCEOEXPER equals 0); while a CEO who experienced the slowest inside promotion had already worked for 47 years before being promoted to the CEO position of that firm (maximum of NONCEOEXPER).

[8] Market-to-Book Ratio of Assets = (book value of total debt + book value of preferred stock + market value of common shares) / (book value of total debt + book value of total equity).
[9] When calculating the number of common shares held by CEO, Denis et al. (1997) exclude the unexercised stock options. We follow the same approach.

3.2 Ordinary Least Squares (OLS) Regression Models

OLS Regression Models are first employed to examine the age-performance relation. The dependent variable PERFORMANCE is proxied by four performance indicators; SALESCHG, ASSETSCHG, TOBINQ and ROA, respectively. SALESCHG and ASSETSCHG provide a measure of firm growth, TOBINQ is a market-based firm performance measure, indicating both the current performance and the future growth opportunities, while ROA measures the firm's operating performance. As in Barker and Mueller (2002), in the baseline regressions, the control variables on both firm and CEO characteristics are included, which are SIZE, LEVERAGE, CAPEXP, SALARY, OWNERSHIP, CEOEXPER and NONCEOEXPER.[10]

Next, to test for the interactive effects of managerial characteristics on the age-performance relation, we convert the CEO characteristic variables into their corresponding dummy variables. Thus, the salary dummy (SALARYD) equals 1 if the CEO annual salary is more than the industry median value, and equals 0 otherwise, where industry segmentation is based on a 2-digit SIC code. Ownership dummy (OWNERSHIPD) equals 1 if the CEO holds at least 1% of outstanding common shares, and is 0 otherwise. The dummy on CEO experience (CEOEXPERD) equals 1 when the firm-specific CEO experience is at least 5 years, and is 0 otherwise. Similarly, non-CEO experience dummy (NONCEOEXPERD) equals 1 when the firm-specific non-CEO experience is at least 5 years, and is 0 otherwise. We introduce four interactive variables, including the interactive terms on age-salary dummy (AGE_SALARYD), age-ownership dummy (AGE_OWNERSHIPD), age-CEO experience dummy (AGE_CEOEXPERD) and age-non-CEO experience dummy (AGE_NONCEOEXPERD). Each

[10] Several studies have shown significant effects of these variables on firm performance (e.g. Hambrick and Mason, 1984; McConnell and Muscarella, 1985; Morck et al., 1988; Weisbach, 1988; Opler and Titman, 1994; Agrawal and Knoeber, 1996; Murphy, 1999).

of these interactive variables is defined as the product of AGE and a specific CEO characteristic dummy. Finally, in addition to these CEO characteristics, we also employ an interactive variable to measure the impact of outside CEO recruitment[11] on the age-performance relation. The interactive variable age-outsider (AGE_OUTSIDERD) is defined as the product of AGE and an outsider dummy (OUTSIDERD), where OUTSIDERD equals 1 when NONCEOEXPER is 0, implying that CEO is hired from outside, or equals 0, implying that CEO is promoted from inside.

3.3 Piecewise Linear Regression Models

To examine the sensitivity of the age-performance relation we next use the piecewise linear regression models. A major challenge to fitting the piecewise regression is estimating the breakpoints, i.e. the knot points chopping the whole data interval of a variable into different segments (Hudson, 1966; Lerman, 1980; Chen et al., 2004). Based on the summary statistics of CEO age, we estimate four potential breakpoints along the whole CEO career horizon; age 50, 55, 60 and 65. The first three breakpoints are equal to the Q1, median and Q3 of CEO age, respectively, and the last one is the regular retirement age.

As in Morck et al. (1988), we begin with the two-breakpoint piecewise linear regressions. In the first model, breakpoint 1 (BP1) and breakpoint 2 (BP2) split the variable AGE into three piecewise age variables; age under breakpoint 1 (AGE_BP1), age from breakpoint 1 to breakpoint 2 (AGE_BP1BP2) and age over breakpoint 2 (AGE_BP2). The regression formulation is as follows:

$$PERFORMANCE = \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP + \beta_6 * CEOEXPER + \beta_7 * NONCEOEXPER + \beta_8 * AGE\_BP1 + \beta_9 * AGE\_BP1BP2 + \beta_{10} * AGE\_BP2 + \varepsilon \quad (2)$$

[11] Murphy (1999) documents a prevalence of CEO succession through outside recruitment rather than inside promotion during 1990s.

Where

$$\begin{cases} AGE < BP1, & AGE\_BP1 = AGE, & AGE\_BP1BP2 = 0, & AGE\_BP2 = 0 \\ BP1 \le AGE < BP2, & AGE\_BP1 = BP1, & AGE\_BP1BP2 = AGE - BP1, & AGE\_BP2 = 0 \\ AGE \ge BP2, & AGE\_BP1 = BP1, & AGE\_BP1BP2 = BP2 - BP1, & AGE\_BP2 = AGE - BP2 \end{cases}$$

Picking up two breakpoints each time from a pool of four potential age breakpoints allows for six alternative combinations of (BP1, BP2), which are (50, 55), (50, 60), (50, 65), (55, 60), (55, 65) and (60, 65). Hence, the values of these three piecewise variables, according to the above equation, are subject to not only the value of AGE but also the value of two-breakpoint combination (BP1, BP2)[12].

Morck et al. (1988) consider the arbitrary choice of breakpoints and examine the robustness of the regression results by chopping the whole data interval of ownership into smaller pieces with all possible breakpoints. We also extend the analysis by using four-breakpoint piecewise regressions with all the potential breakpoints of CEO age. Therefore, the new four-breakpoint combination (BP1, BP2, BP3, BP4) equals to (50, 55, 60, 65), and the variable AGE is split into five new piecewise age variables; age under 50 (AGE_50), age from 50 to 55 (AGE_5055), age from 55 to 60 (AGE_5560), age from 60 to 65 (AGE_6065) and age over 65 (AGE_65). Since the four-breakpoint combination is fixed, the values of these five piecewise variables are only subject to the value of AGE, shown in the following equation[13].

$$\begin{aligned} PERFORMANCE = {} & \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP + \beta_6 \\ & * CEOEXPER + \beta_7 * NONCEOEXPER + \beta_8 * AGE\_50 + \beta_9 * AGE\_5055 + \beta_{10} * AGE\_5060 + \beta_{11} \\ & * AGE\_6065 + \beta_{12} * AGE\_65 + \varepsilon \end{aligned} \quad (3)$$

Where

[12] For instance, when AGE is 62 and (BP1, BP2) is (50, 55), AGE_BP1, AGE_BP1BP2 and AGE_BP2 are 50, 5 and 7, respectively. Consider the other two scenarios. When AGE is 62 but (BP1, BP2) is (55, 65), AGE_BP1, AGE_BP1BP2 and AGE_BP2, in contrast, are 55, 7 and 0, respectively. When (BP1, BP2) is (50, 55) but AGE is 53, AGE_BP1, AGE_BP1BP2 and AGE_BP2 are 50, 3 and 0, respectively.

[13] For instance, when AGE is 57, AGE_50, AGE_5055, AGE_5560, AGE_6065 and AGE_65 are 50, 5, 2, 0 and 0, respectively. In contrast, when AGE is 67, AGE_50, AGE_5055, AGE_5560, AGE_6065 and AGE_65 are 50, 5, 5, 5 and 2, respectively.

$$\begin{cases} AGE < 50, & AGE\_50 = AGE, & AGE\_5055 = 0, & AGE\_5560 = 0, & AGE\_6065 = 0, & AGE\_65 = 0 \\ 50 \le AGE < 55, & AGE\_50 = 50, & AGE\_5055 = AGE - 50, & AGE\_5560 = 0, & AGE\_6065 = 0, & AGE\_65 = 0 \\ 55 \le AGE < 60, & AGE\_50 = 50, & AGE\_5055 = 5, & AGE\_5560 = AGE - 55, & AGE\_6065 = 0, & AGE\_65 = 0 \\ 60 \le AGE < 65, & AGE\_50 = 50, & AGE\_5055 = 5, & AGE\_5560 = 5, & AGE\_6065 = AGE - 60, & AGE\_65 = 0 \\ AGE \ge 65, & AGE\_50 = 50, & AGE\_5055 = 5, & AGE\_5560 = 5, & AGE\_6065 = 5, & AGE\_65 = AGE - 65 \end{cases}$$

3.4 Logistic Regression Models

To determine what factors affect the likelihood of a CEO's decision to continue in their job beyond the normal retirement age, we estimate logistic regressions. We need to carefully distinguish between scheduled retirement and delayed retirement. One difficulty here is to reasonably define the normal retirement age. Age 65 is commonly accepted as the conventional retirement age. However, for a scheduled CEO retirement, the expected departure date and actual departure date could be different. It is possible that a CEO prepares to retire routinely at age 65 but finally retires earlier at age 64 or later at age 66. Weisbach (1988) and Brickley et al. (1999) also consider age 64 to 66 as the normal retirement age interval. Accordingly, scheduled retirement and delayed retirement are defined in two ways: (1) scheduled retirement is defined as the regular CEO departure at age 65, while delayed retirement is defined as the CEO departure at age 67 or later[14]; (2) scheduled retirement is defined as the regular CEO departure at age 64, 65 or 66, while delayed retirement is defined as the CEO departure at age 67 or later.

Based on the definition of scheduled and delayed retirement, the two groups of CEOs are identified from the whole sample of 1,940 CEOs. The first group consists of 174 executives, including scheduled-retired CEOs who left at age 65 and delayed-retired CEOs, and the second group consists of 295 executives, including scheduled-retired CEOs who left at age 64, 65, or 66 and delayed-retired CEOs. We then use a series of logistic regressions to test the impact of firm

[14] Delayed retirement includes two kinds of scenarios: (1) CEO had left the firm, and the departure age is not less than age 67; (2) CEO is working in the firm, and the current age is not less than age 67.

performance and CEO characteristics on likelihood of scheduled-retirement and delayed-retirement of CEOs.

The dependent variable in all regressions equals 1 if the CEO left at the regular retirement age (scheduled retirement), and 0 if CEO continued beyond the regular retirement age (delayed retirement). Independent variables include firm performance measures (SALESCHG, ASSETSCHG, TOBINQ and ROA),[15] and CEO characteristics (OWNERSHIP, CEOEXPER and NONCEOEXPER). We also control for SALARY and SIZE.[16] In addition, the regressions are also estimated using dummy variables for CEO characteristics (SALARYD, OWNERSHIPD, CEOEXPERD and NONCEOEXPERD). Finally, since outside-recruited CEOs tend to have less connection with the board members than inside-promoted CEOs, we use the dummy variable OUTSIDERD to test the impact of outside recruitment on the likelihood of CEO retention at the regular retirement age.

3.5 Industry-Adjusted Tests

The regressions are estimated with and without adjusting for industry performance. Since the results using both measures remain robustly similar, we report only the results with industry adjusted measures, where for each variable, SALESCHG, ASSETSCHG, TOBINQ, ROA, SIZE, LEVERAGE and CAPEXP, we control for industry effects by subtracting the industry median from the values of each variable. Industry classification is based on a 2-digit SIC code. Likewise, to control for variations in executive compensation across industries, we also adjust the variable SALARY.

[15] We choose to measure the overall performance rather than earnings performance since it is possible that superior firm profitability measured by earnings could be due to earnings management and not higher managerial productivity.

[16] Murphy (1999) documents that executive turnover in large firms is more likely to be the age-related normal departure, while executive turnover in small firms is more likely to be performance-forced dismissal.

4. Empirical Results and Discussion

4.1 Age-Performance Relation: OLS Regressions

We first investigate the overall relation between CEO age and firm performance. In Table 2, with dependent variables on SALESCHG, ASSETSCHG and TOBINQ, the coefficients of AGE are both negative and significant at the 1% level. This negative age-growth and age-market value relations are consistent with the negative age-risk relation documented in Serfling (2014) as well as the arguments in Fama (1980), Child (1974) and Hambrick and Mason (1984). The coefficient of AGE on ROA is, however, not significant. This result is consistent with the findings in Child (1974),[17] but different from our expectation. It is also consistent with the findings in Waelchli and Zeller (2013). Additionally, the positive coefficients of OWNERSHIP and the negative coefficients of SALARY support the previous finding that CEO stock holding and equity-based compensation mitigate agency cost and improve firm performance, while non-incentive compensation leads to higher agency cost and lower firm performance (Mehran, 1995; Core et al., 1999).

(Insert Table 2 here)

In Table 3, we repeat the analysis for firm size quartiles. When the dependent variables are ASSETSCHG and TOBINQ, the coefficients of AGE are negative and significant across all the four quartiles of firm size, whereas with SALESCHG, the coefficients of AGE are negative and significant in the first, second and fourth quartiles. These results suggest that the firms

[17] Child (1974) finds a positive relation between management youth and firm growth, but no relation between youth and profitability.

managed by older CEOs consistently show lower growth rates and firm market value, regardless of firm size.

(Insert Table 3 here)

Table 3 also provides additional insights on the relation of CEO age with firm profitability. The coefficients of AGE on ROA are positive and significant at the 1% level in the first quartile, negative and significant at the 1% level in the fourth quartile, while still not significant in the second and third quartiles. Results in Table 3 suggest that the age-profitability link varies by firm size. The positive relation in the first quartile appears to be driven by CEO stock ownership. The coefficient on OWNERSHIP is positive and significant in the first quartile but not significant in the fourth quartile. For the remaining three measures of performance as well, OWNERSHIP is consistently positive in all four quartiles. These results indicate that CEO stock ownership likely dilutes the negative age-performance link.

We further examine the age-performance relation after controlling for the interactive effects of CEO characteristics. Results are reported in Table 4. Other than ROA, AGE remains negative and significant with the other three measures of performance. The coefficients of AGE_SALARYD on SALESCHG, ASSETSCHG and TOBINQ are negative and significant, whereas coefficients of AGE_OWNERSHIPD and AGE_CEOEXPERD are consistently positive. CEOs with higher compensation as basic salary may demonstrate considerable agency problems since they have less wealth concerns on future compensation. As they age, high level of non-incentive compensation exacerbates the decline in performance. Higher stock holdings, however, have a moderating effect on the negative age-performance link. Although higher stock ownership can increase a CEO's influence with the board and potentially result in entrenchment and self-

serving behavior, the overall net effect appears to be positive and a better alignment of the CEO's and shareholders' interests. The prevalent argument on CEO firm tenure is that longer tenure is associated with considerable entrenchment and agency problem (Morck et al., 1988; Hill and Phan, 1991; Hambrick and Fukutomi, 1991). Our results, however, show that longer CEO tenure positively affects the age-performance link. Longer CEO tenure likely leads to greater accumulated stock ownership which mitigates the entrenchment effect. However, the negative relation between performance and non-CEO tenure is consistent with the entrenchment argument.

(Insert Table 4 here)

Outside recruitment implies an extreme scenario of zero firm-specific non-CEO tenure and zero firm experience prior to the CEO appointment. We find that outside recruitment and non-CEO tenure demonstrate opposite effects on the age-performance relation. Whereas AGE_OUTSIDERD is positively related to SALESCHG, ASSETSCHG and TOBINQ, the results for AGE_NONCEOEXPERD are negative. The results with ROA are opposite. CEOs recruited from outside often come with a mandate for making substantive changes in the firm's strategic direction and operational activities. Thus, even though these CEOs are very often older, they tend to exert a positive impact on performance as a result of the new initiatives introduced. On the other hand, inside CEOs with longer non-CEO tenure are likely to be more entrenched. They also have the incentive to preserve and protect their significant human capital invested in the firm. Serfling (2014) shows that older CEOs take less risk. These inside CEOs with longer overall firm tenure with the firm are likely to be more risk averse and pursue investment and financial policies that negatively affect firm performance.

The evidence from the cross-sectional tests shows a robust negative age-growth and age-market-value relation. The age-profitability relation is, however, dependent on firm size, with a positive relation in smaller firms and negative relation in larger firms.

4.2 Age-Performance Relation: Piecewise Linear Regressions

So far we have assumed the age-performance relation to be linear. There is, however, no strong justification to impose such a restriction. The CEO performance-turnover likelihood, for example, has been found to be highest for CEOs under 50, insignificant to marginally significant for CEOs between 50 and 60, and then significant after age 60 (Jensen and Murphy, 1990a). Likewise, a nonlinear relation between ownership and performance has been robustly demonstrated in the literature (Morck et al. (1988), among others). Our evidence thus far also points to ownership having a moderating effect on the negative age-performance relation. In this section, we implement piecewise linear regressions to further examine the age-performance relation. Waelchli and Zeller (2013) also employ piecewise linear regressions when examining the COB-performance relation for their sample of unlisted firms.

We implement both a two-breakpoint and four-breakpoint analysis. The results for the two-breakpoint piecewise regressions are reported in Table 5. Following Morck et al. (1988), we pick up one breakpoint combination with the most explanatory power (biggest adjusted R-Square) from six alternative combinations of (BP1, BP2). For all four performance measures we note that the adjusted R-Square are high and comparable when BP1 is 50. Since age 65 is the normal retirement age, for each dependent variable, we choose the breakpoint combination (50, 65) and study the corresponding regression results.

(Inset Table 5 here)

Based on the selected breakpoint combinations[18], we plot the age-performance relation and observe the variations in sensitivity. In Figure 1, solid and dash lines are used to highlight the statistical significance and insignificance, respectively. As CEO age increases, the curves of SALESCHG, ASSETSCHG and TOBINQ identically show a down-up-down trend. These curves decline sharply when age is under 50 (first piece), then rise slightly when age is from 50 to 65 (second piece), and finally decline again when age is over 65 (third piece). For SALESCHG and ASSETSCHG, only the first piece is significant, while for TOBINQ, the first and third pieces are both significant. By contrast, as CEO age increases, the curve of ROA shows an up-down-up trend. For ROA, the statistical significance is observed in the second and third pieces, but not the first piece. Our results for CEO age-performance relation using ROA are consistent with those reported in Waelchli and Zeller (2013) for COBs of unlisted firms in Switzerland.

(Inset Figure 1 here)

The curves of SALESCHG, ASSETSCHG and TOBINQ provide evidence to support that the age-growth and age-market value links are less sensitive among older CEOs. As noted previously, Jensen and Murphy (1990a) and Murphy (1999) suggest that older CEOs are less likely to experience performance-forced turnover. Our findings are consistent with this evidence since the age-performance relation is mostly not significant beyond age 50. The curve of ROA, however, suggests that younger CEOs focus more on growth rather than profitability. The significant negative relation with ROA in the (50, 65) is possibly due to sub-optimal risk taking by older CEOs which results in reduced competitiveness for the firm.

[18] We select the industry-adjusted results of combination (50, 65) in Table 5, and plot the age-performance relationship in Figure 1. Similarly, we select the industry-adjusted results in Table 6, and plot the age-performance relationship in Figure 2.

(Inset Table 6 here)

To avoid the arbitrary selection of breakpoints, we also use four-breakpoint piecewise regressions to reexamine the age-performance relation. The regression results are reported in Table 6, and the piecewise curves are plotted in Figure 2. By comparing Figures 1 and 2, we find that each curve in Figure 2 shows the same shape as the corresponding curve in Figure 1. Nevertheless, we still notice the remarkable change in statistical significance along the curve for ROA; the downward trend from age 50 to 65 is significant in Figure 1 but not in Figure 2, while the upward trend under age 50 is significant in Figure 2 but not in Figure 1. The disappearing significance on downward trend may be attributed to the use of four-breakpoint regressions.

(Inset Figure 2 here)

In the previous section, the results of Table 3 suggested that the age-profitability relation is contingent on firm size. CEO age and profitability are positively related in small firms but the relation is negative in large firms. Here, the curves for ROA in Figures 1 and 2 suggest that firm profitability increases with age for CEOs less than 50 while it decreases for older CEOs. Accordingly, we reexamine the age-profitability link by adopting piecewise linear regressions and controlling for firm size at the same time. Based on the four quartiles of firm size, we divide the total sample into four subsamples: the smallest 25% firms (first quartile, Group 1), the smaller 50% firms (first and second quartiles, Group 2), the largest 25% firms (fourth quartile, Group 3) and the larger 50% firms (third and fourth quartiles, Group 4). We next fit piecewise linear regressions with breakpoint combination (50, 65) for each of these subsamples. The regression results are reported in Table 7.

(Insert Table 7 here)

The coefficient of AGE_50 is only significant in Group 2, while the coefficient of AGE_5065 is significant in Groups 3 and 4, suggesting that the age-profitability relation is conditional on both firm size and the executive's age. In small firms, younger CEOs (age<50) improve firm profitability while older CEOs (50<age<65) show no demonstrated effect on profitability. In large firms, younger CEOs (age<50) show no impact on firm profitability, while the firm profitability and age relation is negative for older CEOs (50<age<65). A combination of factors, including increasing entrenchment and agency problems and an increase in risk aversion in decision making, possibly explain the negative relation for older CEOs in large firms. Interestingly, in smaller firms managed by CEOs past their normal retirement age (age>65), they exert a positive impact on profitability while in larger firms, for this age group CEOs, the effect on profitability is not significant or marginally negative. One possible explanation is that smaller firms that are managed by CEOs above 65 are likely family owned who continue to be associated with the family business. Family ownership also could be a potential explanation for the positive age-profitability relation in small firms in general.

4.3 Scheduled Retirement vs. Delayed Retirement

We next use logistic regressions to test the likelihood of CEO retention past the regular retirement age. Scheduled retirement is first defined as the CEO departing at age 65. The sample includes 416 observations where all firm performance measures are industry adjusted. The regression results are reported in Table 8.

(Insert Table 8 here)

None of the firm performance measures (SALESCHG, ASSETCHG, TOBINQ and ROA) show any significance. In Model 1, SIZE is positive and significant. Murphy (1999) and

Brickley (2003) document that CEOs in large firms tend to experience scheduled departure at the normal retirement age rather than performance-forced turnover at an early date. Our findings also indicate that CEO turnover in big firms is largely the result of implementing a mandatory retirement policy and not necessarily a mechanism to discipline managerial performance. Although CEOs have the incentive to manipulate short-term earnings performance to boost their compensations and post-retirement benefits (Dechow and Sloan, 1991; Gibbons and Murphy, 1992), we do not find evidence for this in our sample.

In contrast to firm performance measures, CEO characteristics are significantly related to the likelihood of a CEO departing at age 65. The coefficients of SALARY, OWNERSHIP and NONCEOEXPER are significant in Model 2. High CEO stock ownership increases the likelihood of the CEO continuing beyond the normal retirement age, whereas CEOs with a longer tenure with the firm (including non-CEO experience) and CEOs earning higher non-incentive based compensation are more likely to depart at the normal retirement age. High stock ownership that approaches a controlling interest in the firm can result in entrenchment while ownership at lower levels is more effective in incentive alignment (Morck et al., 1988). The low overall CEO stock ownership (<5%) in our sample firms is in the range where the incentive alignment effect dominates. The results in Model 2 are further reinforced in Models 4 and 5 where the CEO characteristics are included as dummy variables. The coefficients on SALARYD, CEOEXPERD and NONCEOEXPERD are uniformly positive and significant at the 1% level, while the coefficient of OWNERSHIPD is negative and significant in both models. Berger et al. (1997) document that entrenched CEOs have several characteristics, including longer tenure in office and compensation that is less sensitive to performance. Our findings suggest that entrenched CEOs are unable to influence board members to delay their retirement. On the

contrary, the entrenched CEO is more likely to be let go on the scheduled retirement age. Since CEO ownership and CEO entrenchment are associated with lower and higher levels of agency problem, respectively, our finding may also suggest that board of directors use the opportunity of scheduled retirement to mitigate agency problems in the firm. Finally, we note that CEOs recruited from outside, who are not entrenched, have a greater likelihood of continuing past the mandatory retirement age.

(Insert Table 9 here)

We reexamine the probability of CEO retention at age 65 by allowing for a larger span of scheduled retirement years. When scheduled retirement is alternatively defined as the CEO's departure at age 64, 65 or 66, the sample includes 733 observations. These results are reported in Table 9. The new results in Table 9 are robustly consistent with the previous results in Table 8. Firm performance measures continue to be unrelated to the likelihood of CEO departure at the normal retirement age while CEO characteristics, such as tenure and ownership, remain important determinants of a CEO leaving at retirement or continuing.

5. Conclusions

An individual's age has been shown to be associated (mostly negatively) with motivation, cognitive abilities, disposition towards risk, energy and enthusiasm. CEO age can, therefore, play an important role in corporate finance decisions. Recent research shows that older CEOs are more risk averse and invest less in R&D and make diversified acquisitions, while younger CEOs are more acquisitive. In this paper, we extensively examine how CEO age affects firm performance. In addition, since aging effects physiological and psychological attributes in individuals and consequently their productivity, we examine what firm and CEO characteristics

contribute to a CEO's decision to continue in the leadership role past the normal retirement age of 65.

Using a sample of 1,940 CEOs in 1,390 industrial firms, we examine the relation of firm growth, firm profitability and firm market value with CEO age. We find a negative age-growth and age-market value relation, and the sensitivity of both relations diminish along the CEO aging process. The age-profitability relation, however, is conditional on firm size. In particular, we find a positive relation with profitability among younger CEOs in small firms and a negative relation among older CEOs in large firms. These results are robust to the control of tenure (including both CEO and non-CEO experience in the firm), non-incentive based compensation and CEO stock ownership. We argue that our findings are a result of an increase in the managerial agency costs with age. For younger CEOs, larger career concerns associated with the greater uncertainty of future wealth reduce managerial agency costs and affect firm performance positively. For older CEOs, on the other hand, the value and uncertainty associated with future wealth reduce as they approach retirement. The decline in career concerns for older CEOs lead to an increase in managerial agency costs. Our empirical findings that, CEOs with longer firm tenure (high likelihood of entrenchment) and CEOs with more non-incentive based compensation (more agency costs) negatively affect firm performance and CEOs with more stock ownership positively affect firm performance, are consistent with the agency argument.

A CEO may delay retirement either because of superior performance or can exert substantial influence on the board stemming from stock ownership or entrenchment. Our empirical results show the decision to depart at the normal retirement age is not related to firm performance. This is consistent with existing evidence that there is a greater likelihood of performance-based turnover in younger CEOs than CEOs closer to retirement. We find that

entrenchment characteristics, including long firm-specific tenure and non-incentive compensation decrease, and a higher stock ownership increase, the likelihood of delayed retirement. Entrenchment can result from higher ownership as well but closer to the controlling interest in the firm. CEOs in our sample own less than 5% of the stock, a range shown in the literature where incentives are more closely aligned with shareholders' interests. We also find that CEOs in small firms and CEOs recruited from outside are more likely to stay in the office beyond the conventional retirement age of 65.

Overall, our empirical results of CEO age on firm performance support some of the recent findings in the literature that show a strong relation between CEO age, attitude towards risk and corporate investment decisions.

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Figure 1 Two-Breakpoint Piecewise Relationship between Age and Performance

The following graphs are drawn based on the industry-adjusted coefficients estimated in Table 5. The two breakpoints of AGE are 50 and 65. Solid lines represent statistical significance, while dash lines represent statistical insignificance.

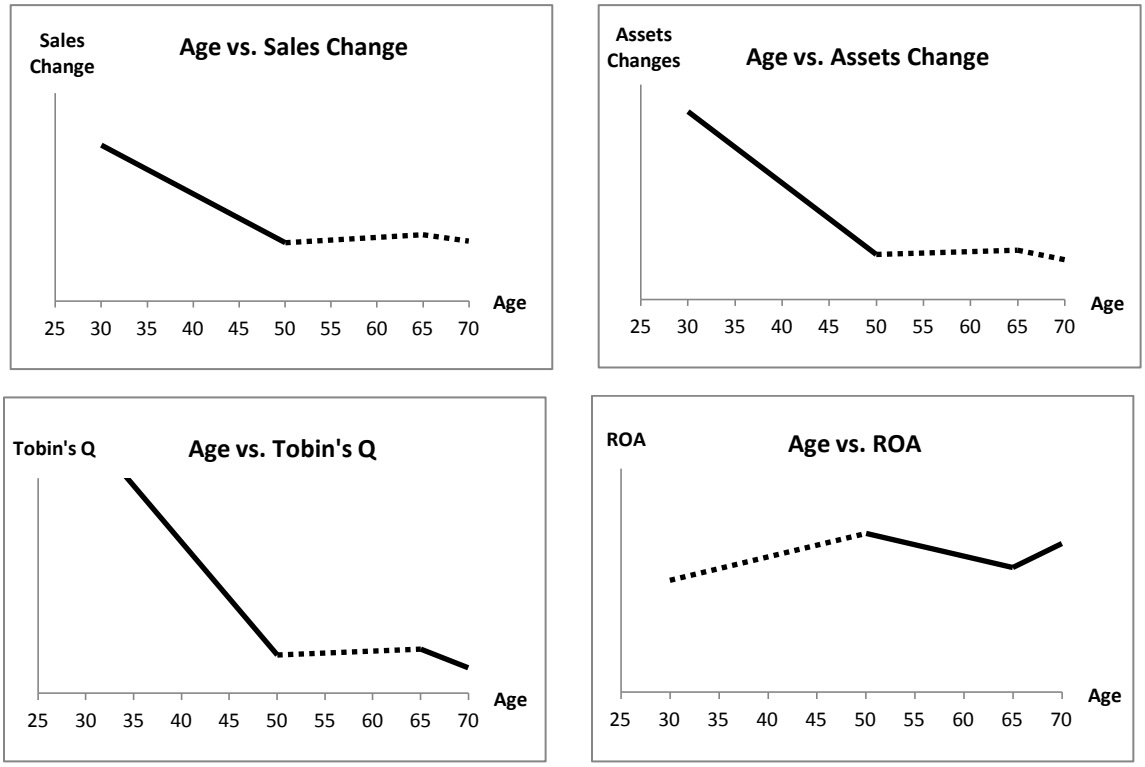
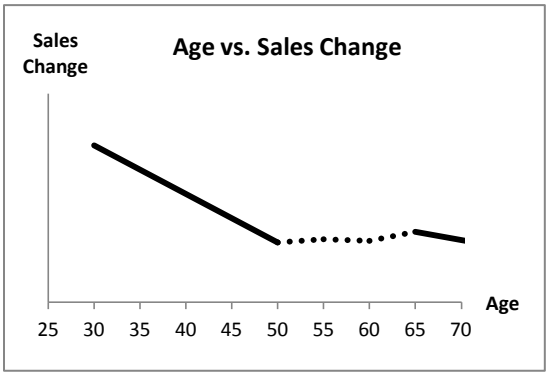
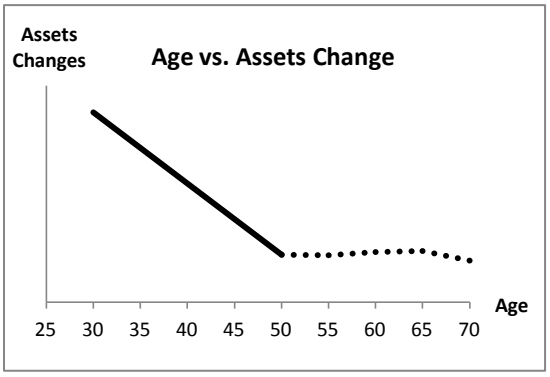
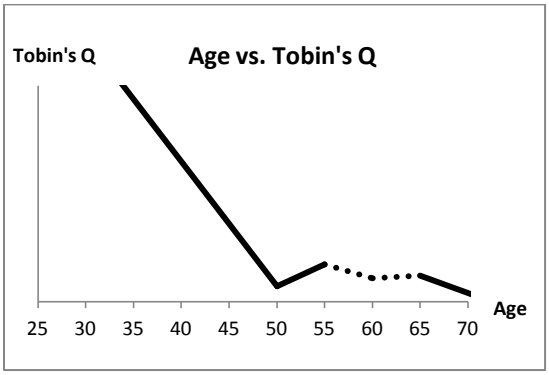


Figure 2 Four-Breakpoint Piecewise Relationship between Age and Performance

The following graphs are drawn based on the industry-adjusted coefficients estimated in Table 6. The four breakpoints of AGE are 50, 55, 60 and 65. Solid lines represent statistical significance, while dash lines represent statistical insignificance.







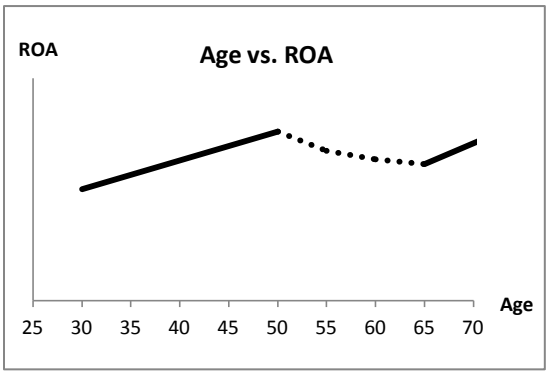


Table 1 Summary Statistics of Variables

The total sample includes 9,051 firm-year observations from 1992 to 2006. Panel A reports the annual summary statistics of CEO age. Panel B reports the summary statistics of dependent and control variables. Dependent variables measure firm performance, including SALESCHG, ASSETSCHG, TOBINQ and ROA. SALESCHG is the annual change of sales. ASSETSCHG is the annual change of total assets. TOBINQ is the market-to-book ratio of total assets. ROA is the ratio of Operating Income Before Depreciation (OIBD) to total assets. Each of the dependent variables is multiplied by 100. Control variables measure firm and CEO characteristics, including SIZE, LEVERAGE, CAPEXP, SALARY, OWNERSHIP, CEOEXPER and NONCEOEXPER. SIZE is the natural logarithm of total assets. LEVERAGE is the ratio of total debt to total asset, multiplied by 100. CAPEXP is the ratio of capital expenditure to sales, multiplied by 100. SALARY is the CEO annual basic salary in thousands of dollars. OWNERSHIP is derived by adding a constant of 10 to the percentage common shares held by CEO, and then taking the natural logarithm. CEOEXPER is the number of years that an individual has worked as the CEO of a specific firm. NONCEOEXPER is the number of years that an individual had worked in a specific firm before becoming the CEO of that firm.

Panel A. Distribution and Summary Statistics of CEO Age by Year

	All Observations								Age > 65			
Year	**N**	**Mean**	**Std. Deviation**	**Maximum**	**Q3**	**Median**	**Q1**	**Minimum**	**N**	**%**	**Mean**	**Median**
1992	169	57.07	6.72	78	62	57	53	37	12	7.1	69.08	68
1993	479	56.34	7.65	82	62	57	51	35	46	9.6	69.57	68
1994	586	55.76	7.66	83	61	56	51	29	48	8.19	69.79	68
1995	604	55.87	7.59	84	61	56	51	30	50	8.28	70.14	68.5
1996	612	55.66	7.46	82	60.5	56	51	31	48	7.84	69.85	69
1997	628	55.46	7.74	83	60	56	51	33	45	7.17	70.64	70
1998	627	55.35	7.50	82	60	56	51	29	42	6.7	70.10	69
1999	664	54.69	7.86	83	60	55	49	30	38	5.72	70.50	69.5
2000	649	54.84	7.97	84	60	55	49	35	46	7.09	70.24	69
2001	640	54.58	7.96	85	60	55	49	36	44	6.88	70.25	68.5
2002	670	54.80	7.60	86	60	55	49	35	43	6.42	70.40	68
2003	706	54.64	7.37	80	60	55	49	33	44	6.23	69.57	68.5
2004	701	55.10	7.31	81	60	55	50	37	55	7.85	69.64	68
2005	690	55.14	7.21	81	60	55	50	36	44	6.38	70.36	69
2006	626	55.32	7.10	80	60	55	50	34	38	6.07	70.18	68.5
Total	9051	55.25	7.57	86	60	55	50	29	643	7.1	70.05	69

Panel B. Summary Statistics of Firm and CEO Characteristics

	Mean	**Std. Deviation**	**Maximum**	**Q3**	**Median**	**Q1**	**Minimum**
Firm Performance Variable							
SALESCHG	16.2	53.5	2152.03	20.99	9.2	1.06	-99.53
ASSETSCHG	18.52	91.64	6389.02	20.98	7.92	-0.54	-84.9
TOBINQ	230.56	274.08	10509.04	252.47	169.52	128.73	40.4
ROA	13.71	13.79	96.51	19.96	14.24	9.15	-267.1
Firm Characteristics Variable							
SIZE	7.15	1.63	13.53	8.23	7.02	5.99	1.62
LEVERAGE	21.16	17.45	99.93	32.46	19.77	5.17	0
CAPEXP	9.09	20.9	929.98	8.38	4.58	2.65	0
CEO Characteristics Variable							
SALARY	640.59	370.69	5500	815	575.96	399.4	0
OWNERSHIP	2.48	0.33	4.2	2.46	2.33	2.31	2.3
CEOEXPER	8.03	8.07	52	11	5	2	0
NONCEOEXPER	8.26	10.29	47	15	3	0	0

Table 2 OLS Regressions of Age-Performance Relation

This table reports the OLS regressions using four measures of performance as the dependent variable. The total sample consists of 9,051 firm-year observations. The coefficients and t values (in parentheses) are reported. Dependent and control variables are defined in Table 1. Performance measures are industry-adjusted by subtracting the industry median. Year and industry fixed effects are included.

	Dependent Variable			
	SALESCHG	**ASSETSCHG**	**TOBINQ**	**ROA**
Independent Variable				
Intercept	-6.75726	1.95504	113.55562***	-5.24606***
	(-1.03)	(0.17)	(3.38)	(-2.95)
SIZE	1.29377***	3.48331***	1.87961	2.89217***
	(3.25)	(4.94)	(0.92)	(26.71)
LEVERAGE	-0.04174	-0.00754	-2.08896***	-0.04873***
	(-1.26)	(-0.13)	(-12.31)	(-5.42)
CAPEXP	0.52157***	0.50472***	0.59145***	-0.10061***
	(18.09)	(9.9)	(4)	(-12.84)
SALARY	-0.00887***	-0.01413***	-0.01487	-0.00436***
	(-4.62)	(-4.16)	(-1.51)	(-8.36)
OWNERSHIP	14.39287***	17.84536***	52.63504***	2.33222***
	(7.55)	(5.29)	(5.38)	(4.5)
CEOEXPER	-0.16945*	-0.13437	0.40212	0.10614***
	(-1.94)	(-0.87)	(0.9)	(4.48)
NONCEOEXPER	-0.28727***	-0.39198***	-1.23306***	0.01379
	(-5.15)	(-3.97)	(-4.31)	(0.91)
AGE	-0.41849***	-0.70866***	-3.19735***	-0.01616
	(-5.03)	(-4.82)	(-7.5)	(-0.72)
Number of Obs.	9051	9051	9051	9051
F Value	71.90	30.45	45.39	131.02
R-Square	0.0598	0.0262	0.0386	0.1039
Adj. R-Square	0.0590	0.0254	0.0378	0.1031

*, ** and *** refer to the 90%, 95% and 99% confidence levels, respectively.

Table 3 OLS Regressions of Age-Performance Relation by Firm Size Quartile

Based on firm size, the total sample of 9,051 firm-year observations is divided into quartiles. Regressions are estimated with the four performance measures for each quartile. The coefficients and t values (in parentheses) are reported. Dependent and control variables are defined in Table 1. Performance measures are industry-adjusted by subtracting the industry median. Year and industry fixed effects are included.

	Dependent Variable							
	SALESCHG				**ASSETSCHG**			
	First Quartile	Second Quartile	Third Quartile	Fourth Quartile	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
Independent Variable								
Intercept	-16.14999	-9.68556	-20.59627	1.43693	-42.00695**	13.57613	18.65709	19.90015
	(-1.13)	(-1.01)	(-1.27)	(0.11)	(-2.34)	(1.22)	(0.47)	(0.9)
SIZE	1.13708	0.72177	1.54842	0.73395	5.17912***	3.02855***	1.82877	2.57223***
	(0.82)	(0.84)	(1.37)	(1.3)	(2.94)	(3.04)	(0.67)	(2.6)
LEVERAGE	-0.14621*	-0.0834*	0.12938	-0.03607	-0.21912**	-0.04671	0.38262*	-0.12759
	(-1.92)	(-1.78)	(1.61)	(-0.63)	(-2.28)	(-0.86)	(1.96)	(-1.28)
CAPEXP	0.53901***	1.12244***	0.81899***	0.23***	0.83107***	0.54416***	0.67199***	0.20587***
	(8.43)	(18.5)	(8.95)	(6.89)	(10.3)	(7.72)	(3.03)	(3.52)
SALARY	-0.01914**	-0.01188***	-0.01266**	-0.00683***	-0.02076**	-0.01636***	-0.02465**	-0.01165***
	(-2.43)	(-3.13)	(-2.49)	(-3.33)	(-2.09)	(-3.71)	(-2)	(-3.24)
OWNERSHIP	22.73377***	12.21517***	12.78233***	10.93066***	35.58967***	9.58947***	11.99764	13.2341*
	(5.65)	(4.25)	(2.76)	(2.68)	(7.01)	(2.87)	(1.06)	(1.85)
CEOEXPER	-0.73417***	-0.05227	-0.10719	0.07115	-0.98263***	-0.09926	0.31891	0.0659
	(-3.33)	(-0.41)	(-0.57)	(0.5)	(-3.53)	(-0.66)	(0.7)	(0.26)
NONCEOEXPER	-0.64268***	-0.2841***	-0.31207**	-0.1728**	-0.67177***	-0.42177***	-0.34681	-0.35876***
	(-3.41)	(-3.06)	(-2.54)	(-2.39)	(-2.82)	(-3.91)	(-1.16)	(-2.83)
AGE	-0.56326***	-0.31545***	-0.13448	-0.42482***	-0.69798***	-0.54088***	-0.74096	-0.77677***
	(-2.97)	(-2.59)	(-0.68)	(-2.9)	(-2.92)	(-3.83)	(-1.55)	(-3.02)
Number of Obs.	2263	2263	2263	2262	2263	2263	2263	2262
F Value	19.68	54.75	14.87	13.97	26.14	18.77	3.66	8.51
R-Square	0.0653	0.1627	0.0501	0.0472	0.0849	0.0625	0.0128	0.0293
Adj. R-Square	0.0620	0.1597	0.0468	0.0439	0.0816	0.0591	0.0093	0.0259

	Dependent Variable							
	TOBINQ				**ROA**			
	First Quartile	Second Quartile	Third Quartile	Fourth Quartile	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
Independent Variable								
Intercept	146.70349	82.06234	99.26373*	23.14959	-19.52857***	-2.36994	3.24217	-2.35238
	(1.59)	(1.54)	(1.76)	(0.53)	(-4.34)	(-0.9)	(1.16)	(-0.72)
SIZE	-0.98932	7.71224	7.35174*	5.42893***	6.91029***	2.99386***	3.49342***	2.8328***
	(-0.11)	(1.62)	(1.86)	(2.78)	(15.68)	(12.75)	(17.89)	(19.27)
LEVERAGE	-1.44061***	-2.34485***	-2.33705***	-2.10183***	-0.14422***	-0.0847***	0.02594*	0.01628
	(-2.92)	(-8.99)	(-8.31)	(-10.66)	(-6.01)	(-6.59)	(1.87)	(1.1)
CAPEXP	1.48878***	0.56968*	0.11197	-0.0029	-0.24135***	-0.02276	-0.07342***	-0.01052
	(3.58)	(1.69)	(0.35)	(-0.03)	(-11.95)	(-1.37)	(-4.65)	(-1.21)
SALARY	-0.04805	-0.05408**	-0.01864	-0.00425	-0.00507**	-0.00409***	-0.00172*	-0.00045
	(-0.94)	(-2.56)	(-1.05)	(-0.6)	(-2.04)	(-3.93)	(-1.96)	(-0.84)
OWNERSHIP	76.10242***	49.28347***	33.7428**	41.35628***	2.57042**	1.32718*	-2.16308***	1.42847
	(2.91)	(3.09)	(2.08)	(2.93)	(2.02)	(1.69)	(-2.7)	(1.35)
CEOEXPER	-1.35701	0.36047	1.35275**	1.10975**	0.18896***	0.0225	0.05152	0.10328***
	(-0.95)	(0.5)	(2.06)	(2.24)	(2.71)	(0.64)	(1.58)	(2.77)
NONCEOEXPER	-4.38461***	-1.99893***	-0.86811**	0.07491	0.20434***	0.0684***	0.01818	0.05683***
	(-3.58)	(-3.87)	(-2.02)	(0.3)	(3.43)	(2.69)	(0.86)	(3.02)
AGE	-4.19841***	-2.82477***	-2.68404***	-1.76321***	0.16824***	0.01246	0.00951	-0.1225***
	(-3.41)	(-4.18)	(-3.91)	(-3.48)	(2.81)	(0.37)	(0.28)	(-3.21)
Number of Obs.	2263	2263	2263	2262	2263	2263	2263	2262
F Value	8.17	18.44	12.04	20.14	65.78	25.25	49.90	61.78
R-Square	0.0282	0.0614	0.0410	0.0668	0.1893	0.0822	0.1505	0.1799
Adj. R-Square	0.0247	0.0581	0.0376	0.0634	0.1864	0.0790	0.1474	0.1770

*, ** and *** refer to the 90%, 95% and 99% confidence levels, respectively.

Table 4 OLS Regressions with Interactive Effects of CEO Characteristics

This table reports the OLS regressions using four measures of performance as the dependent variable. The total sample consists of 9,051 firm-year observations. Dependent and control variables are defined in Table 1. Firm control variables including SIZE, LEVERAGE and CAPEXP are not reported in this table due to space limitation but are included. The interactive variables are defined as the product of AGE and CEO characteristic dummies. In particular, AGE_SALARYD refers to AGE times SALARYD, where SALARYD equals 1 if SALARY is more than the industry median value in that year, and equals 0 otherwise. AGE_OWNERSHIPD refers to AGE times OWNERSHIPD, where OWNERSHIPD equals 1 if CEO holds at least 1% of total common shares outstanding, and equals 0 otherwise. AGE_CEOEXPERD refers to AGE times CEOEXPERD, where CEOEXPERD equals 1 if CEOEXPER is at least 5, and equals 0 otherwise. AGE_NONCEOEXPERD refers to AGE times NONCEOEXPERD, where NONCEOEXPERD equals 1 if NONCEOEXPER is at least 5, and equals 0 otherwise. AGE_OUTSIDERD refers to AGE times OUTSIDERD, where OUTSIDERD equals 1 if NONCEOEXPER is 0, and equals 0 otherwise. Performance measures are industry-adjusted by subtracting the industry median. Year and industry fixed effects are included.

56	*Dependent Variable*							
	SALESCHG		**ASSETSCHG**		**TOBINQ**		**ROA**	
Independent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Firm Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
SALARY	-0.0044** (-1.97)	-0.0041* (-1.86)	-0.0087** (-2.22)	-0.00825** (-2.11)	-0.00471 (-0.42)	-0.00409 (-0.36)	-0.00387*** (-6.43)	-0.00386*** (-6.43)
OWNERSHIP	7.9184*** (3.38)	7.2880*** (3.11)	11.85236*** (2.86)	10.60035*** (2.56)	42.24963*** (3.51)	38.68079*** (3.21)	1.56799** (2.46)	1.58162** (2.48)
CEOEXPER	-0.3994*** (-3.61)	-0.2557*** (-2.86)	-0.50388** (-2.57)	-0.21586 (-1.36)	-0.00532 (-0.01)	0.26084 (0.57)	0.05354* (1.78)	0.09545*** (3.93)
NONCEOEXPER	-0.1481 (-1.53)	-0.1908** (-2.65)	-0.16118 (-0.94)	-0.21942* (-1.72)	-0.36046 (-0.73)	-0.30165 (-0.82)	-0.03639 (-1.38)	-0.02875 (-1.47)
AGE	-0.3996*** (-4.63)	-0.4144*** (-4.66)	-0.69151*** (-4.52)	-0.71791*** (-4.56)	-3.12556*** (-7.04)	-3.51062*** (-7.68)	-0.01752 (-0.75)	0.00928 (0.38)
AGE_SALARYD	-0.1106*** (-4.17)	-0.1065*** (-4.01)	-0.14112*** (-3)	-0.1328*** (-2.82)	-0.26509* (-1.94)	-0.234* (-1.72)	-0.01156 (-1.6)	-0.01201* (-1.66)
AGE_OWNERSHIPD	0.1316*** (4.41)	0.13638*** (4.58)	0.12115** (2.29)	0.13088** (2.48)	0.19628 (1.28)	0.21146 (1.38)	0.01705** (2.1)	0.01812** (2.24)
AGE_CEOEXPERD	0.0660** (2.44)		0.13057*** (2.73)		0.15758 (1.14)		0.01463** (1.99)	
AGE_NONCEOEXPERD	-0.0586* (-1.69)		-0.10125* (-1.65)		-0.37533** (-2.11)		0.02157** (2.29)	
AGE_OUTSIDERD		0.04642* (1.76)		0.08769* (1.88)		0.51521*** (3.8)		-0.02547*** (-3.55)
Number of Obs.	9051	9051	9051	9051	9051	9051	9051	9051
F Value	52.15	56.41	22.42	23.92	31.22	34.93	88.96	97.30
R-Square	0.0648	0.0642	0.0289	0.0283	0.0398	0.0408	0.1056	0.1059
Adj. R-Square	0.0635	0.0631	0.0276	0.0271	0.0385	0.0396	0.1045	0.1048

*, ** and *** refer to the 90%, 95% and 99% confidence levels, respectively.

Table 5 Two-Breakpoint Piecewise Linear Regressions

This table reports the piecewise linear regressions using four measures of performance as the dependent variable. The total sample consists of 9,051 firm-year observations. The coefficients and t values (in parentheses) are reported. Dependent and control variables are defined in Table 1. Control variables including SIZE, LEVERAGE, CAPEXP, SALARY, OWNERSHIP, CEOEXPER and NONCEOEXPER are not reported in this table due to space limitation but are included. Performance measures are industry-adjusted by subtracting the industry median. Year and industry fixed effects are included. The piecewise variables AGE_BP1, AGE_BP1BP2 and AGE_BP2 are defined by the following equations.

$$\begin{cases} AGE < BP1, & AGE\_BP1 = AGE, & AGE\_BP1BP2 = 0, & AGE\_BP2 = 0 \\ BP1 \le AGE < BP2, & AGE\_BP1 = BP1, & AGE\_BP1BP2 = AGE - BP1, & AGE\_BP2 = 0 \\ AGE \ge BP2, & AGE\_BP1 = BP1, & AGE\_BP1BP2 = BP2 - BP1, & AGE\_BP2 = AGE - BP2 \end{cases}$$

	Dependent Variable: **SALESCHG**					
	BP1 & BP2 (50, 60)	BP1 & BP2 (50, 55)	BP1 & BP2 (50, 65)	BP1 & BP2 (55, 60)	BP1 & BP2 (55, 65)	BP1 & BP2 (60, 65)
Independent Variable						
Control Variables	Included	Included	Included	Included	Included	Included
AGE_BP1	-1.86302***	-1.86851***	-1.8757***	-1.13478***	-1.10302***	-0.71219***
	(-7.55)	(-7.05)	(-7.86)	(-7.27)	(-7.42)	(-6.47)
AGE_BP1BP2	0.20932	0.30478	0.20309	0.90413***	0.57186***	1.41346***
	(1.17)	(0.84)	(1.5)	(2.58)	(2.78)	(3.13)
AGE_BP2	-0.11265	0.00181	-0.50674	-0.19244	-0.64999*	-0.77842**
	(-0.49)	(0.01)	(-1.42)	(-0.81)	(-1.79)	(-2.03)
Number of Obs.	9051	9051	9051	9051	9051	9051
F Value	61.80	61.75	62.03	60.64	60.85	59.47
R-Square	0.0640	0.0639	**0.0642**	0.0629	0.0631	0.0617
Adj. R-Square	0.0630	0.0629	**0.0632**	0.0618	0.0620	0.0607

	Dependent Variable: **ASSETSCHG**					
	BP1 & BP2 (50, 60)	BP1 & BP2 (50, 55)	BP1 & BP2 (50, 65)	BP1 & BP2 (55, 60)	BP1 & BP2 (55, 65)	BP1 & BP2 (60, 65)
Independent Variable						
Control Variables	Included	Included	Included	Included	Included	Included
AGE_BP1	-2.68939***	-2.66548***	-2.66242***	-1.71221***	-1.6222***	-1.05705***
	(-6.16)	(-5.68)	(-6.31)	(-6.2)	(-6.16)	(-5.43)
AGE_BP1BP2	0.1846	0.2553	0.10721	1.24262**	0.5817	1.32738*
	(0.58)	(0.4)	(0.45)	(2.01)	(1.6)	(1.66)
AGE_BP2	-0.35688	-0.13503	-0.71162	-0.49165	-0.89379	-0.93558
	(-0.88)	(-0.48)	(-1.13)	(-1.17)	(-1.39)	(-1.38)
Number of Obs.	9051	9051	9051	9051	9051	9051
F Value	26.82	26.75	26.86	26.25	26.17	25.16
R-Square	0.0288	0.0287	0.0289	0.0282	0.0281	0.0271
Adj. R-Square	0.0277	0.0277	0.0278	0.0271	0.0271	0.0260

	Dependent Variable: **TOBINQ**					
	BP1 & BP2 (50, 60)	BP1 & BP2 (50, 55)	BP1 & BP2 (50, 65)	BP1 & BP2 (55, 60)	BP1 & BP2 (55, 65)	BP1 & BP2 (60, 65)
Independent Variable						
Control Variables	Included	Included	Included	Included	Included	Included
AGE_BP1	-11.87864***	-12.69815***	-11.53523***	-6.68117***	-6.36931***	-4.40072***
	(-9.39)	(-9.35)	(-9.43)	(-8.34)	(-8.34)	(-7.8)
AGE_BP1BP2	1.11964	4.24497**	0.37689	3.66218**	1.33453	3.99034*
	(1.22)	(2.29)	(0.54)	(2.04)	(1.26)	(1.72)
AGE_BP2	-2.49381**	-1.88049**	-3.81896**	-2.53089**	-4.04405**	-4.20745**
	(-2.13)	(-2.29)	(-2.09)	(-2.08)	(-2.17)	(-2.13)
Number of Obs.	9051	9051	9051	9051	9051	9051
F Value	41.86	42.11	41.81	39.04	38.95	37.48
R-Square	0.0443	**0.0445**	0.0442	0.0414	0.0413	0.0398
Adj. R-Square	0.0432	**0.0435**	0.0431	0.0403	0.0402	0.0387

	Dependent Variable: **ROA**					
	BP1 & BP2 (50, 60)	BP1 & BP2 (50, 55)	BP1 & BP2 (50, 65)	BP1 & BP2 (55, 60)	BP1 & BP2 (55, 65)	BP1 & BP2 (60, 65)
Independent Variable						
Control Variables	Included	Included	Included	Included	Included	Included
AGE_BP1	0.12499*	0.14041*	0.10473	0.02571	0.0115	-0.02469
	(1.86)	(1.95)	(1.61)	(0.61)	(0.28)	(-0.83)
AGE_BP1BP2	-0.14738***	-0.25099**	-0.10105***	-0.22842**	-0.11135**	-0.11959
	(-3.01)	(-2.54)	(-2.74)	(-2.4)	(-1.99)	(-0.97)
AGE_BP2	0.09969	0.02178	0.21083**	0.10756*	0.2115**	0.20211*
	(1.61)	(0.5)	(2.18)	(1.67)	(2.14)	(1.94)
Number of Obs.	9051	9051	9051	9051	9051	9051
F Value	105.82	105.54	105.87	105.48	105.51	105.31
R-Square	0.1048	0.1045	**0.1048**	0.1045	0.1045	0.1043
Adj. R-Square	0.1038	0.1036	**0.1038**	0.1035	0.1035	0.1033

*, ** and *** refer to the 90%, 95% and 99% confidence levels, respectively.

Table 6 Four-Breakpoint Piecewise Linear Regressions

This table reports the piecewise linear regressions using four measures of performance as the dependent variable. The total sample consists of 9,051 firm-year observations. The coefficients and t values (in parentheses) are reported. Dependent and control variables are defined in Table 1. Control variables including SIZE, LEVERAGE, CAPEXP, SALARY, OWNERSHIP, CEOEXPER and NONCEOEXPER are not reported in this table due to space limitation but are included. Performance measures are industry-adjusted by subtracting the industry median. Year and industry fixed effects are included. The piecewise variables AGE_50, AGE_5055, AGE_5560, AGE_6065 and AGE_65 are defined by the following equations.

$$\begin{cases} AGE < 50, & AGE\_50 = AGE, & AGE\_5055 = 0, & AGE\_5560 = 0, & AGE\_6065 = 0, & AGE\_65 = 0 \\ 50 \le AGE < 55, & AGE\_50 = 50, & AGE\_5055 = AGE - 50, & AGE\_5560 = 0, & AGE\_6065 = 0, & AGE\_65 = 0 \\ 55 \le AGE < 60, & AGE\_50 = 50, & AGE\_5055 = 5, & AGE\_5560 = AGE - 55, & AGE\_6065 = 0, & AGE\_65 = 0 \\ 60 \le AGE < 65, & AGE\_50 = 50, & AGE\_5055 = 5, & AGE\_5560 = 5, & AGE\_6065 = AGE - 60, & AGE\_65 = 0 \\ AGE \ge 65, & AGE\_50 = 50, & AGE\_5055 = 5, & AGE\_5560 = 5, & AGE\_6065 = 5, & AGE\_65 = AGE - 65 \end{cases}$$

Breakpoints (50, 55, 60, 65)				
	Dependent Variable			
	SALESCHG	**ASSETSCHG**	**TOBINQ**	**ROA**
Independent Variable				
Control Variables	Included	Included	Included	Included
AGE_50	-1.8582***	-2.62807***	-12.71777***	0.12986*
	(-6.97)	(-5.57)	(-9.31)	(1.79)
AGE_5055	0.24225	-0.01614	4.43664**	-0.17448
	(0.57)	(-0.02)	(2.04)	(-1.51)
AGE_5560	-0.08418	0.2178	-2.79939	-0.07677
	(-0.19)	(0.27)	(-1.22)	(-0.63)
AGE_6065	0.68548	0.07671	0.51205	-0.04133
	(1.3)	(0.08)	(0.19)	(-0.29)
AGE_65	-0.64534*	-0.71261	-3.53099*	0.18736*
	(-1.67)	(-1.04)	(-1.78)	(1.78)
Number of Obs.	9051	9051	9051	9051
F Value	51.76	22.38	35.18	88.27
R-Square	0.0643	0.0289	0.0446	0.1049
Adj. R-Square	0.0631	0.0276	0.0434	0.1037

*, ** and *** refer to the 90%, 95% and 99% confidence levels, respectively.

Table 7 Two-Breakpoint Piecewise Linear Regressions by Firm Size

Based on the four quartiles of firm size, the total sample of 9,051 firm-year observations is divided into four groups. The first group represents the first quartile. The second group represents the first and second quartiles. The third group represents the fourth quartile. The fourth group represents the third and fourth quartiles. The table reports the piecewise linear regressions using the four performance measures for each of these four groups with the breakpoint combination of (50, 65). The coefficients and t values (in parentheses) are reported. Dependent and control variables are defined in Table 1. Control variables including SIZE, LEVERAGE, CAPEXP, SALARY, OWNERSHIP, CEOEXPER and NONCEOEXPER are not reported in this table due to space limitation but are included. Performance measures are industry-adjusted by subtracting the industry median. Year and industry fixed effects are included. The piecewise variables AGE_50, AGE_5065 and AGE_65 are defined by the following equations.

$$\begin{cases} AGE < 50, & AGE\_50 = AGE, & AGE\_5065 = 0, & AGE\_65 = 0 \\ 50 \le AGE < 65, & AGE\_50 = 50, & AGE\_5065 = AGE - 50, & AGE\_65 = 0 \\ AGE \ge 65, & AGE\_50 = 50, & AGE\_5065 = 15, & AGE\_65 = AGE - 65 \end{cases}$$

	Dependent Variable: **ROA**			
	First Quartile	First & Second Quartiles	Fourth Quartile	Third & Fourth Quartiles
Independent Variable				
Control Variables	Included	Included	Included	Included
AGE_50	0.16165	0.18679**	0.10532	-0.08491
	(1.09)	(2.05)	(0.73)	(-0.91)
AGE_5065	0.10662	-0.02523	-0.15919***	-0.07682*
	(0.97)	(-0.41)	(-2.84)	(-1.95)
AGE_65	0.68139**	0.34337**	-0.24728*	0.06947
	(2.37)	(2.16)	(-1.71)	(0.67)
Number of Obs.	2263	4526	2262	4525
F Value	52.99	78.73	49.80	59.68
R-Square	0.1905	0.1485	0.1812	0.1168
Adj. R-Square	0.1869	0.1466	0.1775	0.1148

*, ** and *** refer to the 90%, 95% and 99% confidence levels, respectively.

Table 8 Logistic Regressions: Scheduled Retirement at Age 65

This table reports the logistic regressions using a sample of 416 observations. The coefficients and t values (in parentheses) are reported. Dependent variable equals 1 if the CEO retired at the scheduled retirement age 65 and is 0 if the CEO retired at age 67 or later. Independent variables measure firm performance and CEO managerial characteristics, and are defined in Table 1. CEO characteristic dummies are defined in Table 4. Performance measures are industry-adjusted by subtracting the industry median.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Independent Variable					
Intercept	-0.55563***	11.3563***	10.72631***	-0.85944**	0.25946
	(2.72)	(5.6)	(5.28)	(2.46)	(0.89)
SALESCHG	-0.0078		-0.0065	-0.00346	-0.00436
	(1.24)		(0.88)	(0.44)	(0.59)
ASSETSCHG	-0.01172*		-0.00857	-0.01149	-0.00964
	(1.9)		(1.32)	(1.64)	(1.42)
TOBINQ	-0.00051		-0.00014	-0.00065	-0.00029
	(0.61)		(0.14)	(0.67)	(0.3)
ROA	0.00267		0.00179	0.00781	0.00707
	(0.26)		(0.17)	(0.69)	(0.64)
SIZE	0.20285***		0.11625	-0.05865	-0.03106
	(3.01)		(1.27)	(0.67)	(0.36)
SALARY		0.00002	-0.0003		
		(0)	(0.83)		
OWNERSHIP		-4.89191***	-4.71684***		
		(5.67)	(5.54)		
CEOEXPER		0.01996	0.02291		
		(1.25)	(1.41)		
NONCEOEXPER		0.02451***	0.02128**		
		(2.65)	(2.26)		
SALARYD				0.58013**	0.73457***
				(2.06)	(2.65)
OWNERSHIPD				-2.03644***	-1.79511***
				(7.66)	(7.1)
CEOEXPERD				1.02466***	
				(3.58)	
NONCEOEXPERD				0.80416***	
				(3.33)	
OUTSIDERD					-0.43764*
					(1.75)
Number of Obs.					
Retired	200	200	200	200	200
Not Retired	216	216	216	216	216
Total	416	416	416	416	416
% Concordant	66.3	77.9	79.1	80.1	78.0
Goodness-of-Fit (Prob. > χ^2)	0.2785	0.4040	0.0169	0.9607	0.1103
Pseudo R-Square	0.0423	0.1894	0.2022	0.2108	0.1776

*, ** and *** refer to the 90%, 95% and 99% confidence levels, respectively.

Table 9 Logistic Regressions: Scheduled Retirement at Age 64 to 66

This table reports the logistic regressions using a sample of 733 observations. The coefficients and t values (in parentheses) are reported. Dependent variable equals 1 if the CEO retired at the scheduled retirement age 64 to 66, and equals 0 if the CEO retired at age 67 or later. Independent variables measure firm performance and CEO managerial characteristics, and are defined in Table 1. CEO characteristic dummies are defined in Table 4. Performance measures are industry-adjusted by subtracting the industry median.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Independent Variable					
Intercept	-0.36602**	8.88796***	8.45955***	-0.51455**	0.54935**
	(2.44)	(7.51)	(7.02)	(1.99)	(2.44)
SALESCHG	-0.00907*		-0.00617	-0.00447	-0.00427
	(1.94)		(1.17)	(0.81)	(0.8)
ASSETSCHG	-0.00448		-0.00235	-0.00374	-0.00321
	(1.08)		(0.51)	(0.77)	(0.69)
TOBINQ	0.00009		0.00061	0.00053	0.00078
	(0.14)		(0.83)	(0.75)	(1.1)
ROA	-0.00129		0.0019	0.00402	0.00411
	(0.17)		(0.22)	(0.45)	(0.47)
SIZE	0.24561***		0.07973	0.0126	0.03535
	(5.09)		(1.11)	(0.22)	(0.61)
SALARY		0.00058**	0.00036		
		(2.33)	(1.2)		
OWNERSHIP		-3.67224***	-3.55326***		
		(7.32)	(7.1)		
CEOEXPER		-0.00652	-0.00786		
		(0.55)	(0.66)		
NONCEOEXPER		0.0288***	0.02621***		
		(4.01)	(3.58)		
SALARYD				0.43231**	0.59849***
				(1.97)	(2.77)
OWNERSHIPD				-2.01529***	-1.83558***
				(10.28)	(9.75)
CEOEXPERD				0.75056***	
				(3.45)	
NONCEOEXPERD				0.88317***	
				(4.8)	
OUTSIDERD					-0.73378***
					(3.78)
Number of Obs.					
Retired	415	415	415	415	415
Not Retired	318	318	318	318	318
Total	733	733	733	733	733
% Concordant	64.9	77.8	78.0	79.8	78.2
Goodness-of-Fit (Prob. > χ^2)	0.0010	0.0566	0.5420	0.0163	0.0079
Pseudo R-Square	0.0432	0.1986	0.2042	0.207	0.1884

*, ** and *** refer to the 90%, 95% and 99% confidence levels, respectively.