CEO AGE AND FIRM PERFORMANCE

Yu Zhang

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ABSTRACT

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Existing studies on horizon problem have investigated the short-term fluctuation of firm performance prior to the normal CEO retirement age of 65. Based on a sample of 1,940 CEOs in 1,390 industrial firms, we examine the change of firm performance over the entire CEO aging process. Empirical evidence shows that CEO age is negatively associated with firm growth and firm market value, and the sensitivity of these two relations diminishes along the CEO aging process. The association between age and firm profitability is conditional on firm size. In particular, we find a positive relation among younger CEOs in small firms and a negative relation among older CEOs in large firms. In this paper, we also examine the likelihood of CEO continuation beyond the regular retirement age of 65. Our empirical results show that stock ownership and firm growth increase the likelihood of delayed retirement past age 65, whereas firm-specific tenure and non-incentive compensation increase the likelihood of scheduled retirement at age 65. In addition, CEOs in small firms and CEOs recruited from outside are more likely to stay longer in their office.

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I. Introduction

An extensive body of work in management science has examined the potential influence of executive age on firm performance (Hart and Mellor, 1970; Child, 1974; Rhodes, 1983; Hambrick and Mason, 1984; Wiersema and Bantel, 1992; Richard and Shelor, 2002). Rhodes (1983) indicates that the heterogeneity of managerial attitudes and behaviors can be attributed to the psychosocial effects along their aging process. Hambrick and Mason (1984), in addition, propose the Upper Echelons theory. They argue that management age, along with other human capital characteristics of top managers, may partially influence strategic choice and firm performance.

Existing studies in corporate finance also investigate the association between management age and firm performance, and these studies mainly focus on the short-term performance fluctuation around the regular retirement age of 65 (the end of executive career horizon). Fama (1980) argues that managers' career concerns, arising from the monitoring effect of managerial labor markets, discipline them to work carefully on behalf of shareholders, and therefore reduce the agency problem. Accordingly, some scholars propose the existence of the horizon problem. They argue that Chief Executive Officers (CEOs) prior to the normal retirement age have no career concerns since they will be out of the active workforce in a short time. Thus, the removal of career concerns may deteriorate the agency problem, and encourage these pre-retirement CEOs to manipulate firm performance and facilitate their own benefits at the cost of shareholders. For instance, Dechow and Sloan (1991) provide evidence that pre-retirement CEOs cut off R&D expenditure to manage firm earnings and boost their earnings-based compensation. Gibbons and Murphy (1992) suggest that firms should use more stock-based incentives to reduce the agency cost when CEOs are during their final years in office. Smith and Watts (1982) and Bizjak et al. (1993) both suggest that firms can defer the payments of incentive compensation into the post-retirement period to mitigate the horizon problem.

Literature on the horizon problem highlights the dramatic decline of CEO career concerns prior to the conventional retirement age, but largely ignores the potential changes in career concerns when CEO is much younger. If career concerns depreciate constantly along the entire aging process, then the gradual decline in career concerns may lead to the long-term agency problem. According to Fama (1980), the managerial labor markets assess managers' capability and provide two basic functions, wage revision and demand modification. These two functions implicitly decide how much and how long managers can receive their annual compensations in the future. Due to the uncertainty about future compensation, CEO career concerns can also be considered as a kind of wealth concerns. Younger CEOs tend to have substantial wealth concerns since they have considerable future compensation. As they get aged, the total value of future compensation will shrink, and the depreciation of wealth concerns may lead to the higher agency costs and lower firm performance. Therefore, the primary objective of this study is to provide evidence on the long-term variation in firm performance along the entire CEO aging process.

In this study, we use a large sample containing 1,390 industrial firms and 1,940 CEOs, and test three dimensions of firm performance involving 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 relationships are negative, and both of them are more stronger among younger CEOs, (2) the age-profitability relationship is negative among older CEOs in large firms while positive among younger CEOs in small firms, and (3) some CEO characteristics, such as ownership, compensation, tenure and educational background, have interactive effects on the age-performance relationship.

Age 65 is an important landmark along the CEO aging process. According to a mandatory retirement policy, it is commonly accepted that CEO career horizon ends around age 65 (Dechow and Sloan, 1991; Gibbons and Murphy, 1992; Murphy and Zimmerman, 1993; Brickley et al., 1999). Meanwhile, studies on management turnover find an extremely high rate of CEO exit around age 65, and they argue that age is more important than performance to explain the CEO departure (Barro and Barro, 1990; Murphy, 1999; Brickley, 2003). Nevertheless, empirical evidence shows that many CEOs continue to stay in office beyond the normal retirement age. For instance, over 7% of the CEOs in our sample are working past age 65. Why some CEO retirements are on schedule, but others not? Brickley (2003) is curious to raise this question, but no one answers him. In this study, we examine the different factors influencing the likelihood of CEO continuation after the regular retirement age. Our empirical results demonstrate 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.

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

II. Literature Review and Hypotheses Development

2.1Management Age, Corporate Strategy and Firm Performance

Scholars in management science have been discussing the association of management age, strategic choice and organizational performance for decades. Hart and Mellors (1970) examine the relationship of chairman age and assets growth rate. They argue that companies led by older chairmen grow at a slower but less volatile rate. Child (1974) also documents a negative relationship between the age of top management and firm growth rate, but no relationship between age and profitability. He concludes that younger managers make more physical and mental efforts to promote firm growth and change, and a youthful management is probably an active influence on firm innovation.

Rhodes (1983) argues that the psychosocial effects through the aging process, including the changes in value, need, and expectation, may have a mixed impact on both the financial and career needs of an executive. Thus, the age-related fluctuation of executive personal needs may lead to the heterogeneity in executive working attitudes and behaviors. Hambrick and Mason (1984) synthesize the research fragments on executive characteristics and propose the Upper Echelons theory. This theory indicates that the strategic choice and performance of an organization can be partially predicted by its managerial background and characteristics. In particular, Hambrick and Mason suggest that the managerial demographic characteristics, such as management age and firm experience, may have an impact on the organizational outcomes.

Wiersema and Bantel (1992) find that top management teams with lower average age are more likely to undergo changes in corporate strategy. Richard and Shelor (2002) find that the age heterogeneity of top management team is negatively related to return on assets. They also find a curvilinear relationship between age heterogeneity and sales growth, which is positive at low and medium levels of age heterogeneity while negative at high levels.

2.2 Age Effect on CEO Turnover

Many scholars document a negative relationship between firm performance and CEO turnover. They argue that the decline of accounting and market performance increases the probability of CEO departure (Coughlan and Schmidt, 1985; Warner et al., 1988; Weisbach, 1988; Barro and Barro, 1990; Murphy, 1999). Although empirical evidence shows a strong statistical significance on the performance-turnover link, the economic significance is fairly small (Jensen and Murphy, 1990a; Barro and Barro, 1990). In addition, Murphy (1999) suggests that the performance-turnover relationship has weakened during the 1990s. Since performance has a limited explanatory power on turnover, scholars have tried to attribute executive departure to other factors, such as CEO age.

Barro and Barro (1990) find that the probability of CEO departure first falls with age up to and including age 52, and then rises with age above that and becomes particularly high at the normal retirement span around age 65. Geddes and Vinod (1997) counter-argue that the probability of CEO turnover is positively related to age, and this relationship 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 older CEOs have higher chance of departure than young CEO. Although the empirical results on age-turnover relationship are inconsistent, scholars tend to agree that age is becoming more important in explaining CEO turnover than performance (Brickley, 2003). To consolidate the previous findings, Murphy (1999) reexamines the age effect on the probability of turnover. He documents that: (1) a CEO around the normal retirement age is more likely to depart, although this has diminished over time; (2) executives in poor-performing companies tend to depart at a younger age; and (3) most importantly, executive turnover is driven by age and not performance in large firms, whereas by performance and not (primarily) age in small firms[1].

2.3 Age Effect on CEO Compensation

Early studies on managerial compensation concentrate on exploring the relationship between executive pay and firm performance. The empirical results, however, are inconsistent. While some studies document a positive relation between performance and pay (Murphy, 1985; Coughlan and Schmidt, 1985; Murphy, 1986; Abowd, 1990), other studies question the performance-pay association. For example, some argue that the performance-pay relationship is weak (Jensen and Murphy, 1990a; Jensen and Murphy, 1990b; Gregg et al., 1993a; Main et al., 1995; Laing and Weir, 1999), while others find

[1] Brickley (2003) also documents the firm size effect on the performance-turnover link. He finds that the performance-turnover sensitivity is much higher in small firms compared to big firms.

little evidence to support the performance-pay link (Leonard, 1990). More recent studies find that much of the variation in executive pay may be attributed to firm size. They report a positive link between firm size and executive pay (Kostuik, 1990; Storey et al., 1995; Main et al., 1995; Laing and Weir, 1999; McKnight et al., 2000). Murphy (1999) reexamines both the performance-pay and firm size-pay relations and updates the previous findings with the most comprehensive results. He summarizes that: (1) levels of pay are higher, and pay-performance sensitivities are lower, in larger firms; (2) levels of pay and pay-performance sensitivities are both lower in regulated utilities than in industrial firms; and (3) levels of pay and pay-performance sensitivities are higher in the US than in other countries (see Murphy, 1999, *p*. 53).

Other than performance and firm size, age also plays an important role in explaining executive remuneration. Some researchers find age to be an insignificant determinant of pay. Deckop (1988), Leonard (1990) and Ingham and Thompson (1993), in tandem, find little evidence of the age-pay association. Other researchers counter-argue that age has a substantial impact on executive pay. 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 the compensation independently, executive age influences the pay through the age-tenure interaction and age-years as a CEO interaction. Finkelstein and Hambrick (1989), Kostuik (1990) and Storey et al. (1995) report an inverted U-shaped relationship between age and compensation, respectively. McKnight et al. (2000) not only report the inverted U-shape between CEO age and bonus, but also predict that around age 53, the proportion of bonus in total pay reaches the peak (maximum point). 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 (see Storey et al., 1995, *p.* 7). In addition, McKnight et al. (2000) suggest that as age increases, the association between firm size and levels of pay weakens.

2.4 CEO Age, Career Concern, and Horizon Problem

Fama (1980) is among the first to propose that executive career concerns can reduce the agency problem and thereby increase firm performance. The managerial labor markets, both external and internal, efficiently monitor the mangers for their past performance and update the assessment of their managerial capabilities. Managers with good performance are more demanded and provided with high-wage offers, while managers with poor performance are less demanded and provided with low-wage offers. The monitoring effect of labor markets brings managers with inevitable career concerns. They are aware that the current managerial quality has a big influence on the future job opportunities. These career concerns discipline managers to stick their own interests to the best interests of shareholders, leading to a reduction in the agency costs resulting from the divergence of interest between managers and shareholders. Holmstrom (1982) confirms career concern to be an important managerial incentive. He, in addition, argues that managers work too hard in early years when the labor markets are still assessing their capabilities, while not hard enough in later years.

Younger managers have substantial career concerns since they will potentially stay in the managerial positions for many years. When approaching the regular retirement age, older managers probably have no career concerns since they will no longer stay in the active workforce. The absence of career concerns triggers the increase of agency cost. In particular, the pre-retirement managers take the opportunistic activities to manipulate firm performance and benefit their own interests, known as the horizon problem.

Dechow and Sloan (1991) show evidence that CEOs reduce R&D expenditure during their final years in office to boost the short-term earnings performance and maximize their earnings-based compensation. They argue that the decline of R&D spending delays the optimal investment opportunities. Hence, the earnings management before CEO retirement is at the cost of firms' long-term performance. Similarly, Barker and Mueller (2002) suggest that the level of R&D expenditure is higher in firms with younger CEO, and lower in firms with older CEO.

Puffer and Weintrop (1991) and Brickley et al. (1999) both find the superior firm performance prior to the scheduled CEO retirement, but provide different interpretations. Puffer and Weintrop (1991) focus on the timing of retirement, and argue that a CEO may decide to retire following good performance to increase the retirement benefits. Brickley et al. (1999), alternatively, provide evidence that the likelihood of internal or external board service after CEO retirement is positively related to the stock and accounting performance before retirement. Accordingly, Brickley et al. argue that the opportunity of post-retirement directorship provides pre-retirement CEO with new career concerns, and these concerns will offset the potential horizon problem during CEO final years in office.

Gibbons and Murphy (1992) and Smith and Watts (1982) argue that when a CEO is close to the retirement age, firms should reinforce the incentive compensation contracts to offset the decline of career concerns. Meanwhile, scholars also notice that the incentive compensations for pre-retirement CEO are usually earnings-based. Gibbons and Murphy

(1992) find that on average, a large portion of the pre-retirement pay is related to firm performance. Yermack (2006) finds that at retirement, CEO can obtain the extraordinary separation packages on top of their regular annual pay, and these separation rewards may be related to the pre-retirement firm performance. Although the performance-based incentive plan is designed to motivate the pre-retirement CEO to seek for the optimal investment opportunities, this type of incentive plan indeed stimulates the pre-retirement CEO to manage the short-term firm earnings in order to increase personal incomes. Thus, the use of earnings-based incentive compensation fuels the horizon problem rather than minimizing it. Therefore, Gibbons and Murphy (1992) suggest that the pay incentives for CEO close to retirement should be tied to shareholder wealth and not to reported earnings, such as the stock-based incentives. Smith and Watts (1982) and Bizjak et al. (1993) offer another solution. They both suggest that the horizon problem could be reduced by deferring incentive compensation to the retirement period.

Murphy and Zimmerman (1993), on the contrary, do not support the existence of horizon problem. They examine some variables that are subject to considerable managerial discretion, including R&D, advertising, capital expenditures and accounting accruals. The empirical results suggest that the changes in these potentially discretionary variables preceding CEO turnover are explained by overall poor economic performance rather than by direct managerial discretion. They find no evidence that the outgoing CEO exercises discretion to increase the earnings-based compensation in strongly performing firms where the CEO retires as part of the regular succession process.

2.5 Hypotheses Development

As noted earlier, scholars have examined the possible influence of managerial aging process on firm performance. Some argue that the psychosocial changes along the managerial aging process may partially affect the strategic choice and outcomes of an organization (Child, 1974; Rhodes, 1983; Hambrick and Mason, 1984), while others focus on the horizon problem and argue that the diminishing career concerns prior to retirement could induce CEO to manipulate short-term firm performance (Smith and Watts, 1982; Dechow and Sloan, 1991; Gibbons and Murphy, 1992; Bizjak et al., 1993; Barker and Mueller, 2002). The empirical studies on horizon problem provide substantial evidence on the dramatic decline of career concerns at the end of conventional career horizon when the CEO is close to the regular retirement age of 65, but largely ignore the possible fluctuation of career concerns at the earlier stages of career horizon when the CEO is much younger. In other words, existing evidence shows a big gap in the career concerns between a CEO at age 50 and another CEO at age 64. It is, however, difficult to tell whether a CEO at age 47 and another CEO at age 55 have the same career concerns. If CEO career concerns diminish constantly along the whole aging process rather than shift suddenly around the retirement age, then the changes in career concerns may lead to a more gradual increase in long-term agency problem.

Both the explicit incentive pays and implicit career concerns motivate CEO to work carefully on behalf of shareholders, and thereby mitigate the agency problem (Gibbons and Murphy, 1992). The explicit incentive contracts discipline the CEO managerial quality by linking annual compensation to firm performance. In addition, the implicit career concerns also discipline managerial behavior. As noted earlier, Fama (1980) argues that CEO career concerns arise from the monitoring effect of managerial labor markets. The labor markets constantly evaluate managerial performance and provide two functions, wage revision and demand modification. The wage revision process provides assessment on how much a CEO can receive for each of the annual compensations in the future (the expected size of annual pay). The demand modification process provides assessment on how long a CEO can stay in the active managerial workforce in the future (the expected horizon of annual pay). These two processes, taken together, determine the expected value of total future compensation. Since the collection of future compensation is contingent to current performance, these compensations can be viewed as a kind of uncertain or risky wealth. To this extent, CEO career concerns are actually their concerns on the uncollected future wealth, or in short, the wealth concerns. The greater the CEO wealth concerns, the less the agency problems. We assume that executive annual compensation is the only source of CEO incomes, and CEO career horizon ends at the regular retirement age of 65. Thus, the total income of a CEO at a certain age consists of two parts: the sum of collected managerial annual pay (past compensation) and the sum of uncollected annual pay (future compensation), shown as the following equation.

$$CEO\ Total\ Career\ Income = \sum_{A_0}^{A_t} \begin{pmatrix} Collected \\ Annual\ Pay \end{pmatrix} + \sum_{A_{t+1}}^{65} \begin{pmatrix} Uncollected \\ Annual\ Pay \end{pmatrix} \tag{1}$$

Where $\mathbf{A_0}$ refers to the beginning age of CEO career horizon, and $\mathbf{A_t}$ refers to the CEO current age.

According to this equation, younger CEOs have potentially longer career horizon and a bigger value for future compensation. Thus, the large amount of uncollected income will provide younger CEOs with considerable wealth concerns, and these concerns will in turn reduce the agency costs and lead to higher firm performance. As CEO age increases, the career horizon will shorten and the total value of future compensation will decrease. The aging CEOs then have less wealth concerns, and may demonstrate higher agency cost and lower firm performance. We therefore state Hypothesis 1as follows:

Hypothesis 1: *Along the CEO aging process, firm performance will decline. Younger CEOs have more wealth concerns and demonstrate better performance compared to older CEOs.*

Murphy (1999) finds that the likelihood of performance-forced turnover is much lower among older CEOs. Without the threat of performance-forced turnover, older CEOs can easily foresee their scheduled departure at the regular retirement age of 65. Also, the certainty on future compensation will remove most of their wealth concerns, and therefore their aging process may be associated with only marginal decline in wealth concerns. In contrast, younger CEOs still face the threat of performance-forced turnover, which leads to the uncertainty on future compensation. Thus, these younger CEOs have substantial wealth concerns, and their aging process may be associated with gradual decline in wealth concerns. Taken together, CEO wealth concerns may decrease at a diminishing rate along the whole aging process. According to the earlier argument, CEO wealth concerns are closely related to their agency problem and firm performance. Therefore, we predict that along the whole aging process, this change in wealth concerns may have a strong impact on the sensitivity of age-performance relationship. In particular, the aging process of younger CEOs is associated with the substantial decrease in firm performance, while the aging process of older CEOs is associated with the marginal decrease in firm performance. We state Hypothesis 2 as follows:

Hypothesis 2: *The negative age-performance relationship tends to be more sensitive among younger CEOs, while less sensitive among older CEOs.*

Existing literature on the horizon problem considers that a CEO around age 65 is at the end of his/her career horizon (Dechow and Sloan, 1991; Gibbons and Murphy, 1992; Murphy and Zimmerman, 1993; Brickley et al., 1999). Studies on CEO turnover also show the extremely high probability of CEO exit around age 65 that can be attributed to the scheduled retirement process rather than the 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? Although Brickley (2003) proposes this question for future research, there is no empirical evidence on this interesting topic to date.

One possible explanation on why a CEO may work beyond the regular retirement age is higher managerial productivity and superior firm performance. Lazear (1979) is first to discuss mandatory retirement policy. He argues that workers are paid less than VMP (value of marginal product) when young and more than VMP when old. Following this wage scheme, there must be some date at which the present value of lifetime wage payment equals the present value of lifetime marginal product, and this date is the optimal retirement date. At this point in time, firms are no longer willing to pay workers the current spot wage, while workers will not voluntarily retire because the current spot wage exceeds the current spot VMP. So, firms impose the mandatory retirement policy. According to this explanation, if a CEO close to age 65 shows a much higher spot VMP than other pre-retirement CEOs, then his optimal retirement date will be some time later than the regular retirement age 65. In addition, if the board of directors observes this change and implicitly revise the mandatory retirement policy, then the originally scheduled exit for this CEO at age 65 could probably be delayed.

Brickley et al. (1999) suggest that CEOs can extend their career horizon by serving on their own board or other boards after the scheduled retirement. They provide evidence that the probability of post-retirement directorship on inside or outside board is strongly and positively related to the pre-retirement stock or accounting performance, respectively. Similarly, if CEOs are willing to extend their career horizon by staying in office after the regular retirement date, they have to demonstrate to board members superior firm performance as evidence of their higher spot VMP or productivity. On the other hand, according to the horizon problem, CEOs intending to retire on schedule may also show superior earnings performance to boost their earnings-based compensation. However, since their higher firm earnings 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. In addition, these outgoing CEOs must be aware that their current earnings management is at the cost of firm performance in the near future, and they would probably leave on schedule even if the board of directors invites them to stay longer. Therefore, we argue that CEOs with superior overall firm performance have a higher chance to experience delayed retirement. Hypothesis 3A is stated as follows:

Hypothesis 3A: *Prior to the normal retirement age of 65, a CEO with better accounting and market performance is more likely to continue in the position rather than retire at age 65.*

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 the board decisions about mandatory retirement policy, then they probably have a bigger chance to continue in the current position. Such influence could be both explicit and implicit. The explicit influence stems from the CEO's stock ownership since higher ownership will provide the CEO with more voting rights. The implicit influence stems from the CEO's entrenchment associated with longer firm tenure. Long-term tenure may provide 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, their scheduled retirements are more likely to be delayed. We therefore state Hypothesis 3B as follows:

Hypothesis 3B: *Prior the normal retirement age 65, CEO with higher ownership and longer firm-specific tenure is more likely to continue in the position rather than retire at the normal retirement age of 65.*

III. 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[2] and 1,940 CEOs, and come from two sources, S&P ExecuComp[3] 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 download the data on firm financial characteristics.

[2] In this research, both financial sector (SIC code 6000 – 6999) and utility sector (SIC code 4900 – 4999) are excluded.
[3] 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. The up-to-date version of ExecuComp (V.2009.03) provides data from 1992 to 2006.

(Insert Table 1 here)

The educational records of 1,597 CEOs[4] are manually collected from Marquis Who's Who on the Web, a biographical research database. Among the 1,597 CEOs, 842 executives have at least one university-level degree in business. The numbers of CEOs holding undergraduate and graduate degrees in business are 292 and 644, respectively, with 543 CEOs having an MBA degree.

We define the variables and classify them into three different categories. Firm performance variables include sales change, assets change, Tobin's Q and return on assets. Sales change (SALESCHG) is defined as the annual percentage change of sales. Assets change (ASSETSCHG) is defined as the annual percentage change of total assets. Tobin's Q (TOBINQ), according to Lewellen and Badrinath (1997), is defined as the market-to-book ratio of total assets[5]. Return on assets (ROA) is defined as the ratio of Operating Income Before Depreciation (OIBD) to total assets. Firm characteristics variables include firm size, financial leverage and capital expenditure. Firm size (SIZE) is defined as the natural logarithm of total assets. Financial leverage (LEVERAGE) is defined as the ratio of total debt to total assets. Capital expenditure (CAPEXP) is defined as the ratio of capital expenditure to sales. CEO characteristics variables include age, salary, ownership, CEO experience and Non-CEO experience. CEO age (AGE) is defined as the CEO chronological age. Salary (SALARY) is defined as the CEO annual basic salary without any bonus, and in thousands of dollars. Ownership (OWNERSHIP) is

[4] Due to data missing in Marquis Who's Who, we only collect the educational information for 1,597 CEOs among the 1,940 CEOs in the total sample.

[5] 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)

defined as the CEO's percentage holding of firm's total common shares[6]. 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 with distribution. CEO experience (CEOEXPER) is defined as 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 (Maximum of SALARY) is more than 8 times of the average value (Mean of SALARY). The average firm-specific CEO tenure is about 8 years (Mean of CEOEXPER), while the most experienced CEO held the position for 52 years (Maximum of CEOEXPER). In addition, at least 25% of the total observations represent CEOs recruited from firm 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).

3.2 OLS Regression Models

OLS Regression Models (Model 1A to Model 1E) are first employed to examine the negative age-performance relationship stated in Hypothesis 1. In Model 1A, 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

[6] When calculating the number of common shares held by CEO, Denis et al. (1997) exclude the unexercised stock options. We follow the same approach.

performance, indicating both the current operating effectiveness and the future growth opportunities, while ROA measures the firm's operating performance. As in Barker and Mueller (2002), control variables on both firm and CEO characteristics, including SIZE, LEVERAGE, CAPEXP, SALARY, OWNERSHIP, CEOEXPER and NONCEOEXPER[7], are included in the regression.

Model 1A

$$PERFORMANCE = \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP + \beta_6 * CEOEXPER + \beta_7 * NONCEOEXPER + \beta_8 * AGE + \varepsilon \quad (2)$$

To test the interactive effect of managerial characteristics on the age-performance relationship, 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. Industry segmentation is based on a 2-digit SIC code. Ownership dummy (OWNERSHIPD) equals 1 if CEO holds at least 1% of all the 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 the four interactive variables in Model 1B, 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 of these

[7] An extensive body of previous work has demonstrated the inconsistent but significant effects of these control variables (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).

interactive variables is defined as the product of AGE and a specific CEO characteristic dummy.

Model 1B

$$PERFORMANCE = \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP + \beta_6 * CEOEXPER + \beta_7 * NONCEOEXPER + \beta_8 * AGE + \beta_9 * AGE\_SALARYD + \beta_{10} * AGE\_OWNERSHIPD + \beta_{11} * AGE\_CEOEXPERD + \beta_{12} * AGE\_NONCEOEXPERD + \varepsilon \quad (3)$$

As an extension of Model 1B, Model 1C employs a new interactive variable to measure the impact of outside CEO recruitment[8] on the age-performance relationship. This 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.

Model 1C

$$PERFORMANCE = \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP + \beta_6 * CEOEXPER + \beta_7 * NONCEOEXPER + \beta_8 * AGE + \beta_9 * AGE\_SALARYD + \beta_{10} * AGE\_OWNERSHIPD + \beta_{11} * AGE\_OUTSIDERD + \varepsilon \quad (4)$$

We further examine the age-performance relationship by controlling another CEO characteristic – his/her education background in business[9]. Due to missing data on CEO educational background, this examination is based on a smaller sample size. Barker and

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

[9] A series of studies document the positive association between education level of top managers and firm innovation, strategic change or R&D intensity (Kimberly and Evanisko, 1981; Bantel and Jackson, 1989; Wiersema and Bantel, 1992; Datta and Guthrie, 1994). Barker and Mueller (2002), however, point out that these studies ignore the difference on fields of study among managers. Empirical evidence has already shown that many executives have educational background in business, especially in the majors of general business, accounting and finance (Bantel and Jackson, 1989). Hambrick and Mason (1984) argue that formal education in business fosters managers to focus on short-term performance and prevent big mistake at the cost of innovative strategic choices. They also suggest that firm profitability or growth has no relationship with the amount of formal management education. Barker and Mueller (2002) find little evidence to support a negative link between R&D spending and the number of business degrees held by CEOs. In this research, therefore, we control for the level of business degree and not the number of business degrees.

Mueller (2002) measure the amount of education in business by counting the number of degrees held by CEO, while we measure the level of education in business by using dummy variables. In Model 1D, four particular dummies, BDEGREE, BGRADUATE, MBA and BBACHELOR, respectively proxy the education dummy (EDUCATIOND), and each of them represents a specific level of business degree. BDEGREE equals 1 if CEO holds at least one university-level degree in business, otherwise 0, BGRADUATE equals 1 if CEO holds at least one graduate degree in business, otherwise 0, MBA equals 1 if CEO holds an MBA degree, otherwise 0, and BBACHELOR equals 1 if CEO holds at least one undergraduate degree in business, otherwise 0.

Model 1D

$$PERFORMANCE = \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP + \beta_6 * EDUCATIOND + \beta_7 * CEOEXPER + \beta_8 * NONCEOEXPER + \beta_9 * AGE + \varepsilon \qquad (5)$$

In Model 1E, we use the interactive variable age-education dummy (AGE_EDUCATIOND) to test the possible education effect on the age-performance relationship. AGE_EDUCATIOND is defined as the product of AGE and a particular education dummy variable. Accordingly, this interactive variable is proxied by AGE_BDEGREE, AGE_BGRADUATE, AGE_MBA and AGE_BBACHELOR, respectively.

Model 1E

$$PERFORMANCE = \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP + \beta_6 * CEOEXPER + \beta_7 * NONCEOEXPER + \beta_8 * AGE + \beta_9 * AGE\_EDUCATIOND + \varepsilon \qquad (6)$$

3.3 Piecewise Regression Models

We use the piecewise linear regression models to examine the sensitivity of the age-performance relationship presented in Hypothesis 2. 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 regressions. In Model 2A, 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).

Model 2A

$$\begin{aligned} PERFORMANCE = {} & \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP \\ & + \beta_6 * CEOEXPER + \beta_7 * NONCEOEXPER + \beta_8 * AGE\_BP1 + \beta_9 * AGE\_BP1BP2 + \beta_{10} \\ & * AGE\_BP2 + \varepsilon \end{aligned} \quad (7)$$

Where

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

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)[10].

Morck et al. (1988) have already considered the arbitrary choice of breakpoints, and they examine the robustness of the regression results by chopping the whole data interval of board ownership into smaller pieces with all possible breakpoints. We also extend Model 2A to Model 2B 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[11].

Model 2B

$$\begin{aligned} PERFORMANCE = {} & \beta_0 + \beta_1 * SIZE + \beta_2 * LEVERAGE + \beta_3 * CAPEXP + \beta_4 * SALARY + \beta_5 * OWNERSHIP \\ & + \beta_6 * CEOEXPER + \beta_7 * NONCEOEXPER + \beta_8 * AGE\_50 + \beta_9 * AGE\_5055 + \beta_{10} \\ & * AGE\_5060 + \beta_{11} * AGE\_6065 + \beta_{12} * AGE\_65 + \varepsilon \end{aligned} \quad (8)$$

Where

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

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[10] 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.

[11] 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.

3.4 Logistic Regression Models

To examine the probability of CEO continuing beyond the normal retirement age as stated in Hypotheses 3A and 3B, 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[12]; (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 on scheduled and delayed retirements, the two groups of CEOs are picked 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 difference on firm performance and CEO influencing

[12] 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.

power between scheduled-retired CEOs and delayed-retired CEOs, within a short period starting from age 63 to the normal retirement age.

Model 3A is designed to test the effect of firm performance on CEO retention (Hypothesis 3A). Dependent variable is a dummy, which equals 1 if CEO left at the regular retirement age (scheduled retirement), and 0 if CEO continued beyond the regular retirement age (delayed retirement). Independent variables include SALESCHG, ASSETSCHG, TOBINQ and ROA, measuring both accounting and market performance[13]. We control for SIZE[14].

Model 3A

$$PROB(Scheduled\ Retirement) = \beta_0 + \beta_1 * SALESCHG + \beta_2 * ASSETSCHG + \beta_3 * TOBINQ + \beta_4 * ROA + \beta_5 * SIZE + \varepsilon \quad (9)$$

Model 3B is designed to test the effect of CEO influence on the board (Hypothesis 3B). Independent variables include OWNERSHIP, CEOEXPER and NONCEOEXPER. In addition, we also control for SALARY[15]. Model 3C extends Model 3B by using dummy variables. The independent variables in this model are SALARYD, OWNERSHIPD, CEOEXPERD and NONCEOEXPERD. Finally, outside-recruited CEOs tend to have less connection with the board members than inside-promoted CEOs, and these outside-hired executives may be more disciplined by the mandatory retirement policy. Model 3D therefore employs the dummy variable OUTSIDERD to test the impact of outside recruitment on the likelihood of CEO retention at the regular retirement age.

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[13] We choose to measure the overall performance rather than earnings performance in case that, superior firm profitability is due to the earnings management but not the higher managerial productivity.

[14] 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.

[15] Berger et al. (1997) suggest that an entrenched CEO has several characteristics, including longer firm tenure and more non-incentive compensation.

Model 3B

$$PROB(Scheduled\ Retirement) = \beta_0 + \beta_1 * SALARY + \beta_2 * OWNERSHIP + \beta_3 * CEOEXPER + \beta_4 * NONCEOEXPER + \varepsilon \quad (10)$$

Model 3C

$$PROB(Scheduled\ Retirement) = \beta_0 + \beta_1 * SALARYD + \beta_2 * OWNERSHIPD + \beta_3 * CEOEXPERD + \beta_4 * NONCEOEXPERD + \varepsilon \quad (11)$$

Model 3D

$$PROB(Scheduled\ Retirement) = \beta_0 + \beta_1 * SALARYD + \beta_2 * OWNERSHIPD + \beta_3 * OUTSIDERD + \varepsilon \quad (12)$$

We provide two alternative hypotheses to estimate the likelihood of CEO retention at the regular retirement age. To compare the explanatory power between these two hypotheses, Model 3E, 3F and 3G are designed by integrating the first four logistic models to test all the factors that potentially affect the likelihood of CEO retention.

Model 3E

$$PROB(Scheduled\ Retirement) = \beta_0 + \beta_1 * SALESCHG + \beta_2 * ASSETSCHG + \beta_3 * TOBINQ + \beta_4 * ROA + \beta_5 * SIZE + \beta_6 * SALARY + \beta_7 * OWNERSHIP + \beta_8 * CEOEXPER + \beta_9 * NONCEOEXPER + \varepsilon \quad (13)$$

Model 3F

$$PROB(Scheduled\ Retirement) = \beta_0 + \beta_1 * SALESCHG + \beta_2 * ASSETSCHG + \beta_3 * TOBINQ + \beta_4 * ROA + \beta_5 * SIZE + \beta_6 * SALARYD + \beta_7 * OWNERSHIPD + \beta_8 * CEOEXPERD + \beta_9 * NONCEOEXPERD + \varepsilon \quad (14)$$

Model 3G

$$PROB(Scheduled\ Retirement) = \beta_0 + \beta_1 * SALESCHG + \beta_2 * ASSETSCHG + \beta_3 * TOBINQ + \beta_4 * ROA + \beta_5 * SIZE + \beta_6 * SALARYD + \beta_7 * OWNERSHIPD + \beta_8 * OUTSIDERD + \varepsilon \quad (15)$$

3.5 Industry-Adjusted Robustness Tests

Industry-adjusted robustness tests are used to eliminate the potential bias in the regression results due to the financial dissimilarity among industries. 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 of variations in executive compensation across industries, we also adjust the variable SALARY.

IV. Empirical Results and Discussion

4.1 Age-Performance Relationship

4.1.1 Overall Age-Performance Relationship

We first investigate the overall relationship between CEO age and firm performance. In Table 2 Panel A, with dependent variables on SALESCHG and ASSETSCHG, the coefficients of AGE are both negative and strongly significant at the 1% level, showing that firm growth declines along the CEO aging process. This negative age-growth relationship is consistent with the argument in Fama (1980), Child (1974) and Hambrick and Mason (1984). Likewise, the coefficient of AGE on TOBINQ is also negative and significant at the 1% level, showing that firm market value declines along the CEO aging process. However, the coefficient of AGE on ROA is not significant, showing that firm profitability has no relationship with CEO age. 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)

The industry-adjusted results in Panel B are consistent with the results in Panel A. The coefficients of AGE on SALESCHG, ASSETSCHG and TOBINQ are all negative and significant, and the coefficient of AGE on ROA turns from positive to negative but still insignificant.

The decline on firm growth and firm market value with CEO age supports Hypothesis 1, and indicates that older CEOs with less wealth concerns on future compensation demonstrate increasing agency costs leading to decreases in performance. More importantly, such evidence also suggests that the age-related agency problem exists not only at the end of CEO career horizon (horizon problem) but also throughout the whole CEO career horizon. We also notice that firm profitability does not drop along the CEO career horizon. This result is consistent with the finding of Child (1974)[16], but different from our expectation.

The age-performance relationship is reexamined after controlling for firm size. The results are presented in Table 3. In both Panel A and Panel B, when dependent variables are ASSETSCHG and TOBINQ, the coefficients of AGE are negative and significant across all the four quartiles of firm size. When dependent variable is SALESCHG, the coefficients of AGE are negative and significant in the first, second and fourth quartiles. These evidences suggest that the CEO aging process deteriorates firm growth and firm market value, regardless of firm size.

(Insert Table 3 here)

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

Table 3 also shows some remarkable evidence on the relationship of CEO age and firm profitability. In Panel A, when dependent variable is ROA, the coefficient of AGE is positive and significant only at the 10% level in the first quartile, while not significant in the other three. In Panel B, the industry-adjusted 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. Since we do not observe the significant age-profitability relationship in Table 2, these results in Table 3 suggest that the age-profitability link may be conditional on firm size. In particular, along the CEO aging process, firm profitability increases and decreases in small and big firms, respectively, and has no obvious change in mid-size firms.

4.1.2 Interactive Effects of CEO Characteristics

The regression results of Model 1B and 1C are reported in Table 4. Model 1B is used to estimate the interactive effects of CEO characteristics on the age-performance relationship. The coefficients of AGE_SALARYD on SALESCHG and ASSETSCHG are negative and significant in both Panel A and B. The coefficient of AGE_SALARYD on TOBINQ is negative and significant after the industry adjustment in Panel B. The coefficient of AGE_SALARYD on ROA is positive in Panel A, but turns to be negative in Panel B although insignificant. The results about AGE_SALARYD indicate that non-incentive compensation may intensify the negative age-performance relationship.

The coefficients of AGE_OWNERSHIPD are uniformly positive. In particular, the coefficients on SALESCHG, ASSETSCHG and ROA are significant in Panel A and B, while the coefficient on TOBINQ is insignificant in both panels. These results indicate that CEO stock ownership may dilute the negative age-performance link.

(Insert Table 4 here)

Likewise, all the coefficients of AGE_CEOEXPERD are positive. In particular, the coefficients on SALESCHG and ASSETSCHG are strongly significant in both Panel A and B, the coefficient on ROA is significant in Panel B, and the coefficient on TOBINQ is insignificant in both panels. These results suggest that CEO tenure within the firm may mitigate the negative age-performance link. That is to say, if a middle-aged CEO has worked for relatively longer time in the current position, then as age increases, performance will probably decline at lower rates.

The interactive variable AGE_NONCEOEXPERD, however, shows inconsistent impacts on different aspects of the age-performance relationship. The coefficients on SALESCHG, ASSETSCHG and TOBINQ are significantly negative in Panel A and B, showing that non-CEO tenure within the firm may strengthen the negative age-growth and age-market value links. In contrast, the coefficient on ROA is significantly positive in both panels, showing that non-CEO tenure may weaken the negative age-profitability link (mainly in large firms).

Model 1C is used to estimate the interactive effect of outside CEO recruitment on the age-performance relationship. Outside recruitment implies an extreme scenario of firm-specific non-CEO tenure and zero firm experience prior to the CEO appointment. Accordingly, outside recruitment and non-CEO tenure demonstrate the opposite effects on the age-performance relationship. The coefficients of AGE_OUTSIDERD on

SALESCHG, ASSETSCHG and TOBINQ are significantly positive in Panel A and B, showing that outside recruitment may dilute the negative age-growth and age-market value links. In contrast, the coefficient of AGE_OUTSIDERD on ROA is significantly negative in both panels, showing that outside recruitment may intensify the negative age-profitability link (mainly in large firms).

The regression results in Table 4 support the interactive effects of some CEO characteristics on the age-performance relationship. The evidence on salary and ownership effect is consistent with the agency cost theory. Higher basic salary indicates that CEO compensation is more insensitive to performance. Such CEOs may demonstrate considerable agency problem since they have less wealth concerns on future compensation. As their age increases, high level of non-incentive compensation will strengthen the decline of performance. CEOs with high stock ownership may demonstrate moderate agency problem since they have more compensation tied to shareholder wealth. As their age increases, high level of stock holding will mitigate the decline of performance. 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 evidence on tenure effect, however, is mixed and inconsistent with this argument. Non-CEO tenure within the firm does damage performance and strengthen the negative age-performance relationship, but CEO tenure shows the opposite effect on the age-performance link.

The regression results of Model 1D and 1E are reported in Table 5. Model 1D is first used to estimate the education effect on firm performance. The coefficient of BDEGREE on TOBINQ is significantly negative in Panel A1 and B1, while the coefficient of

BDEGREE on ROA is significantly positive in both panels. The coefficient of BGRADUATE on ROA is significantly positive in Panel A2 and B2. The coefficient of MBA on ROA is significantly positive[17] in Panel A3 and B3. The coefficients of BBACHELOR on both SALESCHG and TOBINQ are significantly negative in Panel A4 and B4. In addition, since BGRADUATE and MBA do not show any significant links with TOBINQ, the negative link between BDEGREE and TOBINQ can be mainly attributed to the significant result of BBACHELOR. Likewise, the positive link between BDEGREE and ROA can be mainly attributed to the significant result of BGRADUATE and MBA.

In summary, our findings for the effect of education background in business on firm performance are as follows: (1) the undergraduate-level damages growth and market value, while the graduate-level has no impact on growth and market value; (2) the undergraduate-level has no impact on profitability, while the graduate-level facilitates profitability. These findings, on the one hand, are consistent with prior arguments about the positive effect of higher education level (Bantel and Jackson, 1989; Wiersema and Bantel, 1992). On the other hand, they provide evidence that formal education in business foster top management to be more profit-oriented (Hambrick and Mason, 1984).

(Insert Table 5 here)

Model 1E is used to estimate the interactive effect of education on the age-performance relationship. When the dependent variable is TOBINQ, AGE_BDEGREE and AGE_BBACHELOR display significant negative coefficients. When the dependent

[17] In our sample, most of the graduate degrees in business are actually MBA degree, and therefore, the dummy variables of BGRADUATE and MBA demonstrate similar results.

variable is ROA, AGE_BDEGREE, AGE_BGRADUATE and AGE_MBA show significant positive coefficients. Since AGE_BGRADUATE and AGE_MBA have no link with TOBINQ, the negative link between AGE_BDEGREE and TOBINQ can be attributed to the significant result of AGE_BBACHELOR. Also, the positive link between AGE_BDEGREE and ROA can be attributed to the significant result of AGE_GRADUATE and AGE_MBA.

The results of Model 1E demonstrate that formal education in business does affect the age-performance relationship. In particular, undergraduate education in business may strengthen the negative age-market value association, while the graduate business education may dilute the negative age-profitability link[18] (mainly in large firms). Meanwhile, no evidence supports the interactive effect of education in business on the age-growth link.

4.2 Sensitivity of Age-Performance Relationship

Model 2A is designed for two-breakpoint piecewise regressions, and the results are reported in Table 6. According to 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). When the dependent variables are SALESCHG, ASSETSCHG and ROA, (50, 65) shows the best explanatory power. When the dependent variable is TOBINQ, (50, 55) and (50, 65) show comparable explanatory power. In Panel

[18] The negative age-profitability relationship is not observed in Table 2, and only observed among very big firms in Table 3. In contrast, this negative link is observed in Table 5 without controlling for firm size. For Model 1E, the coefficient of AGE on ROA is consistently negative and significant from Panel B1 to B4. A possible reason on this significant result is the change in sample size. Marquis Who's Who database only contains the biographical information of famous industrial leaders, usually in large corporations. When testing the education effect, we have to reduce the sample size by dropping out some small firms. Although we do not intend to control for firm size, firms in the new sample, on average, are larger than firms in the total sample. Therefore, like Table 3, Table 5 also shows the negative age-profitability relationship.

B, the adjusted R-Square of (50, 55) and (50, 65) are 4.45% and 4.42%, respectively. Therefore, for each dependent variable, we choose the breakpoint combination (50, 65) and study the corresponding regression results.

(Inset Table 6 here)

Based on the selected breakpoint combinations[19], we plot the age-performance relationship and observe the variations in relationship 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. This curve initially rises in the first piece, then drops moderately in the second piece, and finally rises again in the third piece. For ROA, the statistical significance is observed in the second and third pieces, but not the first piece.

(Inset Figure 1 here)

The curves of SALESCHG, ASSETSCHG and TOBINQ provide evidence to support Hypothesis 2, showing that the age-growth and age-market value links are less sensitive among older CEOs. In Figure 1, we find that the aging process of younger

[19] We select the industry-adjusted results of combination (50, 65) in Table 6 Panel B, and plot the age-performance relationship in Figure 1. Similarly, we select the industry-adjusted results in Table 7 Panel B, and plot the age-performance relationship in Figure 2.

CEOs is associated with big decline in growth and market value, while the aging process of older CEOs is associated with only small changes in growth and market value. As noted previously, Murphy (1999) has suggested that older CEOs are less likely to experience performance-forced turnover. Our findings indicate that without the threat of dismissal, the wealth concerns on future compensation may depreciate to a very low level, not at the regular retirement age 65 but as early as at age 50. Accordingly, the aging process among these older CEOs will only bring marginal fluctuation on their wealth concerns, and in turn has less impact on agency problem and firm performance. The curve of ROA, however, provides little evidence to support Hypothesis 2. The curve shows no significant decline in the first piece, but a moderate decline in the second piece. This result implies that the negative age-profitability link is somewhat sensitive among older CEOs.

(Inset Table 7 here)

To avoid the arbitrary selection of breakpoints, we also use four-breakpoint piecewise regressions to reexamine the age-performance relationship. The regression results of Model 2B are reported in Table 7, and the piecewise curves are plotted in Figure 2. By comparing between 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 on 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. In Model 2B, the whole age interval from 50 to 65 is cut into three intervals, and thus for each small interval, the significance is potentially reduced.

(Inset Figure 2 here)

In the previous section, the results of Table 3 suggested that the age-profitability relationship is contingent on firm size. When CEO age increases, the profitability goes up in small firms but goes down in large firms. Here, the curves for ROA in Figures 1 and 2 suggest that firm profitability increases along the aging process of younger CEOs while decreases along the aging process of older CEOs. Accordingly, we reexamine the age-profitability link by adopting piecewise regression 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. Specifically, the four samples are the smallest 25% firms (known as first quartile, marked as Group 1), the smaller 50% firms (known as first and second quartiles, marked as Group 2), the largest 25% firms (known as fourth quartile, marked as Group 3) and the larger 50% firms (known as third and fourth quartiles, marked as Group 4). We next fit Model 2A with breakpoint combination (50, 65) for each of these subsamples. The regression results are reported in Table 8.

(Insert Table 8 here)

In Table 8 Panel A, we find that the coefficient of AGE_50 is positive and significant in Groups 2, 3 and 4, while the coefficient of AGE_5060 is negative and significant in Groups 3 and 4. Using industry adjusted data in Panel B, AGE_50 is only significant in Group 2, while the coefficient of AGE_5060 is still significant in Groups 3 and 4. These results suggest that the age-profitability relationship is conditional not only on firm size but also on executive's aging stage. In small firms, the aging process of younger CEOs (age<50) is associated with the increase of firm profitability, while the aging process of older CEOs (50<age<65) has no association with profitability. In large firms, the aging process of younger CEOs (age<50) has no association with firm profitability, while the aging process of older CEOs (50<age<65) is associated with the decline in profitability.

4.3 Scheduled Retirement vs. Delayed Retirement

We use logistic regressions to test the likelihood of CEO retention at the regular retirement age. When scheduled retirement is strictly defined as the CEO departure at age 65, the sample includes 416 observations, and the regression results are reported in Table 9. In Panel A, the coefficient of TOBINQ is consistently negative and significant in Model 3A, 3E, 3F and 3G, while the coefficient of ROA is positive and significant in these four models. The results on TOBINQ and ROA indicate that higher market performance increases the chance of delayed retirement, and higher earnings performance increases the chance of scheduled retirement. These findings are inconsistent with Hypothesis 3A. Our results suggest that CEOs with higher growth are more likely to experience delayed retirement, while CEOs with higher profitability are more likely to experience scheduled departure. A possible explanation may hinge on earnings management. Just prior to retirement, 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). If board members consider the higher profitability prior to scheduled retirement date as a signal of earnings management rather than a result of superior managerial productivity, then they may strictly implement the mandatory retirement policy and force the CEO to retire at the scheduled retirement age. Meanwhile, the short-term earnings management is no doubt at the cost of long-term firm performance. Thus, CEOs who show higher profitability through earnings management, probably also have very strong incentive and intention to retire routinely to avoid the negative outcomes of their own earnings manipulations.

The coefficient of SIZE is consistently positive and significant in Model 3A, 3E, 3F and 3G, indicating that CEOs in large firms have a lower chance of retaining their position at age 65. Murphy (1999) and Brickley (2003) document that CEOs in large firms tend to experience scheduled departure at the conventional retirement age rather than performance-forced turnover at an early date. Taken together, we find that CEOs in big firms are more likely to exit on schedule around age 65, neither earlier nor later, while CEOs in small firms are more likely to be forced out before age 65 or be asked to continue even after age 65. This finding may indicate that CEO turnover in big firms is a scheduled process to implement the mandatory retirement policy, but not an efficient mechanism to discipline managerial performance.

(Insert Table 9 here)

The coefficients of both OWNERSHIP and OWNERSHIPD are consistently negative and significant at the 1% level in Panel A, demonstrating that high stock ownership increases the likelihood of CEO retention at the conventional retirement age 65. The coefficients of both CEOEXPER and NONCEOEXPER are consistently positive in Panel A, but only the coefficient of NONCEOEXPER in Model 3B is significant. The statistical significance is much improved when using dummy variables. Specifically, the coefficients of both CEOEXPERD and NONCEOEXPERD are positively significant at the 1% level in Model 3C and 3F, demonstrating that firm-specific tenure decreases the likelihood of CEO retention at the conventional retirement age 65. We also observe that in Panel A, the dummy variable SALARYD shows a positive and significant coefficient in both Model 3C and 3D, implying that non-incentive compensation lowers the chance of CEO retention at age 65.

In Hypothesis 3B, we predict that both ownership and tenure will enhance the CEO's influencing power on board members, and therefore increase the probability of delayed retirement. The evidence in Panel A supports the prediction on ownership effect but not the tenure effect. In addition, we find that longer tenure and higher salary diminish the probability of delayed retirement. Berger et al. (1997) have documented that entrenched CEOs have several characteristics, including longer tenure in office and compensation that is less sensitive to performance. Our findings suggest that CEO entrenchment does not influence board members when they make decision on whether to delay CEO's scheduled retirement. On the contrary, the entrenched CEO is more likely to be dismissed on schedule. Since CEO ownership and CEO entrenchment are associated with lower and higher levels of agency problem, respectively, our finding may also suggest that the retirement schedule is dominated by board of directors, and CEO has little power to influence the decision process. In particular, board members are willing to invite CEO with less agency problem to continue, and ask a CEO with more agency problem to retire routinely.

In Panel A, we also observe that the coefficient of OUTSIDERD is significantly negative in Model 3D, showing that the outside-recruited CEO has a greater chance of retention around age 65. This finding also provides additional evidence on the board's preference since CEOs hired from the external job markets tend to be less entrenched than CEOs promoted from within.

When using industry adjusted data, the coefficients of SALESCHG, TOBINQ and ROA in Panel B are uniformly insignificant. This change somewhat denies the previous findings in Panel A, and demonstrates that firm market value and firm profitability are not associated with the likelihood of delayed retirement. In contrast, the coefficient of ASSETSCHG appears to be negatively significant in Panel B. This evidence demonstrates that higher firm growth rate increases the chance of CEO retention at the regular retirement age. Nevertheless, Panel B only provides weak evidence on firm growth to support Hypothesis 3A. The coefficient of ASSETSCHG, although significant in Model 3A, is consistently insignificant in Model 3E, 3F and 3G. Likewise, Panel B shows weak evidence on firm size since the coefficient of SIZE is positively significant only in Model 3A.

Panel B, by contrast, provides strong evidence on ownership, tenure and salary. These new results confirm and strengthen the previous findings in Panel A. In particular, the coefficients of OWNERSHIP, OWNERSHIPD, CEOEXPERD and NONCEOEXPERD are uniformly significant at the 1% level, the coefficient of SALARYD becomes strongly significant in Model 3F and 3G, and the coefficient of OUTSIDERD becomes significant in Model 3G.

We reexamine the probability of CEO retention at age 65 by allowing for a larger span of scheduled retirement. When scheduled retirement is alternatively defined as the

CEO's departure at age 64, 65 or 66, the sample includes 733 observations. These regression results are reported in Table 10. The new results in Table 10 are highly consistent with the previous results in Table 9, except for a switch of significance between ASSETSCHG and SALESCHG. The coefficient of ASSETSCHG is no longer significant in both Panels A and B. Instead, the coefficient of SALESCHG appears to be negatively significant, but only in Model 3A. This change still indicates that higher firm growth increases the likelihood of delayed retirement.

(Insert Table 10 here)

According to the results in both Tables 9 and 10, we find that CEOs with higher firm growth rate and stock ownership are more likely to experience delayed retirement, whereas CEOs with longer organizational tenure within the firm and higher non-incentive compensation are more likely to experience scheduled retirement. In addition, CEOs recruited from outside have a greater chance to continue past the mandatory retirement age, and CEOs in large firms have a greater chance to retire at the scheduled retirement age. The results in Table 9 and 10 also demonstrate that CEO ownership, tenure and compensation have a strong influence on the probability of CEO retention at the regular retirement age, while firm performance and firm size only have weak influence.

The empirical evidence may suggest that when making decision on delaying CEO retirement, the board of directors is more concerned about the agency problem rather than short-term firm performance. Board members tend to retain CEOs with more stock ownership and dismiss CEOs with more characteristics of entrenchment. Murphy (1999) has provided evidence tha t older CEOs in large firms face less threat of performance-forced exit, which implies board inefficiency in replacing unqualified CEOs. Our evidence on CEO retirement, by contrast, implies that the board is efficient on dismissing entrenched CEOs by adopting a mandatory retirement policy. Accordingly, we argue that board members dominate the CEO retirement schedule, and CEOs have little influencing power on their own retiring arrangement.

V. Conclusion

Existing studies have examined the relationship between CEO age and firm performance in a limited way and largely outside of the finance disciplines. Academic literature in management science has focused on the association between psychosocial effects of CEO aging process and organizational outcomes, but most of the findings are only based on the empirical results in one or a few specific industries. Literature in corporate finance, by contrast, has focused on the fluctuation of firm performance within a short interval prior to the regular retirement age of 65 (known as the horizon problem), but largely ignores the possible change of firm performance along the entire CEO aging process.

According to Fama (1980), monitoring provided by labor market can discipline managerial behavior since managers are concerned about their working opportunities. The studies on the horizon problem argue that when approaching the normal retirement age, CEOs have no further career concerns and concentrate on their own interests at the cost of firm performance. In this paper, we argue that CEO career concerns, arising from the uncertainty about future compensation, can be also considered as wealth concerns. As a CEO ages, the value and uncertainty associated with future compensation reduce, leading to a decline in their wealth concerns. The depreciation in wealth concerns may enhance the agency problem and in turn deteriorate firm performance. In addition, older CEOs face little threat of performance-forced turnover. Thus, their aging process may be associated with only marginal decline in wealth concerns.

Based on a sample of 1,940 CEOs in 1,390 industrial firms, we examine the changes of firm growth, firm profitability and firm market value along the CEO aging process. Empirical evidence shows a negative age-growth and age-market value relationship. In addition, we find that the sensitivity of these two relations diminishes along the CEO aging process. The age-profitability relationship, however, is conditional on firm size. In particular, we find a positive relation among younger CEOs in small firms and a negative relation among older CEOs in large firms. Empirical evidence also shows that some specific CEO characteristics, including stock ownership, compensation, tenure in the firm and educational background, affect the association between age and performance.

Age 65 is commonly accepted as the regular CEO retirement age. However, many CEOs do not exit on schedule. Instead, they continue to stay in position beyond their normal departure age of 65. In this paper, we provide two alternative hypotheses to explain the likelihood of delayed retirement. One is superior firm performance, and the other is CEO's influencing power stemming from ownership and entrenchment. Our empirical results show weak evidence that CEOs with higher firm growth prior to age 65 are more likely to have a delayed retirement, but show strong evidence that stock ownership increases the likelihood of delayed retirement. In addition, entrenchment characteristics, including long firm-specific tenure and non-incentive compensation, decrease the likelihood of delayed retirement. 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. Berger et al. (1997) has documented that entrenched CEOs face less threat of performance-forced turnover. Our findings on the likelihood of delayed retirement indicate that entrenched CEOs are more likely to be dismissed on schedule rather than be invited to stay longer.

Overall, our empirical results show a significant relation between age and firm performance over the entire CEO aging process, although the strength and direction of this relationship varies with CEO age and firm characteristics.

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Appendices

Figure 1 Two-Breakpoint Piecewise Relationship between Age and Performance

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

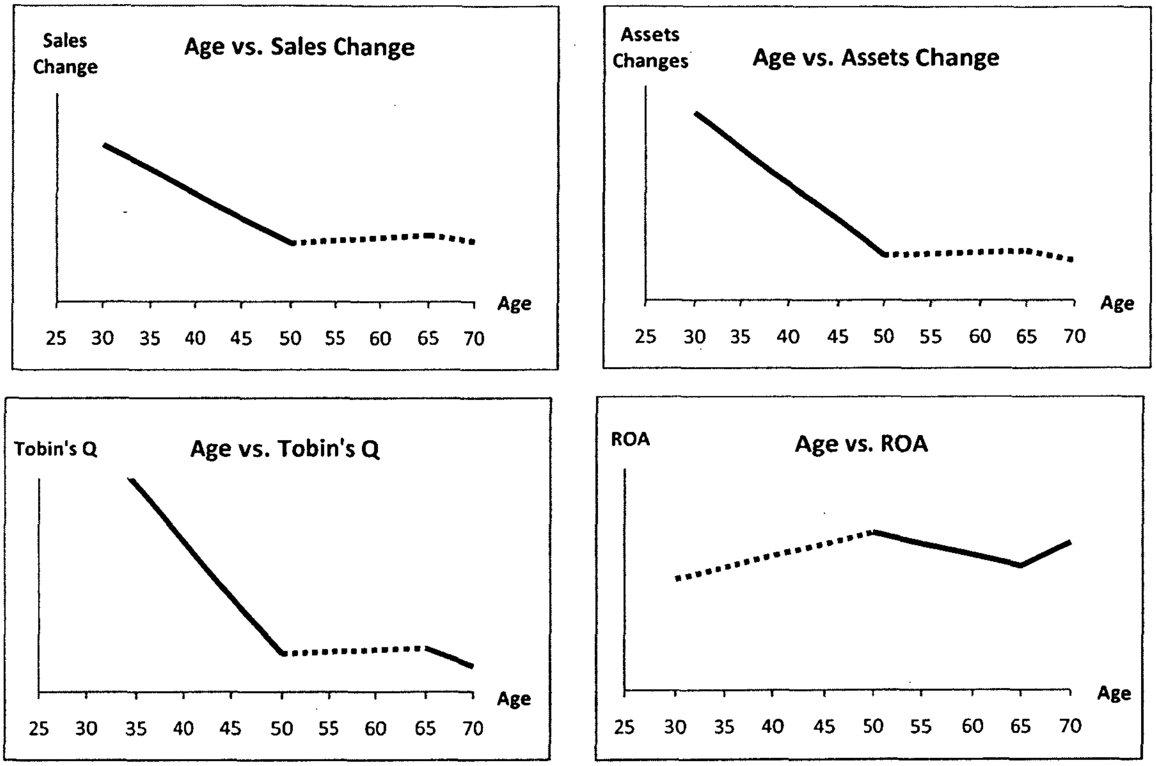

Figure 2 Four-Breakpoint Piecewise Relationship between Age and Performance

The following graphs are drawn based on the industry-adjusted coefficients estimated in Table 7 Panel B. The four breakpoints of AGE are 50, 55, 60 and 65. Solid lines represent statistical significance, while dash lines represent statistical insignificance.

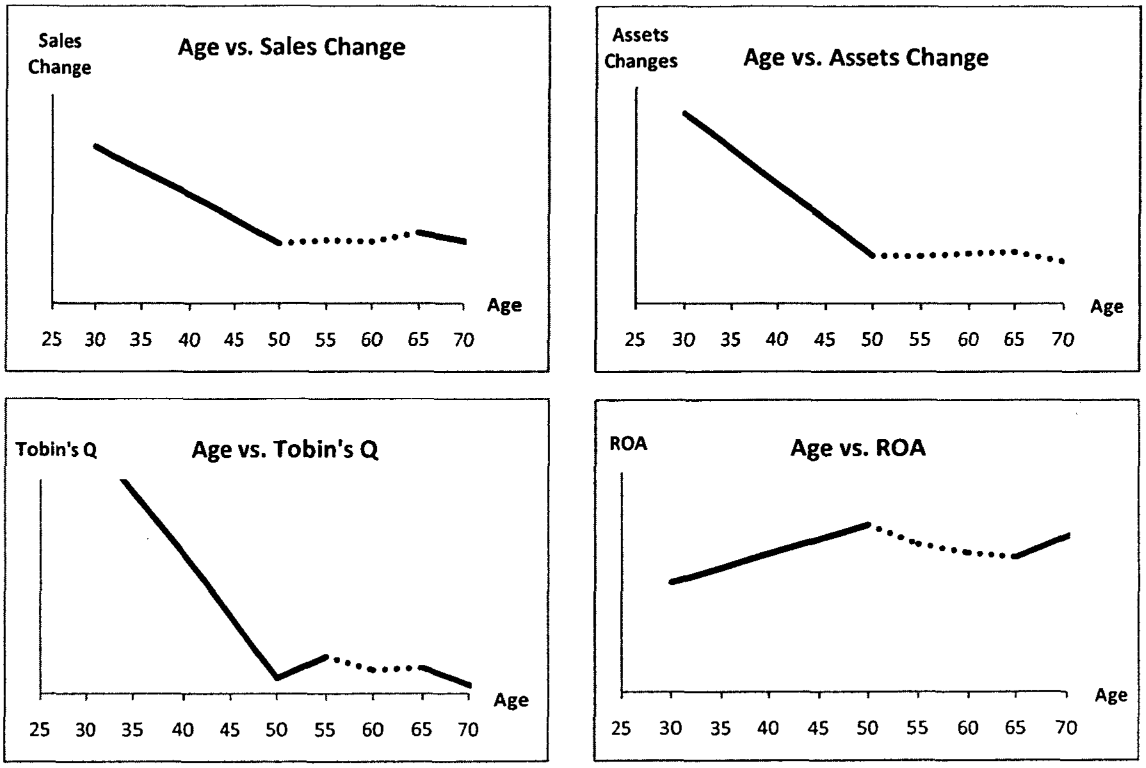

Table 1 Summary Statistics of Variables

The total sample includes 9,051 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. Annual Summary of CEO Age

	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 of Different Variables

	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: General Analysis

Model 1A is fitted using the total sample of 9,051 observations. The coefficients and t values (in parentheses) are reported in Panel A. Dependent and control variables are defined in Table 1. Panel B reports the industry-adjusted results.

Panel A. Pooled OLS regressions

	Dependent Variable			
	SALESCHG	**ASSETSCHG**	**TOBINQ**	**ROA**
Independent Variable				
Intercept	5.77552	-1.75435	380.51739***	-5.83711***
	(0.8)	(-0.14)	(10.24)	(-3.16)
SIZE	1.236**	4.5243***	-2.44281	2.09477***
	(2.55)	(5.35)	(-0.98)	(16.96)
LEVERAGE	-0.10752***	-0.12529**	-2.82619***	-0.08931***
	(-3.26)	(-2.18)	(-16.67)	(-10.62)
CAPEXP	0.47126***	0.44929***	0.55319***	-0.07798***
	(17.87)	(9.77)	(4.08)	(-11.6)
SALARY	-0.00917***	-0.01924***	-0.01178	-0.00168***
	(-4.59)	(-5.52)	(-1.15)	(-3.3)
OWNERSHIP	15.18341***	19.26267***	43.54455***	2.3273***
	(7.75)	(5.64)	(4.33)	(4.66)
CEOEXPER	-0.15203*	-0.11471	0.36616	0.12408***
	(-1.71)	(-0.74)	(0.8)	(5.47)
NONCEOEXPER	-0.32564***	-0.4473***	-1.05597***	0.08311***
	(-5.58)	(-4.4)	(-3.53)	(5.59)
AGE	-0.51255***	-0.80339***	-3.12122***	0.01398
	(-5.99)	(-5.39)	(-7.1)	(0.64)
Number of Obs.	9051	9051	9051	9051
F Value	75.28	33.17	68.94	102.47
R-Square	0.0624	0.0285	0.0575	0.0831
Adj. R-Square	0.0616	0.0276	0.0567	0.0823

Panel B. Pooled OLS regressions (Industry-adjusted)

	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: Firm Size Analysis

Based on firm size, the total sample of 9,051 observations is grouped into four quartiles. Model 1A is fitted using each of the quartiles. Panel A reports the coefficients and t values (in parentheses). Dependent and control variables are defined in Table 1. Panel B shows the industry-adjusted results.

Panel A. OLS regressions based on four quartiles of firm size

	Dependent Variable							
	SALESCHG				**ASSETSCHG**			
	First Quartile	Second Quartile	Third Quartile	Fourth Quartile	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
Independent Variable								
Intercept	33.72977*	-7.37782	7.76426	6.47882	-68.17763***	-0.31374	78.66225	41.63542
	(1.86)	(-0.34)	(0.24)	(0.42)	(-2.97)	(-0.01)	(1.02)	(1.59)
SIZE	-4.82921**	2.12987	0.42786	1.99322*	9.93009***	6.3732*	-3.5464	1.47831
	(-2.24)	(0.72)	(0.11)	(1.95)	(3.64)	(1.88)	(-0.4)	(0.85)
LEVERAGE	-0.19928**	-0.14742***	-0.04903	-0.01236	-0.2688***	-0.15822***	0.12526	-0.24422**
	(-2.54)	(-3.05)	(-0.62)	(-0.22)	(-2.71)	(-2.88)	(0.67)	(-2.54)
CAPEXP	0.48068***	0.86469***	0.52814***	0.25004***	0.77295***	0.42702***	0.41493**	0.23723***
	(7.9)	(16.43)	(7.1)	(7.81)	(10.07)	(7.13)	(2.34)	(4.32)
SALARY	-0.02489***	-0.00894**	-0.01347***	-0.0078***	-0.03609***	-0.02213***	-0.02648**	-0.0133***
	(-2.96)	(-2.29)	(-2.68)	(-3.66)	(-3.4)	(-4.99)	(-2.21)	(-3.65)
OWNERSHIP	23.06552***	14.79227***	12.30858***	10.07237**	37.63997***	10.73845***	11.28945	12.02319*
	(5.62)	(4.91)	(2.6)	(2.43)	(7.27)	(3.13)	(1)	(1.7)
CEOEXPER	-0.66294***	-0.07788	-0.05349	0.16324	-1.02027***	-0.06361	0.32927	0.14155
	(-2.95)	(-0.58)	(-0.28)	(1.11)	(-3.6)	(-0.41)	(0.72)	(0.56)
NONCEOEXPER	-0.61412***	-0.33612***	-0.40151***	-0.22365***	-0.78125***	-0.4242***	-0.43686	-0.38418***
	(-3.18)	(-3.44)	(-3.21)	(-2.97)	(-3.21)	(-3.82)	(-1.46)	(-2.98)
AGE	-0.60401***	-0.43801***	-0.29266	-0.51624***	-0.73505***	-0.63078***	-0.85813*	-0.8206***
	(-3.13)	(-3.44)	(-1.46)	(-3.41)	(-3.02)	(-4.35)	(-1.8)	(-3.16)
Number of Obs.	2263	2263	2263	2262	2263	2263	2263	2262
F Value	22.84	46.46	11.39	16.67	27.65	20.43	3.06	10.30
R-Square	0.0750	0.1415	0.0388	0.0559	0.0894	0.0676	0.0108	0.0353
Adj. R-Square	0.0717	0.1385	0.0354	0.0525	0.0861	0.0643	0.0072	0.0319

	Dependent Variable							
	TOBINQ				**ROA**			
	First Quartile	Second Quartile	Third Quartile	Fourth Quartile	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
Independent Variable								
Intercept	721.0412***	329.41599***	454.4849***	298.30581***	-82.28534***	0.45429	19.52431***	22.75062***
	(6.1)	(2.83)	(4.03)	(5.6)	(-14.97)	(0.08)	(4.54)	(8.52)
SIZE	-58.11727***	4.36189	-6.39775	-1.38902	15.58733***	1.31684*	-0.95449*	-0.70914***
	(-4.14)	(0.27)	(-0.49)	(-0.39)	(23.86)	(1.75)	(-1.92)	(-3.97)
LEVERAGE	-2.44806***	-2.73741***	-2.86842***	-2.79163***	-0.13467***	-0.10712***	-0.09259***	-0.10199***
	(-4.79)	(-10.47)	(-10.42)	(-14.21)	(-5.67)	(-8.78)	(-8.83)	(-10.37)
CAPEXP	1.20314***	0.35782	-0.02019	0.01072	-0.19123***	0.0158	0.0053	-0.00603
	(3.04)	(1.25)	(-0.08)	(0.1)	(-10.39)	(1.19)	(0.54)	(-1.07)
SALARY	-0.16039***	-0.07156***	-0.01898	0.00223	-0.00806***	0.00321***	0.00296***	0.00161***
	(-2.93)	(-3.39)	(-1.08)	(0.3)	(-3.17)	(3.26)	(4.43)	(4.33)
OWNERSHIP	62.68036**	48.14307***	22.96685	40.31172***	4.12087***	1.82352**	0.07884	0.29839
	(2.35)	(2.95)	(1.39)	(2.79)	(3.32)	(2.4)	(0.13)	(0.41)
CEOEXPER	-0.94871	0.45783	1.62706**	0.97864*	0.13263*	0.02172	0.0598**	0.08081***
	(-0.65)	(0.63)	(2.42)	(1.9)	(1.95)	(0.64)	(2.34)	(3.13)
NONCEOEXPER	-4.23602***	-1.65487***	-0.92195**	-0.03672	0.18368***	0.09689***	0.08342***	0.08087***
	(-3.37)	(-3.13)	(-2.12)	(-0.14)	(3.15)	(3.93)	(5.02)	(6.14)
AGE	-3.60572***	-2.92657***	-3.12099***	-1.92789***	0.09652*	0.01626	0.02846	-0.0397
	(-2.88)	(-4.24)	(-4.47)	(-3.64)	(1.66)	(0.5)	(1.07)	(-1.5)
Number of Obs.	2263	2263	2263	2262	2263	2263	2263	2262
F Value	15.85	22.69	18.74	31.61	113.49	15.87	17.81	23.92
R-Square	0.0533	0.0745	0.0624	0.1009	0.2871	0.0533	0.0594	0.0783
Adj. R-Square	0.0499	0.0712	0.0590	0.0977	0.2846	0.0499	0.0561	0.0750

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

Panel B. OLS regressions based on four quartiles of firm size (Industry-adjusted)

	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: Interactive Effects of CEO Characteristics

Model 1B and Model 1C are fitted using the total sample of 9,051 observations. The coefficients and t values (in parentheses) are reported in Panel A. 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. 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, 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. Panel B reports the industry-adjusted results.

Panel A. OLS regressions using interactive variables

	Dependent Variable							
	SALESCHG		ASSETSCHG		TOBINQ		ROA	
Independent Variables	Model 1B	Model 1C	Model 1B	Model 1C	Model 1B	Model 1C	Model 1B	Model 1C
Firm Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
SALARY	-0.00717***	-0.00691***	-0.01723***	-0.01678***	-0.01152	-0.01079	-0.00235***	-0.00239***
	(-3.32)	(-3.21)	(-4.57)	(-4.46)	(-1.04)	(-0.97)	(-4.26)	(-4.34)
OWNERSHIP	7.94173***	7.17081***	12.05938***	10.615**	35.70938***	31.59608**	1.87567***	1.96811***
	(3.32)	(3)	(2.89)	(2.55)	(2.9)	(2.57)	(3.08)	(3.23)
CEOEXPER	-0.41222***	-0.25702***	-0.53367***	-0.22609	-0.18225	0.21195	0.07981***	0.112***
	(-3.65)	(-2.81)	(-2.7)	(-1.42)	(-0.31)	(0.45)	(2.77)	(4.81)
NONCEOEXPER	-0.16637*	-0.21402***	-0.19893	-0.2549**	-0.29821	-0.11742	-0.00724	0.01618
	(-1.68)	(-2.88)	(-1.15)	(-1.97)	(-0.58)	(-0.31)	(-0.29)	(0.86)
AGE	-0.54722***	-0.57789***	-0.86279***	-0.90879***	-3.24886***	-3.65274***	-0.00645	0.02828
	(-6.21)	(-6.36)	(-5.61)	(-5.73)	(-7.16)	(-7.82)	(-0.29)	(1.22)
AGE_SALARYD	-0.07684***	-0.07252***	-0.08667*	-0.07816*	-0.04768	-0.02282	0.02161***	0.02154***
	(-2.94)	(-2.78)	(-1.9)	(-1.72)	(-0.35)	(-0.17)	(3.25)	(3.24)
AGE_OWNERSHIPD	0.15934***	0.165***	0.16237***	0.17348***	0.18153	0.20557	0.01425*	0.01465*
	(5.18)	(5.38)	(3.02)	(3.24)	(1.15)	(1.3)	(1.82)	(1.87)
AGE_CEOEXPERD	0.07324***		0.1415***		0.21021		0.00864	
	(2.65)		(2.94)		(1.48)		(1.23)	
AGE_NONCEOEXPERD	-0.0778**		-0.12199**		-0.35199*		0.03781***	
	(-2.2)		(-1.98)		(-1.93)		(4.19)	
AGE_OUTSIDERD		0.06879**		0.11616**		0.55615***		-0.03777***
		(2.55)		(2.46)		(4.01)		(-5.49)
Number of Obs.	9051	9051	9051	9051	9051	9051	9051	9051
F Value	54.45	58.98	24.27	25.96	46.56	51.82	71.59	79.09
R-Square	0.0674	0.0670	0.0312	0.0306	0.0582	0.0593	0.0868	0.0878
Adj. R-Square	0.0662	0.0658	0.0299	0.0294	0.0570	0.0582	0.0856	0.0867

Panel B. OLS regressions using interactive variables (Industry-adjusted)

	Dependent Variable							
	SALESCHG		ASSETSCHG		TOBINQ		ROA	
Independent Variable	Model 1B	Model 1C	Model 1B	Model 1C	Model 1B	Model 1C	Model 1B	Model 1C
Firm Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
SALARY	-0.00435**	-0.00411*	-0.0087**	-0.00825**	-0.00471	-0.00409	-0.00387***	-0.00386***
	(-1.97)	(-1.86)	(-2.22)	(-2.11)	(-0.42)	(-0.36)	(-6.43)	(-6.43)
OWNERSHIP	7.91837***	7.28797***	11.85236***	10.60035**	42.24963***	38.68079***	1.56799**	1.58162**
	(3.38)	(3.11)	(2.86)	(2.56)	(3.51)	(3.21)	(2.46)	(2.48)
CEOEXPER	-0.39944***	-0.25572***	-0.50388**	-0.21586	-0.00532	0.26084	0.05354*	0.09545***
	(-3.61)	(-2.86)	(-2.57)	(-1.36)	(-0.01)	(0.57)	(1.78)	(3.93)
NONCEOEXPER	-0.14805	-0.19075***	-0.16118	-0.21942*	-0.36046	-0.30165	-0.03639	-0.02875
	(-1.53)	(-2.65)	(-0.94)	(-1.72)	(-0.73)	(-0.82)	(-1.38)	(-1.47)
AGE	-0.39961***	-0.41438***	-0.69151***	-0.71791***	-3.12556***	-3.51062***	-0.01752	0.00928
	(-4.63)	(-4.66)	(-4.52)	(-4.56)	(-7.04)	(-7.68)	(-0.75)	(0.38)
AGE_SALARYD	-0.11061***	-0.10654***	-0.14112***	-0.1328***	-0.26509*	-0.234*	-0.01156	-0.01201*
	(-4.17)	(-4.01)	(-3)	(-2.82)	(-1.94)	(-1.72)	(-1.6)	(-1.66)
AGE_OWNERSHIPD	0.1316***	0.13638***	0.12115**	0.13088**	0.19628	0.21146	0.01705**	0.01812**
	(4.41)	(4.58)	(2.29)	(2.48)	(1.28)	(1.38)	(2.1)	(2.24)
AGE_CEOEXPERD	0.066**		0.13057***		0.15758		0.01463**	
	(2.44)		(2.73)		(1.14)		(1.99)	
AGE_NONCEOEXPERD	-0.05857*		-0.10125*		-0.37533**		0.02157**	
	(-1.69)		(-1.65)		(-2.11)		(2.29)	
AGE_OUTSIDERD		0.04642*		0.08769*		0.51521***		-0.02547***
		(1.76)		(1.88)		(3.8)		(-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 OLS Regressions: Education Effect

Model 1D and Model 1E are fitted using a sample of 7,784 observations. The coefficients and t values (in parentheses) are reported in Panel A. 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. Education dummies include BDEGREE, BGRADUATE, MBA and BBACHELOR. BDEGREE equals 1 if CEO holds any university-level degree in business and 0 otherwise. BGRADUATE equals 1 if CEO holds any graduate degree in business and 0 otherwise. MBA equals 1 if CEO holds an MBA degree and 0 otherwise. BBACHELOR equals 1 if CEO holds any bachelor degree in business and 0 otherwise. The interactive variables including AGE_BDEGREE, AGE_BGRADUATE, AGE_MBA and AGE_BBACHELOR are defined as the product of AGE and education dummies. Panel B reports the industry-adjusted results.

Panel A. OLS regressions using different education dummies

	Dependent Variable							
	SALESCHG		**ASSETSCHG**		**TOBINQ**		**ROA**	
Independent Variable	Model 1D	Model 1E	Model 1D	Model 1E	Model 1D	Model 1E	Model 1D	Model 1E
Panel A1. Education Dummy: Degree in Business (BDEGREE)								
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
BDEGREE	-2.02953*		-0.91344		-16.47919***		1.42832***	
	(-1.72)		(-0.43)		(-2.7)		(4.78)	
AGE	-0.55378***	-0.53976***	-0.95636***	-0.94927***	-3.25649***	-3.13725***	0.00118	0.06273***
	(-5.94)	(-5.78)	(-5.69)	(-5.64)	(-6.76)	(-6.5)	(0.05)	(3.99)
AGE_BDEGREE		-0.02845		-0.01539		-0.2491**		0.02533***
		(-1.34)		(-0.4)		(-2.27)		(4.71)
Number of Obs.	7784	7784	7784	7784	7784	7784	7784	7784
F Value	38.93	38.79	17.81	17.81	56.35	56.10	91.35	91.27
R-Square	0.0431	0.0430	0.0202	0.0202	0.0612	0.0610	0.0956	0.0956
Adj. R-Square	0.0420	0.0419	0.0191	0.0191	0.0602	0.0599	0.0946	0.0945
Panel A2. Education Dummy: Graduate Degree in Business (BGRADUATE)								
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
BGRADUATE	-1.54321		-2.11123		-1.84992		0.87436***	
	(-1.27)		(-0.96)		(-0.29)		(2.83)	
AGE	-0.547***	-0.54047***	-0.95211***	-0.94213***	-3.21051***	-3.21053***	-0.00341	-0.00918
	(-5.87)	(-5.78)	(-5.67)	(-5.59)	(-6.66)	(-6.64)	(-0.14)	(-0.39)
AGE_BGRADUATE		-0.02183		-0.03274		-0.00431		0.01812***
		(-0.99)		(-0.83)		(-0.04)		(3.25)
Number of Obs.	7784	7784	7784	7784	7784	7784	7784	7784
F Value	38.77	38.70	17.89	17.87	55.50	55.49	89.54	89.85
R-Square	0.0430	0.0429	0.0203	0.0203	0.0604	0.0604	0.0939	0.0942
Adj. R-Square	0.0418	0.0418	0.0192	0.0191	0.0593	0.0593	0.0929	0.0932

Panel A. (Continued)

	Dependent Variable							
	SALESCHG		ASSETSCHG		TOBINQ		ROA	
Independent Variable	Model 1D	Model 1E	Model 1D	Model 1E	Model 1D	Model 1E	Model 1D	Model 1E
Panel A3. Education Dummy: MBA Degree (MBA)								
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
MBA	-0.6848		-1.04296		7.11094		0.68921**	
	(-0.54)		(-0.46)		(1.09)		(2.16)	
AGE	-0.54879***	-0.54659***	-0.95463***	-0.95001***	-3.20705***	-3.24232***	-0.00219	-0.00603
	(-5.88)	(-5.85)	(-5.68)	(-5.65)	(-6.66)	(-6.72)	(-0.09)	(-0.25)
AGE_MBA		-0.00815		-0.01841		0.14336		0.01589***
		(-0.36)		(-0.45)		(1.22)		(2.76)
Number of Obs.	7784	7784	7784	7784	7784	7784	7784	7784
F Value	38.62	38.60	17.81	17.81	55.63	55.67	89.13	89.49
R-Square	0.0428	0.0428	0.0202	0.0202	0.0605	0.0605	0.0935	0.0939
Adj. R-Square	0.0417	0.0417	0.0191	0.0191	0.0594	0.0595	0.0925	0.0928
Panel A4. Education Dummy: Bachelor Degree in Business (BBACHELOR)								
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
BBACHELOR	-2.80342*		-1.02768		-31.55069***		1.25259***	
	(-1.8)		(-0.37)		(-3.93)		(3.18)	
AGE	-0.56242***	-0.55194***	-0.95907***	-0.95537***	-3.37087***	-3.25516***	0.00363	-0.00097
	(-6.01)	(-5.92)	(-5.69)	(-5.68)	(-6.98)	(-6.76)	(0.15)	(-0.04)
AGE_BBACHELOR		-0.04258		-0.01734		-0.50578***		0.02004***
		(-1.49)		(-0.34)		(-3.43)		(2.77)
Number of Obs.	7784	7784	7784	7784	7784	7784	7784	7784
F Value	38.96	38.84	17.80	17.80	57.32	56.88	89.79	89.50
R-Square	0.0432	0.0430	0.0202	0.0202	0.0622	0.0618	0.0942	0.0939
Adj. R-Square	0.0421	0.0419	0.0191	0.0191	0.0611	0.0607	0.0931	0.0928

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

Panel B. OLS regressions using different education dummies (Industry-adjusted)

	Dependent Variable							
	SALESCHG		ASSETSCHG		TOBINQ		ROA	
Independent Variable	Model 1D	Model 1E	Model 1D	Model 1E	Model 1D	Model 1E	Model 1D	Model 1E
Panel B1. Education Dummy: Degree in Business (BDEGREE)								
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
BDEGREE	-1.3983		-0.02725		-13.02741**		0.53264*	
	(-1.21)		(-0.01)		(-2.18)		(1.71)	
AGE	-0.46087***	-0.45169***	-0.86291***	-0.86249***	-3.32686***	-3.23327***	-0.03921	-0.04365*
	(-5.09)	(-4.97)	(-5.21)	(-5.19)	(-7.11)	(-6.9)	(-1.6)	(-1.78)
AGE_BDEGREE		-0.01807		-0.00112		-0.19445*		0.00993*
		(-0.87)		(-0.03)		(-1.81)		(1.77)
Number of Obs.	7784	7784	7784	7784	7784	7784	7784	7784
F Value	35.67	35.59	16.00	16.00	39.78	39.61	110.58	110.60
R-Square	0.0397	0.0396	0.0182	0.0182	0.0440	0.0438	0.1135	0.1135
Adj. R-Square	0.0385	0.0385	0.0170	0.0170	0.0429	0.0427	0.1125	0.1125
Panel B2. Education Dummy: Graduate Degree in Business (BGRADUATE)								
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
BGRADUATE	-0.82177		-1.02362		-1.03522		0.59968*	
	(-0.69)		(-0.47)		(-0.17)		(1.87)	
AGE	-0.45638***	-0.45349***	-0.86168***	-0.8574***	-3.29252***	-3.29625***	-0.04124*	-0.04563*
	(-5.04)	(-4.99)	(-5.2)	(-5.15)	(-7.04)	(-7.02)	(-1.69)	(-1.86)
AGE_BGRADUATE		-0.01016		-0.01446		0.0068		0.01348**
		(-0.47)		(-0.37)		(0.06)		(2.33)
Number of Obs.	7784	7784	7784	7784	7784	7784	7784	7784
F Value	35.56	35.53	16.02	16.01	39.23	39.23	110.65	110.89
R-Square	0.0395	0.0395	0.0182	0.0182	0.0434	0.0434	0.1136	0.1138
Adj. R-Square	0.0384	0.0384	0.0171	0.0171	0.0423	0.0423	0.1125	0.1127

Panel B. (Continued)

	Dependent Variable							
	SALESCHG		ASSETSCHG		TOBINQ		ROA	
Independent Variable	Model 1D	Model 1E	Model 1D	Model 1E	Model 1D	Model 1E	Model 1D	Model 1E
Panel B3. Education Dummy: MBA Degree (MBA)								
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
MBA	-0.51358		-0.69163		4.6124		0.57913*	
	(-0.42)		(-0.31)		(0.73)		(1.75)	
AGE	-0.45735***	-0.45579***	-0.8629***	-0.85957***	-3.29331***	-3.31656***	-0.04051*	-0.04405*
	(-5.05)	(-5.02)	(-5.21)	(-5.18)	(-7.04)	(-7.08)	(-1.66)	(-1.8)
AGE_MBA		-0.00619		-0.01327		0.0928		0.01414**
		(-0.28)		(-0.33)		(0.81)		(2.36)
Number of Obs.	7784	7784	7784	7784	7784	7784	7784	7784
F Value	35.52	35.51	16.01	16.01	39.29	39.31	110.59	110.91
R-Square	0.0395	0.0395	0.0182	0.0182	0.0435	0.0435	0.1135	0.1138
Adj. R-Square	0.0384	0.0384	0.0171	0.0171	0.0424	0.0424	0.1125	0.1128
Panel B4. Education Dummy: Bachelor Degree in Business (BBACHELOR)								
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included
BBACHELOR	-2.54501*		-0.57138		-28.36237***		0.23738	
	(-1.67)		(-0.21)		(-3.61)		(0.58)	
AGE	-0.46975***	-0.46021***	-0.86563***	-0.8637***	-3.43236***	-3.32856***	-0.0394	-0.0404*
	(-5.17)	(-5.08)	(-5.21)	(-5.21)	(-7.32)	(-7.12)	(-1.61)	(-1.65)
AGE_BBACHELOR		-0.03802		-0.01123		-0.45661***		0.00215
		(-1.36)		(-0.22)		(-3.17)		(0.29)
Number of Obs.	7784	7784	7784	7784	7784	7784	7784	7784
F Value	35.82	35.72	16.00	16.00	40.74	40.39	110.25	110.22
R-Square	0.0398	0.0397	0.0182	0.0182	0.0450	0.0447	0.1132	0.1132
Adj. R-Square	0.0387	0.0386	0.0171	0.0171	0.0439	0.0436	0.1122	0.1121

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

Table 6 Two-Breakpoint Piecewise Regressions

Model 2A is fitted by using a sample of 9,051 observations. The coefficients and t values (in parentheses) are reported in Panel A. 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. The piecewise variables AGE_BP1, AGE_BP1BP2 and AGE_BP2 are defined by the following equations. Panel B reports the industry-adjusted results.

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

Panel A. Piecewise regressions based on different breakpoint combinations

	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	-1.92706***	-1.96638***	-1.95071***	-1.19223***	-1.17933***	-0.82024***
	(-7.62)	(-7.24)	(-7.97)	(-7.43)	(-7.71)	(-7.24)
AGE_BP1BP2	0.06363	0.22372	0.08067	0.63157*	0.4171**	1.32544***
	(0.35)	(0.6)	(0.58)	(1.77)	(1.99)	(2.87)
AGE_BP2	-0.14964	-0.10544	-0.50887	-0.19906	-0.6341*	-0.7936**
	(-0.64)	(-0.64)	(-1.4)	(-0.82)	(-1.71)	(-2.02)
Number of Obs.	9051	9051	9051	9051	9051	9051
F Value	64.23	64.24	64.40	62.94	63.17	62.18
R-Square	0.0663	0.0664	**0.0665**	0.0651	0.0653	0.0644
Adj. R-Square	0.0653	0.0653	**0.0655**	0.0641	0.0643	0.0633

	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	-2.68617***	-2.68497***	-2.68698***	-1.75232***	-1.69374***	-1.17551***
	(-6.09)	(-5.67)	(-6.29)	(-6.26)	(-6.34)	(-5.95)
AGE_BP1BP2	-0.01726	0.06475	-0.04167	0.89115	0.41394	1.30227
	(-0.05)	(0.1)	(-0.17)	(1.43)	(1.13)	(1.62)
AGE_BP2	-0.36017	-0.23173	-0.69865	-0.464	-0.87074	-0.97215
	(-0.89)	(-0.81)	(-1.1)	(-1.1)	(-1.34)	(-1.42)
Number of Obs.	9051	9051	9051	9051	9051	9051
F Value	28.76	28.74	28.81	28.19	28.19	27.41
R-Square	0.0308	0.0308	**0.0309**	0.0302	0.0302	0.0294
Adj. R-Square	0.0298	0.0297	**0.0298**	0.0292	0.0292	0.0284

Panel A. (Continued)

	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	-11.39992***	-12.19798***	-11.14339***	-6.48399***	-6.24173***	-4.39093***
	(-8.78)	(-8.75)	(-8.87)	(-7.86)	(-7.94)	(-7.54)
AGE_BP1BP2	0.74272	3.6016*	0.18024	2.96507	1.12272	3.94475*
	(0.79)	(1.89)	(0.25)	(1.62)	(1.04)	(1.66)
AGE_BP2	-2.01673*	-1.70234**	-3.05097	-2.00065	-3.26815*	-3.5235*
	(-1.68)	(-2.02)	(-1.63)	(-1.61)	(-1.71)	(-1.75)
Number of Obs.	9051	9051	9051	9051	9051	9051
F Value	60.09	60.35	60.07	57.62	57.57	56.35
R-Square	0.0623	**0.0626**	0.0623	0.0599	0.0599	0.0587
Adj. R-Square	0.0613	**0.0615**	0.0613	0.0589	0.0588	0.0576

	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	0.28692***	0.26446***	0.28464***	0.16839***	0.15232***	0.06218**
	(4.45)	(3.82)	(4.56)	(4.11)	(3.9)	(2.15)
AGE_BP1BP2	-0.11549**	-0.07855	-0.10505***	-0.31622***	-0.19388***	-0.30448***
	(-2.47)	(-0.83)	(-2.97)	(-3.47)	(-3.62)	(-2.59)
AGE_BP2	-0.01811	-0.07428*	0.06185	0.01385	0.0984	0.10265
	(-0.3)	(-1.77)	(0.67)	(0.22)	(1.04)	(1.03)
Number of Obs.	9051	9051	9051	9051	9051	9051
F Value	84.19	84.06	84.32	84.15	84.07	82.82
R-Square	0.0852	0.0851	**0.0853**	0.0852	0.0851	0.0839
Adj. R-Square	0.0842	0.0841	**0.0843**	0.0842	0.0841	0.0829

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

Panel B. Piecewise regressions based on different breakpoint combinations (Industry-adjusted)

	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

Panel B. (Continued)

	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 7 Four-Breakpoint Piecewise Regressions

Model 2B is fitted using the total sample of 9,051 observations. The coefficients and t values (in the parentheses) are reported in Panel A. 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. The piecewise variables AGE_50, AGE_5055, AGE_5560, AGE_6065 and AGE_65 are defined by the following equations. Panel B reports the industry-adjusted results.

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

Panel A. Piecewise regressions with four breakpoints

Breakpoints (50, 55, 60, 65)				
	Dependent Variable			
	SALESCHG	**ASSETSCHG**	**TOBINQ**	**ROA**
Independent Variable				
Control Variables	Included	Included	Included	Included
AGE_50	-1.97399***	-2.66918***	-12.26781***	0.25253***
	(-7.23)	(-5.6)	(-8.75)	(3.62)
AGE_5055	0.29355	-0.04271	4.1551*	0.00862
	(0.68)	(-0.06)	(1.87)	(0.08)
AGE_5560	-0.43372	-0.19861	-3.20371	-0.20225*
	(-0.95)	(-0.25)	(-1.36)	(-1.73)
AGE_6065	0.74009	0.25401	0.83331	-0.0856
	(1.38)	(0.27)	(0.3)	(-0.62)
AGE_65	-0.68549*	-0.78549	-2.92775	0.06515
	(-1.74)	(-1.14)	(-1.45)	(0.65)
Number of Obs.	9051	9051	9051	9051
F Value	53.82	24.01	50.36	70.36
R-Square	0.0667	0.0309	0.0627	0.0854
Adj. R-Square	0.0654	0.0296	0.0614	0.0842

Panel B. Piecewise regressions with four breakpoints (Industry-adjusted)

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 8 Piecewise Regressions: Firm Size Analysis

Based on the four quartiles of firm size, the total sample of 9,051 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. Model 2A is fitted using each of these four groups, and the breakpoint combination is (50, 65). Panel A reports the coefficients and t values (in the parentheses). 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. The piecewise variables AGE_50, AGE_5065 and AGE_65 are defined by the following equations. Panel B reports the industry-adjusted results.

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

Panel A. Piecewise regressions on ROA among different firm size groups

	Dependent Variable: **ROA**			
	First Quartile	First & Second Quartiles	Fourth Quartile	Third & Fourth Quartiles
Independent Variable				
Control Variables	Included	Included	Included	Included
AGE_50	0.09134	0.18223**	0.35297***	0.31582***
	(0.63)	(1.99)	(3.54)	(4.69)
AGE_5065	0.02729	-0.09609	-0.10338***	-0.0693**
	(0.26)	(-1.57)	(-2.68)	(-2.45)
AGE_65	0.67308**	0.21929	-0.2476**	-0.09581
	(2.41)	(1.37)	(-2.48)	(-1.3)
Number of Obs.	2263	4526	2262	4525
F Value	91.34	103.36	21.43	34.36
R-Square	0.2886	0.1863	0.0869	0.0707
Adj. R-Square	0.2854	0.1845	0.0829	0.0687

Panel B. Piecewise regressions on ROA among different firm size groups (Industry-adjusted)

	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 9 Logistic Regressions: Scheduled Retirement at Age 65

Model 3A to Model 3G, each is fitted using a sample of 416 observations. The coefficients and t values (in parentheses) are reported in Panel A. 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. Panel B reports the industry-adjusted results. Model 3C and Model 3D are not presented in Panel B. The independent variables in these two models are CEO characteristic dummies.

Panel A. Logistic regressions when the scheduled retirement age is 65 years old

	Model 3A	Model 3B	Model 3C	Model 3D	Model 3E	Model 3F	Model 3G
Independent Variable							
Intercept	-4.29257***	11.27411***	-0.99076***	0.1814	4.72848**	-2.98371***	-2.2917***
	(6.2)	(5.44)	(3.13)	(0.76)	(2.24)	(3.57)	(2.78)
SALESCHG	-0.00561				-0.00739	-0.00208	-0.00305
	(0.84)				(0.98)	(0.28)	(0.44)
ASSETSCHG	-0.00877				-0.00737	-0.01015	-0.00816
	(1.3)				(1.05)	(1.44)	(1.19)
TOBINQ	-0.00278**				-0.00247**	-0.00264**	-0.0021*
	(2.43)				(1.98)	(2.25)	(1.85)
ROA	0.05051***				0.05279***	0.04921***	0.04512**
	(3.05)				(2.69)	(2.7)	(2.55)
SIZE	0.54891***				0.62234***	0.29338***	0.33208***
	(6.44)				(4.72)	(2.65)	(3.1)
SALARY		0.00005			-0.00131***		
		(0.17)			(3.24)		
OWNERSHIP		-4.86859***			-3.71483***		
		(5.64)			(4.87)		
CEOEXPER		0.01954			0.02263		
		(1.23)			(1.34)		
NONCEOEXPER		0.02425***			0.01157		
		(2.61)			(1.16)		
SALARYD			0.56049**	0.74208***		0.06369	0.20464
			(2.23)	(3.03)		(0.22)	(0.71)
OWNERSHIPD			-2.01073***	-1.78898***		-1.82436***	-1.57346***
			(7.81)	(7.31)		(6.7)	(6.1)
CEOEXPERD			0.95098***			1.04438***	
			(3.38)			(3.59)	
NONCEOEXPERD			0.82248***			0.59871**	
			(3.48)			(2.41)	
OUTSIDERD				-0.50405**			-0.20578
				(2.05)			(0.79)
Number of Obs.							
Retired	200	200	200	200	200	200	200
Not Retired	216	216	216	216	216	216	216
Total	416	416	416	416	416	416	416
% Concordant	74.5	77.9	74.3	69.4	82.5	81.5	79.8
Goodness-of-Fit (Prob. > χ^2)	0.0764	0.4466	0.5190	0.0042	0.0048	0.0366	0.2606
Pseudo R-Square	0.1268	0.1895	0.1979	0.1672	0.2475	0.2293	0.1998

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

Panel B. Logistic regressions when the scheduled retirement age is 65 years old (Industry-adjusted)

	Model 3A	Model 3B	Model 3E	Model 3F	Model 3G
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 10 Logistic Regressions: Scheduled Retirement at Age 64 to 66

Model 3A to Model 3G, each is fitted using a sample of 733 observations. The coefficients and t values (in parentheses) are reported in Panel A. Dependent variable equals 1 if the CEO retired at the scheduled retirement age 64 to 66. It 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. Panel B reports the industry-adjusted results. Model 3C and Model 3D are not presented in Panel B. The independent variables in these two models are CEO characteristic dummies.

Panel A. Logistic regressions when the scheduled retirement age is 64 to 66 years old

	Model 3A	Model 3B	Model 3C	Model 3D	Model 3E	Model 3F	Model 3G
Independent Variable							
Intercept	-3.64043***	8.66697***	-0.49601**	0.65008***	4.54027***	-2.082***	-1.26537**
	(7.67)	(7.14)	(2.07)	(3.35)	(3.3)	(3.66)	(2.22)
SALESCHG	-0.00909*				-0.00729	-0.0061	-0.00543
	(1.9)				(1.39)	(1.13)	(1.05)
ASSETSCHG	-0.00314				-0.00216	-0.00284	-0.00242
	(0.7)				(0.46)	(0.57)	(0.51)
TOBINQ	-0.00136*				-0.00029	-0.00047	-0.00006
	(1.91)				(0.37)	(0.59)	(0.1)
ROA	0.0389***				0.02806**	0.02899**	0.02514*
	(3.17)				(2.02)	(2.08)	(1.85)
SIZE	0.49027***				0.40039***	0.21197***	0.23468***
	(8.47)				(4.31)	(2.85)	(3.22)
SALARY		0.00049**			-0.00045		
		(2.11)			(1.5)		
OWNERSHIP		-3.6955***			-3.00025***		
		(7.37)			(6.29)		
CEOEXPER		-0.00488			-0.00786		
		(0.41)			(0.66)		
NONCEOEXPER		0.02913***			0.02008***		
		(4.05)			(2.66)		
SALARYD			0.46955**	0.66442***		0.11707	0.28578
			(2.36)	(3.42)		(0.51)	(1.27)
OWNERSHIPD			-2.01561***	-1.83274***		-1.85217***	-1.67738***
			(10.58)	(10.06)		(9.2)	(8.68)
CEOEXPERD			0.7496***			0.76531***	
			(3.48)			(3.47)	
NONCEOEXPERD			0.91315***			0.74057***	
			(5.06)			(3.95)	
OUTSIDERD				-0.76997***			-0.58904***
				(4.02)			(2.94)
Number of Obs.							
Retired	415	415	415	415	415	415	415
Not Retired	318	318	318	318	318	318	318
Total	733	733	733	733	733	733	733
% Concordant	72.2	77.9	75.0	70.1	79.7	81.1	80.2
Goodness-of-Fit (Prob. > χ^2)	0.0726	0.0499	0.0981	0.0358	0.3542	0.0100	0.0000
Pseudo R-Square	0.1086	0.1975	0.2028	0.1834	0.2236	0.2181	0.2007

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

Panel B. Logistic regressions when the scheduled retirement age is 64 to 66 years old (Industry-adjusted)

	Model 3A	Model 3B	Model 3E	Model 3F	Model 3G
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.