

**You Can't Take It With You:  
Sunset Provisions for Equity Compensation  
When Managers Retire, Resign, or Die**

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**Abstract**

Company stock option plans have diverse “sunset” policies for modifying terms of options held by managers who exit the firm. In our S&P 500 sample, these forfeiture, vesting, and expiration provisions are less generous in companies characterized by fast growth, dependence on skilled human capital, and high strategic interaction with competitors. While these results apply for workers who retire at the end of their careers, almost no variation exists in the treatment of workers who resign with the possibility of working elsewhere. We show that these features of firms’ option plans directly impact management turnover. For CEOs over age 60, companies’ sunset rules imply large discounts to option award values and estimates of total compensation.

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**I Introduction**

This study investigates how companies treat executive stock options when managers leave their positions due to retirement, resignation, or death. The substantial literature analyzing executive options generally assumes that they terminate immediately or within a short period after managers exit the firm.<sup>1</sup> In reality, companies have diverse policies, which we call “sunset” regulations, for how to modify the options of managers who leave the firm.

Sunset rules can lead to major changes in option awards’ vesting schedules and expiration dates when managers leave the company. Firms may set their sunset rules either tightly or leniently. Tight sunset rules would imply that a firm is very concerned with worker retention, since option holders exiting the firm would suffer large value losses. Lenient sunset

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<sup>1</sup> For example, the stopping state model introduced by Carpenter (1998) requires that when leaving the firm, “the executive exercises the option if it is in the money and vested, or else forfeits the option.” A survey of option pricing models by Ammann and Seiz (2004) includes a similar characterization, common to a wide range of models, that “if the employee leaves after the vesting period, the option is forfeited if it is out of the money and exercised (immediately) if it is in the money.” A theory paper by Bulow and Shoven (2005) opens with the assertion that “Most employee options must be exercised within 90 days of the termination of employment.” The authors give no empirical support for this claim, which they use to motivate a proposal to account for all vested stock options as 90-day options, extended every quarter. All of these models will under-state the value of options to employees, as well as their cost to issuing companies, if workers are allowed to retain significant option value when exiting a company.

rules might be used for an entirely different motive, to lengthen the investment horizons of managers by allowing them to continue holding their stock options long after they leave the company. Either the retention motive or the horizon motive might be important in companies with significant growth options or long-term investment opportunities.

Our main empirical result is a demonstration that for most firms, the retention motive dominates the horizon motive, as stronger sunset rules related to management retirement are systematically associated with variables related to growth opportunities. We also find that when retirement sunset rules are strong, firms exhibit lower frequencies of management turnover, again consistent with these rules being used for retention. However, we find that sunset rules related to resignations, rather than retirements, are generally quite harsh and exhibit little cross-sectional variation related to the characteristics of different firms.

Strong sunset rules also imply material reductions to the apparent award date values of options given to executives who are near retirement age. Using our dataset, we estimate that the sample mean value of new option awards should be reduced by more than half, and total CEO compensation should be reduced by as much as 25%, for CEOs aged 65 and older, if one assumes that these CEOs expect to retire in one year. We also derive large discounts to estimated means of option compensation and total compensation for CEOs at all ages above 60, based upon an assumption that these CEOs expect to retire at age 65.

Although we lack precise data about how frequently sunset rules impact the value of equity compensation, we can infer some basic estimates by studying option holdings and executive turnover in the population of top managers covered by the ExecuComp database for our sample of S&P 500 companies. Within this group, the annual turnover frequency is

approximately 12.8%, implying that the half-life of a typical manager's stay with each firm is just over five years and the expected interval between changing jobs is about 7.6 years.<sup>2</sup> At the end of their last years listed on ExecuComp, on average managers hold approximately 5.4 years worth of unexercised option awards. These data are consistent with a clear majority of option exercises taking place after managers leave their companies, implying that firms' sunset rules for vesting, forfeiture, and truncation eventually become operative for most option awards.

Our research adds to a relatively thin literature of four papers that have studied inter-firm differences in the design and implementation of executive stock option plans. These studies include Kole (1997), who examines companies' different vesting rules for options; Pasternack and Rosenberg (2003), who study exercise prices and dividend protection in the option plans of Finnish firms; Chen (2004), who studies repricing restrictions in U.S. firms' option plans; and Sautner and Weber (2006), who examine a variety of aspects of European companies' option plans. The Sautner and Weber study is the most comprehensive to date, but the variables it examines, including accounting choices, completeness of disclosure, and performance targets for options to become exercisable, have little relevance for most U.S. firms since accounting and disclosure practices are mandatory, and performance targets for options to become exercisable remain relatively rare.

The remaining sections of this paper are organized as follows. Section II provides a description of the data and an overview of different option sunset rules. Section III studies

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<sup>2</sup> Turnover rates for lower-level employees are probably higher than these estimates for top managers, implying even greater importance for firms' sunset rules. Although employee turnover data does not exist for individual companies, we tabulate industry level turnover data compiled by the U.S. Bureau of Labor Statistics between 2001 and 2006 in its monthly Job Openings and Labor Turnover Survey (JOLTS) survey. If the firms in our sample exhibited employee turnover at the mean levels of their respective industries in the JOLTS survey, the turnover rate for ordinary workers in these companies would be about 34.0% per year.

cross-sectional differences in sunset rules among companies. Section IV provides analysis indicating that sunset rules have significant associations with rates of executive turnover.

Section V contains conclusions.

## **II Data description**

### *A. Data collection*

Our dataset is drawn from the most recent shareholder-approved equity compensation plans in effect for companies in the Standard & Poor's 500 index in the Fall of 2005. SEC disclosure rules require the full text of each plan to be filed as an attachment to a Form 10-K, 10-Q, 14-A (proxy statement), or 8-K during the fiscal quarter in which the plan goes into effect. In each subsequent year, a company's 10-K filing includes an Exhibit Index cross-referencing the documents where one can obtain the full text of all compensation plans then in effect. These plans usually contain information about the vesting schedules, forfeiture rules, and other parameters of stock option awards, but some plans use vague or general language and leave the specific terms to the discretion of a board of directors subcommittee (usually its compensation or stock option committee). In such cases, we frequently find this information in a term sheet written by the board subcommittee and also filed with the SEC.

Equity compensation plans in many firms also provide for restricted stock, performance shares, or other derivative forms of equity pay. We limit our analysis to stock options, because their role in executive compensation is far larger than these other instruments. Our reading of many firms' plans indicates that restricted stock, when authorized, very often has sunset rules for vesting and forfeiture exactly matching those for stock options, so we believe our conclusions

about option compensation apply in a straightforward way to all types of equity pay.

Table 1 indicates that we locate the option plans and/or term sheets for 389 of the 500 companies in the S&P 500 index, and these firms comprise the sample for analysis presented below. Of the 111 S&P 500 companies not in our sample, the large majority lack an SEC filing describing their sunset rules with adequate specificity. A minority of missing firms, 21 companies, are omitted because they either have no option plan in effect or have recently announced an intention to stop awarding options as compensation.

Our data collection focuses on two aspects of stock options: whether the expiration date changes when an executive leaves the firm, and whether provisions for vesting or exercisability change.

### *B. Changes to option life*

Table 2 presents basic summary statistics about option life before and after an employee leaves the firm. In the top half of the table, data indicate that ten-year options are awarded by an overwhelming majority of companies, in line with a longstanding practice that can be traced to personal income tax preferences that require options to expire in ten years or less. The lower half of Table 2 shows how much option life is retained by managers who leave their companies, and the full distributions of these data are plotted in Figure I. We report the maximum time permitted for executives to exercise their options; in cases in which the option already had less life remaining than the maximum permitted under the plan, the shorter time will apply.<sup>3</sup> We

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<sup>3</sup> A small number of companies permit minor increases in option life under certain conditions; for example, in cases of death some firms leave intact the expiration date of the decedent's options but specify that the estate will have no less than 6 months to exercise should the options' expiration be imminent. Because these adjustments are rare, generally small, and incompatible with most of our data definitions, we do not incorporate them into our analysis.

tabulate data for three different types of departures: resignations, retirements, and deaths.<sup>4</sup> Resignations are mid-career departures of executives who presumably will take other jobs, perhaps with competitor firms. Retirements are distinguished from resignations in most firms by a formula tied to age and years of service, though more than half of our sample companies do not make clear disclosures of these guidelines. In a minority of companies, no distinction is drawn between resignation and retirement, and the same sunset provisions for equity pay apply in either case. Deaths in office are analyzed as a benchmark for the other two categories of departure; deaths present a useful baseline because of the complete absence of any moral hazard issue related to the executive's departure from the firm, as well as the lack of concern that the executive may work elsewhere.<sup>5</sup>

Data in Table 2 and Figure I show that mid-career resignations generally lead to elimination of the large majority of option life, as more than 85% of companies give managers three months or less to exercise their options after a resignation (just over half of company resignation policies appear to follow the 90-day rule that is the focus of the model in Bulow and Shoven (2005), though the fraction is far less for retirements and deaths). Retirements are treated much differently. The mean and median option life retained when executives retire is 4.4 and 3.0 years, respectively, and a significant fraction of companies permit executives to hold

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<sup>4</sup> These three types of departures are mentioned in nearly every company's plan. A significant minority of firms have additional rules for departures that occur for such reasons as layoffs (involuntary terminations) or permanent disability. When present, we find that the sunset rules for layoffs are often close to identical to the rules for resignations, and the rules for disability are very similar to those for cases of death.

<sup>5</sup> One firm, Synovus Financial, goes to great length to distinguish between suicides and other causes of death in its 2002 Long Term Incentive Plan, which mentions suicide no less than eight times. Similar to other companies, Synovus in cases of death provides for accelerated vesting of equity compensation and a long period for the optionee's estate to exercise, but only if the deceased manager did not take his own life. The company did not respond to our inquiry asking about the reasons for this safeguard against the moral hazard problem of executives killing themselves in order to achieve more rapid vesting of their options.

their options for their full term in cases of retirement. For deaths in office, the deceased executive's heirs or estate inherit the right to exercise the option, and the mean and median periods permitted for exercise are 3.2 and 1.0 years, respectively. Figure I shows that, in terms of firms' leniency toward option holders, death represents an intermediate state between resignation, which generally leads to large reductions in option values, and retirement, in which optionees are often treated generously.

### *C. Changes in vesting schedules*

Along with the possible truncation of option maturity, equity compensation plans also include regulations for how to treat options that have not yet vested at the time that an executive leaves the firm. In this case, sunset rules could lead either to a reduction of option value, which would occur if the unvested options are forfeited in whole or in part, or possibly an increase in value, if the executive's departure triggers more rapid vesting of options than would be the case if he stayed employed.<sup>6</sup> Detail about these regulations appears in Table 3.

The table begins with information about the overall vesting schedules for firms in the sample. Of the 389 firms that we study, we were unable to determine vesting rules for 30, although we do know their sunset rules for treatment of unvested options (whatever the vesting schedule) when an optionee leaves. The remaining 359 firms for which we have complete information feature 89 distinct vesting schedules; the most popular schedules call for annual

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<sup>6</sup> Earlier vesting would increase the options' subjective value to an employee. However, it could also reduce the expected cost to shareholders by triggering value-destroying earlier exercise.



vesting of awards in three or four tranches at each anniversary of the award date.<sup>7</sup> To analyze the wide range of schedules, we summarize vesting information using a handful of statistics, including the weighted average time for a company's entire award to vest, the median time to vest (the time after which half of more of the options are exercisable), and the time for 100% of an award to vest. Panel A at the top of Table 3 presents information about these statistics. The data indicate that the weighted average time for an award to vest is about two and a half years, and the median vesting time is about two years.

In the center of Table 3, Panel B shows information about the treatment of unvested options for executive departures in the three categories of resignation, retirement, and death. The treatments range from immediate accelerated vesting, the most favorable case, which is shown in the top row, and forfeiture of all unvested options, the most punitive case, which is shown in the bottom row. Clear disparities exist in the treatment of options across the three states. Nearly all companies – 96% of the sample – cancel unvested options in cases of resignation, but these forfeiture frequencies are much smaller – 44% and 35% – in cases of retirement and death, respectively. About 60% of firms allow for immediate or continuing vesting of options in cases of death, and about 50% of firms do so for retirees.<sup>8</sup> As shown in the table, a small minority of firms have regulations that call for partial forfeiture of unvested options in any or all of the three types of separations, with the fraction of options forfeited

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<sup>7</sup> Some firms make option awards with several different vesting schedules, even though the awards might occur in the same year. In such cases we use the most common schedule, which can usually be ascertained easily from information in the annual proxy statement. A small minority of firms attach performance conditions to the vesting of option awards, particularly for managers at the very top of the hierarchy such as the CEO. We ignore these contingent vesting schedules for purposes of this study and focus instead on vesting schedules for generic options.

<sup>8</sup> Options that continue on their original vesting schedules will eventually become exercisable with the passage of time, unless the firm also has truncation rules (see above) that shorten the option life so that the new expiration date falls before the completion of vesting.

calculated according to a fixed rule or a pro rata schedule with respect to the passage of time since the award date.

*D. Substitute and complement relation of sunset rules*

Data from Tables 2 and 3 indicate that optionees can lose substantial value when leaving their firms either because of the truncation of option life or the forfeiture of unvested options. An obvious question is whether these two types of adjustments operate as substitutes, complements, or orthogonally, and Panel C of Table 3 presents data showing an unambiguous complementary relationship. For all three types of executive departures, the panel compares the average option life retained by optionees who receive the most lenient treatment of unvested options – immediate, accelerated vesting – to those who receive the harshest treatment – complete forfeiture. The average life retained is far higher in firms that provide for accelerated vesting. The data therefore show that when firms wish to recoup option value from executives who leave the company, they tend to do so in two ways at once, both shortening the options’ lives and canceling options that have not yet vested, so that sunset rules operate strongly as complements with respect to one another.

In contrast, we find a substitute relation between sunset rules and the presence of defined benefit pension plans for CEOs. These pension plans act as management retention devices and are generally structured to give managers incentives to stay with their firms until a “normal retirement age,” which is often age 65 (Sundaram and Yermack, 2007). We use ExecuComp data to identify companies in our sample that also maintain defined benefit CEO pensions; our sample exhibits an almost even 50-50 split between companies that have CEO pension plans and

those that do not. We find a clear pattern more lenient sunset rules, which reduce the costs of early exit for CEOs, in firms with CEO pensions, which increase the costs of early exit: for example, the average months of option life retained in retirement are 69 in firms with pension plans vs. 37 in other firms (t-statistic 7.43), and the fraction of firms in which unvested options are forfeited at retirement is 0.32 in firms with pension plans vs. 0.56 in other firms (t-statistic 4.87).

We also examine the related question of whether the value of CEO option awards are adjusted to take account of vesting, forfeiture, and related provisions. Using data for our sample companies in 2004, we model their CEOs' annual stock option award values as a function of standard compensation variables, including firm size, industry, company performance, the CEO's percent ownership, and the CEO's age, among others. As dependent variables we use the Black-Scholes value of each CEO's award, the log of 1 plus this value, and the ratio of stock option award value to total compensation. We augment these regressions with various measures of the strength of each firm's sunset rules, including the weighted average time for options to vest, a dummy variable for whether unvested options are forfeited upon retirement, the number of months of option life retained by executives who retire, and the fraction of option award value lost when an executive receives an award and retires on year later. Despite trying various combinations of regressor variables, we find almost no evidence of statistical significance for any of the sunset rules upon cross-sectional values of awards to individual CEOs. Thus, neither the value of a CEO's option award nor the fraction of his total compensation in the form of options appear to be related to sunset provisions.

*E. Sunset rules and the apparent award date value of executive options*

Studies of executive turnover suggest that a large majority of managers should expect to leave their companies at or before age 65.<sup>9</sup> This timetable should affect the apparent value of new stock option awards to recipients with ages in the early to mid 60s. Members of this cohort would ordinarily not expect to remain employed for the entire option term, meaning that their firms' sunset rules would very likely lead to modifications in their options before expiration. We assess the impact of sunset rules upon ex ante option valuations using data about the stock option awards received by CEOs of our sample firms in 2004. We assume that each CEO will retire at age 65 or, if already past 65, then one year after the award. We recognize that these retirement assumptions are stylized and do not reflect the possibility of retirement dates depending endogenously upon sunset rules, so our results should be interpreted as suggestive.<sup>10</sup>

For each actual CEO option award, we ascertain how much, if any, would not have vested by the expected retirement date of age 65, and we apply the company's sunset rules for forfeiture and/or accelerated or pro-rata vesting, as appropriate. We also assume that the options' life is expected to change at each CEO's retirement, again using the company's sunset rules, and we use these rules to calculate shortened expiration dates for each CEO's options

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<sup>9</sup> The clearest demonstration of this appears in Table 1 of Coughlan and Schmidt (1985), the first published study of CEO turnover. That table shows that the unconditional turnover frequency for CEOs spikes upward at ages 63, 64, and 65, and that less than 10% of CEOs in office at any given time are over 65. More recent studies feature similar statistics; for example, Huson, Malatesta and Parrino (2004) show that the mean age for departing CEOs is 61.6 years, and the median is 63, with a standard deviation of 5.85 years. Hayes and Schaefer (1999) report mean ages of 61 for CEOs who die in office and 51 for CEOs who resign to take the top job at other firms.

<sup>10</sup> Research into CEO separation agreements indicates that, although boards of directors have the flexibility to waive sunset rules, this happens infrequently. Yermack (2006) presents data indicating that standard sunset rules for equity compensation are altered for only 8% of CEOs retiring voluntarily and 16% of CEOs who are dismissed, and some of these alterations relate only to restricted stock and not options. An interesting qualification to this result is that many exiting CEOs remain as participants in their firms' equity compensation plans and keep their options alive by continuing as members of their boards of directors after leaving the CEO post. However, post-CEO board service is relatively rare for dismissed CEOs and is generally of short tenure even in cases of friendly CEO succession.

whenever such an adjustment is relevant.

Table 4 presents the results of this analysis for three subsamples of CEOs: those aged 61-62, 63-64, and 65 or above. The table shows apparent option award values for these subsamples before and after application of each firm's sunset rules.<sup>11</sup> The impact of the sunset rules is significant: the values of options awarded to CEOs aged 61-62 should be reduced by a mean of 13%, while the mean reductions for CEOs in the two older age groups are 44% and 53%, respectively. Because option awards comprise roughly half of total CEO compensation for our sample firms, the impact of these reductions is extremely important.

Two qualifications to this analysis are important. First, many approaches to valuing executive options use a reduced expected option life to reflect the possibility of early exercise. If these reductions were imposed across-the-board, the dollar-value reductions calculated above would diminish. Second, the differences in option value that we find do not carry over as dramatically to calculations of incentives, as measured by the deltas of options or their change in value with respect to the underlying stock price.

### **III Cross-sectional determinants of sunset rules**

#### *A. Hypotheses*

Having described the distribution of sunset rules across companies, we now analyze how the strength of these rules varies cross-sectionally. Our null hypothesis is that sunset rules occur

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<sup>11</sup> For option valuation we use the Black-Scholes approach for ease of calculation. Many other valuation techniques have been applied to executive options, including binomial, stopping state, lattice, and utility-based models. Most of our analysis focuses upon the relative loss in option value caused by different sunset regulations, and we believe that within reasonable tolerances, these relative differentials should generally be invariant to the choice of valuation model. See Ammann and Seiz (2004).

randomly with no systematic connection to other firm characteristics. We explore two alternative hypotheses, related to well-known theories about how equity compensation is used to influence the long-term relationships between top executives and their firms. These theories have evolved around two main concerns: lengthening executives' investment horizons, and discouraging valuable executives from leaving the company.

In the academic literature, much of the early theoretical treatment of executive options studied whether they could influence managers to choose investment projects with long-horizon payoffs. Dechow and Sloan (1991) is probably the exemplar of this line of research, which focused upon using equity compensation to counter incentives for managers to cut investment spending in order to increase accounting profits near the end of their careers. Some empirical evidence for the horizon problem appears in Murphy and Zimmerman's (1993) study of company financial performance surrounding CEO turnover events.

If the horizon problem represents an important factor in management compensation, its influence should be most apparent in companies characterized by valuable long-term investment opportunities, loosely described as growth firms. These companies tend to require highly skilled managers who have expertise in selecting and implementing investments from the menu of a firm's potential projects (Smith and Watts, 1992). Awarding these managers equity pay, especially in the late stages of their careers, would give them a financial stake in the payoffs of these projects even beyond the dates at which they separated from their firms. We therefore test the alternative hypothesis that sunset rules are set leniently in growth firms in which human capital represents an especially important input to the value creation process.

A separate hypothesis, yielding an opposite set of predictions, arises from the widely

recognized use of stock option compensation as an employee retention device. Following this theory, sunset rules should be set tightly rather than leniently in firms for which human capital is especially important, in order to prevent managers either from retiring too early or from resigning to work for a competitor. The retention theory, sometimes known as “golden handcuffs,” is therefore more concerned with securing the services of good managers so that they can choose the next generation of a firm’s investments, as opposed to influencing the payoff horizon of the investments they might select. The retention aspect of equity pay has been highlighted by many authors, beginning at least with Smith and Watts (1992) and probably earlier. Core and Guay (2001) elaborate on how this theory applies to option programs broadly targeting all of a firm’s employees.

*B. Variable definitions*

We use regression analysis of the sunset rules in our sample of S&P 500 companies to test the competing hypotheses of whether growth companies with valuable human capital set their sunset rules loosely, due to investment horizon concerns, or tightly, for retention reasons. These two alternative hypotheses are tested against a null hypothesis that sunset rules are established without attention to firm characteristics. We estimate regressions that follow the general form:

$$\text{Tightness of sunset rules}_i = \alpha + \beta_1 (\text{Growth opportunities})_i + \beta_2 (\text{Controls})_i + \varepsilon_i$$

Table 5 presents descriptive statistics about the key variables used in our regressions. The first four lines of the table reproduce data introduced earlier to describe options’ vesting schedules, the time permitted for exercise after retirement or resignation, and forfeiture of unvested options

at retirement. The next two lines present two variables that we calculate by transforming our basic data about sunset rules into economic measures of their value consequences for option holders.

We construct a measure of the percent of option award value lost when a hypothetical employee at each sample firm receives a new option award and then retires one year later. So that our variable will show clearly the effects of forfeiture and truncation rules, we use fixed assumptions for all companies for the exercise price (\$25.00), stock price (\$25.00), volatility (0.30), dividend rate (0.015), and risk-free rate (0.045), and we calculate a benchmark Black-Scholes option value for each firm under these assumptions. We then determine how this benchmark value would change if the executive retired one year after the award, with the firm's rules about vesting, forfeiture, and maturity truncation becoming operational at that time. Table 5 shows that the median retirement adjustment to options reduces their award value by 65.7%, and the inter-quartile range of this variable is quite large, from 22.3% at the top of the first quartile to 91.4% at the top of the third. The Appendix contains examples of how this calculation would be derived using the sunset rules in effect for two well-known companies.

We construct a similar measure of the value lost under an assumption that an executive receives a new option award and then resigns, rather than retires, one year later. As shown on the next line in Table 5, the value consequences of resignation are generally far more severe than those for retirement. The mean and median retirement adjustments to options reduce their value by 95.1% and 95.9%, respectively, and even at the 10<sup>th</sup> percentile of the distribution the adjustment recoups 92.1% of option value for the firm.

To measure the degree to which a firm's sunset rules discourage employees from



working elsewhere after they retire, we compare each firm's treatment of options for executives who retire with options held by those who die. Specifically, we calculate the value lost for an executive who receives a new option award and then dies one year later. We then compare the value losses for executives who die and those who retire (using the variable above), and create a binary (0, 1) variable that equals one if the retirement value loss is equal to or greater than the death loss. Firms for which the value equals one would appear to be those most concerned about the possibility of a retired executive working elsewhere, since this cannot happen when executives die. Table 5 shows that 36% of companies have sunset rules that take equal or greater option value away from retirees compared to decedents.

These seven variables, listed in the top rows of Table 5, serve as our dependent variables in cross-sectional regressions measuring the strength of firms' sunset rules. Our regressions are estimated for option plans in effect in late 2005, so all financial data is generally measured or calculated with respect to the year 2004.

We use a number of explanatory variables to identify growth firms in which highly skilled managers are especially valuable. Research and development expense divided by net sales serves as a proxy for the presence of growth opportunities. When this value is missing from the Compustat database, we set it equal to zero. We identify growth firms using the compound annual growth rate of net sales for each company in the five-year period 1999 to 2004. To identify industries in which strategic considerations make management retention important, we use the Herfindahl Index, which measures the degree of competition within an industry. We construct the index at the three-digit SIC level using annual data for net sales, and it equals the sum of the squared market shares of each company in the industry. The index takes

a high value when an industry has strategic interaction among a few large players and the cost of defections by key employees is potentially high. To capture the degree of labor mobility in an industry, we use two variables. First, we tabulate at the industry level the rate of voluntary worker turnover (sometimes called the “quit rate”), excluding layoffs, retirements and deaths, as measured by the Bureau of Labor Statistics JOLTS survey between 2001 and 2006. Second, we use an index of enforcement of non-competition agreements created by Garmaise (2006) for each of the 50 U.S. states. As Garmaise discusses, considerable variation exists in the conditions under which state courts will enforce non-compete provisions. In states with low values of his index, notably California, workers can change jobs within the same industry more easily than elsewhere in the U.S.<sup>12</sup> We expect companies located in states with low values of the Garmaise index to have stronger sunset rules to counteract their state’s liberal employment laws.

Additional regression controls include firm size (the log of total assets), firm age (the log of years since the IPO, with no firm listed as more than 80 years old due to CRSP data limitations), industry dummy variables defined according to the 48 groupings of Fama and French, and the breadth of each company’s option program, equal to the percentage of option awards made to employees other than the top five executive officers, calculated on a cumulative basis over a company’s entire history on the ExecuComp database, from 2004 to as far back as 1992.

Our regression results appear in Table 6, which presents estimates for firms’ weighted average vesting schedules as well as the four other dependent variables associated with retirement sunset rules: the maximum time permitted to exercise options in retirement, an

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<sup>12</sup> See Section 16600 of the California Business and Professions Code. Akin, Gump, Strauss, Hauer & Feld, “Check your noncompete clauses – California court gives employees a new basis to void employment agreements,” Summer 2001, [www.akingump.com/docs/publication/412.pdf](http://www.akingump.com/docs/publication/412.pdf).

indicator variable for the forfeiture of all unvested options at retirement, the percentage of option value forfeited in each firm by an executive who retires one year after receiving new options, and an indicator variable for firms whose sunset rules impose equal or greater financial penalties upon executives when they retire compared to when they die in office. Along with coefficient estimates for our main independent variables, we tabulate coefficients for the software industry dummy variable, both because of the evident importance of human capital as an input in this industry, and also because the use of options for compensation by software firms has attracted enormous attention from both academics and business journalists.

In Table 6 statistically significant estimates occur across many of the five regressions. In general, sunset rules appear stronger in companies that are smaller, younger, and faster growing, as shown by estimates in the first three rows of the table. These findings are broadly consistent with the retention hypothesis, indicating that knowledge-based firms with high needs to retain valuable human capital have the strongest retirement sunset rules, since these companies tend to be young, small, and fast-growing. The results do not support the horizon hypothesis, which predicts more lenient sunset rules for firms with more skilled managers. Further confirmation of the importance of the retention hypothesis appears in estimates in subsequent rows of Table 6. The Herfindahl index is significant in two out of five models, with signs in a direction implying tighter sunset rules when management retention is important due to strategic interaction with other firms in an industry. The Garmaise (2006) non-compete enforcement index has significant estimates in three out of five models, all again in a direction consistent with tighter sunset rules when managers are at greater risk of leaving the firm. The software industry dummy variable has significant estimates in two out of five models, both with signs implying tighter sunset rules

when growth opportunities are high. Neither the R&D / sales nor the industry quit rate variables generate significant estimates.

Two further patterns in Table 6 appear important to us. First, our measure of option plan breadth has little association with the strength of firms' retirement sunset rules. This seems to imply that worker retention concerns, to the extent they influence option plan design, extend well beyond members of top management down into the ranks of middle and lower management. Second, we observe almost no statistically significant estimates in our regression on the left of Table 6 with options' vesting periods as the dependent variable; only the historical sales growth variable has a significant estimate. Our failure to detect significant associations between firms' vesting schedules and most of our independent variables is the same outcome reached by Kole (1997, Table 4), who uses data from 1980 to investigate whether vesting periods are longer for firms with high values of R&D but does not find significant results. Our results seem to indicate that vesting schedules are not as important to firms in designing their option plans as other parameters such as forfeiture or truncation provisions for executives who leave the company.

We also estimate regressions in which the dependent variables are recomputed to reflect resignation, instead of retirement, sunset rules. These regressions' results generally fail to yield significant estimates, so we do not tabulate them in order to save space. This outcome is not surprising given the lack of variation in the dependent variables documented above, but it poses some difficulty for our interpretation that sunset rules arise mainly to influence managerial retention rather than to lengthen managers' investment horizons. One might expect retention concerns to be greatest in the middle of managers' careers, when any exit from the firm would be considered a resignation rather than a retirement, while horizon concerns would be greatest at the

end of a managers' careers, when exit would be considered retirement. We find little variation in sunset rules for resignations, and tighter sunset rules among growth companies with respect to retirements, an outcome that indicates a concern for retention at the end of managers' careers, rather than at the middle. We conclude that the golden handcuff components of sunset rules appear to be a significant factor in deterring early retirements of skilled workers, but we do not find evidence that they are designed to discourage mid-career defections.

#### **IV Sunset rules and executive turnover**

Analysis above suggests that options' sunset rules are set by companies to help them retain valuable employees. Numerous studies have documented the costs and benefits of retaining skilled managers, including the role of executive compensation plans. Hayes and Schaefer (1999) show that when CEOs are hired by one firm from another, the hiring firm's stock price increases significantly while for former firm's price falls. Clayton, Hartzell and Rosenberg (2005) find that stock volatility increases after episodes of CEO turnover, apparently due to the market's uncertainty about the ability of the successor CEO. Fee and Hadlock (2003) show that firms hiring CEOs from outside make large equity compensation grants to them, to offset the compensation they forfeit when leaving their prior firms. Sundaram and Yermack (2007) find that defined benefit pension plans are effective in retaining managers until they reach a target retirement age and in inducing them to retire at that point. In this section, we attempt to extend this literature by investigating the connection between sunset rules and actual rates of executive turnover.

Research into firms' rates of worker turnover is difficult, because no statistics are

publicly reported about worker attrition, and it is not even clear that firms compile this data. Prior firm-level research into employee turnover has generally been limited to the five most highly paid officers of a firm as listed in the compensation section of the annual proxy statement; when an executive appears in the proxy statement one year and is omitted the next year, the convention is to assume that the executive has left the company. We adopt this convention as well, although we note that it will somewhat over-estimate actual turnover rates, because it is possible for executives to remain employed but see their position in the firm's compensation hierarchy fall so that they are no longer among the five most highly paid.

We use the ExecuComp database to calculate turnover rates for top-five managers in each company. We record every individual listed in proxy statements from 2004 back to 1992, or as long as the company is covered by ExecuComp. We identify the executive's last year in the database as a turnover year (we reserve data from 2005 to determine turnover cases for 2004). We divide the number of turnover observations for each company by the total number of person-years covered by ExecuComp. As shown in Table 4, mean and median values for this turnover variable are 12.8% and 12.5%, respectively, substantially lower than the data for industry turnover rates for workers at all levels of the firm.

Table 7 presents regression analysis of firms' top management turnover rates as a function of stock option sunset rules. Our main explanatory variables, taken from the top rows of Table 4, are the weighted average time for a firm's option awards to vest, an indicator for the forfeiture of unvested options when workers retire, and the maximum time permitted to exercise options in retirement. Additional control variables include industry dummy variables, the cumulative stock return from 1992 to 2004, and the stock's volatility measured using monthly

return data over the previous ten years. We do not include a relative measure of stock performance, such as the industry average return, since the regressions already include dummy variables for industries. When a firm is covered by ExecuComp for a shorter period than the standard interval of 1992 to 2004, we use a correspondingly shorter period for measuring the firm's cumulative stock return.

Estimates in the left column of Table 7 show insignificant association between executive turnover and variables measuring the sunset rules related to vesting, forfeiture, and truncation. Our control variables for stock returns and stock volatility are each strongly significant with the expected signs. We proceed to adjust our model to account for the endogeneity of the sunset rules. As shown by the analysis in Table 6 above, each firm's policy for the vesting, forfeiture and maturity of retirees' options is not exogenous but instead depends on the firm's size, age, industry, and to a certain extent, its need to retain skilled workers. To take account of this endogeneity, we re-estimate the turnover regression in Table 7 by replacing the retiree option maturity variable with its fitted value, using output from the OLS regression in Table 6 that predicts the option life retained in retirement by executives at each firm. This instrumental variable approach should be properly identified since certain independent variables in Table 6 – especially firm age and firm size – should not have any association with the error terms in Table 7's model of management turnover frequencies. Our two-stage estimates, shown in the second column of Table 7, now indicate a positive estimate for the option maturity variable, significant at the 5 percent level. Similar estimations using fitted values of the vesting and forfeiture variables do not lead to significant results.

We conclude that sunset rules for setting option maturities in retirement have important

effects upon executive turnover. The point estimate in the right column implies that adding one year (or 12 months) of maturity to retirees' options would be associated with a 0.4 percentage point annual rise in the frequency of management turnover, compared to the unconditional mean of 12.8%.

A recent paper by Carter and Lynch (2004) uses an alternative measure of employee turnover based upon the cancellation rates of stock options as disclosed in footnotes to firms' annual Form 10-K filings. The authors assume that option cancellations are correlated with workers' departure rates from the firm, and they find that cancellations are reduced when a company reprices its options. We obtain data on option cancellations for all of the firms in our sample, and we find mean and median values for the option cancellation rate of 4.8% and 3.7%, respectively, numbers that are implausibly low as estimates of overall employee turnover. When we reestimate the regressions in Table 7 using this quantity as the dependent variable, all of the important explanatory variables' coefficients fail to have statistical significance.

## **V. Conclusions**

This paper investigates sunset provisions of executive stock options, showing that when managers leave their firms, their options become subject to a variety of rules related to options' exercisability and expiration. These rules vary considerably across companies. Some firms with lenient sunset provisions permit exiting managers to retain their options for many years and provide for continuing or even accelerated vesting of options when managers exit the company. In contrast, other firms have less lenient regulations that lead to shortened option lives and forfeiture of unvested awards.



Along with our documentation of the variety and magnitude of these sunset provisions, we develop a number of empirical results. We document the impact of sunset rules upon the apparent values of new stock options when awarded to managers who expect to retire before the options expire; our results imply that estimates of option values and total compensation for older CEOs should be discounted substantially. We find that the strength of sunset rules varies company-by-company in relation to each firm's size, age, skilled labor demand, and the degree of competitive rivalry within an industry. In general, sunset rules are stronger when firms should have a high need to retain valuable human capital. Consistent with this interpretation, we find a positive association between the leniency of firms' sunset provisions and the rate at which top managers exit the firm.

### **Appendix: Operation of sunset rules at two companies**

In Figures A-I and A-II, we study the effects of sunset rules upon hypothetical option awards to managers who expect to retire in one year at two well-known S&P 500 companies, Time Warner and Viacom. In Figure A-I, the top illustration shows that Time Warner's option awards consist of four equal tranches, one of which becomes exercisable on each of the first through fourth anniversaries of the award date, and all of which expire after ten years. The lower illustration shows how these tranches are treated if a manager retires from the company one year after receiving an option award.<sup>13</sup> According to Time Warner's policies, all tranches vest immediately at retirement, but their expiration is shortened to five years from the retirement

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<sup>13</sup> A large number of companies require forfeiture of all options if an executive does not stay with the firm for at least one year after the award date. For that reason, in most of our models and calculations we adopt the convention of assuming that managers leave the company, for whatever reason, one year or more after the award date.

date, effectively turning ten-year options into six-year options in our example. As shown in Table A1, an executive who expected *ex ante* to retire from Time Warner one year after his option award date would perceive the Black-Scholes value of these options as being 16% lower as a result of the foreseen truncation of their original expiration.

Viacom is a company similar to Time Warner in size and industry, and it also awards ten-year options that vest ratably over the first four anniversaries after the award date. However, as shown in Figure A-II, executives who retire from Viacom obtain far less generous treatment of their options than those who retire from Time Warner. If an executive retires one year after receiving a new option award, Viacom's option plan requires forfeiture of the three unvested tranches, representing three-fourths of the entire award, and the remaining tranche has its expiration truncated from the tenth anniversary of the award date to the fourth. Together, these changes, if anticipated *ex ante* by a manager expecting to retire, would reduce the award date value of the option by about 83%, as shown in Table A1.

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**Table 1**  
**Sample selection**

Sample selection for a study of stock option plans in effect for the S&P 500 firms as of Fall 2005. Stock option plans are available as attachments to firms' 10-K, 10-Q, Proxy or 8-K SEC filings. Some firms provide additional detail about option awards in annual term sheets that are also filed as attachments to these documents. Companies are excluded from the study if they do not have an active stock option plan on file or their plan does not include adequate detail about the treatment of options when employees leave the company.

Companies in S&P 500	500
<i>Firms excluded:</i>	
No active plan for awarding stock options	(21)
Newly public, no stock option plan filed with SEC	(3)
Option plan filed, with incomplete data	(87)
Sample for analysis	389

**Table 2****Lives of executive stock options**

Summary statistics about the lives of executive stock options, based upon an analysis of 389 S&P 500 firms' option plans in effect during Fall 2005. Panel A shows the distribution of option expirations across sample firms as of the award date. Panel B shows sample statistics about the option life retained when executives leave their firms due to either retirement, resignation, or death. In most companies, age and service criteria are used to differentiate cases of retirement from resignations. Data in Panel B represent maximum values, since executives are generally not permitted to extend the lives of options beyond their original expiration dates.

**Panel A: Distribution of executive stock option expirations at award date**

Option expiration	Number of firms	Percentage of sample
4 years	1	0.3%
5 years	7	1.8%
6 years	5	1.3%
7 years	30	7.7%
8 years	7	1.8%
9 years	1	0.3%
10 years	338	86.9%

Mean = 9.57

Std. Dev. = 1.16

**Panel B: Executive stock option life (maximum, in years) retained by executives who leave their firms**

Reason for leaving firm	Mean	Std. Dev.	Min	Percentiles of distribution					
				10 <sup>th</sup>	25 <sup>th</sup>	Med	75 <sup>th</sup>	90 <sup>th</sup>	Max
Retirement	4.43	3.71	0	0.25	1	3	10	10	10
Resignation	0.40	1.19	0	0	0.08	0.25	0.25	5	10
Death in office	3.15	3.17	0	1	1	1	5	10	10

**Table 3****Vesting policies for executive stock options**

Summary statistics about the vesting of executive stock options, based upon an analysis of 389 S&P 500 firms' option plans in effect during Fall 2005. Panel A shows the vesting time in years for at least half of an award to vest, an entire award to vest, and the weighted average time for the entire award to vest. Panel B tabulates firms' policies for the treatment of unvested options when executives leave their firms due to either retirement, resignation, or death. In most companies, age and service criteria are used to differentiate cases of retirement from resignations. Pro rata vesting refers to partial vesting of options based upon the fraction of the full vesting period that an executive has served.

**Panel A: Vesting periods (in years) from date of award**

Amount of award vested	Mean	Std. Dev.	Min	Percentiles of distribution					
				10 <sup>th</sup>	25 <sup>th</sup>	Med	75 <sup>th</sup>	90 <sup>th</sup>	Max
Half of award	2.22	0.70	0	2	2	2	2	3	6
Entire award	3.59	1.07	0	3	3	3	4	5	10
Weighted average	2.38	0.67	0	2	2	2.5	2.5	3	6

**Panel B: Treatment of unvested options for executives who leave their firms (number of firms, percent of sample)**

	Retirement		Resignation		Death in office	
Full immediate vesting	130	33.4%	7	1.8%	217	55.8%
Continue original vesting schedule	67	17.2%	7	1.8%	19	4.9%
Pro rata immediate vesting	12	3.1%	3	0.8%	8	2.1%
Other partial vesting	9	2.3%			9	2.3%
Unvested options forfeited	171	44.0%	372	95.6%	136	35.0%

**Panel C: Mean option life retained by certain subsamples of executives who leave their firms**

Treatment of unvested options	Retirement	Resignation	Death in office
Full immediate vesting	5.37 years	5.57 years	3.49 years
Forfeited	2.52 years	0.29 years	1.95 years

**Table 4****Impact of sunset provisions upon option compensation of CEOs, by age**

Values of stock options and total compensation for CEOs in different age classes, with and without the impact of companies' sunset provisions for adjusting option terms when CEOs retire. The first two rows of the table show the number of CEOs in each age range who received stock options in 2004, and the number whose option values would be reduced at their expected retirement dates according to the rules of company option plans. Expected retirements are assumed to occur at age 65 for all CEOs in the first two columns, and one year past the current age of all CEOs in the right column. The middle rows of the table show mean values of option awards for the subsamples of CEOs in each age range, before and after the application of company policies for treatment of options at retirement. These policies, described more fully in Tables II and III, require the forfeiture of some unvested options and truncation of the remaining life of options that are not forfeited. All option values are calculated with the Black-Scholes formula using actual exercise prices and expirations, assumptions for volatility and dividend yield provided by ExecuComp, and a risk-free rate of 4.5%. The bottom rows of the table show mean values of total compensation for CEOs in each age range, both with and without the option value reductions related to expected retirement dates. Total compensation is assumed to equal the sum of salary, bonus, restricted stock awards, stock option awards, long-term incentive plan payouts, and items disclosed as "other annual compensation" such as perquisites and retirement plan contributions. The table omits five CEOs who received options with certain performance conditions which made valuation difficult.

CEO age range	61 - 62	63 - 64	65 and above
CEOs receiving options	35	14	17
Option values reduced at retirement	17	11	14
Percentage with values reduced	49%	79%	82%
Option values without reductions, mean (000)	\$8,688	\$4,708	\$8,705
Option values with reductions, mean	\$7,533	\$2,626	\$4,099
Percentage change	- 13%	- 44%	- 53%
CEOs in total sample	40	18	31
Total compensation, mean (000)	\$13,932	\$10,267	\$13,685
Total compensation after option value reductions, mean	\$12,777	\$8,512	\$10,279
Percentage change	- 8%	-17%	- 25%



**Table 5****Descriptive statistics for variables**

Descriptive statistics for key variables used in regression analysis of stock option plans maintained by 387 S&P 500 firms in 2005. Data on vesting and forfeiture terms for stock options are tabulated from equity compensation plans filed with the SEC by 389 companies. The variable measuring option value lost at retirement is based upon the costs to a hypothetical executive who is awarded at-the-money options and retires one year later. Calculations of these option value losses use the Black-Scholes method and assume a stock price and exercise price of \$25.00, volatility of 0.30, risk-free rate of 0.045, dividend rate of 0.015, and each company's policies for vesting, forfeiture and truncation. Company volatility data is calculated based upon up to ten years of monthly stock returns for each firm. The Herfindahl index is based upon firms' sales data and is tabulated at the three-digit SIC level. Option plan breadth is the total fraction of each firm's options awarded to persons other than the top five executives, based on the company's entire history on the ExecuComp database. The variable measuring years since the IPO date is capped at 80 years, the oldest age available on the CRSP database. The industry quit rate is tabulated from Bureau of Labor Statistics survey data. The non-compete enforcement index is a count variable between 0 and 12 obtained from Garmaise (2006) based upon the laws of the 50 U.S. states; the index is mapped to each company according to the geographic location of its headquarters. The fraction of the firm's option exercises reported on the Form 4 database equals the option exercises between 2002 and 2004 reported on the Thomson Financial insider trading database divided by the firm's total exercises as reported in footnotes to annual Form 10-K filings. The mean time at which options are exercised relative to the expiration date is calculated separately for each firm between 2002 and 2004 based on data reported on the Thomson database, and the table reports descriptive statistics for these within-firm means.

	Mean	Std. Dev.	Percentiles				
			10 <sup>th</sup>	25 <sup>th</sup>	Med	75 <sup>th</sup>	90 <sup>th</sup>
Time for option awards to vest (weighted average, months)	28.6	8.1	24	24	30	30	36
Time to exercise options in retirement (maximum, months)	52.9	44.5	3	12	36	120	120
Time to exercise options after resignation (maximum, months)	4.8	14.3	0	1	3	3	60
Forfeiture of all unvested options at retirement (indicator)	0.44	0.50	0	0	0	1	1
Option value lost at retirement (percentage)	53.5%	38.0%	0	22.3%	65.7%	91.4%	96.7%
Option value lost at resignation (percentage)	95.1%	9.8%	92.1%	94.5%	95.9%	100%	100%
Retirement treated same or worse than death (indicator)	0.36	0.47	0	0	0	1	1
Option plan breadth (pct. of awards beyond top five executives)	0.84	0.11	0.70	0.79	0.87	0.91	0.95
Annual turnover rate among firm's top five executives, 1992-2004	12.8%	4.8%	6.7%	9.8%	12.5%	15.8%	18.4%
Firm size (log of total assets)	9.34	1.39	7.74	8.24	9.19	10.23	11.21
Years since firm's IPO	34.9	21.7	10	17	33	44	76
Research & development expense / net sales	0.038	0.079	0	0	0	0.036	0.145
Herfindahl index	0.156	0.160	0.027	0.056	0.102	0.191	0.354
Stock return, three years, 2002-04	0.076	0.155	-0.102	-0.007	0.084	0.169	0.253
Sales growth rate, annualized, 1999-2004	0.087	0.106	-0.025	0.022	0.070	0.131	0.230
Stock volatility	0.379	0.158	0.235	0.270	0.331	0.438	0.615
Software industry indicator	0.054	0.220	0	0	0	0	0
Non-compete enforcement index	3.848	2.142	0	3	4	5	6
Industry voluntary quit rate, 2001-05	0.169	0.066	0.131	0.138	0.150	0.160	0.239
Fraction of firm's exercises reported on Form 4 database, 2002-04	0.165	0.140	0.026	0.063	0.130	0.229	0.351
Mean time of option exercises, years prior to expiration, 2002-04	3.68	2.00	0.93	2.01	3.62	5.19	6.30
Firm awards reload options (indicator)	0.090	0.287	0	0	0	0	0
Firm pays zero dividends in 2004 (indicator)	0.243	0.429	0	0	0	0	1

**Table 6****Cross-sectional determinants of option sunset rules at retirement**

Regression estimates for models of various regulations contained in S&P 500 companies' stock option plans as of 2005. The dependent variable in the first column equals the weighted average number of months for a company's stock option awards to vest. The second column's dependent variable equals the maximum number of months permitted for a retiring employee to exercise vested stock options, multiplied by  $10^{-2}$  for display purposes. In the third column, the binary dependent variable equals one if an executive forfeits unvested options at retirement. The dependent variable in the fourth column equals the percentage of option award value lost at retirement by a CEO who receives new options and retires one year later. The binary dependent variable in the right column equals one if the value lost by executives who retire equals or exceeds the value lost by executives who die in office. Among the explanatory variables, firm age is capped at 80 years, the oldest age available on the CRSP database. The industry quit rate is computed from Bureau of Labor Statistics data. The non-compete enforcement index is a count variable between 0 and 12 reported by Garmaise (2006) at the state level. Option plan breadth is the percentage of option awards to employees other than the top five executives, measured over all the years in which a firm appears in the ExecuComp database. Standard errors appear in parentheses below each coefficient estimate.

Dependent variable Estimation	Vesting OLS	Retirement option life OLS	Retirement forfeiture Logit	Retirement value loss OLS	Retirement >= death Logit
Firm size (log of total assets)	0.55 (0.43)	0.09 <sup>a</sup> (0.02)	-0.20 <sup>b</sup> (0.13)	-0.04 <sup>b</sup> (0.02)	-0.22 (0.14)
Firm age (log of years since IPO)	-0.41 (0.78)	0.07 <sup>b</sup> (0.04)	-0.53 <sup>b</sup> (0.21)	-0.06 <sup>c</sup> (0.03)	-0.38 <sup>c</sup> (0.23)
Sales growth (five year CAGR)	10.49 <sup>b</sup> (4.94)	-0.56 <sup>b</sup> (0.22)	1.65 (1.36)	0.60 <sup>a</sup> (0.21)	2.95 <sup>b</sup> (1.50)
R&D / Sales	2.28 (9.79)	-0.40 (0.45)	1.71 (3.03)	0.51 (0.41)	2.27 (2.89)
Herfindahl Index	1.66 (3.74)	-0.15 (0.17)	1.92 <sup>b</sup> (0.94)	0.23 (0.16)	2.85 <sup>a</sup> (1.00)
Option plan breadth	4.99 (4.99)	0.29 (0.23)	-1.99 (1.36)	-0.33 (0.21)	-1.81 (1.41)
Industry quit rate	-41.92 (35.25)	0.89 (1.51)	-1.26 (4.22)	0.14 (1.49)	0.05 (3.90)
Non-compete enforcement index	0.36 (0.24)	0.03 <sup>a</sup> (0.01)	-0.12 <sup>c</sup> (0.06)	-0.02 <sup>b</sup> (0.01)	-0.09 (0.07)
Software industry (indicator)	0.43 (6.12)	-0.18 (0.22)	3.45 <sup>a</sup> (0.83)	0.15 (0.26)	3.60 <sup>a</sup> (0.87)
Observations	357	387	387	357	357
Industry indicators (Fama-French)	Yes	Yes	Yes	Yes	Yes
Adjusted R <sup>2</sup>	0.043	0.299		0.217	
F or Likelihood Ratio statistic	1.32 <sup>c</sup>	4.30 <sup>a</sup>	92.98 <sup>a</sup>	2.97 <sup>a</sup>	91.14 <sup>a</sup>

Significant at 1% (a), 5% (b), and 10% (c) levels.

**Table 7**  
**Effect of firms' option sunset rules upon top executive turnover**

OLS regression analysis of top executive turnover as a function of companies' policies for treatment of stock options at retirement. Option forfeiture and truncation rules appear in company equity compensation plan documents filed with the SEC. The turnover rate for top executives is based upon changes in the listing of firms' five highest paid officers in company proxy statements, as reported by ExecuComp. The fitted value of the time to exercise options in retirement is obtained from the regression model presented in the second column of Table 6. Standard errors appear below each estimate in parentheses. Both the turnover rate and stock return are compounded continuously. Although these variables are compiled over the period 1992 to 2004 for most companies, a shorter window is used for firms with less data available on ExecuComp.

Dependent variable:

Annual turnover rate among top 5 executive group, 1992-04

Cumulative stock return, 1992-2004	-0.011 <sup>a</sup> (0.002)	-0.011 <sup>a</sup> (0.002)
Stock volatility	0.087 <sup>a</sup> (0.019)	0.102 <sup>a</sup> (0.020)
Time for option awards to vest (weighted average, in months, x 10 <sup>3</sup> )	-0.357 (0.271)	-0.381 (0.269)
Forfeiture of unvested options at retirement (indicator)	0.0003 (0.005)	0.001 (0.005)
Time to exercise options in retirement, actual (maximum, in months, x 10 <sup>3</sup> )	0.056 (0.060)	
Time to exercise options in retirement, predicted (fitted regression value, x 10 <sup>3</sup> )		0.356 <sup>b</sup> (0.140)
Observations	357	357
Industry indicator variables	Yes	Yes
Adjusted R <sup>2</sup>	0.184	0.198
F-statistic	2.71 <sup>a</sup>	2.87 <sup>a</sup>

Significant at 1% (a), 5% (b), and 10% (c) levels.

**Table A1**  
**Value of adjustments to option terms when managers retire**

The table shows the value consequences of adjustments to stock option awards when managers retire from two companies, using the hypothetical example of a 64-year-old executive who receives new options when planning to retire one year later at age 65. Under the option plans of each company, a new award vests in four annual tranches, and each firm has different rules for whether the tranches are subject to the possibility of forfeiture and/or reduced time to expiration when the optionee retires. The first area of the table shows a “base case” option award that has no forfeiture and no shortened expiration when the optionee retires. The second area of the table shows data for Time Warner, which truncates all option tranches to a maximum of 5 years from an optionee’s retirement date but requires no forfeiture of unvested options. The third area of the table shows data for Viacom, which requires forfeiture of three out of the four award tranches if the optionee retires, while shortening the remaining life of the fourth tranche to a maximum of 3 years. Value calculations, which use the Black-Scholes method, are based on the same set of input parameters for both companies: award date stock price and exercise price of \$25.00, volatility of 0.30, risk-free rate of 0.45, and dividend rate of 0.015.

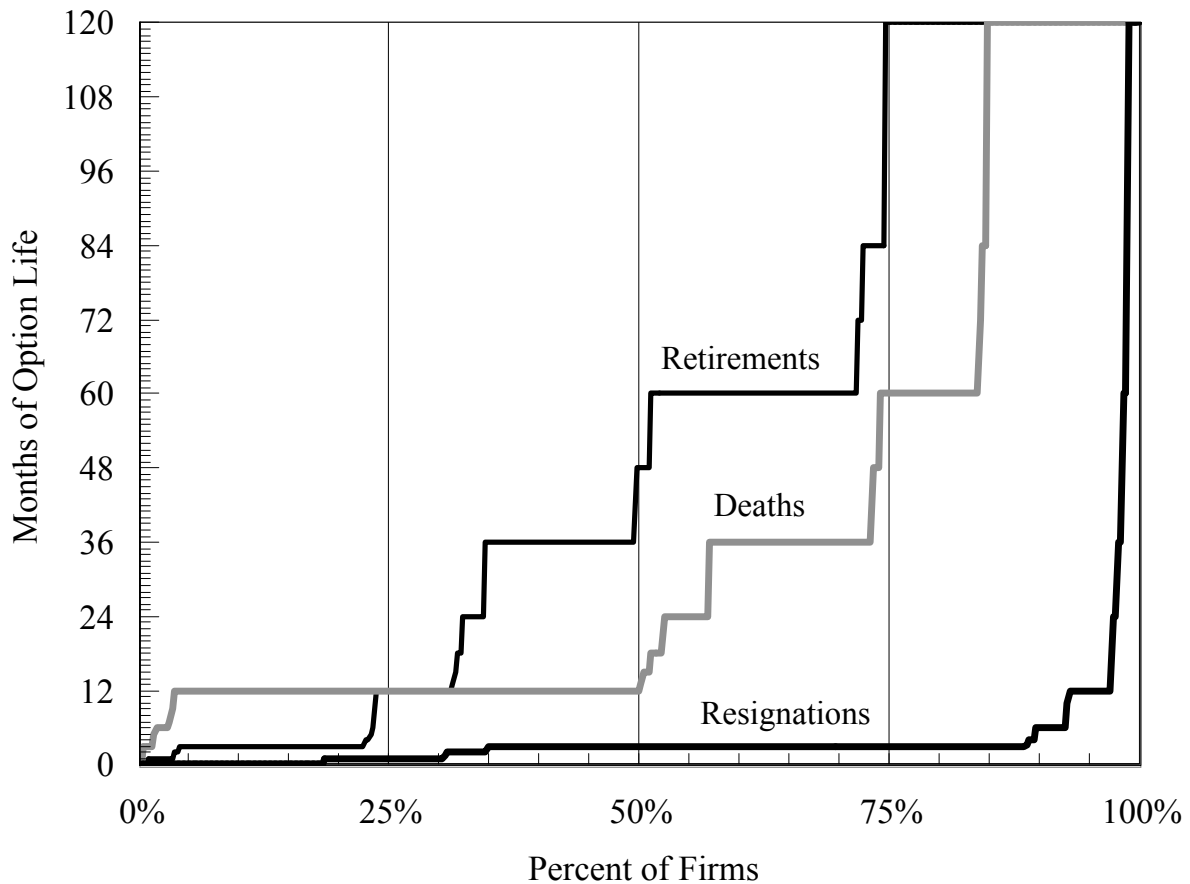
<u>Base Case</u>	<u>Original T</u>	<u>Adjusted T</u>	<u>Value</u>
Tranche 1	10	10	\$9.93
Tranche 2	10	10	\$9.93
Tranche 3	10	10	\$9.93
Tranche 4	10	10	\$9.93
Total			\$39.72

<u>Time Warner (Figure 1a)</u>	<u>Original T</u>	<u>Adjusted T</u>	<u>Value</u>
Tranche 1	10	6	\$8.06
Tranche 2	10	6	\$8.06
Tranche 3	10	6	\$8.06
Tranche 4	10	6	\$8.06
Total			\$32.24

Value lost relative to Base Case - 16%

<u>Viacom (Figure 1b)</u>	<u>Original T</u>	<u>Adjusted T</u>	<u>Value</u>
Tranche 1	10	4	\$6.67
Tranche 2	10	forfeited	\$0
Tranche 3	10	forfeited	\$0
Tranche 4	10	forfeited	\$0
Total			\$6.67

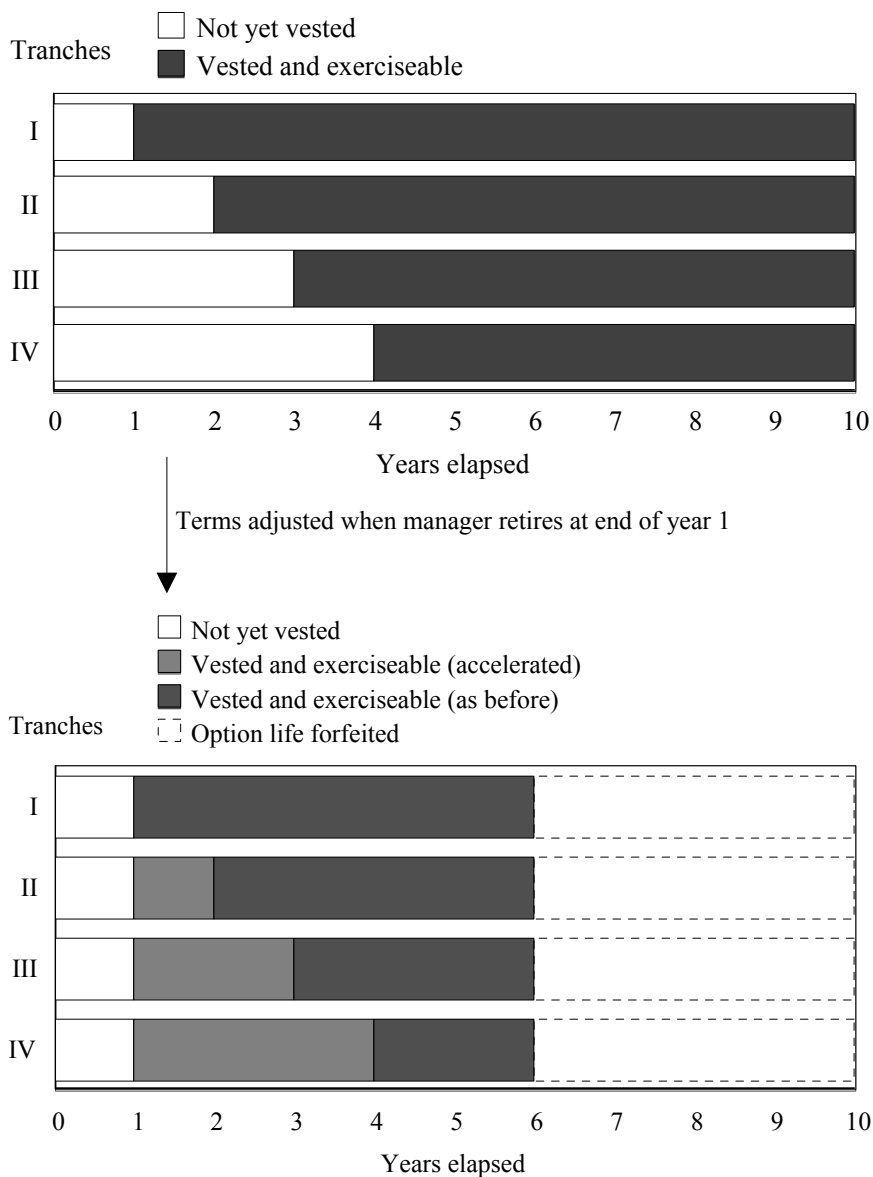
Value lost relative to Base Case - 83%



**Figure I**

**Cumulative distributions of option life retained by managers who retire, resign, or die**

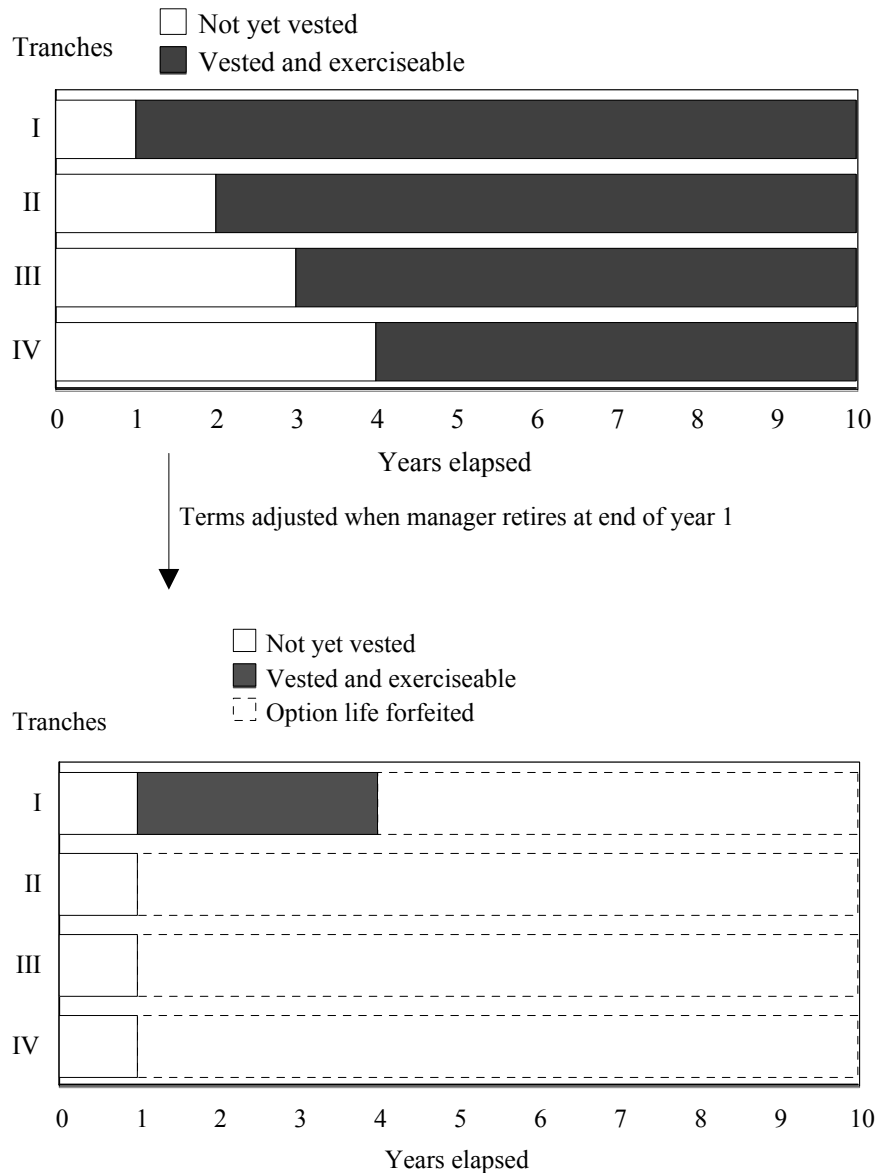
The figure shows the distribution of executive stock option maturities that managers in different companies would receive upon exiting their firms while holding unexercised options. The three lines tabulate firms' policies for managers' retirements, resignations, and deaths, with the differentiation between retirements and resignations generally depending on age and service criteria. In all cases, the value tabulated is the maximum maturity allowed to a manager; if the original option expiration date precedes the maximum time allowed, the manager simply retains the original expiration date. Data is obtained from executive compensation plan documents filed by 389 S&P 500 firms with the SEC for the year 2005.



**Figure A-I**

**Adjustments to executive stock options when a manager retires: Time Warner**

The figure shows the intervals during which the separate tranches of an executive stock option award would be exercisable for managers at Time Warner Inc. who retire one year after receiving an award. The top graph shows a typical award with a ten-year time to expiration and four tranches, which vest sequentially after each of the first four years. The bottom graph shows adjustments to the award if the option holder were to retire at the end of the first year. All of the tranches would vest immediately, but their expiration dates would be shortened from the tenth to the sixth year. The Black-Scholes value lost to the optionee as a result of these changes equals about 16% of the award date value, as shown in Table A1.



**Figure A-II**

**Adjustments to executive stock options when a manager retires: Viacom**

The figure shows the intervals during which the separate tranches of an executive stock option award would be exercisable for managers at Viacom Inc. who retire one year after receiving an award. The top graph shows a typical award with a ten-year time to expiration and four tranches, which vest sequentially after each of the first four years. The bottom graph shows adjustments to the award if the option holder were to retire at the end of the first year. Three of the four tranches would be forfeited, and the expiration date for the other tranche would be shortened to the fourth year. The Black-Scholes value lost to the optionee as a result of these changes equals about 83% of the award date value, as shown in Table A1.