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Stock option grant vesting terms: economic and financial reporting determinants

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Abstract Option grant vesting terms are a contractual provision that is shaped by accounting standards and other economic factors. We examine the effect of accounting standards, specifically SFAS 123(R), on the vesting terms of stock option grants while also modeling other economic determinants of this contract feature. We document significant variation in stock option grant vesting periods and patterns suggesting that firms actively choose vesting terms. Consistent with financial reporting incentives influencing contract design, we find that firms simultaneously lengthen vesting periods and alter vesting patterns after the adoption of SFAS 123(R). The changes in vesting patterns are consistent with firms trying to defer recognition of the option expense, while limiting the incremental risk imposed on the CEO. In addition, we find that vesting schedules are longer in growth firms where lengthening the executive's investment horizon is more important and that firms with more powerful CEOs and weaker governance grant options with shorter vesting periods.

Keywords Executive compensation · Stock option vesting periods · Effects of SFAS 123(R)

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1 Introduction

We investigate the determinants of executive stock option vesting terms and provide evidence on how accounting standards shape this contract feature. Vesting restrictions determine when the ownership of stock option grants transfers to executives and when they can freely exercise them. Critics of compensation practices argue that managers' freedom to exercise stock options early is detrimental to investors (e.g., Bebchuk and Fried 2004), and the recent financial crisis has again put a spotlight on this issue. However, extended vesting provisions can be costly for managers, whose wealth is tied up in unvested stock, by creating liquidity problems and by exposing them to their firms' stock price volatility during the vesting period. Consistent with these costs being substantial, managers exercise a considerable portion of their options soon after they vest and well before they expire (e.g. Huddart and Lang 1996; Armstrong et al. 2007; Fu and Ligon 2010), which highlights their strong preference for shorter vesting.

Against the backdrop of this debate about whether vesting optimally aligns incentives, recent accounting standards further complicate a firm's choice of vesting terms by creating an explicit role for vesting terms in the accounting for stock options. Statement of Financial Accounting Standards 123(R), which applies to all fiscal years starting after June 15, 2005, requires firms to expense the fair value of option grants over the vesting period. This change in accounting standards provides an opportunity to investigate the trade-offs involved in setting restrictions on the exercise of option grants while documenting how financial reporting considerations shape executive contracts.

Firms generally grant stock options according to an equity plan that leaves vesting terms to the discretion of the board of directors. Contrary to the common perception that firms adopt boilerplate terms, we document significant variation in the length and pattern of vesting restrictions. *Vesting Period*, the time between the grant date and the vesting date of the last tranche of the grant, ranges from immediately to 10 years. *Vesting Duration*, the weighted average vesting term of all tranches of the grant, ranges from 0 to 120 months, with an inter-quartile range of 16–30 months. Vesting patterns also vary: 55 % of the option grants in our sample vest in equal installments over the vesting period, 32 % cliff vest at the end of the vesting period, and 13 % vest in an irregular pattern.

The recent accounting standard, SFAS 123(R), directly links vesting patterns with the compensation expense recognized in net income, making it a powerful setting for studying the effects of accounting rules on contract design. For example, if a firm grants options with a fair value of $1,000,000 that vest equally over 2 years (the 25th percentile of the vesting period in our sample), the firm recognizes a compensation expense of $500,000 in the year of the grant and in the subsequent year. If the same grant vests over 4 years (the 75th percentile of the vesting period in our sample), the firm recognizes $250,000 in the year of the grant and $250,000 in each of the next 3 years. Extending the vesting schedule therefore reduces the

expense recognized in the year of the grant and defers a greater proportion of the expense to later periods. In addition, because option granting to executives tends to be irregular, the deferral of the expense over a longer time period allows the firm to recognize a smoother option expense. The intense lobbying against recognizing the stock option expense and the common trend of granting options at-the-money to avoid recognizing any expense before the adoption of SFAS 123(R) suggest that firms prefer to report lower levels of the expense.

SFAS 123(R) also created incentives for firms to change their vesting patterns. The revised standard requires that firms amortize the fair value of a cliff-vested grant equally over the vesting period, creating a wedge between when the option expense is recognized and when it is available to be exercised. For example, the firm must expense 50 % of the option grant annually if the option cliff-vests at the end of 2 years, which is identical to the expense recognition of a grant that vests annually over 2 years. A switch from cliff-vesting options to equally vesting options therefore better aligns the vesting pattern with the expense recognition.

Economic theory suggests that firms trade off the costs and benefits of stock option vesting patterns. Longer vesting terms can benefit the firm by extending the effective life of equity incentives and the investment horizon of the manager (e.g. Kole 1997; Cadman and Sunder 2011). These are particularly valuable to firms with significant growth opportunities and considerable information asymmetry regarding the long-term effects of current managerial actions. Balsam and Miharjo (2007) find that large holdings of unvested equity help to retain talented CEOs because executives generally forfeit their unvested equity holdings when they voluntarily resign. In contrast, Lambert et al. (1991) demonstrate analytically that deep in-the-money unvested options induce managers to behave in a more risk-averse manner, while Brisley (2006) demonstrates that shorter vesting terms, which allow managers to exercise in-the-money options early, along with new at-the-money grants, are an efficient way to maintain risk-taking incentives.

While firms may prefer longer or shorter vesting terms depending on the circumstances, managers prefer shorter vesting terms. Vesting requirements impose economically significant forfeiture risk on managers in the case of early departure, in addition to equity and liquidity risk, which increases the cost of contracting with longer vesting terms. Thus when granting options as compensation for managers' past achievements, firms may prefer shorter vesting terms that impose less risk on the executive. Finally, because CEOs prefer shorter vesting terms, more powerful CEOs with influence over the pay-setting process likely receive option grants with shorter vesting terms. We expect stronger board and shareholder monitoring to moderate the effects of more powerful CEOs on option vesting terms.

We test the hypothesized financial and economic reporting determinants of vesting terms in a sample of firms from the ExecuComp database over fiscal years 1997–2008. Consistent with financial reporting concerns shaping vesting terms, we find that firms, on average, lengthen option grant vesting schedules following the adoption of SFAS 123(R). In particular, firms that grant cliff-vesting options before the adoption of SFAS 123(R) respond most significantly to mandated option expense recognition by extending the vesting terms while simultaneously switching to equal vesting patterns. This is likely because firms that granted cliff-vesting

options before SFAS 123(R) can limit the incremental risk imposed on the CEO when extending vesting schedules by allowing a portion of the grant to vest earlier. Consistent with this conjecture, we find firms that granted cliff-vesting options before SFAS 123(R) extend the *Vesting Duration* by 12 months and the *Vesting Period* by 27 months when switching to equal vesting patterns. These changes defer a greater proportion of the recognized expense to later periods and afford executives the opportunity to exercise a portion of the options earlier than they could under a cliff-vesting pattern. Therefore this change allows the firm to reap the reporting benefits of longer vesting terms while reducing the additional forfeiture, equity, and liquidity risks imposed on the CEO.

Consistent with vesting terms helping overcome the agency problems that result from divergences in investment horizons, we find a positive relation between option grant vesting periods and firm investment opportunities. We also find that better performing firms grant options with longer durations, consistent with vesting being used to retain these CEOs. Firms with more powerful CEOs grant options with shorter vesting patterns, but this relation is mitigated by the presence of strong monitoring. We do not find any evidence of a negative relation between stock volatility and vesting patterns, as predicted by Brisley (2006).

Overall our paper contributes to the contracting literature on several dimensions. First, we extend the literature on the role of accounting standards in contract design by highlighting that firms alter contract terms so that they can defer recognizing the compensation expense on their income statement. Previous research examines the effect of stock option expensing on firm reporting choices. Aboody et al. (2006), for example, investigate the assumptions underlying the fair value estimates, and Carter et al. (2007) find that firms shift towards granting restricted stock in lieu of options when they voluntarily recognize the option expense. In contrast to their study of *voluntary* expensing, our setting allows us to use an exogenous shock to accounting, which provides a clean setting for examining the effect of accounting on contract terms. Choudhary et al. (2009) investigate the effects of mandatory option expensing and find that firms accelerate unvested out-of-the-money options in anticipation of SFAS 123(R). In contrast to the one-time incentive that firms with underwater options had to *shorten* vesting periods before the implementation of SFAS 123(R), our study suggests that, after the mandated expense recognition, firms shift equilibrium vesting patterns to make them *longer*. Specifically, we find that firms respond to SFAS 123(R) by simultaneously extending the term of equity grants and altering vesting patterns in a manner that maps the vesting pattern with expense recognition and defers a greater portion of the expense to later periods, thereby altering the incentive effects of these contracts.

Second, while some studies have considered vesting schedules in their analyses, we provide comprehensive large sample evidence on how firms weigh the costs and benefits to shareholders in setting stock option grant vesting schedules. In contemporaneous work, Cadman and Sunder (2011), Gopalan et al. (2011), and Chi and Johnson (2009) examine a related contract feature, compensation duration, in specific contexts. These studies incorporate the vesting terms of equity-based compensation along with the mix of equity in total compensation to compute the duration measure. We focus exclusively on the vesting terms to isolate the

dimension of the contract that influences the horizon of incentives. Bolton et al. (2006) show analytically that the proportion of equity and the vesting terms play two different roles. While the amount of equity affects overall effort incentives, vesting terms directly affect the decision-making horizon. A limitation of the combined compensation duration measure is that it is difficult to tease out specific effects on vesting terms from changes in equity compensation. In addition, our hypothesis about accounting effects specifically applies to vesting terms, rather than the overall use of equity based compensation, rendering the aggregate compensation measure unsuitable for our study. Our results indicate that vesting schedules are a strategic contract feature that is used to overcome agency conflicts resulting from the separation of ownership and control.

2 Hypothesized determinants of vesting terms

Option grant vesting terms are a contractual provision that is shaped by accounting standards and other economic factors. We discuss the hypothesized determinants in this section.

2.1 Influence of financial reporting on vesting terms

The original SFAS 123 allowed firms to choose between the intrinsic value method and the fair value method for expensing stock option grants. Under the intrinsic value method firms that granted stock options with exercise prices equal to the price of the underlying stock at the time of the grant (at the money) did not recognize a compensation expense at the time of the grant. As Murphy (1999) points out, virtually all firms granted options in this manner to avoid recognizing the compensation expense. In contrast, SFAS 123(R), which took effect for fiscal years starting after June 15, 2005, mandates the expensing of executive stock options at their fair values over the vesting periods. According to SFAS 123(R) §39:

> The compensation cost for an award of share-based employee compensation classified as equity shall be recognized over the requisite service period. … The requisite service period is the period during which an employee is required to provide service in exchange for an award, which is often the vesting period.

Following the adoption of SFAS 123(R), option grant vesting terms directly affect firms' reported earnings. Because option grant patterns tend to be irregular, longer vesting durations smooth option expense recognition and damp the volatility of net income induced by the option expense. Firms can also defer portions of the compensation expense to later periods by granting options with longer vesting periods. Managers are concerned with both the level and the smoothness of earnings. For example, Graham et al. (2005) find that 78 % of CFOs are willing to sacrifice some value to achieve smoother earnings. Firms may also wish to smooth and defer the compensation expense to later periods to reduce the total CEO

compensation reported in the summary compensation table of the firm proxy statement, in turn mitigating criticism of their compensation practices.

Vesting terms also affect the option's fair value and therefore the total expense recognized over the life of the option because of two opposing forces. First calculating the value of the option for reporting purposes requires firms to estimate the expected life of the option. Because vesting terms affect exercise behavior, as shown by Huddart and Lang (1996) and Fu and Ligon (2010), lengthening the vesting period will increase the expected life, and thus the fair value, of an option grant. According to SFAS 123(R), firms can use their historical exercising behavior or the "…expected term might be estimated in some other manner, taking into account whatever relevant and supportable information is available, including industry averages and other pertinent evidence such as published academic research (§A29)." SAB 107 elaborates on this and also establishes a simplified rule for firms that do not yet have sufficient information to estimate the expected life. The simplified rule sets the expected life as equal to the average of the vesting term and the contractual life of the option, explicitly linking the expected life with the vesting schedule.[1]

The second effect of lengthening the vesting is that it increases the probability of forfeiture, which lowers the fraction of the option value that is recognized in the financial statements. Firms are required to estimate the forfeiture probability ex ante and make adjustments when actual forfeiture probability differs from the expected probability. The net effect of these two forces is ambiguous. To better establish the relative importance of increases in the expected life and the forfeiture risk on the fair value of the option grant, we perform several simulations using the formula for expected life established by SAB 107 and annual forfeiture probabilities between 5 and 15 %. (Other parameters include a risk free rate of 5 % and a return volatility ranging from 30 to 50 %.) In this untabulated simulation, we find that the effect of lengthening the vesting period on the total estimated compensation expense is generally small and in most cases weakly negative. This outcome suggests that the main effect of vesting on the recognized expense is due to the timing of the recognized expense, not the total amount of the expense over the life of the option.

2.2 Horizon incentives

An agency conflict exists between managers and shareholders because of the divergence of their investment horizons. Managers with short employment horizons may sacrifice long-term value creation for short-term profitability. Stock option grants help lengthen investment horizons and align the interests of managers with shareholders. Granting options with short vesting terms, however, may not achieve alignment in investment horizons because risk-averse managers prefer to exercise

[1] We empirically examine how firms take vesting into account in determining the option expense. We use the variable OPTLIFE from Compustat (obtained from 10-K footnote disclosures) on the firm's expected life of the options for reporting purposes for the post 123R period. When we regress this expected life assumption on the *Vesting Duration* of the CEO's option grant we obtain a coefficient of 0.46 (t-stat 11.00). This result provides strong evidence that firms take vesting into account when they determine the option expense, and it is close to the simplified rule established in SAB 107.

their options early in the term. Lengthening the vesting term extends the executive's holding period and investment horizon, which in turn influences the executive's operating and financing horizon.

Stein (1989) models the incentive effects of the fraction of shares that the manager intends to sell in the short term, which can be interpreted as the fraction of options that vest, demonstrating that expected selling creates incentives for managers to act myopically. More recently Bolton et al. (2006) endogenize vesting terms in their model and show that shareholders choose vesting terms to influence the horizon of managerial actions. They conclude that shareholders should lengthen stock-option vesting periods if they wish to maximize long-run firm value. Edmans et al. (2011) derive an optimal contract that provides the manager with a dynamically rebalanced portfolio of cash and equity and uses gradual vesting of this portfolio to address the managerial myopia problem.[2] The empirical evidence is consistent with the intuition in these models. Kole (1997) provides initial evidence that firms with greater R&D intensity grant restricted stock with longer vesting periods.

Building on the prior literature, we hypothesize that longer vesting should be most valuable in firms with greater growth opportunities that also face considerable information asymmetry about the impact of current actions on future cash flows.[3] Consequently, to encourage managers to take long-term value enhancing projects, we predict that firms with significant growth opportunities will provide equity payments with longer vesting schedules.

2.3 Retention incentives

Longer vesting terms also provide incentives for the CEO to remain with the firm. CEOs who voluntarily terminate their employment generally forfeit their unvested equity holdings. Rusticus (2006) finds the probability of forfeiture of unvested options is 78 % for regular CEO termination. Dahiya and Yermack (2008), who investigate agreements regarding voluntary departures, find forfeiture probabilities of 44 % for retirement and 96 % for other voluntary departures. Consistent with this argument, Balsam and Miharjo (2007) find that executives with high levels of unvested equity are less likely to depart voluntarily.

[2] In contrast to these models where extended vesting is seen as the critical contract feature that extends the horizon of managers and prevents myopia, Laux (2012) cautions that, if there is a risk that the CEO will get fired before the options vest, the cost of forfeiting these options may induce managers to myopically boost interim performance to prevent their being fired and losing all their options. His optimal contract separates the two roles of vesting: ownership transfer and the timing of exercisability. In the presence of long-term projects, it may be optimal to have a transfer of ownership of the options after only a short period, while still preventing option exercises until the uncertainty about the project has been resolved. Thus the prediction from this model for vesting terms is ambiguous.

[3] Firms with considerable growth opportunities must make investment decisions about projects where the cash flows will not be fully revealed for longer periods and management has a considerable information advantage that cannot be credibly disclosed. Thus equity values may not fully reflect the expected value of the investment. The price adjusts to reflect the investment choices as information about investments is revealed over time.

Longer vesting terms thus increase the cost to another firm that is hiring an executive away from their current position because Fee and Hadlock (2003) find that new employers compensate executives for forfeited equity.[4] We expect firms to increase retention of well-performing CEOs by extending vesting terms, ceteris paribus. At the same time, Brickley (2003) suggests that there is a deeper pool of replacement CEOs in more homogeneous industries. Thus we expect a negative relation between vesting and industry homogeneity if a firm can easily find a replacement CEO in such industries.

2.4 Risk-taking incentives

Agency problems also arise because undiversified, risk-averse managers prefer less firm-specific risk than well-diversified shareholders. Prior literature finds that the convex pay-off function of stock options helps to overcome the divergence in risk preferences by encouraging managers to take more risk (e.g., Rajgopal and Shevlin 2002). However, Lambert et al. (1991) predict that deep-in-the-money options may encourage managers to be more risk averse and to forego projects with positive net present value but higher risk. To avoid this decline in risk-taking incentives as options rise into the money, Brisley (2006) suggests that allowing executives to exercise their options earlier reduces the risks imposed by holding options that lie deep in the money and affords firms the opportunity to increase risk-taking incentives at a lower cost (with fewer grants). This theory suggests that firms with more risky investment opportunities and a greater need to provide risk-taking incentives may grant stock options with shorter vesting periods that allow managers to exercise their in-the-money options earlier.

2.5 Equity as compensation

U.S. Internal Revenue Code Section 162(m) limits the corporate tax deduction for compensation paid to the CEO in excess of $1 million. Performance-based compensation, such as at-the-money option grants, is exempt from this limit. In contrast, salary and discretionary cash bonuses that are not directly tied to performance do not qualify for a tax deduction. As a result, firms may compensate their executives with stock options to reap the tax benefits of such compensation (e.g., Hall and Murphy 2002).

At the same time, unvested option grants impose greater risk on the CEO than cash payments, such as bonus or salary. Specifically, vesting provisions limit CEOs' opportunities to liquidate their assets; this limitation exposes them to the stock's volatility and to forfeiture risk. Shorter vesting terms allow options to be converted to cash sooner, which reduce risk and increase the CEO's subjective value of the grant. Consistent with this conjecture, Hodge et al. (2009) provide survey evidence that managers value options less when the vesting period is longer. Thus we expect

[4] For example, when Ford Motor Company hired Alan Mulally from Boeing, Ford paid him an $18.5 million dollar bonus, which was largely composed of $11 million to "make up for bonuses and stock options forfeited by leaving Boeing" (Ford 2006 proxy statement).

shorter vesting schedules when firms grant options as current compensation rather than to provide future incentives.

2.6 CEO bargaining power and monitoring

Vesting restrictions impose significant costs on the manager. First, vesting increases the risk of forfeiting the options upon early departure. Second, longer vesting terms impose liquidity risk by tying the manager's wealth up in unvested options and exposing it to firm-specific equity risk during the vesting period. Because of these factors, CEOs prefer the flexibility of shorter vesting terms. Thus we expect CEOs with more bargaining power relative to the board and greater influence over pay-setting to receive option grants with shorter vesting terms.

Strong boards of directors can limit executives from extracting wealth through excessive or poorly structured compensation. Prior literature finds that other external monitors, such as institutional investors, also influence contract design either directly through shareholder activism (Hartzell and Starks 2003) or indirectly through the firm's efforts to attract institutional investors (Bushee 1998). Consistent with institutions playing a significant role in compensation design, Cadman and Sunder (2011) find that short-horizon controlling investors provide equity grants with shorter vesting periods to the executives of firms before the IPO, while institutional ownership is associated with longer vesting terms after the IPO. To the extent that these monitoring mechanisms reduce executive rent extraction and increase the effectiveness of the incentives provided by equity payments, we expect strong monitoring to mitigate the CEO's influence on vesting terms.[5]

3 Data and variable measurement

3.1 Sample

Executive stock options are generally granted according to an option plan, equity plan, long-term incentive plan or omnibus plan that has been approved by shareholders. These plans provide a framework for the types and conditions of equity grants and provide the board or compensation committee with the authority to issue them at their discretion. The same plan will be in place for several years before a new plan comes up for a vote (e.g., Armstrong et al. 2010). To achieve certain reporting, tax, or corporate governance benefits, the plans often place some restrictions on the board's authority. Common restrictions include the prohibition of discount options (options that are already in the money at the time of the grant) and the repricing of options; they also place caps on the maximum term of the options (typically 10 years). However, most pertinent to our study, in the vast majority of cases, the plans give the board complete discretion over the vesting terms.

[5] In contrast, direct monitoring and contractual provisions such as vesting periods could also act as substitutes. In that case, more closely monitored firms can allow executives to exercise their options earlier in the term, because these more closely monitored managers impose fewer agency costs.

To provide some evidence on the extent of board discretion with regard to vesting, we read in detail the equity plans of a subsample of 100 firms; our goal was to learn about restrictions placed on the board's discretion in setting vesting terms. Eighty-five percent of the plans do not specify vesting restrictions, leaving the vesting terms to the board. For example: "The Committee, in its sole discretion, shall prescribe … the time or times at which, or the conditions upon which, an Option or portion thereof shall become vested and exercisable …" (American Electric Power Co, proxy statement 2005). Six percent of the plans specify a minimum vesting period (often quite short, e.g., 6 months or 1 year). Finally, 9 % of the plans specify a vesting schedule either as a default or by mandate. Overall, directors generally maintain discretion over vesting terms to ensure that various incentive, retention, or reporting objectives are achieved.

We obtain vesting data from Form 4 filings, as collected by Thomson Financial. The SEC requires firms to file a Form 4 when there is a change in ownership by an insider. Options granted to the CEO fall within this requirement. In addition, Form 4 filings include vesting schedules associated with option grants. To ensure the integrity of the data, we restrict the sample to observations where we can match the total number of options granted that are reported on Form 4 with those reported in the proxy statement for a given fiscal year (obtained from Standard and Poor's ExecuComp).[6] We impose this restriction for several reasons. First matching the Form 4 filings with proxy statements ensures that the observed grants are compensation for the reported fiscal year and not part of a long-term incentive payout. Second, matching the grants on Form 4 with those reported in the proxy statement prevents potential errors that may exist in the Form 4 files. For this reason, we also restrict the sample to fiscal years 1997–2008.[7]

We manually investigate option grants with vesting periods of longer than 4 years to confirm that these potentially influential observations are not performance-based vesting or the result of data errors. In cases where firms grant options multiple times during a fiscal year, we calculate the weighted average of the vesting terms. After imposing the restrictions described above and eliminating grants with performance-based vesting and observations with insufficient data to calculate our control variables, our final sample consists of 7,412 firm-year observations. Table 1 provides the distribution of observations by year (Panel A) and industry (Panel B). Panel A suggests the sample is fairly evenly distributed across the sample period, and Panel B indicates that our sample spans a broad range of industries.

[6] We focus on stock option grants for several reasons. First, stock option grants are the largest component of (equity) pay during our sample period. Second, since our focus is on equity grants with service-based vesting, we would like to exclude any equity grants with performance vesting conditions. Gerakos et al. (2007) find that option grants with performance-based vesting restrictions are relatively rare, while Bettis et al. (2007) find that performance-based vesting awards are more common for restricted stock grants than they are for option grants.

[7] Before August 2002, beneficial owners were not required to file their Form 4 until the 10th day of the month following the change in beneficial ownership. This leads to errors in the Form 4 files in the early part of the period. We begin our sample in 1997 because our ability to match ExecuComp grants with Form 4 filings significantly improves from this year.

Table 1 Sample statistics

Panel A: Annual distribution of firm-level observations		
Years	Firm years	% of sample
1997	456	6.15
1998	483	6.52
1999	517	6.98
2000	558	7.53
2001	605	8.16
2002	709	9.57
2003	762	10.28
2004	800	10.79
2005	750	10.12
2006	630	8.50
2007	588	7.93
2008	554	7.47
Total	7,412	100.00

Panel B: Industry distribution of sample		
Industry	Firm years	% of sample
Agriculture	26	0.35
Chemicals	322	4.34
Computers	1,075	14.50
Durable manufacturers	1,898	25.61
Extractive	343	4.63
Finance, insurance and real estate	96	1.30
Food	264	3.56
Mining and construction	181	2.44
Other	19	0.26
Pharmaceuticals	329	4.44
Retail	955	12.88
Services	600	8.09
Textiles and printing/publishing	513	6.92
Transportation	348	4.70
Utilities	443	5.98
Total	7,412	100.00

This table displays the distribution of the sample over time (Panel A) and industry (Panel B) based on the Barth et al. (1998) industry classification. The sample only includes firm-years for which there is sufficient information to calculate all vesting and control variables

3.2 Variable measurement

Because vesting patterns vary in length and pattern, we examine several dimensions of vesting periods. Our primary vesting measure is the weighted average vesting term (*Vesting Duration*), calculated as the average time to vest for the options in a

grant weighted by the number of options that vest over a given period. We also measure the term of the grant based on the time it takes for the entire grant to vest (*Vesting Period*). To capture the notion of early versus late vesting, we construct an indicator variable, *Early*, which takes the value of one if the entire grant vests within 1 year of the grant date. In addition, we construct a variable *%EARLY,* which is the fraction of the grant that vests in the first year. To further explore the vesting patterns, we use the indicator variable *EQUAL* to measure whether the option grant vests in equal installments over the vesting period; the indicator variable *CLIFF* measures whether the entire grant vests at one time.

To better illustrate these measures, consider two grants: one that vests in four equal installments annually and another that completely vests 4 years after the grant date. We categorize the option grant that vests ratably over 4 years as *EQUAL*, and the option that completely vests 4 years after the grant as *CLIFF*. The *Vesting Period* is 4 years for both grants. Note, however, that the *Vesting Duration* of these grants differs. The *EQUAL* vesting grant represents a *Vesting Duration* of 2.5, while the *CLIFF* vesting grant in the example represents a *Vesting Duration* of 4 years. Finally, *%EARLY* is 25 % for the equal vesting grant and 0 % for the cliff-vesting grant.

3.3 Descriptive statistics of vesting terms

Table 2 provides summary statistics of the vesting schedules for our sample. While there is a perception that firms adopt fairly boilerplate vesting terms (e.g., Hall and Murphy 2002), consistent with firms affording compensation committees discretion over option grant terms, we document significant variation in the length and pattern of vesting terms. Panel A provides detailed statistics of the vesting terms. The mean (median) *Vesting Duration,* the weighted average vesting period, is 23.9 (24) months. The median *Vesting Duration* corresponds to a vesting schedule where the options vest in equal annual installments over 3 years or cliff vest at the end of 2 years. The standard deviation is 11 months, suggesting significant variation in vesting. We also find an average firm-specific standard deviation of 6 months (not tabulated). *Vesting Period,* the total period over which the option completely vests, ranges from immediate vesting to a *Vesting Period* of 120 months, or 10 years. On average, the first tranche of an option grant vests approximately 1 year after the grant date. The average number of dates on which a portion of the grant vests, or tranches, is 5.7, and the median is three tranches. Panel B provides the distribution of the fraction of the total number of options across all grants vesting each year. About 6 % of the options vest immediately, while approximately 42 % of options vest within the first year, and 63 % vest within the first 2 years. Note, however, that these statistics represent the average. A significant proportion of grants vest over longer periods.

Panel C provides information on the vesting pattern of the option grants. Equal vesting grants, where the grant vests ratably over time, are the most common (54.8 % of the sample), followed by cliff vesting grants (32.5 %). The remaining grants (12.7 %) vest irregularly over time, which in some cases is because, in a given year, the executive may receive both equal and cliff vesting options. Among the equal vesting grants reported in Panel D, those vesting over 3 or 4 years are

Table 2 Vesting summary statistics

Panel A: Distribution of the vesting summary statistics

	Mean	SD	Min	p25	Median	p75	Max
Vesting duration	23.9	11.3	0	16	24	30	120
Vesting of first tranche	13.6	10.4	0	12	12	12	120
Vesting period	35.8	17.9	0	24	36	48	120
Number of tranches	5.7	11.9	1	1	3	4	245

Panel B: Fraction that vests each year after the grant (N = 6647)

	Mean (%)
Fraction that vests immediately	6.0
Fraction that vests in year 1	36.1
Fraction that vests in year 2	21.0
Fraction that vests in year 3	23.2
Fraction that vests in year 4	10.0
Fraction that vests in year 5	3.1
Fraction that vests beyond 5 years	0.7
	100.00

Panel C: Vesting patterns

	N	% of total
Equal	4,059	54.8
Cliff	2,409	32.5
Other	944	12.7
	7,412	100.00

Panel D: Distribution of equally vested grants

	N	% of total
Equally over 2 years	204	2.8
Equally over 3 years	1,691	22.8
Equally over 4 years	1,685	22.7
Equally over 5 years	469	6.3
Equally over more than 5 years	10	0.1
	4,059	54.8

Table 2 continued

Panel E: Distribution of cliff vesting grants		
	N	% of total
All immediate	360	4.9
At the end of 1 year	1,331	18.0
At the end of 2 years	174	2.3
At the end of 3 years	389	5.2
At the end of 4 years	80	1.1
At the end of 5 years	54	0.7
Beyond 5 years	21	0.3
	2,409	32.5

This table displays the details of the distribution of the vesting variables. Panel A provides the basic descriptive statistics for the vesting variables. Panel B shows the average fraction of the grant vesting in each year relative to the grant date. Panel C shows the distribution over the type of grant: vesting in equal installments over the vesting period (Equal), or vesting all at the end of the vesting period (Cliff), or vesting irregularly over the vesting period (Other). Panels D and E show the distribution of vesting periods within the two main groups of vesting patterns, Equal and Cliff.

most common. For the cliff vesting options, reported in Panel E, 4.9 % of all grants vest immediately, while cliff vesting on the first anniversary of the grant is most common. Overall, we find significant variation in option grant vesting patterns, which suggests that the common perception—that all options vest ratably over 3 or 4 years—is not accurate.

To provide initial evidence on whether the adoption of SFAS 123(R) influenced vesting patterns, we compare the *Vesting Duration* for the firm years before and after the accounting rule took effect; we also do a matched comparison of the *Vesting Duration* for firms with data on option grants both before and after the rule change. The results are reported in Table 3. In Panel A, we find that the *Vesting Duration* (*Vesting Period*) is higher by 3.68 (6.94) months on average after SFAS 123(R). We also find a higher median *Vesting Duration* and *Vesting Period* post-SFAS 123(R). In Panel B, we focus on a constant sample analysis where we can compare vesting terms for the same firm over time. We eliminate from this sample firms that voluntarily expensed their options before 2006, restricting the sample to 712 firms. We use the average vesting terms for each firm before the adoption of SFAS 123(R) and the average following the adoption of the rule. Consistent with firms extending vesting periods following the requirement to recognize the option grant expense, we find that the average *Vesting Duration* is significantly greater in the years following the adoption, based on a paired *t* test. The difference is comparable to increasing the *Vesting Duration* by 2.9 months, or 12 % of the initial duration. We also find that the average *Vesting Period*, the period over which the option grant vests, increases by 4.8 months, or 13 % of the initial period. In nonparametric tests, we compare the medians of the two time periods and find that there is also a statistically significant extension of the median vesting terms after SFAS 123(R).

Table 3 Effect of SFAS123(R) on vesting

Panel A: Overall sample (N = 7,412 firm years)			
	N	Mean vesting duration	Mean vesting period
Pre 123R	5,799	23.12	34.24
Post 123R	1,613	26.80	41.18
Diff post–pre		3.68	6.94
T test		11.67***	13.93***
	N	Median vesting duration	Median vesting period
Pre 123R	5,799	24.00	36.00
Post 123R	1,613	25.87	39.42
Diff post–pre		1.87	3.42
Wilcoxon z		12.12***	13.71***
Panel B: Constant sample (N = 712 firms)			
		Mean vesting duration	Mean vesting period
Average Pre 123R		24.01	36.63
Average Post 123R		26.95	41.42
Diff post–pre		2.94	4.79
Paired T test		8.97***	9.38***
		Median vesting duration	Median vesting period
Median pre 123R		24.00	36.00
Median post 123R		26.00	42.20
Diff post–pre		2.00	6.20
Wilcoxon z		9.52***	10.28***

This table displays the details of the changes in *Vesting Duration* around the mandatory adoption of stock option expensing pursuant to FAS123R. Panel A provides the *Vesting Duration* and vesting period both before and after the adoption of FAS123R for all firm-years in the sample. Panel B shows the average *Vesting Duration* and *Vesting Period* pre and post FAS123R for a constant sample of firms with grants both before and after the adoption of stock option expensing

3.4 Proxies for the determinants of vesting terms

The discussion in Sect. 2 suggests that vesting terms are a function of financial reporting incentives and many competing economic forces. We identify variables that proxy for the various determinants, recognizing that it is difficult to construct proxies that test only one theory independently. We highlight cases where a variable could be interpreted in the context of multiple economic hypotheses and predict the direction of the relation with vesting under each of those relevant hypotheses.

3.4.1 Financial reporting

The adoption of SFAS 123(R) provides an exogenous shock to the standard for expensing stock options, which creates an opportunity to examine how accounting

standards shape compensation design, in particular the vesting contract feature.[8] Carter et al. (2007) examine the relation between *voluntarily* expensing option grants and compensation design. Because there are likely to be different relations, we separately examine changes in vesting terms around the adoption of SFAS 123(R) and those firms that voluntarily expense stock option grants before its adoption. Specifically we include two indicator variables for firms that recognize the fair value expense of option grants. The first indicator is set to one after the 83 firms in our sample voluntarily expense stock option grants. The second indicator is set to one for all firms after the adoption of SFAS 123(R). We predict that firms grant options with longer vesting schedules after recognizing the option compensation expense on the income statement.

3.4.2 Economic determinants

The horizon incentives hypothesis highlights the importance of growth opportunities for the design of vesting schedules. The most common measure of growth opportunities is the market-to-book ratio as a proxy for Tobin's Q. A drawback of this measure is that accounting conservatism and the profitability of current operations affect the measure. We separate these effects using the approach in Richardson (2006), which is based on the Ohlson (1995) model. Under this approach, the value of the firm can be separated into the value of the assets in place and the value of growth opportunities. The value of the assets in place is calculated using the firm's current earnings and book value and estimates of the earnings persistence and cost of equity capital. The measure of growth opportunities can then be calculated as the difference between the observed equity value and the estimated value of the assets in place.[9]

When computing the value of the assets in place, we follow Richardson (2006) and assume a constant discount rate of 12 %. But, unlike Richardson (2006), we allow the earnings persistence parameter to vary across industries, rather than use the constant persistence of 0.62 based on Dechow et al. (1999). We re-estimate the earnings persistence model in Dechow et al. separately for each two-digit SIC industry and use these industry-specific persistence parameters to calculate the value of the assets in place. However, our results later in the paper are robust to alternative assumptions, including using the constant persistence parameter of 0.62 and varying the discount rate between 9 and 15 %. We expect a positive relation between growth opportunities and vesting terms.

Next we consider two measures of performance, accounting earnings and stock market returns. We measure accounting performance as the firm's return on assets (ROA). We measure stock performance as the buy-and-hold return over the prior fiscal year. We decompose the overall stock performance of the firm into the market

[8] Although SFAS 123(R) is not truly exogenous, it imposes option grant expensing on all firms. Thus it provides an opportunity to investigate how firms alter their contracts when required to recognize option grants as an expense. Nonetheless, we address this concern empirically when examining the change in the vesting periods in Sect. 4.5.

[9] While we use this as our primary measure of growth opportunities, our results are consistent when we use the conventional market-to-book measure.

return and the firm-specific abnormal return. We separate the market return because Bolton et al. (2006) argue that shareholders provide short vesting terms when the speculative component of stock price is high, which is more likely after higher market returns. If firms grant equity as compensation for past performance, we expect shorter vesting periods for firms with better performance. In contrast, when looking through the lens of the retention hypothesis, we predict that retention becomes more important for high performing managers, leading to longer vesting schedules following strong firm performance.

To test the retention hypothesis, we also consider the cost of replacing the CEO. We first consider the importance of the CEO. Following Balsam and Miharjo (2007), we measure the difference between the total cash compensation received by the executive and the average earned by CEOs within the same industry (two-digit SIC code), size decile, and year. As the abnormal cash compensation represents the CEO's relative value, we expect a positive relation with vesting.[10] We also consider the labor market. As in Parrino (1997), we measure the homogeneity of the industry as a proxy for the competition in the labor market for CEOs.[11] Brickley (2003) suggests that industry homogeneity may reflect more precise performance evaluations or a deeper pool of potential replacement CEOs. Thus, if a firm can relatively easily find a replacement CEO, then all else being equal, they have lower incentives to retain the CEO, and we expect a negative relation between vesting and industry homogeneity.

To realign risk-taking incentives, we expect shorter vesting schedules for firms with greater underlying volatility. We use the standard deviation of the firm's daily stock returns over the prior fiscal year as a measure of firm risk. Following the risk-taking incentive hypothesis, we predict higher volatility to be associated with shorter vesting patterns.

3.4.3 CEO power and monitoring

Because vesting terms impose costs and risks on the CEO, a more powerful CEO who has captured the pay-setting process will encourage the board to provide option grants with shorter vesting terms. To measure the relative power of the CEO, we measure the difference in cash compensation between the CEO and the next highest paid executive scaled by the compensation of the second highest paid executive.[12]

[10] Abnormal cash compensation could alternatively be a proxy for CEO power as CEOs with higher bargaining power could negotiate higher current compensation. If this variable captures CEO power rather than retention incentives, we would expect a negative relation with vesting terms because powerful CEOs would not want to be constrained by longer vesting terms.

[11] Industry homogeneity is calculated using a two-factor regression model of a firm's stock return on the returns for the industry and the overall stock market. The measure is the average across all firms in the two-digit SIC industry of the partial correlation coefficient on the industry return index. Industries where returns are more correlated are considered more homogenous.

[12] In cases where the CEO is not the highest paid executive, we measure the difference between CEO compensation and the highest paid executive, which yields a negative value. Recent work by Bebchuk et al. (2011) uses a slightly different but related metric, namely CEO total pay scaled by the total pay of the top five executives; they find that CEOs with a large pay slice tend to be associated with greater agency problems. They include equity pay, long-term incentive payouts, and other compensation in their metric. Because equity pay is linked with the vesting term, it is important to exclude this from our

Hayward and Hambrick (1997) and Chatterjee and Hambrick (2007) find that CEOs with greater relative power engage in more empire-building and rent extraction, such as making more acquisitions and overpaying for acquisitions. Thus we predict that CEOs with greater relative power also influence contract design to receive equity grants with shorter vesting patterns.

We expect firms with more effective monitoring mechanisms to mitigate a CEO's ability to extract rents and influence contract design. To test this, we create a monitoring index as the standardized sum of four dimensions of monitoring. We measure the CEO's influence over the board by whether the CEO is also the chairman of the board. We measure the strength of monitoring by the board as the percentage of independent board members. We also include the shareholder rights proxy (G-index) developed by Gompers et al. (2003). In addition, we include the percentage of institutional ownership, because recent literature argues that institutions play a role in the design of executive compensation (Hartzell and Starks 2003; Cadman and Sunder 2011). While each of these individual measures has been well established in the literature as a proxy for monitoring and governance, we need a single parsimonious measure of the strength of monitoring so that we can evaluate the ability of strong monitoring mechanisms to rein in powerful CEOs. So rather than picking any one monitoring metric, we combine the measures into a monitoring index, where a higher composite score indicates greater monitoring. To address the differing scales of the monitoring variables, we standardize each of them by subtracting its sample mean and dividing by its sample standard deviation. We then add the standardized values of the percentage of independent directors and institutional ownership and subtract the standardized values of the G-index and the CEO-chairman indicator.

4 Multivariate results

4.1 Study design

We predict that vesting terms are a function of financial reporting and other economic determinants. We test the hypothesized determinants with the following empirical model:

$$\begin{aligned}\text{Vesting} = {} & \beta_0 + \beta_1 \text{SFAS 123}(R) + \beta_2 \text{Voluntary Expense} + \beta_3 \text{Growth opportunities} \\ & + \beta_4 \text{Industry Homogeneity} + \beta_5 \text{Abnormal Cash Comp} \\ & + \beta_6 \text{ROA} + \beta_7 \text{Market Return} + \beta_8 \text{Abnormal Return} \\ & + \beta_9 \text{Volatility} + \beta_{10} \text{High CEO Power} + \beta_{11} \text{High Monitoring Index} \\ & + \beta_{12} \text{High Monitoring Index} * \text{High CEO Power} + \beta_{13} \text{CEO Retirement Age} \\ & + \beta_{14} \text{New CEO Indicator} + \beta_{15} \text{CEO Ownership} + \beta_{16} \text{Log Assets} + \varepsilon_1 \end{aligned} \quad (1)$$

Footnote 12 continued
measure of CEO power, and we therefore use the measure in Hayward and Hambrick (1997) and Chatterjee and Hambrick (2007).

Table 4 Summary statistics (N = 7,412)

Variable	Mean	SD	Min	P25	Median	P75	Max
Assets (in $ mil.)	6,425	19,854	16	574	1,594	4,867	495,023
Growth opportunities	0.518	0.304	−1.982	0.383	0.575	0.720	1.951
Industry homogeneity	0.263	0.032	0.228	0.237	0.249	0.302	0.319
Abnormal cash compensation	0.027	0.451	−0.972	−0.237	0.000	0.179	4.833
ROA	0.105	0.090	−0.464	0.060	0.100	0.152	0.479
Market return	0.099	0.175	−0.297	−0.101	0.130	0.223	0.471
Firm abnormal return	0.067	0.475	−1.070	−0.216	0.005	0.261	3.827
Volatility	0.421	0.204	0.107	0.279	0.371	0.510	1.936
CEO power	0.393	0.090	0.018	0.336	0.386	0.443	0.898
CEO-chair	0.650	0.477	0.0	0.0	1.0	1.0	1.0
Board independence	0.685	0.164	0.000	0.571	0.714	0.818	1.000
Inst. ownership	0.552	0.340	0.000	0.330	0.656	0.805	1.745
G-index	9.322	2.534	1.000	8.000	9.000	11.000	18.000
Monitoring index	0.009	1.893	−7.437	−1.234	0.024	1.255	5.892
Retirement age indicator	0.126	0.332	0.000	0.000	0.000	0.000	1.000
New CEO indicator	0.216	0.412	0.000	0.000	0.000	0.000	1.000
CEO ownership	0.016	0.052	0.000	0.001	0.002	0.008	1.000

Variable definitions:

Assets (in $ mil.): Book value of assets (in millions of dollars) measured at the end of year t−1

Growth opportunities: Measure of growth opportunities similar to the one in Richardson (2006), based on the Ohlson (1995) model and Dechow et al. (1999), evaluated in year t−1. We use a 12 % discount rate and allow the abnormal earnings persistence to vary by industry

Industry homogeneity: Parrino (1997) measure of industry homogeneity. It is the average, across all firms in each two-digit SIC industry, of the partial correlation coefficient for an industry return index in a two-factor regression model of the stock return of a firm on the returns for the industry and the overall stock market

Abnormal cash compensation: The difference between the annual salary and bonus and the average salary and bonus for firms in the same two-digit SIC industry, size decile, and year scaled by the average salary and bonus of the group, year t−1

ROA: Operating income after depreciation and amortization divided by average total assets in year t−1

Market return: Annualized value-weighted market return, year t−1

Firm abnormal return: Annualized market adjusted firm return, year t−1

Volatility: Annualized standard deviation of daily stock returns over the prior 252 trading days

CEO power: The difference between the total cash compensation of the CEO and the next highest paid executive scaled by the total cash compensation of the next highest paid executive, year t−1

CEO-chair: An indicator variable equal to one if the CEO is also the chairman of the board, year t−1

Board independence: Percentage of board members defined as independent, year t−1

Inst. ownership: Percentage of outstanding shares held by institutional investors, end of year t−1

G-index: Governance score from the Gompers et al. (2003), year t−1

Monitoring index: Monitoring score derived as the sum of the standardized variables for board independence and institutional ownership minus that of CEO-Chair and G-index

CEO retirement age indicator: An indicator variable if the CEO age is greater than or equal to 62, year t−1

New CEO indicator: An indicator variable that takes on the value 1 if the CEO is in the first tenure year

CEO Ownership: Percentage of outstanding shares owned by the CEO at the end of year t−1

Variable definitions and descriptive statistics are displayed in Table 4. To ease the interpretation of the main and interaction effects and to reduce the impact of outliers, we convert the Monitoring Index and the CEO Power variables into indicator variables with the cut-off at each variable's median. In the regressions, we also control for industry effects by including indicator variables for each industry based on Barth et al. (1998) industry classification. We control for CEOs who are close to retirement because Dechow and Sloan (1991) suggest that the horizon conflict between the manager and shareholders is heightened as the manager approaches retirement. We include additional CEO characteristics: CEOs in their first year of office and the proportion of outstanding shares owned by the CEO. We also control for firm size with the natural log assets. To correct for time-series and cross-sectional correlation, significance tests are based on robust standard errors that are clustered by firm and year.

4.2 Vesting duration

Table 5 presents the results from estimating Eq. (1), where the dependent variable is the weighted average vesting period, *Vesting Duration*. Column (1) presents the estimation results for the full sample of firm-years. To explore whether the relations differ based on vesting patterns, in Columns (2) and (3), we partition the sample based on whether the firms primarily grant options with equal vesting patterns (i.e., more than 75 % of all grants vest equally).

The results for the full sample are consistent with the hypothesis that firms lengthen their vesting period to defer the compensation expense associated with option grants. We find statistically significant increases in vesting following the voluntary adoption of option expensing and the mandatory adoption under SFAS 123(R). The coefficient of 3.6 on SFAS 123(R) in Table 5, Panel A, Column (1) indicates that *Vesting Duration* increases by 3.6 months, on average, after the adoption of SFAS123(R), which is an increase of about 15 % of the average *Vesting Duration*.

Focusing on the other economic determinants, we find that firms with greater growth opportunities grant options with longer *Vesting Duration*, as suggested by the positive and significant coefficient on our proxy for growth opportunities. This is consistent with firms granting options with longer *Vesting Duration* to encourage longer horizons when there are more long-term investment opportunities. But we do not find evidence that CEOs with abnormal cash compensation relative to industry peers are associated with longer vesting. In addition, we do not find evidence that industry homogeneity, our proxy for labor market conditions, is related to the *Vesting Duration* in the overall sample.

The coefficients on performance (both ROA and abnormal stock returns) are mixed. ROA is positive and significant, which is consistent with firms granting longer vesting patterns to retain well-performing CEOs. At the same time, abnormal stock returns are not significantly related to *Vesting Duration*. The negative and significant coefficient on market returns is consistent with the predictions in Bolton et al. (2006) that shareholders provide managers with shorter vesting terms when the speculative component of stock price is high. We do not find support for the risk-

taking hypothesis proposed by Brisley (2006); stock return volatility is not significantly related to *Vesting Duration*.

The negative and significant coefficient on CEO Power is consistent with more powerful CEOs receiving option grants with shorter *Vesting Duration*.[13] In addition, the interaction term between Monitoring and CEO Power is positive and statistically significant, suggesting that monitoring is effective in reducing the influence of CEO Power. We also find that CEOs with greater ownership stakes in their firms receive options with longer vesting terms. This is consistent with a better alignment of CEO incentives and shareholder interests. We do not find a significant relation between older CEOs and *Vesting Duration*. This finding, together with evidence in Dahiya and Yermack (2008) that 44 % of CEOs forfeit unvested equity grants upon retirement, casts doubt on the hypothesis that firms grant options with longer vesting terms to extend the horizon of CEOs nearing retirement.

Finally, we do not find a difference between new CEOs and those who have been in office longer than 1 year. In untabulated tests, we reexamine this issue by performing a within-firm analysis where we compare the option vesting for the incoming CEO with that of the outgoing CEO. This gives us a sample of 850 CEO transitions. Using this potentially more powerful setting, we find that incoming CEOs have a statistically significant longer *Vesting Duration* than the outgoing CEOs (25.06 vs. 23.97 months). This provides some support for the notion that new CEOs receive longer vesting to encourage them to build a stake in the firm.[14]

To provide greater context on economic magnitudes, we compare the effect of the accounting treatment to that of the other variables. We restrict our attention to the variables that are statistically significant. CEO Power and the interaction with monitoring have effect sizes of 1.3 months each. For the continuous variables, we compare the effect of moving from the 25th percentile to the 75th percentile of the variable. The results suggest that the effect sizes for Growth Opportunities, ROA, Market Return, CEO Ownership, and Log Assets are 0.6, 0.4, 2.9, 0.05, and 0.7 months respectively. With the caveat that the results on the indicator variables and the continuous variables are not strictly comparable, the accounting effects are

[13] Our tests examining the influence of CEO power on vesting terms has potentially differential predictions for the CEO versus other top executives, while all the other determinants suggest variations across firms rather than across executives within a firm. A within-firm comparison has the advantage of using the firm as its own control. However, a significant drawback is that, in about 75 % of firm-years, the vesting schedules are identical for other executives. Nevertheless, we compare the average vesting of the CEO versus the CFO using a paired *t* test for all firm years in our sample where the CFO also received options and data could be matched between ExecuComp and Thomson Financial, as discussed in Sect. 3.1. We pick CFOs for the comparison to keep the executive role constant and because most companies have a CFO and the position can be easily identified in ExecuComp. While the difference between CEOs and CFOs is not statistically significant in the overall sample, CEOs have lower *Vesting Duration* relative to the CFO in the sub-sample of powerful CEOs; this difference is significant at the 5% level.

[14] In untabulated tests, we repeat the analysis in Table 5 using *Vesting Period* as the dependent variable. The results are generally similar. In particular, the two reporting variables and the measure of growth opportunities are still positive and statistically significant. The effect of CEO Power is positive and significant. Similar to the result in Table 5, the main effect and the interaction effect of the monitoring index are positive, although now the main effect is significant and the interaction effect is not. In contrast to the results in Table 5 using *Vesting Duration*, the retirement indicator is negative and significant, while the coefficient on ROA is no longer significant.

Table 5 Determinants of the length of option grant vesting

Variable	Hypothesis	Full sample (1)	Low use of equal vesting (2)	High use of equal vesting (3)
Post FAS123R	Financial reporting (+)	3.636***	4.364***	0.855
Voluntary expensing	Financial reporting (+)	3.165***	3.503**	1.813*
Growth opportunities	Horizon (+)	1.809*	2.372**	0.984
Industry homogeneity	Retention (±)	8.875	18.392	−7.08
Abnormal cash compensation	Retention (+)	0.347	0.511	0.208
ROA	Compensation (−)/retention (+)	4.521**	4.951*	2.998
Market return	Control	−8.975**	−9.552***	−4.152
Firm abnormal return	Compensation (−)/retention (+)	0.443	0.501	−0.037
Volatility	Risk taking (−)	−0.031	1.108	−1.993
High CEO power	Monitoring (−)	−1.296**	−0.915	−1.653***
High monitoring index	Monitoring (+)	0.892	0.659	0.514
High monitoring*High CEO power	Monitoring (+)	1.288*	1.278	0.813
CEO retirement age	CEO control	−0.72	−1.021	−0.153
New CEO indicator	CEO control	0.321	0.572	−0.269
CEO ownership	CEO control	7.376**	4.319	5.965*
Log assets	Firm control	0.770***	1.057***	−0.232
N		7,412	5,180	2,232
Adj R^2		0.071	0.081	0.078

This table provides the estimation results from an OLS model of CEO stock option grant vesting length. The dependent variable is *Vesting Duration*, the weighted average vesting period of the annual stock option grants. Voluntary Expensing is an indicator variable equal to 1 if the firm voluntarily expenses options at the time of the grant and 0 otherwise. Post SFAS 123(R) is an indicator variable equal to 1 if the grant occurs after the adoption of SFAS 123(R) and 0 otherwise for firms that did not voluntarily expense before SFAS 123(R). The remaining independent variables are as defined in Table 5. High CEO Power and High Monitoring Index are indicator variables set to 1 for observations above the sample median and 0 otherwise. Specification (1) uses firm-year observations from the full sample, (2) uses firms that do not primarily rely on equally vested options, and (3) focuses on the sample that primarily used equal vested options, identified as more than 75 % of the options of a given firm vesting equally. Industry fixed effects based on Barth et al. (1998) are included but not reported. To correct for time series and cross-sectional correlation, t-statistics (in parentheses) are based on robust standard errors that are clustered by firm and year. Significance levels of the coefficients are indicated as follows: ***, **, * indicate significant coefficients at the 1, 5, and 10 % levels based on two-tailed tests

among the largest effects in our tests. Potential explanations for the small effects of the economic determinants are measurement error in the empirical proxies and the possibility that a subset of the firms adopt standardized vesting terms rather than altering this contract feature as firm and CEO characteristics change.

As can be seen from Column (2), we generally find consistent results in the sample of firms that do not rely heavily on option grants with equal vesting patterns. In contrast, there are few significant effects in the subsample of firms that grant options with equal vesting patterns, reported in Column (3). In unreported tests, we find that these firms pay lower total compensation and use a smaller proportion of options in their compensation mix relative to the other firms in our sample. We also find that the vesting terms are fairly sticky over time for these firms and the average firm-specific standard deviation in *Vesting Duration* is 3.9 months for firms that primarily grant equally vesting options, as compared to 9 months for the sample with low use of equal vesting. While these results suggest that firms that pay less or rely less on options pick more standardized terms and are less likely to vary them over time, the small sample size and resultant lower power make it hard to draw firm conclusions about firms that mainly use equal vesting options.

4.3 Other attributes of vesting schedules

The average *Vesting Duration* and *Period* do not capture the full richness of the vesting schedule. To illuminate the choice of vesting patterns, we estimate the propensity to grant options with equal vesting patterns, as this is the most widely used pattern, covering a little over half the sample. This analysis is particularly interesting with respect to the accounting treatment variables because options that cliff-vest are expensed ratably over the vesting term. That is, under SFAS 123(R), an option that cliff-vests after 4 years is expensed in the same manner as an option that vests equally over 4 years. At the same time, an option that cliff-vests after 4 years imposes greater risk and longer horizon incentives on the executive than one that vests ratably over 4 years. As such, a firm that grants cliff-vesting options may impose similar risk on the executive but extend the overall term of the option by switching to granting options that vest ratably over an extended period.[15] The results, reported in Column (1) of Table 6, support the conjecture that firms are more likely to grant options with equal vesting schedules after the adoption of stock option expensing.

We also examine the fraction of the grant that vests within the first year (*%Early*) and whether the entire option grant vests within the first year (*Early).* Column (2) reports the results where the dependent variable is the portion of the grant vesting early, and Column (3) reports the results predicting whether the entire grant vests early. Because early vesting leads to shorter average vesting periods, the predicted signs are opposite those for *Vesting Duration*. In general, the results on the economic determinants are consistent with those on estimating the average vesting period. Consistent with accounting regulations influencing contract design to defer recognizing the compensation expense, the coefficients on voluntary expensing firms and the adoption of SFAS 123(R) indicate a significant movement away from

[15] For example, an executive may be indifferent between an option grant that vests ratably over 6 years and one that cliff vests at the end of 4 years. This is because the equal vesting grant has a lower probability of forfeiture of the full grant and affords the executive opportunities to exercise portions of the grant earlier.

Table 6 Determinants of vesting patterns

Variable	Equal (1)	% Early (2)	Early (3)
Post FAS123R	0.711***	−0.145***	−0.809***
Voluntary expensing	0.459**	−0.117***	−0.525**
Growth options	−0.03	−0.073**	−0.259**
Industry homogeneity	−1.547	−0.31	−1.032
Abnormal cash compensation	0.072**	−0.011	−0.061
ROA	−0.207	−0.003	0.440*
Market return	−1.248*	0.342**	1.561**
Firm abnormal return	0.112**	−0.016	−0.085*
Volatility	−0.019	−0.387	−4.631
High CEO power	−0.131***	0.032**	0.098*
High monitoring index	0.184*	−0.037	−0.176
High monitoring*high CEO power	0.147***	−0.045**	−0.197***
CEO retirement age	−0.095*	0.033*	0.181**
New CEO indicator	−0.001	−0.002	−0.001
CEO ownership	0.151	−0.048	0.116
Log assets	0.057**	−0.021***	−0.083***
N	7,412	7,412	7,412
Adjusted R^2		0.095	
McFadden's pseudo R^2	0.081		0.108

This table displays the determinants of several alternative dimensions of vesting period. The first dependent variable, *Equal*, is the probability that the option grant vests equally over time, rather than all at the end of the vesting period or irregularly. The second dependent variable is *% Early*, defined as the proportion of the option grant that vests within 1 year. Finally, the third dependent variable, *Early,* an indicator variable if all of the grant vests within 1 year. The model is estimated as an OLS regression when the dependent variable is *%Early* and as a probit model when the dependent variable is *Early* and *Equal*. Voluntary Expense is an indicator variable equal to 1 if the firm voluntarily expenses options at the time of the grant and 0 otherwise. *SFAS 123(R)* is an indicator variable equal to 1 if the grant occurs after adopting SFAS 123(R) and 0 otherwise. The remaining independent variables are as defined in Tables 4 and 5. Industry fixed effects based on Barth et al. (1998) are included but not reported. To correct for time-series and cross-sectional correlation, t-statistics (in parentheses) are based on robust standard errors that are clustered by firm and year. Significance levels of the coefficients are indicated as follows: ***, **, * indicate significant coefficients at the 1, 5, and 10 % levels based on two-tailed tests

grants that vest early. The results for economic determinants are broadly consistent with earlier results except with respect to ROA and CEO Retirement Age.

4.4 Changes analysis of the effects of SFAS 123(R) on vesting patterns

The univariate analysis reported in Table 3 indicates that firms extended option grant vesting patterns after the adoption of SFAS 123(R). We next investigate the characteristics associated with an increase in vesting terms after the adoption of SFAS 123(R). An important factor in vesting schedules following the adoption of SFAS 123(R) is the nature of the vesting pattern before adoption. We find firms that

granted cliff-vesting options before SFAS 123(R) were more likely to alter vesting patterns than firms that granted options with equal vesting patterns. The results in Tables 5 suggest that the effect of 123(R) was different for firms that primarily granted options with equal vesting patterns from the rest of the sample, and results in Table 6 show that firms shift towards equal vesting after the adoption of SFAS 123(R).

We further examine *Vesting Duration* as a function of the vesting pattern for the last grant before recognizing the option grant expense and the first grant after SFAS 123(R). The results, displayed in Table 7, Panel A, indicate that firms that previously granted options with equal vesting patterns do not alter the *Vesting Duration* after recognizing the fair value of the options as an expense. In sharp contrast, firms that previously granted options with cliff-vesting patterns extend the *Vesting Duration*, on average, by approximately 12 months when switching to an equal vesting pattern after the adoption of SFAS 123(R). In addition, the *Vesting Period* increases by about 27 months, on average, for firms that switch from cliff-vesting to equal vesting patterns.[16] These results are consistent with our findings in Table 5, Panel A, column (2), which reports the significant effects of reporting incentives for firms that had a low reliance on equally vesting options. More generally, approximately 40 % of firms that previously granted options with cliff-vesting patterns switched to equal vesting after the adoption of SFAS 123(R). In contrast, only about 5 % of firms using equal vesting grants switched to cliff-vesting. Together these findings are consistent with firms extending the *Vesting Duration* but compensating the CEO by allowing a portion of the grant to vest earlier.

The changes in vesting patterns surrounding SFAS 123(R) afford us an opportunity to test whether firms compensate CEOs for the additional risk imposed on them when extending vesting terms. We build on the changes in vesting surrounding of SFAS 123(R) as a quasi-exogenous shock to vesting and measure the change in vesting, total compensation, and current compensation (salary plus bonus) from 2005 to 2006. In untabulated tests, we test for a correlation between these changes. Consistent with firms compensating CEOs for the additional risk imposed by longer vesting terms, we find a positive and significant correlation between changes in vesting terms and changes in both current compensation (Pearson correlation 0.07, $p = 0.061$) and total compensation (Pearson correlation 0.069, $p = 0.065$).

Next we investigate whether incentives to respond to financial reporting concerns are associated with changes in vesting patterns following stock option expensing. We estimate the change in the firm-specific average *Vesting Duration* following the adoption of SFAS 123(R). We include the size of the firm, ROA, CEO Power, CEO Ownership, and our measure of monitoring in the set of determinants. Based on our earlier findings, we include an indicator for firms that primarily granted options with

[16] Note that for cliff-vesting grants the vesting period and the *Vesting Duration* should be the same since the full grant vests at the end of the vesting period. In this table, the two are not always identical because we have firms that have multiple cliff-vesting grants in the same year. In that case, the *Vesting Duration* is the weighted average of the grants, but the vesting period is the maximum of the vesting periods. Results are similar if we exclude those observations.

Table 7 Evidence on the change in vesting terms following the adoption of SFAS 123(R)

Panel A: Change in vesting terms following SFAS 123(R)

	Last grant pre-123R		
First grant post-123R	Cliff-vesting	Equal vesting	Other
Vesting duration			
Cliff-vesting			
N	81	28	8
Pre-123R	19.3	27.3	35.7
Post-123R	20.4	24.6	29.7
Equal vesting			
N	67	415	41
Pre-123R	15.2	27.3	25.0
Post-123R	27.6***	27.2	26.6
Other			
N	10	22	40
Pre-123R	4.3	26.8	28.7
Post-123R	32.3***	28.0	30.0
Vesting period			
Cliff-vesting			
N	81	28	8
Pre-123R	20.5	45.6	52.6
Post-123R	22.2	32.2**	34.6
Equal vesting			
N	67	415	41
Pre-123R	17.2	44.0	47.6
Post-123R	44.4***	43.2**	44.4
Other			
N	10	22	40
Pre-123R	6.6	47.6	47.5
Post-123R	51.8***	50.5	46.8

Panel B: Cross-sectional analysis of the change in vesting duration following SFAS 123(R)

Variable	Δ vesting duration
Log assets pre 123R	−0.532**
ROA pre 123R	0.447
High CEO power pre 123R	0.865
Accelerated vesting indicator	−0.346
High use of equal vesting pre 123R	−5.036***
CEO ownership pre 123R	7.137
High monitoring index pre 123R	−1.706**
Top5 options/total options pre 123R	1.339***

Table 7 continued

Panel B: Cross-sectional analysis of the change in vesting duration following SFAS 123(R)	
Variable	Δ vesting duration
Intercept	9.030***
N	712
Adjusted R^2	0.08

Panel A: Reports the changes in the vesting pattern and the length of the vesting period following SFAS 123(R) as function of the vesting pattern pre-123(R). The last grant pre-123(R) represents the vesting pattern of annual option grant in the fiscal year before the adoptions of SFAS 123(R), First grant post-123(R) represents the vesting pattern of the option grant in the year of the adoption of SFAS 123(R), where vesting patterns are identified as Cliff-vesting if the full option grant vests at the end of the vesting period, Equal Vesting if the option grant vests in equal intervals over the vesting period, and Other if the option vests at irregular intervals over the vesting period. ***, **, * indicate significant differences in *Vesting Duration* and *Vesting Period* between grants made pre-123(R) and post-123(R) at the 1, 5, and 10 % levels based on paired t-tests

Panel B: The cross-sectional determinants of the change in *Vesting Duration* following SFAS 123R. The independent variables are as defined in Table 4 and are measured as the average over the pre 123R period. The dependent variable is the difference between the firm's average *Vesting Duration* before and after the adoption of SFAS 123(R)

equal vesting patterns before mandatory expensing. We include an indicator for firms that accelerate the vesting of outstanding option before SFAS 123(R). Choudhary et al. (2009) find that firms avoided recognizing the expense of the previously granted unvested options by accelerating the vesting of outstanding underwater options just before SFAS 123(R) took effect. To the extent that this indicates that these firms have a greater sensitivity to reporting concerns, we should see a larger shift for these firms. Finally, we include the fair value of the options granted to the top five executives relative to the total fair value of options granted throughout the firm as a measure of the importance of the options granted to top executives, for whom vesting also influences the total compensation reported in the summary compensation table of the proxy statement. We measure all determinants as the average firm characteristics over the sample period prior to the adoption of 123(R).

The results of this cross-sectional test are reported in Table 7, Panel B. Consistent with the univariate results in Panel A, we find that firms that rely on equal vesting patterns before 123(R) are less likely to increase the vesting term. We also find that firms with greater proportions of option compensation awarded to the top five executives are more likely to extend *Vesting Duration*, while firms with stronger monitoring are less likely to extend the vesting. We find no evidence that firms that accelerated vesting before the adoption of SFAS 123(R) extend the vesting afterwards. This is potentially consistent with these firms not needing the extra reporting benefits since they were already successful in reducing the options expense that needed to be recognized after SFAS 123(R). In untabulated tests, we find similar results when using *Vesting Period* as the dependent variable.

One concern is that our results on the accounting variables are driven by other institutional changes over this period, such as the increased scrutiny of monitoring

practices after the Sarbanes–Oxley Act. To address this concern, in untabulated tests we restrict the sample to post-2003 firm years, i.e., after the implementation of Sarbanes–Oxley; we continue to find a shift in 2006, when SFAS 123(R) went into effect. Overall, our results strongly support the hypothesis that firms altered their vesting schedules in response to SFAS 123(R). We find changes in vesting patterns (a shift towards equal vesting) and an extended *Vesting Duration*.

4.5 Additional analyses

In this section, we discuss two additional sets of tests. First we analyze the relation between vesting and option exercise, which is an important underlying assumption in our hypotheses. We also investigate the relation between option vesting and option life, another important contractual feature in option grants.

A key assumption in our hypotheses is that option vesting influences option exercise behavior. Using proprietary data on broad based option plans for several firms, Huddart and Lang (1996) and Armstrong et al. (2007) find that employee option exercises are positively related to vesting. Using data on executives, Fu and Ligon (2010) provide univariate evidence that about 12 % of options are exercised immediately after vesting and 36 % during the first year after vesting. To provide further support for this assumption in our sample, we examine the relation between number of option vesting and the number of option exercised during the year. The number of options that have vested during the year is not directly disclosed, but we can infer the number of options that vest using two approaches with data from ExecuComp:

(1) number of unvested options$_{t-1}$ + number of options granted$_t$ − number of unvested options$_t$
(2) number of options exercised$_t$ + number of vested options$_t$ − number of vested options$_{t-1}$

We use both these approaches for our sample firms and only retain observations where they match to minimize errors. When calculating the flow of options we adjust for stock splits. We scale the number of options that vested during the year by the sum of unvested options at beginning of year and the number of options granted during the year. The resulting variable measures the fraction of available options that vest during the year and, by construction, lies between 0 and 1. On average, 31 % of the available options vest during the year. As expected, this variable is highly correlated with our main variable, *Vesting Duration* (Pearson correlation 0.34, $p < 0.0001$). We similarly scale the exercise variable and winsorize the scaled vesting and exercise variables at 1 and 99 %.

The results of the option exercise analysis are shown in Table 8. We first show the relation without any controls. The coefficient is 0.26, suggesting about 26 % of vested option are exercised in the year in which they vest. The results are similar after controlling for several determinants of option exercise. In addition, CEOs are more likely to exercise when stock performance has been good and when the stock is highly valued, and they are less likely to do so when volatility is high. These results are consistent with findings in Fu and Ligon (2010) that CEOs exercise about

Table 8 The effect of option vesting on option exercise

Variable	$Exercise_t$	$Exercise_t$
$Vest_t$	0.262***	0.257***
Firm abnormal return $_{t-1}$		0.035**
Market return $_{t-1}$		0.055
Book-to-market assets $_{t-1}$		−0.146***
Log market value of equity $_{t-1}$		−0.005
Volatility $_{t-1}$		−0.173***
N	5,603	5,603
Adjusted R^2	0.018	0.037

This table provides the regression coefficients from an OLS model of CEO option exercise. The dependent variable *Exercise* is the number of option exercised by the CEO during the year, and *Vest* is the number of options that vest during the year. Both are scaled by the sum of new options granted and the balance of unvested options at the end of the prior year. To correct for cross-sectional and time-series correlation, t-statistics (in parentheses) are based on robust standard errors that are clustered by firm and year. Significance levels of the coefficients are indicated as follows: ***, **, * indicate significant coefficients at the 1, 5, and 10 % levels based on two-tailed tests

36 % of options within 12 months after they vest. Overall, our analysis supports the assumption that option exercise is related to option vesting.

Our study focuses on stock option vesting patterns as a contractual provision that is shaped by accounting standards and other economic factors. Another contractual provision of option grants that is shaped by some of the same forces is the option life (or option term), the time from the grant date to the expiration date. Unlike with vesting, there is little cross-sectional variation in option life; the vast majority of firms choose the same option life (10 years). After the adoption of SFAS 123(R), as with vesting, the magnitude of the option expense depends on the option life. The value of an option is a function of the expected life of the option, which is directly related to the contractual life. Thus firms can reduce the option expense reported on financial statements by shortening the life of the option. To test this conjecture, we examine the option life in our sample in the years before and after the adoption of SFAS 123(R).

The results of this analysis are displayed in Table 9. Panel A provides the descriptive statistics for option life. The average option life for the full sample is 112 month (9.3 years). Consistent with financial reporting affecting the choice of option life, the average option life drops from 114 months before SFAS 123(R) to 107 months afterwards, a statistically significant change. Panel B provides further insight into how firms adjust their choice of option life. Before the adoption of SFAS 123(R), 81 % of the options granted included a 10-year life, and 5 % included a seven-year life. After the adoption of SFAS 123(R), 65 % of options were granted with a 10-year life and 19 % were granted with a seven-year life. This shift is consistent with firms granting options with a shorter option life to reduce the option expense reported in the financial statements.

Table 9 Effect of SFAS123(R) on option life

Option life	Full sample	Pre 123R	Post 123R	Change
Panel A: Descriptive statistics of option life (in months)				
Mean	112.4	114.1	107.4	−6.7***
Median	120.0	120.0	120.0	
SD	19.1	18.4	20.4	
Panel B: Frequency of most common option life (in %)				
5 years	3.82	3.64	4.40	0.76
7 years	8.91	5.72	18.79	13.07***
10 years	77.64	81.49	65.73	−15.76***
Other	9.63	9.15	11.08	1.93*

This table shows the relation between option life (the time from the grant date to the expiration date of the option) and the introduction of SFAS 123(R). Panel A shows the descriptive statistics for the full sample and for the subsamples pre and post 123R. Panel B shows the frequency of the most common choices for option life. Significance levels of the change from pre to post 123R are indicated as follows: ***, **, * indicate significant coefficients at the 1, 5, and 10 % levels based on two-tailed tests

5 Conclusion

This study examines the vesting schedules of stock option grants and illuminates how firms set vesting terms in response to financial reporting incentives. We document significant cross-sectional variation in option grant vesting patterns and durations. Consistent with financial reporting concerns shaping this contract feature, firms extend vesting terms after the adoption of SFAS 123(R). We also find evidence that the costs and benefits of other economic determinants shape vesting patterns. Specifically, vesting schedules are longer when it is more important to lengthen the executive's horizon. Consistent with firms granting longer vesting options to help retain CEOs, we find a positive relation between well-performing CEOs and option grant durations. We also find that CEOs with greater power are granted options with shorter vesting terms but that strong monitoring mitigates this effect.

Overall, we provide insight into an important but largely ignored dimension of equity compensation. We demonstrate that economic factors predicted by agency theory shape option grant vesting terms. In addition, our findings indicate that financial reporting incentives influence option grant vesting duration and vesting patterns. Our study contributes to a greater understanding of how vesting terms help to resolve agency conflicts. More generally, our evidence contributes to the debate on how accounting standards shape contract design. As Lambert (2010) points out, vesting restrictions, along with limits on the timeliness of performance measures, can prevent managers from cashing out before delivering. We provide evidence that the period before managers can liquidate their options has lengthened in response to recent accounting standards.

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References

Aboody, D., Barth, M., & Kasznik, R. (2006). Do firms understate stock option-based compensation expense disclosed under SFAS 123? *Review of Accounting Studies, 11*, 429–461.

Armstrong, C., Gow, I. D., & Larcker, D. F. (2010). *Consequences of shareholder rejection of equity compensation plans*. Working Paper.

Armstrong, C., Jagolinzer, A., & Larcker, D. F. (2007). *Timing of employee stock option exercises and the cost of stock option grants*. Working Paper.

Balsam, S., & Miharjo, S. (2007). The effect of equity compensation on voluntary executive turnover. *Journal of Accounting and Economics, 43*, 95–119.

Barth, M., Beaver, W., & Landsman, W. (1998). Relative valuation roles of equity book value and net income as a function of financial health. *Journal of Accounting and Economics, 25*(1), 1–34.

Bebchuk, L. A., Cremers, M., & Peyer, U. (2011). The CEO pay slice. *Journal of Financial Economics, 102*, 199–221.

Bebchuk, L. A., & Fried, J. (2004). *Pay without performance: The unfulfilled promise of executive compensation*. Cambridge: Harvard University Press.

Bettis, J. C., Bizjak, J. M., Coles, J., & Kalpathy, S. (2007). *Equity grants with performance-based vesting conditions*. Working Paper.

Bolton, P., Scheinkman, J., & Xiong, W. (2006). Executive compensation and short-termist behavior in speculative markets. *Review of Economic Studies, 72*, 577–610.

Brickley, J. A. (2003). Empirical research on CEO turnover and firm-performance: a discussion. *Journal of Accounting and Economics, 36*(1–3), 227–233.

Brisley, N. (2006). Executive stock options: Early exercise provisions and risk-taking incentives. *Journal of Finance, 61*, 2487–2509.

Bushee, B. J. (1998). The influence of institutional investors on myopic R&D investment behavior. *The Accounting Review, 73*(3), 305–333.

Cadman, B., & Sunder, J. (2011). *The role of investor horizon on compensation horizon*. Working Paper.

Carter, M. E., Lynch, L. J., & Tuna, A. I. (2007). The role of accounting in the design of CEO equity compensation. *Accounting Review, 82*, 327–357.

Chatterjee, A., & Hambrick, D. C. (2007). It's all about me: Narcissistic CEOs and their effects on company strategy and performance. *Administrative Science Quarterly, 52*, 351–386.

Chi, J. D., & Johnson, S. A. (2009). *The value of vesting restrictions on managerial stock and option holdings*. Working Paper.

Choudhary, P., Rajgopal, S., & Venkatachalam, M. (2009). Accelerated vesting of employee stock options in anticipation of FAS 123-R. *Journal of Accounting Research, 47*, 105–146.

Dahiya, S., & Yermack, D. (2008). You can't take it with you: Sunset provisions for equity compensation when managers retire, resign, or die. *Journal of Corporate Finance, 14*(5), 499–511.

Dechow, P., Hutton, A., & Sloan, R. (1999). An empirical assessment of the residual income valuation model. *Journal of Accounting and Economics, 26*, 1–34.

Dechow, P., & Sloan, R. (1991). Executive incentives and the horizon problem: An empirical investigation. *Journal of Accounting and Economics, 14*, 51–89.

Edmans, A., Gabaix, X., Sadzik, T., & Sannikov, Y. (2011). *Dynamic CEO compensation*. Working Paper.

Fee, C. E., & Hadlock, C. J. (2003). Raids, rewards, and reputations in the market for managerial talent. *Review of Financial Studies, 12*, 1311–1353.

Fu, X., & Ligon, J. A. (2010). Exercises of executive stock options on the vesting date. *Financial Management, 39*, 1097–1126.

Gerakos, J., Goodman, T. H., Ittner, C. D., & Larcker, D. F. (2007). *Compensation objectives and non-cash pay: An investigation of benefits and broad-based equity grants.* Working Paper.

Gompers, P., Ishii, J., & Metrick, A. (2003). Corporate governance and equity prices. *Quarterly Journal of Economics, 118*, 107–155.

Gopalan, R., Milbourn, T., Song, F., & Thakor, A. V. (2011). *The optimal duration of executive compensation: Theory and evidence*. Working Paper.

Graham, J., Harvey, C., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics, 40*, 3–73.

Hall, B., & Murphy, K. (2002). Stock options for undiversified executives. *Journal of Accounting and Economics, 33*, 3–42.

Hartzell, J. C., & Starks, L. T. (2003). Institutional investors and executive compensation. *Journal of Finance, 58*, 2351–2374.

Hayward, M. L. A., & Hambrick, D. C. (1997). Explaining the premiums paid for large acquisitions: Evidence of CEO hubris. *Administrative Science Quarterly, 42*, 103–127.

Hodge, F., Rajgopal, S., & Shevlin, T. (2009). Do managers value stock options and restricted stock consistent with economic theory? *Contemporary Accounting Research, 26*, 899–932.

Huddart, S., & Lang, M. (1996). Employee stock option exercises: An empirical analysis. *Journal of Accounting and Economics, 21*, 5–43.

Kole, S. R. (1997). The complexity of compensation contracts. *Journal of Financial Economics, 43*, 79–104.

Lambert, R. A. (2010). Discussion of ''Implications for GAAP from an analysis of positive research in accounting''. *Journal of Accounting and Economics, 50*, 287–295.

Lambert, R. A., Larcker, D. F., & Verrecchia, R. E. (1991). Portfolio considerations in valuing executive compensation. *Journal of Accounting Research, 29*, 129–149.

Laux, V. (2012). Stock option vesting conditions, CEO turnover, and myopic investment. *Journal of Financial Economics, 106*, 513–526.

Murphy, K. J. (1999). Executive Compensation. In O. Ashenfelter & D. Card (Eds.), *Handbook of labor economics* (Vol. III, pp. 2485–2563). Amsterdam: North-Holland.

Ohlson, J. (1995). Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research, 11*, 661–687.

Parrino, R. (1997). CEO turnover and outside succession: A cross-sectional analysis. *Journal of Financial Economics, 46*, 165–197.

Rajgopal, S., & Shevlin, T. (2002). Empirical evidence on the relation between stock option compensation and risk taking. *Journal of Accounting and Economics, 33*, 145–171.

Richardson, S. A. (2006). Over-investment of free cash flow. *Review of Accounting Studies, 11*, 159–189.

Rusticus, T. O. (2006). *Executive severance agreements*. Dissertation, The University of Pennsylvania.

Stein, J. (1989). Efficient capital markets, inefficient firms: A model of myopic corporate behavior. *Quarterly Journal of Economics, 104*, 655–669.