The Cost of Equity Implications of Accounting for Employee Stock Options

Zining Li
Southern Methodist University
zli@cox.smu.edu

Wendy Wilson
Texas Christian University
wendy.wilson@tcu.edu

Suning Zhang
George Mason University
szhang4@gmu.edu

September 30, 2013

We thank Mary Stanford and seminar participants at Texas Christian University and The University of Tennessee for helpful comments.

The Cost of Equity Implications of

Accounting for Employee Stock Options

Abstract

This study examines whether the accounting treatment of employee stock options affects the cost of equity capital. Our study is motivated by theoretical predictions that the presentation of accounting information can affect the cost of capital, as well as the debate over whether recognition versus disclosure of option compensation expense is significant. We analyze the cost of capital effects for firms that granted stock options over the years 1999 through 2011, and we focus much of our analysis on firms operating in new economy industries since new economy firms were particularly vocal critics of SFAS 123R and because equity financing costs are especially important for these firms. The results show that the cost of capital was decreasing in the fair value of option grants before SFAS 123R was enacted. However, we find that once expense recognition was required, the cost of capital benefits from option grants were eliminated. We also analyze the portion of option grants that are not explained by the firm's economic characteristics ("residual option grants") as an estimate of options issued to take advantage of the favorable accounting treatment before the enactment of SFAS 123R. We find evidence that firms may have "overissued" options before SFAS 123R was implemented, but that the value of residual option grants decreased once the cost of capital benefits were eliminated by the change in accounting policy.

I. INTRODUCTION

In this paper, we examine whether the accounting treatment of employee stock options affects the cost of equity capital. Accounting for stock options changed significantly in December of 2004 with the implementation of Statement on Financial Accounting Standards 123R (SFAS 123R) – *Share-Based Payment* (FASB 2004), which required companies to recognize an expense for the fair value of employee stock option grants. Whether option compensation expense should be recognized on the income statement when this information was already disclosed in the footnotes generated much debate prior to the implementation of the new standard. Critics of SFAS 123R claimed that option grants did not have the same economic costs as cash compensation and thus expense recognition was not appropriate, whereas those in favor of SFAS 123R argued that the economic costs of options were similar and should be recognized (Bodie et al. 2003, Farber et al. 2007). While the debate over stock option accounting focused largely on the decrease to net income from recognition of option compensation expense, whether the accounting policy further affected firms' cost of equity capital has not been explored by existing research.

Theoretical explanations of the relation between accounting information and the cost of capital predict that the change in financial reporting for the fair value of employee stock option grants from footnote disclosure to income statement recognition could have no effect on, or could decrease or increase, the relation between option use and the cost of capital. The efficient market hypothesis suggests that recognition versus disclosure of accounting information should not have an effect so long as the same information is publicly available. However, cost of capital effects could occur if the market values recognized versus disclosed employee option grant information differently (Barth et al. 2003, Hirschleifer and Teoh 2003, Lambert et al. 2007, Schipper 2007, Callahan et al. 2012).

The controversy surrounding the enactment of SFAS 123R suggests that accounting treatment was a significant issue for affected firms (Hall and Murphy 2002, Bodie et al. 2003). Evidence from related research demonstrates that stock option accounting is an area where financial statement users and preparers appear to distinguish between information that is disclosed versus information that is recognized (Espahbodi et al. 2002, Choudhary 2011, Frederickson et al. 2006, Libby et al. 2006). In addition, differential valuation of recognized versus disclosed employee option grant information was a primary concern of those who were opposed to SFAS 123R (Alsheimer 2006, Farber et al. 2007).

This study utilizes the change in accounting treatment under SFAS 123R to examine whether accounting treatment affects the association between the value of stock option grants and the cost of equity capital. In the first set of tests, we estimate the Black-Scholes value of options granted to all employees for a sample of firms between the years 1999 and 2011 and calculate an estimate of the cost of equity capital using the model in Easton (2004). We present evidence that firms incurred a lower cost of equity for a greater value of option grants in the years before expense recognition was required, but that this effect was eliminated once SFAS 123R was implemented. This result contrasts with the conclusion from Dechow et al. (1996) that cost of capital concerns did not affect lobbying efforts against option expense recognition; however it supports the idea that the change in accounting treatment had economic consequences beyond the direct expense effect on net income.

Our analysis focuses on the cost of capital effects for firms operating in new economy industries, as this is a subset of firms that issued a significant amount of stock options prior to the implementation of SFAS 123R (Core and Guay 2001, Ittner et al. 2003) and for whom equity financing costs are particularly important (Templin 2005). Results from the cross-sectional analysis indicate that firms operating in new economy industries had a significantly more negative

association between the cost of equity and option grants in the pre-123R period. This result is consistent with the differential effects of disclosure versus recognition of option expense having more significant implications for new economy firms (Murphy 2003).

In our second set of tests, we estimate the component of the total Black-Scholes fair value of option grants that is not explained by the firm's economic circumstances using an option grant determinant model comprised of macro and microeconomic explanatory factors identified by related research (Core and Guay 1999, Core and Guay 2001, Ittner et al. 2003, Bergman and Jenter 2007). We analyze option grants that are not explained by economic determinants, termed "residual option grants", as these are options that firms may have granted strategically in order to take advantage of the favorable accounting treatment. We are interested in potential cost of capital effects from residual option grants, as academic research has proposed that firms were motivated to grant options prior to the implementation of SFAS 123R because the lack of recognized expense led to a lower perceived cost of options relative to their economic cost (Murphy 2002, Hall and Murphy 2003).

The results show that the cost of capital was decreasing in the fair value of residual option grants for all firms (i.e., both traditional and new economy firms) in the years before SFAS 123R was implemented, but that these effects did not persist into the post-123R period. We find that all firms granted options in excess of the expected amount in the pre-123R period, but that firms decreased the amount of residual option grants after SFAS 123R was enacted. This result suggests that firms may have "overissued" options to take advantage of the cost of equity relation under favorable accounting treatment. Finally, our cross-sectional analysis indicates that the cost of capital effects from residual option grants were more pronounced for new economy firms. All of the inferences from our study are consistent under an alternative cost of capital measure based on Callahan et al. (2012).

Our study makes several contributions to research in accounting and finance on the effects of stock option grants. First, we present evidence that when option-related compensation costs were not recognized on the income statement, the cost of equity was negatively related to the value of stock option grants. Prior studies of the effects of accounting on option grants recognize the theoretical arguments as to why earnings-related incentives may motivate firms to grant options in lieu of other forms of compensation (Carter et al. 2007, Brown and Lee 2011). However, these studies use firms' past history of meeting earnings benchmarks as proxies for the extent to which firms derived equity market benefits from the favorable accounting treatment. This study looks beyond the more indirect earnings effect and provides evidence that cost of capital considerations may have provided incentives for the use of employee option grants before expense recognition was required.

Second, our study provides evidence that the change in accounting policy under SFAS 123R had a significant effect on the economic consequences of employee option grants. Existing research reports mixed evidence as to whether the change from disclosure to expense recognition affected firms, investors, and/or stock price. While some papers conclude that the change in accounting policy mattered (Carter et al. 2007, Brown and Lee 2011, Hayes et al. 2012, Skantz 2012), other studies find that the change in accounting did not have a significant effect (Oyer and Schaefer 2006, Desai et al. 2013). Our study contributes to this research by demonstrating that the change in stock option accounting brought about by SFAS 123R was important.

Third, the evidence from our study sheds light on the relation between the perceived cost and economic cost of option grants (Murphy 2002). We find that firms reduced the amount of residual option grants after SFAS 123R was implemented, suggesting that firms that may have been "overissuing" options to take advantage of the more favorable accounting treatment and cost of equity effects prior to SFAS 123R changed their behavior once expense recognition was

required. While Murphy's (2002) perceived cost theory suggests that favorable accounting treatment caused firms to grant options because they were considered an inexpensive form of employee compensation, our evidence suggests that the use of option grants prior to SFAS 123R may have been motivated by the receipt of real economic benefits in the form of lower cost of equity.

This paper also adds to research on the economic consequences of option compensation. Extant research has either focused on the intended or unintended consequences of executive option compensation (Burns and Kedia 2006), or the determinants of option compensation for rank-and-file employees. Our study investigates a valuation outcome of broad-based option use and examines how the accounting treatment of option grants impacts the cost of equity. Contrary to the conclusion reached by Dechow et al (1996), we find that option grant information that was disclosed and then recognized had cost of capital implications for affected firms.

Collectively, the evidence from our paper shows that firms enjoyed real economic benefits from the lack of expense recognition, and that this effect was more pronounced for firms operating in new economy industries. Elimination of the cost of capital effects from option grants after SFAS 123R shows that the change in accounting policy had a significant effect on firms granting options, which provides important insights for regulators on how changes in accounting policy affect firm behavior. This evidence, together with research on the cost of capital effects of recognition versus disclosure in other contexts (e.g., FIN 46, see Callahan et al. (2012)), suggests that understanding the economic consequences of differences in the presentation of accounting items has important regulatory implications. This has potential connotations for future changes in accounting treatment where previously disclosed information must be recognized in the financial statements (e.g., accounting for leases, FASB 2013).

II. HYPOTHESIS DEVELOPMENT

SFAS 123R was issued in December of 2004 after a lengthy and contentious debate between accounting and industry practitioners and regulators. Previously, stock option accounting was outlined by Statement on Financial Accounting Standards 123 (SFAS 123), *Accounting for Stock-Based Compensation* (FASB 1995), which allowed compensation expense for employee option grants to be calculated under the intrinsic value method (APB 25) and was equal to zero for most option grants.[1] While SFAS 123 encouraged firms to recognize the fair value of option grants as compensation expense on the income statement, only footnote disclosure of the pro forma net income effects was required. Critics of SFAS 123, including the FASB, alleged that the favorable accounting treatment was misleading with respect to firm valuation (Hall and Murphy 2002, Murphy 2003) and resulted in financial statements that did not faithfully represent the economic transactions of the firm (Alsheimer 2006, FASB 2004).

Under SFAS 123R, firms must recognize amortization expense for the fair value of option grants on the income statement. Thus, the revisions imposed by SFAS 123R changed the presentation of information from disclosure in the financial statement footnotes to expense recognition on the income statement. Theoretical explanations of the relation between accounting information and the cost of capital predict that the change in accounting treatment from the pre-123R disclosure regime to the post-123R expense recognition regime could result in no change, a decrease, or an increase in the relation between option grants and the cost of equity capital for affected firms.

In a frictionless market, the efficient market hypothesis predicts that a change in the presentation of accounting information from disclosure to recognition should not have cost of

[1] Compensation expense for employee option grants is equal to zero under the intrinsic value method if the exercise price and the number of options granted are fixed and the exercise price is equal to or greater than the market price on the grant date.

capital effects as long as investors do not perceive changes in affected firms' expected cash flows and risk characteristics.[2] Because the fair value of stock option compensation expense was provided in the financial statement footnotes under the pre-123R disclosure regime, mandatory expense recognition did not change the amount of available information. Evidence from research conducted during the pre-123R time period shows that option grant information disclosed in financial statement footnotes had value relevance (Aboody 1996, Aboody et al. 2004, Bell et al. 2002), which indicates that stock prices of affected firms reflected information reported in footnote disclosures. This evidence, along with predictions under the efficient market hypothesis, suggests that the change from disclosure to recognition would not have an effect on firms' cost of capital.

However, if the enactment of SFAS 123R led to an increase in the quality, relevance, or reliability of stock option information, then academic theory suggests this would result in a decrease to affected firms' cost of capital. The literature on estimation risk (Lambert et al. 2007, Barth and Schipper 2008) shows that increased disclosure leads to greater transparency, which leads to a lower cost of capital. In addition, information processing factors play a role in the relevance of disclosed information (Barth et al. 2003, Ahmed et al. 2006). If the prominence of income statement recognition made option information more relevant for decision-making, affected firms may have experienced a lower cost of capital. Finally, if investors believed that information that is recognized is more reliable than information that is disclosed, either because recognized numerical values are more rigorously audited or are measured with greater reliability, this would also lead to lower cost of capital (Libby et al. 2006, Cotter and Zimmer 2003).

On the other hand, theoretical arguments involving systematic cognitive biases among investors and the market's fixation on earnings (e.g., Hirschleifer and Teoh 2003) suggest that the

[2] This is consistent with the "no differences" view presented in Schipper (2007). The "no differences" view proposes that once information is incorporated in financial reports, the location and presentation of the information has no direct implications; all communications are processed based on their informational properties and not on how or where they are displayed (Schipper 2007).

change in accounting treatment would lead to an increase in the cost of capital for affected firms.[3] Earnings fixation refers to the market's excessive reliance on accounting earnings in determining firm value without fully evaluating other information that is relevant for the firm's future investment prospects (Graham et al. 2005, Elliott et al. 2011). Under Hirschleifer and Teoh's (2003) model where some investors have limited attention, the market overvalues firms relative to fundamental value when the cost of employee compensation is not expensed, and correctly values firms when option costs are expensed against accounting earnings. If stock prices did not fully incorporate the economic costs of option grants from information provided in footnote disclosures during the pre-123R period, firms that granted stock options would have experienced relatively higher market valuations.[4] Once SFAS 123R was implemented and the market incorporated option compensation costs against accounting earnings, market valuations would adjust downward, leading to a relatively higher cost of equity capital.[5]

[3] Lambert et al. (2007)'s model also suggests that an increase in the cost of capital is possible through direct and indirect effects of a change in accounting quality. Under Lambert et al. (2007), if the change in accounting treatment directly increases the market's assessments of the variance of the firm's cash flows and their covariance with aggregate market cash flows, and/or indirectly results in riskier firm investment or operational decisions, affected firms could experience an increase in the cost of capital. However, based on the fact that stock option expense does not have a direct effect on firms' cash flows, as well as evidence that option grants did not have a significant effect on firms' risky investment and financial policies during the pre- and post-123R periods (Hayes et al. 2012), Lambert et al.'s (2007) theoretical model does not have strong support in this setting. We acknowledge that this model has been used to motivate inquiries into cost of capital effects in other settings (see Ashbaugh-Skaife et al. 2009 and Callahan et al. 2012).

[4] This is consistent with the cost of capital hypothesis proposed by Dechow et al. (1996). Dechow et al. (1996) found that firms with capital financing needs (measured by the firm's level of free cash flow) did not employ greater lobbying efforts against the FASB's 1993 Exposure Draft (FASB 1993) and did not experience adverse stock price reactions when announcements about proposals for recognizing stock option expense were made. Dechow et al. (1996) concluded that this evidence did not support cost of capital concerns as a significant explanatory factor against mandatory recognition of stock option compensation expense. However, Dechow et al.'s study did not examine the relation between cost of capital and option grants at the firm level and their analysis did not analyze the change in accounting policy imposed by SFAS 123R.

[5] An example of greater market valuation as a result of not recording compensation expense can be demonstrated with AOL Time Warner's (AOL) 2001 financial statements. Had AOL reported an expense for amortization of the fair value of the year's option grants when calculating net income, the company would have reported an operating loss of about $1.7 billion rather than the $700 million in operating income actually reported (Bodie et al. 2003). AOL's market valuation would have been adversely affected had the company reported a significant net loss rather than $700 million in operating profits.

Regulators who argued against the change in accounting treatment claimed that the earnings effect from expense recognition would have a particularly unfavorable impact on the cost of equity capital. For example, the Commissioner of the SEC, Mr. J. Carter Beese, Jr., stated, "For most of us, the stock option accounting debate boils down to one thing: the cost of capital. And without a doubt, forcing companies to record an expense when they issue stock options will increase the cost of capital. Period."[6] Similar concerns about negative cost of capital effects were expressed by firm managers (Alsheimer 2006). For example, in testimony before the U.S. House of Representatives regarding the proposal for mandatory recognition of option-related compensation expense, the President and CEO of RSA Security, Inc. stated that if the company "had to take that kind of hit to…the P/E ratio…it would be difficult in terms of capital formation".[7]

We exploit the change in the accounting treatment of stock-based compensation expense under SFAS 123R, as the new standard provides an exogenous shock to accounting for employee option grants that did not have an impact on the underlying economic benefits of options. Theoretical arguments suggest that the change in accounting treatment could have had no effect, a decrease, or an increase in the relation between option use and affected firms' cost of capital. However, if accounting affected the market's use of information about option-based compensation, we expect to observe a change in the relation between the fair value of stock option grants and the cost of capital around the implementation of SFAS 123R. If expense recognition improved the quality, relevance or reliability of option information, we expect a positive correlation between options and the cost of capital before SFAS 123R but not afterwards. If expense recognition had adverse consequences due to the market's fixation on earnings, we expect a negative correlation

[6] Remarks by SEC Commissioner Mr. J. Carter Beese, Jr. to members of The Association of Publicly Traded Companies in Palo Alto, California on November 15, 1993.
[7] Remarks by Mr. Arthur Coviello, President and CEO of RSA Security, Inc., to members of the Subcommittee on Capital Markets, Insurance, and Government Sponsored Enterprises of the U.S. House of Representatives in Washington D.C. on March 3, 2004.

between options and the cost of capital before SFAS 123R but not afterwards. Therefore, we propose the first hypothesis, stated in alternative form:

H1: There is a change in the relation between the cost of equity and the fair value of stock option grants before and after the implementation of SFAS 123R.

We hypothesize that new economy firms may have experienced superior cost of capital effects relative to firms operating in other industries. This prediction is based on several factors. First, it is difficult for investors to value new economy firms due to the fact that accounting earnings for these firms often do not fully reflect future investment prospects (Core et al. 2003). Valuation is more complex for firms operating in new economy industries because of their high growth rates, significant research and development costs, and large investments in intangible assets, where the accounting expenses are largely recorded in advance of the realization of returns in earnings. Second, new economy firms granted significant amounts of options in the years before SFAS 123R was implemented, and thus would have recognized comparatively option expenses under the new accounting standard (Hall and Murphy 2003, Alsheimer 2006).[8] Murphy (2003) shows that new economy firms' financial statement-based accounting metrics would look comparatively worse under SFAS 123R due to their relative levels of employee volume and profitability. Finally, new economy firms were particularly vocal critics of the change in accounting treatment, citing concerns that the expense charges would put them at a competitive disadvantage relative to less affected firms (Espahbodi et al. 2002, Asheimer 2006). Hirschleifer and Teoh's (2003) model supports this conjecture, as it shows that greater magnitudes of option grants exacerbate the overvaluation problem caused by not recognizing option compensation

[8] In a study using a sample of 100 high-growth companies, Botosan and Plumlee (2001) found that recognition of stock option expense would have a material effect on earnings and firm performance metrics, with a median reduction of 14.0 percent in earnings per share and a median reduction of 13.6 percent in return on assets.

expense in earnings. Taking these characteristics into account, we propose the second hypothesis, stated in alternative form:

H2: SFAS 123R affected the relation between the cost of equity and the fair value of stock option grants differently for new economy firms relative to traditional firms.

The next two hypotheses are based on the idea that if firms experienced cost of capital effects from option grants, companies may have "overissued" option-based compensation to take advantage of the economic benefits. Academics proposed that one reason why firms granted a significant amount of stock options during the 1990s and early 2000s is because options were perceived as an inexpensive form of employee compensation relative to their economic cost due to the lack of expense recognition (Murphy 2002, Hall and Murphy 2003). Under this reasoning, firms may have granted an excessive amount of options (hereafter, "residual stock options") because of the perceived lower compensation cost, which would have implications for the cost of equity. Therefore, we propose a third hypothesis specific to the economic consequences of residual stock options, stated in alternative form:

H3: There is a change in the relation between the cost of equity and the fair value of residual stock option grants before and after the implementation of SFAS 123R.

Finally, we hypothesize that the cost of capital effects from residual stock option grants were greater for new economy firms. It is possible that the economic advantages associated with lower equity financing costs prior to the implementation of SFAS 123R were particularly important for new economy firms given that these companies have limited alternative sources of capital funding (Templin 2005). In addition, because new economy firms were able to grant higher volumes of options overall due to the customary industry-wide practice of option-related compensation (Ittner et al. 2003), they may have had more flexibility in issuing options in excess

of the amount that would be explained by the firm's economic circumstances. Therefore, the fourth hypothesis, stated in alternative form, is:

H4: SFAS 123R affected the relation between the cost of equity and the fair value of residual stock option grants differently for new economy firms relative to traditional firms.

III. RESEARCH DESIGN

Estimating the Value of Total Option Grants

We calculate the total value of stock options a firm grants in a year by multiplying the number of options granted by an estimate of the options' fair value. We obtain option information for all firms with relevant data over the years 1999 through 2011 and we identify the number of stock options granted from Compustat (variable "optgr") when this data is available.[9] For firm-years where the number of options granted is not directly available, we follow the procedure described in Bergman and Jenter (2007) to estimate the amount.[10]

Next we estimate the per-share fair value of option grants using the modified Black-Scholes model (Merton 1973). The model inputs include the stock price at the grant date, option exercise price, expected stock-return volatility, risk-free interest rate, time-to-maturity of the option, and the expected dividend yield. We assume that $1/12^{th}$ of the total number of annual options are granted each month, using the mid-point of the monthly high and low as the option exercise price (Bergman and Jenter 2007). We obtain estimates of the dividend yield and expected stock-return volatility from ExecuComp for firm-years 1999 through 2006. For the years 2007 through 2011, we calculate an estimate of the dividend yield based on the average dividend payout over the

[9] Compustat begins reporting the total number of options granted in 2004.

[10] We collect the number of options granted to executives from ExecuComp (variable "numsecur") and divide this by the percentage of the total number of options granted that year (variable "pcttotopt"). We delete all firm-years in which the sample standard deviation of the estimates is greater than 10% of the mean, and if the estimate of number of total option grants is smaller than the number of option grants to the top five executives we set the number of total grants equal to the number of option grants to top five executives.

previous three years and we estimate the expected stock-return volatility based on the average monthly stock-return volatility over the previous five years. We set the time-to-maturity of the option to seven years and we use the seven-year monthly Treasury bill yield as the risk-free rate. Finally, we calculate the per-employee value of stock options granted in a year by dividing the Black-Scholes value of total stock options granted by the number of employees, and use the natural log of one plus the per-employee stock option grant value (*ALLOPT*) in our empirical tests (Bergman and Jenter 2007).[11]

Estimating the Value of Residual Option Grants

In order to isolate the influence of the accounting treatment on option grants even further, we estimate the portion of option grants that are not explained by macro and microeconomic determinants documented by prior literature. The amount of "residual option grants" represents the grants that are motived by the favorable accounting treatment, if any, as well as other unmodeled factors. The explanatory variables used in our determinant model have been identified by related literature (Ittner et al. 2003, Oyer and Schafer 2005) as arising from: 1) incentive effects, 2) employee attraction and retention effects, and 3) tax and cash flow effects.

One of the most commonly cited reasons why firms offer stock-based compensation to employees is as an incentive to align employee interests with those of the firm's shareholders (Jensen and Meckling 1976). We follow related research (Smith and Watts 1992, Gaver and Gaver 1993, Baber et al. 1996, Core and Guay 1999, Ittner et al. 2003) and model incentive effects by the firm's investment opportunity set, identified by sales growth (*SALEGRTH*), research and development (*RD*) and advertising (*ADV*) expenditures, and the firm's ratio of book to market

[11] If the number of employees of a firm is missing we substitute the missing value with the firm's average number of employees for the period 1996 through 2011. Our results are similar if we eliminate firm-years in which the number of employees is missing.

value (*BM*). We predict that the amount of option grants is positively related to *SALEGRTH, RD,* and *ADV*, and is negatively related to *BM*. In addition, we include two measures of the firm's past performance that are related to option grant characteristics (e.g., options' convex payoff functions and grant vesting periods) designed to provide incentives for employees (Bergman and Jenter 2007): the firm's annualized stock returns over the prior two years (*ANNRET*) and the firm's prior year return on assets (*ROA*).[12] We also include two monitoring control variables based on the idea that option grants are less frequent when other forms of employee monitoring are present. We include firm size (*SIZE*) and leverage (*LEV*), and expect that the incentive effects of option-based compensation are increasing in *SIZE* and decreasing in *LEV* (Core and Guay 2001, Ittner et al. 2003).

Another explanation for stock-based compensation is to attract and retain employees (Ittner et al. 2003, Oyer and Shaefer 2005, Bergman and Jenter 2007, Kedia and Rajgopal 2009), where the importance of equity-based incentives is related to attracting the "right" type of employee to match the firm's needs. For example, price volatility can be used as a sorting mechanism where firms with high volatility are predicted to attract optimistic employees (Oyer and Shaefer 2005). Therefore, we measure a firm's stock price volatility (*VOLATILITY*) as the standard deviation of monthly stock returns during the year.[13] We also include two variables to capture geographic variability in employee retention (Ittner et al. 2003, Kedia and Rajgopal 2009): a regional indicator variable (*COAST*) that is equal to one if the firm's headquarters is located in high-tech states on the east and west U.S. coasts to account for employee retention differences between high-tech labor

[12] Bergman and Jenter (2007) use the term "employee sentiment" to describe the determinant of option grants that is measured by prior year stock returns (*ANNRET*). Bergman and Jenter (2007) hypothesize that employees have a preference for option-based compensation when the firm's prior performance has been strong, leading to high levels of employee sentiment and larger amounts of option grants. Other research (e.g., Core and Guay 1999) uses the term "incentive effects" in reference to the use of prior stock returns as an explanatory variable. Regardless of the particular term used to describe the influence of prior returns, the consensus among related literature is that the firm's past stock price performance is positively related to the amount of options granted.

[13] We require that firms have a minimum of five monthly return values in a given year to calculate *VOLATILITY*.

markets and more traditional labor markets, and the unemployment rate in the metropolitan statistical area where the firm's corporate headquarters are located (*UNEMP*) based on evidence that firms located in tight labor markets grant more options to attract and retain employees.[14] Finally, Oyer and Shaefer (2005) suggest that option plans are more common among firms whose returns are more closely related to the returns of other firms that compete for the same set of employees. Therefore, we control for the firm's industry return volatility (*VOLSHR*). We expect that stock option grants are increasing in all of the attraction and retention incentive variables.

Finally, tax and cash flow considerations serve as determinants of option-based compensation (Yermack 1995, Matsunaga 1995, Dechow et al., 1996, Core and Guay 2001, Ittner et al. 2003). Similar to Ittner et al. (2003), we use two indicator variables as proxies for the firm's marginal tax rate: *LOWTAX* is an indicator variable equal to one if the firm has negative pretax book income and net operating carry-forwards, and *HIGHTAX* is an indicator variable equal to one if the firm has positive pretax income and no net operating loss carry forwards. Core and Guay (2001) find that firms grant more employee stock options when they face greater financing constraints, thus we incorporate a variable representing the firm's free cash flow (i.e., representing a lack of cash constraints, *CASHFLOW*).[15] We expect that option grants are increasing in *LOWTAX* and are decreasing in *HIGHTAX* and *CASHFLOW*.

We incorporate the economic determinants of option grants in the following model:

[14] *COAST* is an indicator variable equal to one if the firm's headquarters are located in CA, WA, NY, NJ, MD, NC, VA, CT, RI, MA, or ME. To calculate *UNEMP* we obtain the zip code of the firm's corporate headquarters from Compustat and the total labor force and unemployment rate for each zip code from the U.S. Census Bureau. We then match each firm's zip code to a metropolitan statistical area (MSA) and obtain information on the total labor force and unemployed labor force at the MSA level by adding all of the zip codes in each MSA. The variable *UNEMP* is calculated by dividing the unemployed labor force by the total labor force at the MSA level.

[15] Our results are robust to an alternative measure of financing constraints used by Core and Guay (2001), which is defined as the three-year average of the sum of common and preferred dividends and cash flow from investing less cash flow from operations, scaled by total assets.

$$ALLOPT = \delta_0 + \delta_1 SIZE + \delta_2 ANNRET + \delta_3 BM + \delta_4 SALEGRTH + \delta_5 RD + \delta_6 ADV + \delta_7 VOLATILITY + \delta_8 CASHFLOW + \delta_9 LEV + \delta_{10} HIGHTAX + \delta_{11} LOWTAX + \delta_{12} ROA + \delta_{13} UNEMP + \delta_{14} VOLSHR + \delta_{15} COAST + \varepsilon \quad (1)$$

where *ALLOPT* is the natural log of one plus the per-employee fair value of stock options granted in a year, and all other variables are as previously defined.[16] We analyze equation (1) for our panel dataset separately by firm-year groups categorized according to the 48 Fama-French industry classifications (Fama and French 1997).[17] The fair value of residual option grants (*RESOPT*) is calculated as the difference between the fair value of all options granted by the firm in a year (*ALLOPT*) and the value of option grants explained by the determinant model.

Measuring the Effect of Option Grants on Cost of Equity

We measure the cost of equity capital based on Easton (2004), calculated as follows:[18]

$$COE = \sqrt{\frac{EPS_2 - EPS_1}{P_0}} \quad (2)$$

where the cost of equity (*COE*) is measured for the year of the option grant, EPS_2 and EPS_1 are the mean analyst forecast of earnings per share for two years and one year after the option grant, respectively, and P_0 is price per share at the end of the year of the option grant. Analyst forecasts are obtained from I/B/E/S and stock price is collected from CRSP.[19]

[16] Detailed definitions of all of the regression variables are provided in the appendix. All of the continuous variables are winsorized at the 1st and 99th percentile.
[17] Observations in the sample represent 44 of the 48 industries identified by Fama and French (1997).
[18] We acknowledge that a number of empirical measures are available to estimate the cost of equity capital (Botosan and Plumlee 2005, Callahan et al. 2012). We chose Easton's (2004) cost of equity measure (i.e., *RPEG* in Easton (2004)) based on evidence in Botosan and Plumlee (2005) and Botosan et al. (2011) that *RPEG* exhibits a better association with firm-risk measures relative to other empirical estimates of the cost of equity. We discuss the sensitivity of our results to this cost of equity estimate in section VI.
[19] Equation (1) shows that when EPS_2 is less than EPS_1, the critical assumption of the Easton model is violated and the cost of equity capital cannot be computed. Therefore, for firms with a negative value of (EPS_2-EPS_1) we follow the technique of Botosan and Plumlee (2005) and substitute long-term earnings forecasts EPS_5 and EPS_4 in order to maximize the number of observations available for the cost of equity tests. EPS_5 (the mean analyst forecast of earnings per share for five years after the option grant) is always greater than EPS_4 (the mean analyst forecast of earnings per share for four years after the option grant).

We measure option grants (*OPTIONS*) two ways (*ALLOPT* and *RESOPT*, as previously defined), and test whether the relation between option grants and the cost of equity is significantly different before and after the implementation of SFAS 123R with the following regression model:

$$\begin{aligned} COE = {} & \delta_0 + \delta_1 POST + \delta_2 OPTIONS + \delta_3 OPTIONS*POST + \delta_4 DISP + \\ & \delta_5 SIZE + \delta_6 DEBT + \delta_7 BM + \delta_8 UBETA + \delta_9 LTGRTH + \\ & \delta_{10} DISP*POST + \delta_{11} SIZE*POST + \delta_{12} DEBT*POST + \delta_{13} BM*POST + \\ & \delta_{14} UBETA*POST + \delta_{15} LTGRTH*POST + Year\ fixed\ effects + \varepsilon \end{aligned} \quad (3)$$

where *COE* is the cost of equity defined by equation (2), *OPTIONS* is either *ALLOPT* or *RESOPT*, and *POST* is an indicator variable equal to one if the observation is from 2005 through 2011 and is zero otherwise. The other variables in the regression model control for firm-level factors that are known to have a predictable relation with the cost of equity (Botosan and Plumlee 2005). We measure information risk as the standard deviation of analysts' forecasts (*DISP*) and firm size by the natural log of the market value of equity (*SIZE*). We expect *DISP* to be positively related to *COE* (Botosan and Plumlee 2005) and *SIZE* to be negatively related to *COE* (Berk 1995). We also control for the ratio of long-term debt to the market value of equity (*DEBT*) and the ratio of the book value of total equity to the market value of equity (*BM*). We expect that *DEBT* and *BM* will be positively related to *COE* based on Modigliani and Miller (1958) and Berk (1995), respectively. We include a variable measuring the unlevered CAPM beta (*UBETA*) as a control for market risk, as indicated by the capital asset pricing literature that demonstrates that the cost of equity capital is increasing in *UBETA* (Lintner 1965, Sharpe 1964).[20] Finally, the last control variable is long-term growth in earnings from I/B/E/S (*LTGRTH*), which we expect to be positively related with *COE*

[20] The advantage of using unlevered beta (*UBETA)* over the CAPM beta (*BETA*) is that *BETA* not only captures market risk but also leverage risk (Chung 1989). Calculating an unlevered beta circumvents this problem. We follow the procedure described in Botosan and Plumlee (2005) to obtain *UBETA*:

$$UBETA = BETA/[1 + \frac{Debt}{Equity}]$$

where *BETA* is estimated via the market model using value-weighted market index returns and a minimum of 30 monthly returns out of the 60 monthly returns over the past five years. The debt to equity ratio is computed by dividing long-term debt by stockholders' equity at the beginning of the year (which is equivalent to *DEBT*).

(Botosan and Plumlee 2005). We also include variables representing the interaction of each control with *POST* and year fixed effects.

The significance level of the coefficient on *ALLOPT*POST* (δ_3) provides evidence as to whether the relation between the fair value of option grants and the cost of equity is different across the accounting regimes (hypothesis 1), and the significance level of the coefficient on *RESOPT*POST* (δ_3) provides evidence on whether this relation exists for residual option grants. We analyze equation (3) separately for firms operating in new economy industries to provide insight into whether the relation, if any, is different over time for new economy firms relative to traditional firms.

We also conduct a cross-sectional test to directly test hypotheses 2 and 4:

$$\begin{aligned} COE = {} & \delta_0 + \delta_1 NEWECON + \delta_2 OPTIONS + \delta_3 OPTIONS*NEWECON + \delta_4 DISP + \\ & \delta_5 SIZE + \delta_6 DEBT + \delta_7 BM + \delta_8 UBETA + \delta_9 LTGRTH + \\ & \delta_{10} DISP*NEWECON + \delta_{11} SIZE*NEWECON + \delta_{12} DEBT*NEWECON + \\ & \delta_{13} BM*NEWECON + \delta_{14} UBETA*NEWECON + \delta_{15} LTGRTH*NEWECON + \\ & Year\ fixed\ effects + \varepsilon \end{aligned} \quad (4)$$

where *NEWECON* is an indicator variable equal to one if the firm operates in a new economy industry and all other variables are as previously defined.[21] We analyze equation (4) for firm-year observations from the pre- and post-123R periods separately. The significance level and sign of the coefficient on *ALLOPT* and *RESOPT* (δ_2) provides evidence on whether there is a significant relation between the total amount of option grants or the amount of residual option grants, respectively, and the cost of equity capital for firms not operating in new economy industries in either the pre- or post-123R period. The sign and significance level of the sum of the coefficients

[21] New Economy firms operate in industries related to computer hardware, telecommunications, computer software, or computer programming and networking (i.e. industries with the following four-digit SIC codes: SIC 3570-3577, SIC 4812-4813, SIC 3660-3679, SIC 5045, SIC 5961 and SIC 7370-7379). This definition of new economy firms is similar to Murphy (2003).

on *ALLOPT* and *ALLOPT*NEWECON* ($\delta_2 + \delta_3$) indicates whether there is a significant relation between option grants and the cost of equity for new economy firms in the pre- and post-123R periods. Likewise, the sign and significance level of the sum of the coefficients on *RESOPT* and *RESOPT*NEWECON* ($\delta_2 + \delta_3$) provides evidence on whether there is a significant relation between the amount of residual option grants and the cost of equity capital for new economy firms in the pre- or post-123R periods. Analyzing the pre- and post-123R periods separately allows us to examine whether new economy firms experienced different relations between total and residual option grants and the cost of equity over time (hypotheses 2 and 4), as demonstrated by the significance of the coefficients on the interaction terms, *ALLOPT*NEWECON* and *RESOPT*NEWECON* (δ_3).[22]

IV. SAMPLE

Our sample is based on firm-year observations from 1999 through 2011 that have relevant data available on ExecuComp, Compustat, CRSP, and I/B/E/S.[23] Details regarding the sample selection are reported in panel A of table 1. We begin by identifying all firms covered by ExecuComp between 1999 and 2011 that have data to calculate the Black-Scholes fair value of option grants, which results in 20,288 observations. We eliminated 2,640 observations representing financial firms and 753 observations for firms that voluntarily recognized the fair value of compensation expense prior to the enactment of SFAS 123R. We removed 953 observations representing options granted in 2005 in order to eliminate confounding effects from this transition

[22] Our approach comparing new economy firms relative to traditional firms can also be thought of as a test between a treatment group (new economy firms) and a control group (traditional firms). Since our tests span a long time period (1999 – 2011), it is possible that changes in economy-wide factors coincide with the change in accounting treatment (e.g., market participants could view employee option grants negatively due to the stock option backdating scandals that occurred in 2005 and 2006). If stock option accounting affected the relation between option grants and the cost of equity, we expect to observe significant effects for the treatment sample (i.e., new economy firms).

[23] The sample period begins in 1999 so that the pre- and post-123R time periods are balanced. We discuss the sensitivity of our results to this research design choice in section VI.

year prior to the enactment date of SFAS 123R. After eliminating 1,351 observations missing data needed to estimate the cost of equity and 3,480 observations missing information to calculate the control variables, we are left with a final dataset of 11,111 firm-year observations.

Panel B of table 1 reports the industry distribution of the sample. New economy firms operate in industries related to computer hardware, telecommunications, computer software, or computer programming and networking, and comprise 22.17 percent of the sample observations. A variety of traditional economy industries are represented, with the largest proportion in the durable manufacturing and retail industries. Panel C reports the annual Black-Scholes value of option grants per employee.[24] The statistics show that the average fair value of option grants was increasing from 1999 to 2000 and was steadily decreasing from 2001 through 2011. Total option grant values were much larger for new economy firms. For example, in the peak grant year for both groups, 2000, the average (median) per-employee fair value of options granted by new economy firms was $59,530 ($30,080) and was $9,660 ($1,710) for traditional economy firms. The lower half of panel C shows that the fair value of option grants declined between the pre- and post-123R time periods, where the mean (median) fair value of option grants was $14,970 ($2,620) and $4,760 ($930) for the pre- and post-123R periods, respectively. The time-series and cross-sectional patterns reported for the sample are consistent with statistics reported by related studies (e.g., Hall and Murphy 2003, Brown and Lee 2011, Hayes et al. 2012).

Table 2 reports the correlation coefficients for the continuous regression variables used in the cost of equity tests, with the Pearson (Spearman) correlation coefficients reported in the upper right (lower left) panel and two-tailed p-values in parentheses. The correlation coefficients

[24] The annual Black-Scholes option grant values reported in panel C of table 1 are scaled by the number of employees, and the natural log of one plus this value is equal to the variable *ALLOPT*.

between *ALLOPT* and *COE*, as well as the correlation between *RESOPT* and *COE*, are all significantly negative.

V. EMPIRICAL RESULTS

Relation Between Option Grants and Cost of Equity

Results of tests of the relation between the fair value of option grants and the cost of equity are reported in table 3. Panel A provides descriptive statistics on the regression variables and panels B and C report results of the regression analyses. As reported in panel A, the mean (median) *COE* in the pre-123R period is 12 percent (10 percent) and is 11 percent (10 percent) in the post-123R period. The fair value of options granted, expressed as the natural log relative to the number of employees (*ALLOPT*), has a median value in the pre-123R (post-123R) period equal to 1.29 (0.66), which equates to option grant values of $2,633 ($935) per employee across the sample periods (reported in panel C of table 1). The descriptive statistics for the control variables are similar to those reported by Botosan and Plumee (2005), with some variation due to the relatively larger size of the firms in our sample.

The time-series regression analysis is reported in panel B, where the coefficient representing the relation between option grants and the cost of capital for all firms is significantly negative in the pre-123R period (p-value = 0.0049) and is insignificant in the post-123R period (p-value = 0.1548). The significant coefficient on the interaction term (p-value = 0.0021) indicates that the relation between the cost of capital and option grants is different after the implementation of SFAS 123R, which provides support for hypothesis 1. In a separate analysis of the new and traditional economy firms, the interaction term *(ALLOPT*POST)* is significantly positive for new economy (p-value = 0.0016) and traditional economy firms (p-value = 0.0069), indicating that the difference in the

relation between option grants and the cost of equity is prevalent for firms in various industries.[25] The Z-statistic for the test of a significant difference between the coefficient on *ALLOPT*POST* across firm groups is significant (p-value = 0.0608), which indicates that the difference in the relation between option grants and the cost of equity in the pre-123R and post-123R periods is significantly different for firms operating in new economy relative to traditional industries.[26]

Panel C of table 3 reports results from the cross-sectional analysis (equation 4). The coefficients on *ALLOPT* and *ALLOPT* + (*ALLOPT*NEWECON*) for the pre-123R period are significantly negative (p-value = 0.0075 and p-value = 0.0027, respectively), which shows that the cost of capital was decreasing in the fair value of option grants for traditional and new economy firms in the years prior to SFAS 123R. The significantly negative coefficient on *ALLOPT*NEWECON* (p-value = 0.0362) in the pre-123R period indicates that this relation was greater for firms operating in new economy industries.

In contrast, the results for the post-123R period show that the relation between option grants and the cost of equity is insignificant for both groups of firms, which indicates that the change in accounting treatment had economic consequences for affected firms. Furthermore, the coefficient on *ALLOPT*NEWECON* is not significant in the post-123R period, indicating similar effects across firm groups. The coefficients on the control variables are largely significant in the predicted direction across all variables and across both the pre-123R and post-123R time periods. Consistent with Botosan and Plumlee (2005), the results indicate that the cost of equity is increasing in *DISP*, *DEBT*, *BM*, *UBETA*, *LTGRTH*, and is decreasing in *SIZE*.

[25] We also analyze equation (3) for a constant subsample, where each firm in this analysis has at least one year of data in the pre- and post-123R periods. In untabulated results, we find evidence consistent with panel B of table 3. This mitigates concern that systematic differences between the firms in the pre- and post-123R samples are contributing to inferences from tests of equation (3).

[26] The Z-statistic for the test of coefficients across samples is computed as:
$Z = (b_i - b_j)/\sqrt{(s^2(b_i) + s^2(b_j))}$, where b_i and b_j are coefficient estimates from the two sub-samples, and $s^2(b_i)$ and $s^2(b_j)$ are the squared standard errors of the coefficients (Chen et al. 2010). The inference from the test across samples is unaltered when we pool the samples and instead add the interaction term *ALLOPT*POST*NEWECON* to the model.

Overall, the results presented in panels B and C of table 3 indicate that the cost of equity was negatively related to option grant values before SFAS 123R was implemented, but that this effect was magnified for firms operating in new economy industries. In addition, the economic benefits that firms received from granting options under the favorable accounting treatment disappeared once SFAS 123R was implemented, which is consistent with economic consequences resulting from the change in stock option accounting policy.

Determinants of Option Grants

Descriptive statistics on the economic factors used in the option grant determinant analysis are reported in panel A of table 4 separately for new and traditional economy firms.[27] Relative to traditional firms, new economy firms are smaller, have higher prior year annualized stock returns, lower book to market values, higher sales growth, and spend more for research and development. In addition, new economy firms have higher stock return volatility, greater cash constraints, and smaller amounts of debt financing. The differences in option grant characteristics across new and traditional economy firms are consistent with prior research (Ittner et al. 2003).

Panel B of table 4 reports results from the option grant determinant model (equation 1).[28] For the new economy firms, 11 of the 15 explanatory variables are significant in the predicted direction and the r-squared value for model fit is 47 percent. Consistent with Ittner et al. (2003), option grants by new economy firms are increasing in *SIZE*, *ANNRET*, *SALEGRTH*, *RD*, *ADV*, and *VOLATILITY*, and are decreasing in *BM*, *LEV*, and *CASHFLOW*. In addition, geographic factors

[27] The option determinant model does not include the cost of equity and incorporates a different set of control variables relative to those used in the cost of equity equations. Therefore, 14,508 observations are available for equation (1), which is larger than the sample used in the cost of capital regressions.

[28] The variable *RESOPT* is estimated from regressions of equation (1) for industry groups categorized according to the 48 Fama-French industry classifications (Fama and French 1997) over 1999-2011 (results not tabulated). The results reported in panel B of table 4 provide a summary of the regression coefficients from a separate analysis of equation (1) for new and traditional economy firms.

play a significant role (e.g., higher levels of option grants for *COAST* and *UNEMP*), which is consistent with employee attraction and retention determinants of option grant behavior.

The significance of the determinants for traditional economy firms is also strong. As reported in the right column of panel B, 12 of the 15 explanatory variables are significant in the predicted direction and the r-squared value for model fit is 34 percent. The only notable differences in the determinants for traditional firms relative to those for new economy firms are that option grants are decreasing in *CASHFLOW*, which is consistent with findings in Core and Guay (1999), and that *LEV* is not a significant explanatory factor. The tax status of the firm plays a significant role for traditional economy firms, with option grants increasing (decreasing) when a firm is in a low (high) tax bracket.

Relation Between Residual Option Grants and Cost of Equity

Panel A of table 5 reports descriptive statistics of *COE* and *RESOPT* for new and traditional economy firms in the pre- and post-123R periods. *COE* decreased slightly from the pre- to post-123R time period for both groups of firms, with a mean *COE* in the pre-123R period of 12.8 (11.5) percent and in the post-123R period of 11.2 (11.2) percent, for new (traditional) economy firms, respectively. New economy firms granted larger values of residual options during the pre-123R period, where the mean amount of *RESOPT* for new economy firms before SFAS 123R was $427 compared the mean of *RESOPT* of $140 for traditional economy firms. Both new and traditional economy firms issued comparatively fewer residual options during the post-123R period, with average residual grant values of −$147 and −$142 by new and traditional economy

firms, respectively. Overall, the descriptive statistics demonstrate that after SFAS 123R, firms decreased both the total and residual option grant amounts.[29]

Panel B of table 5 reports results from the time-series analysis of the relation between residual option grants and the cost of equity. The significantly positive coefficient on *RESOPT*POST* (p-value = <0.0001) for all firms in the sample provides support for hypothesis 3. Specifically, firms exhibited a lower cost of equity for a greater value of residual option grants in the pre-123R time period (demonstrated by the significantly negative coefficient on *RESOPT*, p-value = <0.0001), but the effect was insignificant after SFAS 123R was enacted (p-value = 0.7308). Results from the separate analysis of traditional and new economy firms are consistent with those reported for the entire sample, and the Z-statistic for the test of difference in *RESOPT*POST* across the firm groups is significant (p-value = 0.0132).

Results of tests of the relation between the cost of equity and the residual value of option grants for the new versus traditional economy firms in both accounting regimes are reported in panel C of table 5. The coefficients for both traditional and new economy firms are significantly negative in the pre-123R period (p-value = 0.0031 and p-value = 0.0000, respectively) and are not significantly different from zero in the post-123R period (p-value = 0.8065 and p-value = 0.4639, respectively). This evidence shows that the cost of capital was decreasing in the level of residual option grants for both traditional and new economy firms in the years prior to SFAS 123R, but that this did not persist into the post-123R period once the option expense was recognized. The significantly negative coefficient on *RESOPT*NEWECON* in the pre-123R period (p-value = 0.0019) indicates that the effects during the favorable accounting treatment regime were stronger

[29]The result that the amount of options granted across all firms decreased after the implementation of SFAS 123R is consistent with findings reported by other research, including Brown and Lee (2011) and Hayes et al. (2012). The result with respect to new economy firms in particular is consistent with Hayes et al. (2012). We are not aware of any research that empirically documents a decrease in the level of residual option grants around the implementation of SFAS 123R.

for new economy firms relative to firms operating in other industries. This may have been possible for this subset of firms due to differences in new economy firm characteristics, such as the importance of human capital and R&D and technological investment (Bell et al. 2002, Core et al. 2003).

Overall, the results reported in table 5 support the idea that once recognition of the fair value of option-related compensation expense was required, firms no longer received economic benefits of option grants in the form of lower cost of equity. Another way of characterizing the inferences from the residual option grant analysis is that absent any change in option granting behavior around the implementation of SFAS 123R, firms may have experienced an increase in the cost of equity had the option-related compensation expense for the pre-123R magnitude of residual options been reported in earnings during the post-123R period. However, the fact that cost of equity remained relatively constant over time, combined with the decrease in both total and residual option grants, indicates that firms may have avoided the potentially adverse cost of equity consequences related to expense recognition by reducing the value of residual option grants.

VI. SENSITIVITY ANALYSES

Change in Cost of Capital

The results reported in tables 3 and 5 indicate that firms experienced different effects between the values of options granted and the cost of equity across accounting regimes, and also that firms changed the extent to which they granted options over this time period. To investigate the impact of changes in firms' option granting behavior on the relation between option values and the cost of equity, we analyze equation (3) represented in changes form with the following regression model:

$$CH\_COE = \delta_0 + \delta_1 CH\_ALLOPT + \delta_2 CH\_DISP + \delta_3 CH\_SIZE + \delta_4 CH\_DEBT +$$

$$\delta_5 CH\_BM + \delta_6 CH\_UBETA + \delta_7 CH\_LTGRTH + \varepsilon \quad (5)$$

We include 1,036 observations that have data available for at least two years in both the pre-123R and post-123R periods. We calculate the average value for the regression variables in each period and use the difference between the post-123R and the pre-123R average value for each firm in equation (5). For example, *CH_COE* is the difference between the average *COE* for the post-123R and pre-123R periods. A significantly positive coefficient on *CH_ALLOPT* indicates that a greater value of option grants in the post-123R period is related to an increase in the cost of equity for affected firms.

Results are reported in table 6. The negative values of *CH_ALLOPT* that are reported in the descriptive statistics (panel A) show that firms decreased the amount of options granted from the pre-123R period to the post-123R period (consistent with results reported in panel A of table 5). However, the cost of equity increased and decreased for various firms in this subsample, as evidenced by positive and negative values of *CH_COE*. As reported in panel B, the coefficient on *CH_ALLOPT* is significantly positive, which indicates greater cost of equity for a growth in option values across time and is consistent with inferences from table 3. It is also notable that the coefficient on the intercept is significantly positive (p-value = 0.0413). This result indicates that for a constant level of option grants across the pre-123R and post-123R time periods, firms experienced a higher cost of equity in the post-123R regime.[30]

Cost of Equity Measure

Botosan and Plumlee (2005) show that Easton's (2004) *RPEG* cost of equity estimate is associated with firm risk in a more stable and meaningful manner relative to other cost of equity

[30] We were initially interested in examining the cost of equity effects for firms that reported the same level of option grants between the pre- and post-123R time periods. Based on the results reported in table 3, we would expect that the relation between option values and the cost of equity would be significantly positive following the enactment of SFAS 123R for these firms. However, only four firms in the sample reported the same value of option grants during the pre-123R and post-123R years.

estimates. Cross-sectional consistency in estimating the cost of equity relative to firm-risk measures is important for our analysis. However, given that multiple empirical approaches are available to estimate the cost of equity, we examine whether our inferences are robust to an alternative estimate.

The alternative cost of equity estimate, *AVGCOE,* is based on Callahan et al. (2012) and is the average of four individual cost of capital measures from Easton (2004), Gebhardt et al. (2001), Claus and Thomas (2001), and Ohlson and Juetter-Nauroth (2005).[31] We follow other research (e.g., Callahan et al. 2012) and use the average of the estimates to minimize the amount of noise inherent in each of the individual measures caused by the different assumptions used in estimating the firm's terminal value. We calculate *AVGCOE* and the related control variables used in the cost of equity regression models (equations 3 and 4) for 8,662 firm-year observations from the time period 1999 through 2011. Selected results from our analysis of equation (3) (i.e., combined time series comparison for all firms and separately for new economy firms) are reported in table 6.[32]

As reported in panel A, the coefficient on *ALLOPT*POST* is significant for all firms and for both industry categories, indicating that the relation between the cost of capital and the total fair value of options granted is different between the pre- and post-123R periods. This result provides support for hypothesis 1. In addition, the Z-statistic for the test of difference in *ALLOPT*POST* across the firm groups is significant (p-value = 0.0169), which provides support for hypothesis 2.

[31] Easton's (2004) model (equation 2), imposes an assumption of zero growth in abnormal earnings beyond the forecast horizon. Gebhardt et al. (2001) and Claus and Thomas (2001) both use residual income-based valuation models in estimating the cost of equity. Gebhardt et al. (2001) assume that a firm's return on equity reverts to an industry-level norm beyond the forecast horizon and Claus and Thomas (2001) assume that earnings grow at the analysts' growth rate for five years and that abnormal earnings growth is constant thereafter. Ohlson and Juetter-Nauroth (2005) assume that the long-term growth rate is equal to the risk-free rate less three percent. These four cost of equity measures have been widely used in related research (see Callahan et al. (2012) for details).

[32] For brevity, the results of the cross-sectional regressions (equation 4) using the alternate cost of equity estimate are not tabulated because there are no differences in the results with *AVGCOE* as the dependent variable versus *COE*. We also omit results for the control variables as inferences are similar from those reported in tables 3 and 5.

The results reported in panel B also corroborate prior conclusions regarding the effect of residual option grants (hypothesis 3). The coefficients on *RESOPT*POST* are all significant, which shows that the relation between residual options granted and the cost of capital was different for firms operating in a variety of industries across the two accounting regimes. The Z-statistic for the test of difference in *RESOPT*POST* across the firm groups is significant (p-value = 0.0021), which indicates that the effect is stronger for firms operating in new economy industries. Consistent with the cross-sectional results reported in panel C of tables 3 and 5, we also find that the cost of equity effects from option grants for new economy firms is significantly different relative to firms operating in traditional industries in the pre-123R period but not afterwards (results not tabulated). Overall, the inferences from our analyses under *AVGCOE* provide similar conclusions and demonstrate robustness of our analyses across a different cost of equity estimate.

Extended Pre-123R Time Period

We use data on stock option grants from 1999 through 2011 in our cost of equity tests in order to retain a balanced time period across the pre- and post-123R samples (i.e., six years of observations are included before and after SFAS 123R was implemented, with 2005 excluded from the analysis). The option grant data used in the determinant model also matches this time period (1999 through 2011). However, since SFAS 123 governed accounting for stock options from 1996 through 2004, the complete pre-123R time period extends to 1996. Therefore, we conduct a robustness check to examine whether the inferences reported in the paper are sensitive to the definition of the pre-123R time period.

For this analysis, we include data from 17,423 observations from 1996 through 2011 in the option grant determinant model (equation 1) as well as the cost of equity regressions (equations 3

and 4). Results (not tabulated) from regressions of all of the cost of equity tests for the pre-123R period are consistent with the results reported in tables 3 and 5. Results from the cross-sectional tests demonstrate that new economy firms experienced significantly different cost of capital effects relative to firms operating in traditional industries for both total and residual option grants, which is consistent with the main results and also provide support for hypothesis 2 and hypothesis 4. Specifically, when the pre-123R period is defined as 1996 through 2004 the coefficients on the variables of interest in equation (4) (*ALLOPT*NEWECON* and *RESOPT*NEWECON*) are both significantly negative. In addition, results over the extended time period also support rejecting hypothesis 1 and hypothesis 3. The coefficients on *ALLOPT* and *RESOPT* are significantly negative and the coefficients on *ALLOPT*POST* and *RESOPT*POST* in equation (3) are significantly positive for new economy firms. This result suggests that new economy firms enjoyed cost of capital benefits from option grants prior to the implementation of SFAS 123R but not afterwards. However, the coefficients on the interaction terms *ALLOPT*POST* and *RESOPT*POST* are insignificant for traditional firms, indicating that the change in cost of equity effects from option grants is not observed for these firms. Overall, conclusions from the extended pre-123R time period are consistent with the findings tabulated in the paper.

VII. CONCLUSION

This study provides evidence that the change in accounting for stock options imposed by SFAS 123R eliminated the negative relation between employee stock option grants and the cost of equity capital that existed under the favorable accounting treatment. The evidence is consistent with the cost of capital hypothesis proposed by Dechow et al. (1996) and is supported by theoretical models of systematic cognitive biases among investors and the market's fixation on earnings. Furthermore, the results show that the cost of capital benefits from option grants were

more pronounced for new economy firms. This evidence supports the idea that the change in accounting treatment of stock options had economic consequences beyond the direct expense effect on net income that has been demonstrated by existing research. The result that accounting for stock options incurred real economic effects (i.e., lower cost of equity) also contributes to mixed findings from the line of research that examines whether option expense recognition versus disclosure mattered to investors.

We also find evidence that firms may have "overissued" employee stock options when the favorable accounting treatment was in place during the pre-123R period. The results from our estimation of the portion of option grants not explained by macro and microeconomic fundamentals shows that all firms incurred a lower cost of equity for a larger value of residual option grants before SFAS 123R was enacted, but not afterwards. The results also indicate that firms reduced the amount of residual option grants after SFAS 123R was enacted, perhaps because the cost of capital benefit from the "overissuance" of options disappeared. This evidence indicates that firms may have "overissued" options during the pre-123R period not because the perceived accounting cost of options was less than their economic cost, but because firms enjoyed real economic benefits from the favorable accounting treatment in effect during this time.

Collectively, the evidence from this study shows that the change in accounting policy imposed by SFAS 123R had a significant effect on firms granting employee stock options, particularly for firms operating in new economy industries. The results provide insights for policy makers on how changes in accounting regulation affect firm behavior, as well as evidence of real economic consequences imposed by mandatory expense recognition of option compensation costs.

REFERENCES

Aboody, D. 1996. Market Valuation of Employee Stock Options. *Journal of Accounting and Economics* 22: 357-391.

Aboody, D., M. Barth, and R. Kasznik. 2004. SFAS No. 123 Stock-based Compensation Expense and Equity Market Values. *The Accounting Review* 79: 251-275.

Ahmed, A., E. Kilic, and G. Lobo. 2006. Does Recognition Versus Disclosure Matter? Evidence from Value-Relevance of Banks' Recognized and Disclosed Derivative Financial Statements. The Accounting Review 81: 567-588.

Alsheimer, A. 2006 Assessing Corporate America's Opposition to the FASB's New Stock Option Expensing Policy. *Entrepreneurial Business Law Journal* 43-62.

American Institute of Certified Public Accountants, Accounting Principles Board. 1972. *Accounting for Stock Issued to Employees*. Accounting Principles Board Opinion No. 25. New York, NY: AICPA.

Ashbaugh-Skaife, H., Collins, D., Kinney, W., LaFond, R., 2009. The Effect of SOX on Internal Control Deficiencies and Their Remediation on Accruals Quality. *The Accounting Review* 83: 217-250.

Baber, W., S. Janakiraman, and S. Kang. 1996. Investment Opportunities and the Structure of Executive Compensation. *Journal of Accounting and Economics* 21: 297-318.

Barth, M., G. Clinch, and T. Shibano. 2003. Market Effects of Recognition and Disclosure. Journal of Accounting Research 41: 581-609.

Barth, M., and K. Schipper. 2008. Financial reporting transparency. *Journal of Accounting, Auditing & Finance* 23: 173-190.

Berk, J. 1995. A Critique of Size-Related Anomalies. *Review of Financial Studies* 8: 275-286.

Bell, T., W. Landsman, B. Miller, and S. Yeh. 2002. The Valuation Implications of Employee Stock Option Accounting for Computer Software Firms. *The Accounting Review 77*: 971-996.

Bergman, N. and D. Jenter. 2007. Employee Sentiment and Stock Option Compensation. *Journal of Financial Economics* 84: 667-712.

Bodie, Z., R. Kaplan, and R. Merton. 2003. For the Last Time, Stock Options are an Expense. *Harvard Business Review* 81: 62-71.

Botosan, C. and M. Plumlee. 2001. Stock Option Expense: The Sword of Damoches Revealed. *Accounting Horizons* 15: 311-327.

Botosan, C. and M. Plumlee. 2005. Assessing Alternative Proxies for the Expected Risk Premium. *The Accounting Review* 80: 21-53.

Botosan, C., M. Plumlee, and H. Wen. 2011. The Relation Between Expected Returns, Realized Returns, and Firm Risk Characteristics. *Contemporary Accounting Research* 28: 1085-1122.

Brown, L. and Y. Lee. 2011. Change in Option-Based Compensation Around the Issuance of SFAS 123R. *Journal of Business Finance and Accounting* 38: 1053-1095.

Burns, N. and S. Kedia. 2006. The impact of performance-based compensation on misreporting. *Journal of Financial Economics* 79: 35-67.

Callahan, C., R. Smith, and A. Spencer. 2012. An Examination of the Cost of Capital Implications of FIN 46. *The Accounting Review* 87: 1105-1134.

Carter, M., L. Lynch, and I. Tuna. 2007. The Role of Accounting in the Design of CEO Equity Compensation. *The Accounting Review* 82: 327-357.

Chen, H., J. Chen, G. Lobo, and Y. Wang. 2010. Association between borrower and lender state ownership and accounting conservatism. *Journal of Accounting Research* 48 (5): 973-1014.

Choudhary, P. 2011. Evidence on Differences Between Recognition and Disclosure: A Comparison of Inputs to Estimate Fair Values of Employee Stock Options. *Journal of Accounting and Economics* 51: 77-94.

Chung, K. 1989. Debt and Risk: A Technical Note. *Journal of Business Finance and Accounting* 16: 719-727.

Claus, J., and J. Thomas. 2001. Equity Risk Premia as Low as Three Percent? Evidence From Analysts' Earnings Forecasts for Domestic and International Stock Markets. *Journal of Finance* 56: 1629-1666.

Core, J. and W. Guay. 1999. The Use of Equity Grants to Manage Optimal Equity Incentive Levels. *Journal of Accounting and Economics* 28: 151-184.

Core, J. and W. Guay. 2001. Stock Option Plans for Non-executive Employees. *Journal of Financial Economics* 61: 253-287.

Core, J., W. Guay, and Van Buskirk. 2003. Market Valuations in the New Economy: an Investigation of What Has Changed. *Journal of Accounting and Economics* 34: 43-67.

Cotter, J. and I. Zimmer. 2003. Disclosure Versus Recognition: The Case of Asset Revaluations. *Asia-Pacific Journal of Accounting and Economics* 10: 81-99.

Dechow, P., A. Huton, and R. Sloan. 1996. Economic Consequences of Accounting for Stock-based Compensation. *Journal of Accounting Research* 34: 1-20

Desai, H., Z. Li, and S. Zhang. 2013. The Impact of Economic Determinants on the Change in Employee Options Use Post 123R. Working Paper, Southern Methodist University.

Easton, P. 2004. PE Ratios, PEG Ratios, and Estimating the Implied Expected Rate of Return on Equity Capital. *The Accounting Review* 79: 73-96.

Elliott, B., J. Hobson, and K. Jackson. 2011. Disaggregating Management Forecasts to Reduce Investors' Susceptibility to Earnings Fixation. *The Accounting Review* 86: 185-208.

Espahbodi, H., P. Espahbodi,Z. Rezaee, and H. Rehranian. 2002. Stock Price Reaction and Value Relevance of Recognition versus Disclosure: The Case of Stock-Based Compensation. *Journal of Accounting and Economics* 33: 343-373.

Fama, E., and K. French. 1997. Industry Costs of Equity. *Journal of Financial Economics* 43: 153-193.

Farber, D., M. Johnson, and K. Petroni. 2007. Congressional Intervention in the Standard-Setting Process: An Analysis of the Stock Option Accounting Reform Act of 2004. *Accounting Horizons* 21: 1-22.

Financial Accounting Standards Board. 1993. *Exposure Draft: Accounting for Stock-Based Compensation*. Norwalk, CT: FASB.

Financial Accounting Standards Board. 1995. *Statement of Financial Accounting Standards No. 123: Accounting for Stock-Based Compensation*. Norwalk, CT: FASB.

Financial Accounting Standards Board. 2004. *Statement of Financial Accounting Standards No. 123R: Share-Based Payment*. Norwalk, CT: FASB.

Financial Accounting Standards Board. 2013. *Proposed Accounting Standards (Update): Accounting for Leases.* Norwalk, CT: FASB.

Frederickson, J., F. Hodge, and J. Pratt. 2006. The Evolution of Stock Option Accounting: Disclosure, Voluntary Recognition, Mandated Recognition, and Management Disavowals. *The Accounting Review* 81: 1073-1093.

Gaver, J. and K. Gaver. 1993. Additional Evidence on the Association Between the Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies. *Journal of Accounting and Economics* 16: 125-160.

Gebhardt, W., C. Lee, and B. Swaminathan. 2001. Toward an Implied Cost of Capital. *Journal of Accounting Research* 39: 135-176.

Graham, J., C. Harvey, and S. Rajgopal. 2005. The Economic Implications of Corporate Financial Reporting. *Journal of Accounting and Economics* 40: 3-73.

Hall, B. and K. Murphy. 2003. The Trouble With Stock Options. *Journal of Economic Perspectives* 17: 49-70.

Hayes, R., M. Lemmon, and M. Qu. 2012 Stock Options and Managerial Incentives for Risk Taking: Evidence from SFAS 123R. *Journal of Financial Economics* 105: 174-190.

Hirshleifer, D. and S. Teoh. 2003. Limited Attention, Information Disclosure, and Financial Reporting. *Journal of Accounting and Economics* 36: 337-386.

Ittner, C., R. Lambert, and D. Larker. 2003. The Structure and Performance Consequences of Equity Grants to Employees of New Economy Firms. *Journal of Accounting and Economics* 34: 89-127.

Jensen, M. and W. Meckling. 1976. Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure. *Journal of Financial Economics* 3: 305-360.

Kedia, S. and S. Rajgopal. 2009. Neighborhood Matters: The Impact of Location on Broad Based Stock Option Plans. *Journal of Financial Economics* 92: 109-127.

Lambert, R., C. Leuz, and R. Verrecchia. 2007. Accounting Information, Disclosure, and the Cost of Capital. *Journal of Accounting Research* 45: 385-420.

Libby, R., M. Nelson, and J. Hunton. 2006. Recognition versus Disclosure, Auditor Tolerance for Misstatement, and the Reliability of Stock-Compensation and Lease Information. *Journal of Accounting Research* 44: 533-560.

Lintner, J. 1965. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *Review of Economics and Statistics* 47: 13-37.

Matsunaga, S. 1995. The Effects of Financial Reporting Costs on the Use of Employee Stock Options. *The Accounting Review* 70: 1-26.

Merton, R. 1973. Theory of Rational Option Pricing. *Bell Journal of Economics and Management Science* 4: 141-183.

Modigliani, F. and M. Miller. 1958. The Expected Cost of Equity Capital, Corporate Finance, and the Theory of Investment. *American Economic Review* 85: 315-341.

Murphy, K. 2002. Explaning Executive Compensation: Managerial Power Versus the Perceived Cost of Stock Options. *The University of Chicago Law Review* 69: 847-869.

Murphy, K. 2003. Stock-Based Pay in New Economy Firms. *Journal of Accounting and Economics* 34: 129-147.

Ohlson, J. and B. Juettner-Nauroth. 2005. Expected EPS and EPS Growth as Determinants of Value. *Review of Accounting Studies* 10: 349-365.

Oyer, P. and S. Schaefer, 2005. Why do some firms give stock options to all employees? An empirical examination of alternative theories. *Journal of Financial Economics* 76: 99–133.

Oyer, P. and S. Schaefer. 2006. Costs of Broad-Based Stock Option Plans. *Journal of Financial Intermediation* 15: 511 – 534.

Schipper, K. 2007. Required Disclosures in Financial Reports. *The Accounting Review* 82: 301-326.

Sharpe, W. 1964. Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk. *Journal of Finance* 19: 425-442.

Skantz, T. 2012. CEO Pay, Managerial Power, and SFAS 123(R). *The Accounting Review* 87: 2151 – 2179.

Smith, C. and R. Watts.1992. The Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies. *Journal of Financial Economics* 32: 263-292.

Templin, B. 2005. Expensing Isn't the Only Option: Alternatives to the FASB's Stock Option Expensing Proposal. *Journal of Corporation Law* 30: 357-404.

Yermack, D. 1995. Do Corporations Award CEO Stock Options Effectively? *Journal of Financial Economics* 39: 237-269.

Appendix: Variable Definitions

Cost of equity

COE	Cost of equity based on Easton (2004) following the modification described in Botosan and Plumlee (2005) for the year of the option grant
OPTIONS	A variable equal to *ALLOPT* or *RESOPT* (equations 3 and 4)
ALLOPT	Natural log of one plus the Black-Scholes value of option grants to all employees in a given year scaled by the number of employees
RESOPT	The difference between *ALLOPT* and the expected value for *ALLOPT*, where the expected values of stock option grants are obtained from 44 regressions (equation 4) conducted for firms within the same Fama and French (1997) industries
NEWECON	An indicator variable equal to one if the firm operates in industries related to computer hardware, telecommunications, computer software, or computer programming and networking (i.e. SIC 3570-3577, SIC 4812-4813, SIC 3660-3679, SIC 5045, SIC 5961 and SIC 7370-7379), and zero otherwise
POST	An indicator variable equal to one if the observation represents stock option grants from 2005 through 2010, and zero otherwise
DISP	Standard deviation of analysts' forecasts for 30 days prior to the end of the year of the option grant
SIZE	Natural log of the market value of equity at the beginning of the year of the option grant
DEBT	Long-term liabilities scaled by the market value of equity at the beginning of the year of the option grant
BM	Book value of total equity divided by market value of equity at the beginning of the year of the option grant
UBETA	Unlevered beta, calculated as the market beta divided by (1 + *DEBT*) for the year prior to the option grant
LTGRTH	Long-term growth in earnings provided by I/B/E/S for the year prior to the option grant

Appendix: Variable Definitions (continued)

Determinants of annual option grants

SIZE	Natural log of the market value of equity at the beginning of the year of the option grant
BM	Book value of total equity divided by market value of equity at the beginning of the year of the option grant
ANNRET	Average of the firm's annualized returns for two years prior to the option grant
SALEGRTH	Change in annual total sales for the year prior to the option grant
RD	Research and development (R&D) expense scaled by total sales in the year prior to the option grant
ADV	Advertising expense scaled by total sales in the year prior to the option grant
VOLATILITY	Standard deviation of continuously compounded monthly returns in the year prior to the option grant
CASHFLOW	Net cash flow from operating activities minus cash dividends, capital expenditures, and R&D expenditures, scaled by total assets in the year prior to the option grant
LEV	Leverage ratio, calculated as the sum of short-term debt and long-term debt, scaled by total assets in the year prior to the option grant
HIGHTAX	An indicator variable equal to one if the firm had a positive pretax book income and no net operating loss carry-forwards in the year prior to the option grant, and zero otherwise
LOWTAX	An indicator variable equal to one if the firm had a negative pretax book income and net operating loss carry-forwards in the year prior to the option grant, and zero otherwise
ROA	Ratio of net income before taxes to total assets in the year prior to the option grant
UNEMP	Ratio of the unemployed labor force to the total labor force for the metropolitan statistical area containing the zip code of the firm's headquarters
VOLSHR	A firm's share of its industry return, measured as the r-squared value generated from a regression of the firm's monthly stock returns on industry stock returns in the year prior to the option grant
COAST	An indicator variable equal to one if the firm's headquarters is located in the following states: CA, WA, NY, NJ, MD, NC, VA, CT, RI, MA, NH, ME, and zero otherwise

Table 1: Sample Statistics

Panel A: Sample Selection

Firms with Black-Scholes value of per-employee option grants (1999-2011)	20,288
Exclude: Financial firms	2,640
Firms that voluntarily recognized the fair value of option expense on the income statement before SFAS 123R was enacted	753
2005 firm-years	953
Firms missing information to calculate control variables	3,480
Firms missing information to calculate cost of equity	1,351
Final sample (firm-year observations)	11,111

Panel B: Industry Distribution

	# of firm-years	*%*
New Economy	2,463	22.17%
Traditional Economy:		
Durable manufacturers	2,254	20.29%
Retail	1,499	13.49%
Services	1,034	9.31%
Utilities	725	6.56%
Textiles/printing/publishing	583	5.25%
Pharmaceutical	475	4.28%
Transportation	444	4.00%
Chemicals	395	3.56%
Extractive	374	3.37%
Food	326	2.90%
Mining and construction	229	2.06%
Others	302	2.72%
Total traditional economy	8,648	77.83%
TOTAL	11,111	100.0%

Table 1 (continued)

Panel C: Annual Black-Scholes Fair Value of Option Grants Per Employee (in $000s)

	New Economy			Traditional Economy		
Year	N	MEAN	MEDIAN	N	MEAN	MEDIAN
1999	209	41.36	16.39	812	7.97	1.62
2000	204	59.53	30.08	782	9.66	1.71
2001	196	49.50	26.85	642	8.04	1.86
2002	218	31.11	17.12	736	7.55	2.05
2003	212	29.42	14.08	661	6.29	1.79
2004	227	29.49	13.75	741	7.16	1.76
2006	190	15.71	6.84	647	3.75	1.01
2007	206	14.54	5.61	739	4.20	0.85
2008	214	8.13	3.51	731	3.90	0.75
2009	213	6.23	2.19	765	2.83	0.69
2010	210	5.98	2.17	737	2.88	0.69
2011	164	6.00	1.93	655	3.16	0.71
TOTAL	2,463			8,648		

	All Firms					
Year	N	MEAN	MEDIAN	STD	25thPctl	75thPctl
Pre-123R (1999 – 2004)	5,640	14.97	2.62	32.16	0.96	11.02
Post-123R (2006 – 2011)	5,471	4.76	0.93	13.53	0.14	3.31

New Economy firms operate in industries related to computer hardware, telecommunications, computer software, or computer programming and networking (i.e. SIC 3570-3577, SIC 4812-4813, SIC 3660-3679, SIC 5045, SIC 5961 and SIC 7370-7379). This definition of new economy firms is similar to Murphy (2003). Traditional Economy firms operate in the following industries: agriculture (SIC 0100-0199, SIC 0200-0299, SIC 0700-0799, SIC 0900-0999) mining & construction (SIC 1000- 1999, excluding 1300-1399), food (SIC 2000-2111), textiles & printing/publishing (SIC 2200-2799), chemicals (SIC 2800-2824, SIC 2840- 2899), pharmaceuticals (SIC 2830-2836), extractive (SIC 2900-2999, SIC 1300-1399), durable manufacturers (SIC 3000-3999, excluding SIC 3570-3577 and SIC 3660-3679), transportation (SIC 4000-4899, excluding SIC 4812-4813), utilities (SIC 4900-4999), retail (SIC 5000-5999, excluding SIC 5045 and SIC 5961), and services (SIC 7000-8999, excluding SIC 7370-7379).

Table 2: Correlation Matrix

	COE	ALLOPT	RESOPT	DISP	SIZE	DEBT	BM	UBETA	LTGRTH
COE	1.0000	-0.0036	-0.0158	0.3476	-0.3269	0.2642	0.3900	0.1389	0.0709
		(0.7053)	*(0.0958)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*
ALLOPT	-0.0337	1.0000	0.6631	-0.0324	0.0318	-0.2444	-0.2788	0.4362	0.4879
	(0.0004)		*(<0.0001)*	*(0.0006)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*
RESOPT	-0.0265	0.6725	1.0000	-0.0305	-0.0208	-0.0220	-0.0172	0.0861	0.1438
	(0.0053)	*(<0.0001)*		*(0.0013)*	*(0.0283)*	*(0.0206)*	*(0.0707)*	*(<0.0001)*	*(<0.0001)*
DISP	0.3051	-0.1335	-0.0749	1.0000	0.0359	0.1692	0.1770	-0.0094	-0.0881
	(<0.0001)	*(<0.0001)*	*(<0.0001)*		*(0.0002)*	*(<0.0001)*	*(<0.0001)*	*(0.3198)*	*(<0.0001)*
SIZE	-0.3629	0.0328	-0.0162	0.0580	1.0000	-0.1285	-0.3873	-0.1870	-0.1519
	(<0.0001)	*(0.0005)*	*(0.0881)*	*(<0.0001)*		*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*
DEBT	0.1564	-0.3409	-0.0545	0.2376	0.0216	1.0000	0.5303	-0.2917	-0.2954
	(<0.0001)	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(0.0231)*		*(<0.0001)*	*(<0.0001)*	*(<0.0001)*
BM	0.3372	-0.3180	-0.0587	0.2544	-0.3860	0.4719	1.0000	-0.0117	-0.2674
	(<0.0001)	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*		*(0.2177)*	*(<0.0001)*
UBETA	0.1955	0.2789	0.0781	0.0313	-0.2128	-0.4890	0.0068	1.0000	0.4256
	(<0.0001)	*(<0.0001)*	*(<0.0001)*	*(0.0010)*	*(<0.0001)*	*(<0.0001)*	*(0.4737)*		*(<0.0001)*
LTGRTH	0.1266	0.3937	0.1430	-0.2197	-0.1888	-0.4778	-0.3276	0.4429	1.0000
	(<0.0001)	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	

The upper right (lower left) panel reports Pearson (Spearman) correlation coefficients. The two-sided p-value is reported in parentheses below each coefficient. All variables are defined in the appendix.

Table 3: Effect of Employee Option Grants on Cost of Equity

Panel A: Descriptive Statistics

Pre-123R (N=5,640)

Variable	MEAN	MEDIAN	STD	25th Pctl	75th Pctl
COE	0.12	0.10	0.06	0.08	0.13
ALLOPT	1.70	1.29	1.31	0.67	2.49
DISP	0.07	0.03	0.13	0.02	0.07
SIZE	7.43	7.21	1.52	6.33	8.40
DEBT	0.39	0.17	0.60	0.02	0.48
BM	0.47	0.40	0.35	0.23	0.61
UBETA	0.60	0.40	0.56	0.20	0.82
LTGRTH	0.17	0.15	0.08	0.12	0.21

Post-123R (N=5,471)

Variable	MEAN	MEDIAN	STD	25th Pctl	75th Pctl
COE	0.11	0.10	0.05	0.08	0.12
ALLOPT	0.97	0.66	1.07	0.13	1.46
DISP	0.10	0.06	0.14	0.03	0.10
SIZE	7.76	7.62	1.46	6.70	8.68
DEBT	0.33	0.16	0.54	0.02	0.40
BM	0.50	0.43	0.33	0.28	0.63
UBETA	0.66	0.54	0.48	0.32	0.86
LTGRTH	0.14	0.13	0.07	0.10	0.17

Table 3 (continued)

Panel B: Regressions of Cost of Equity on Option Grants (Time periods combined)

Dependent variable = COE

	Predicted	All Firms		New Economy		Traditional Economy	
	Sign	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept		0.126	<0.0001	0.150	<0.0001	0.121	<0.0001
POST	?	-0.024	0.0112	-0.036	0.1022	-0.022	0.0295
ALLOPT	?	-0.002	0.0049	-0.007	0.0018	-0.002	0.0162
ALLOPT*POST	?	0.004	0.0021	0.008[†]	0.0016	0.004	0.0069
DISP	+	0.157	<0.0001	0.182	<0.0001	0.144	<0.0001
SIZE	−	-0.008	<0.0001	-0.009	<0.0001	-0.007	<0.0001
DEBT	+	0.011	<0.0001	0.013	0.1788	0.015	<0.0001
BM	+	0.036	<0.0001	0.066	<0.0001	0.030	<0.0001
UBETA	+	0.015	<0.0001	0.006	0.1380	0.019	<0.0001
LTGRTH	+	0.083	<0.0001	0.086	0.0128	0.078	<0.0001
DISP*POST	+/−	-0.049	0.0034	-0.077	0.0571	-0.035	0.0614
SIZE*POST	+/−	0.002	0.0102	0.003	0.1383	0.002	0.0676
DEBT*POST	+/−	0.003	0.4186	0.016	0.2227	-0.001	0.7532
BM*POST	+/−	0.003	0.6466	-0.027	0.0664	0.008	0.2259
UBETA*POST	+/−	-0.007	0.0216	0.001	0.9125	-0.008	0.0487
LTGRTH*POST	+/−	0.011	0.5965	-0.043	0.3276	0.026	0.2579
N		11,111		2,463		8,648	
R-squared		32%		31%		34%	

Post-123R:

	All Firms		New Economy		Traditional Economy	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
ALLOPT + (ALLOPT*POST)	0.001	0.1548	0.001	0.3316	0.002	0.1572

[†] indicates significance at the 0.10 level of the Z-statistic for the test of a significant difference between the coefficient on *ALLOPT*POST* for the new economy and traditional economy subsamples. P-values are based on two-sided tests using standard errors corrected for firm clustering. All variables are defined in the appendix.

Table 3 (continued)

Panel C: Regressions of Cost of Equity on Option Grants (Separate time periods)

Dependent variable = COE

	Predicted Sign	Pre-123R Coefficient	Pre-123R P-value	Post-123R Coefficient	Post-123R P-value
Intercept		0.120	<0.0001	0.100	<0.0001
NEWECON	?	0.031	0.1122	0.012	0.4834
ALLOPT	?	-0.002	0.0075	0.001	0.1689
ALLOPT*NEWECON	−	-0.004	0.0362	0.000	0.4595
DISP	+	0.144	<0.0001	0.107	<0.0001
SIZE	−	-0.008	<0.0001	-0.006	<0.0001
DEBT	+	0.015	<0.0001	0.013	<0.0001
BM	+	0.029	<0.0001	0.036	<0.0001
UBETA	+	0.019	<0.0001	0.012	0.0001
LTGRTH	+	0.077	<0.0001	0.108	<0.0001
DISP*NEWECON	+/−	0.037	0.2796	-0.004	0.8943
SIZE*NEWECON	+/−	-0.002	0.2910	0.000	0.7794
DEBT*NEWECON	+/−	-0.001	0.9285	0.016	0.0980
BM*NEWECON	+/−	0.035	0.0101	0.001	0.9225
UBETA*NEWECON	+/−	-0.013	0.0097	-0.003	0.4546
LTGRTH*NEWECON	+/−	0.001	0.9730	-0.060	0.0625
N		5,640		5,471	
R-squared		37%		30%	
Year fixed effects		Included		Included	

New Economy:

	Pre-123R Coefficient	Pre-123R P-value	Post-123R Coefficient	Post-123R P-value
ALLOPT + (ALLOPT*NEWECON)	-0.006	0.0027	0.001	0.2994

The p-value for the coefficient on *ALLOPT*NEWECON* is based on a one-sided test and all other p-values are based on two-sided tests using standard errors corrected for firm clustering. All variables are defined in the appendix.

Table 4: Determinants of Employee Option Grants

Panel A: Descriptive Statistics

New Economy Firms (N=3,156)

Variable	MEAN	STD	MEDIAN	25th Pctl	75th Pctl
ALLOPT	2.21	1.44	2.19	1.02	3.26
SIZE	7.33	1.71	7.02	6.06	8.27
PRERET	0.26	0.62	0.12	-0.10	0.43
BM	0.47	0.35	0.38	0.22	0.60
SALEGRTH	0.15	0.32	0.10	-0.02	0.26
RD	0.13	0.13	0.11	0.03	0.18
ADV	0.01	0.03	0.00	0.00	0.01
VOLATILITY	0.16	0.08	0.14	0.10	0.20
CASHFLOW	-0.03	0.13	-0.01	-0.09	0.05
LEV	0.12	0.16	0.04	0.00	0.21
HIGHTAX	0.48	0.50	0.00	0.00	1.00
LOWTAX	0.11	0.31	0.00	0.00	0.00
ROA	0.03	0.17	0.06	-0.01	0.13
UNEMP	0.06	0.02	0.05	0.05	0.07
VOLSHR	0.34	0.23	0.32	0.13	0.52
COAST	0.65	0.48	1.00	0.00	1.00

Traditional Economy Firms (N=11,352)

Variable	MEAN	STD	MEDIAN	25th Pctl	75th Pctl
ALLOPT	1.07	1.05	0.78	0.30	1.49
SIZE	7.37	1.54	7.24	6.30	8.34
PRERET	0.17	0.41	0.11	-0.05	0.30
BM	0.54	0.39	0.46	0.28	0.68
SALEGRTH	0.11	0.26	0.08	0.00	0.18
RD	0.03	0.09	0.00	0.00	0.02
ADV	0.01	0.03	0.00	0.00	0.01
VOLATILITY	0.12	0.06	0.10	0.07	0.15
CASHFLOW	0.01	0.10	0.02	-0.02	0.06
LEV	0.23	0.17	0.23	0.09	0.35
HIGHTAX	0.56	0.50	1.00	0.00	1.00
LOWTAX	0.05	0.23	0.00	0.00	0.00
ROA	0.07	0.12	0.08	0.03	0.13
UNEMP	0.06	0.02	0.05	0.05	0.07
SIZE	0.33	0.25	0.30	0.11	0.53
COAST	0.37	0.48	0.00	0.00	1.00

Table 4 (continued)

Panel B: Regressions of Option Grants on Economic Determinants

Dependent variable = ALLOPT

	Predicted Sign	New Economy Coefficient	New Economy P-value	Traditional Economy Coefficient	Traditional Economy P-value
Intercept		1.269	<0.0001	0.773	<0.0001
SIZE	+	0.085	0.0148	0.034	0.0084
ANNRET	+	0.167	<0.0001	0.111	0.0009
BM	−	-0.433	<0.0001	-0.362	<0.0001
SALEGRTH	+	0.321	<0.0001	0.350	<0.0001
RD	+	4.404	<0.0001	4.710	<0.0001
ADV	+	2.909	0.0089	1.309	0.0453
VOLATILITY	+	5.191	<0.0001	2.838	<0.0001
CASHFLOW	−	0.838	0.0011	-0.206	0.3014
LEV	−	-1.289	<0.0001	-0.015	0.8850
HIGHTAX	−	0.003	0.6395	-0.101	0.0003
LOWTAX	+	0.052	0.4715	0.215	0.0005
ROA	+	0.344	0.0063	1.008	<0.0001
UNEMP	−	-16.768	<0.0001	-6.175	<0.0001
VOLSHR	+	-0.106	0.4759	-0.082	0.1143
COAST	+	0.332	<0.0001	0.128	0.0003
N		3,156		11,352	
R-squared		47%		34%	

Table 5: Effect of Residual Option Grants on Cost of Equity

Panel A: Descriptive Statistics

New Economy Firms (N=2,463)

	Pre-123R		POST-123R		Test of Difference	
	MEAN	MEDIAN	MEAN	MEDIAN	MEAN	MEDIAN
COE	0.128	0.106	0.112	0.099	(<0.0001)	(<0.0001)
RESOPT	0.356	0.326	-0.159	-0.149	(<0.0001)	(<0.0001)
ALLOPT	2.959	2.963	1.530	1.469	(<0.0001)	(<0.0001)
Residual grant ($000s)*	0.427	0.385	-0.147	-0.139		
Total grant ($000s)*	18.273	18.365	3.620	3.346		

Traditional Economy Firms (N=8,648)

	Pre-123R		POST-123R		Test of Difference	
	MEAN	MEDIAN	MEAN	MEDIAN	MEAN	MEDIAN
COE	0.115	0.101	0.112	0.097	(0.0035)	(<0.0001)
RESOPT	0.131	0.049	-0.153	-0.158	(<0.0001)	(<0.0001)
ALLOPT	1.332	1.027	0.812	0.565	(<0.0001)	(<0.0001)
Residual grant ($000s)*	0.140	0.050	-0.142	-0.146		
Total grant ($000s)*	2.789	1.792	1.253	0.760		

* Total grant = EXP (ALLOPT) – 1and Residual grant = EXP (RESOPT) – 1, where the values of ALLOPT and RESOPT are the mean and median values of RESOPT and ALLOPT reported for each time period, respectively. All variables are defined in the appendix.

Table 5 (continued)

Panel B: Regressions of Cost of Equity on Residual Option Grants (Time periods combined)

Dependent variable = COE

	Predicted	All Firms		New Economy		Traditional Economy	
	Sign	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept		0.126	<0.0001	0.145	<0.0001	0.120	<0.0001
POST	?	-0.023	0.0140	-0.030	0.1650	-0.021	0.0376
RESOPT	?	-0.006	<0.0001	-0.011	<0.0001	-0.003	0.0111
RESOPT*POST	?	0.006	0.0001	0.0010†††	<0.0001	0.003	0.0720
DISP	+	0.155	<0.0001	0.173	<0.0001	0.143	<0.0001
SIZE	−	-0.008	<0.0001	-0.009	<0.0001	-0.008	<0.0001
DEBT	+	0.011	<0.0001	0.015	0.1173	0.015	<0.0001
BM	+	0.038	<0.0001	0.070	<0.0001	0.031	<0.0001
UBETA	+	0.014	<0.0001	0.003	0.4860	0.018	<0.0001
LTGRTH	+	0.077	<0.0001	0.065	0.0456	0.072	<0.0001
DISP*POST	+/−	-0.046	0.0056	-0.069	0.0899	-0.033	0.0771
SIZE*POST	+/−	0.002	0.0055	0.003	0.1007	0.002	0.0449
DEBT*POST	+/−	0.003	0.3862	0.014	0.2853	-0.001	0.7920
BM*POST	+/−	0.001	0.8755	-0.031	0.0259	0.006	0.3445
UBETA*POST	+/−	-0.004	0.0872	0.005	0.2570	-0.006	0.0958
LTGRTH*POST	+/−	0.020	0.3368	-0.017	0.6901	0.036	0.1187
N		11,111		2,463		8,648	
R-squared		32%		32%		34%	

Post-123R:

	All Firms		New Economy		Traditional Economy	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
RESOPT + (RESOPT*POST)	0.000	0.7308	-0.001	0.5010	0.000	0.9405

††† indicates significance at the 0.01 level of the Z-statistic for the test of a significant difference between the coefficient on *RESOPT*POST* for the new economy and traditional economy subsamples. P-values are based on two-sided tests using standard errors corrected for firm clustering. All variables are defined in the appendix.

Table 5 (continued)

Panel C: Regressions of Cost of Equity on Residual Option Grants (Separate time periods)

Dependent variable = COE

	Predicted	Pre-123R		Post-123R	
	Sign	Coefficient	P-value	Coefficient	P-value
Intercept		0.119	<0.0001	0.100	<0.0001
NEWECON	?	0.026	0.1747	0.013	0.4718
RESOPT	?	-0.004	0.0031	0.000	0.8065
RESOPT*NEWECON	–	-0.007	0.0019	-0.001	0.3634
DISP	+	0.143	<0.0001	0.109	<0.0001
SIZE	–	-0.008	<0.0001	-0.006	<0.0001
DEBT	+	0.015	<0.0001	0.013	<0.0001
BM	+	0.030	<0.0001	0.035	<0.0001
UBETA	+	0.018	<0.0001	0.012	<0.0001
LTGRTH	+	0.071	<0.0001	0.112	<0.0001
DISP*NEWECON	+/–	0.029	0.3983	-0.007	0.8237
SIZE*NEWECON	+/–	-0.002	0.2485	-0.001	0.7525
DEBT*NEWECON	+/–	0.001	0.9205	0.016	0.1034
BM*NEWECON	+/–	0.038	0.0038	0.002	0.8776
UBETA*NEWECON	+/–	-0.016	0.0010	-0.002	0.5289
LTGRTH*NEWECON	+/–	-0.011	0.7733	-0.059	0.0672
N		5,640		5,471	
R-squared		37%		30%	
Year fixed effects		Included		Included	

New economy firms:

	Pre-123R		Post-123R	
	Coefficient	P-value	Coefficient	P-value
RESOPT + (RESOPT*NEWECON)	-0.011	0.0000	-0.001	0.4639

The p-value for the coefficient on *RESOPT*NEWECON* is based on a one-sided test and all other p-values are based on two-sided tests using standard errors corrected for firm clustering. All variables are defined in the appendix.

Table 6: Effect of Employee Option Grants on Change in Cost of Equity

Panel A: Descriptive Statistics

N=1,036

Variable	MEAN	MEDIAN	STD	25th Pctl	75th Pctl
CH_COE	0.001	0.000	0.044	-0.015	0.016
CH_ALLOPT	-0.783	-0.571	0.834	-1.213	-0.199
CH_DISP	0.042	0.024	0.094	0.003	0.054
CH_SIZE	0.390	0.380	0.695	-0.048	0.817
CH_DEBT	-0.013	0.000	0.378	-0.123	0.103
CH_BM	0.059	0.048	0.254	-0.070	0.195
CH_UBETA	0.067	0.091	0.374	-0.083	0.273
CH_LTGRTH	-0.032	-0.026	0.057	-0.060	0.001

Panel B: Regression of Change in Cost of Equity on Change in Total Option Grants

Dependent variable = CH_COE

	Predicted Sign	Coefficient	P-value
Intercept	?	0.004	0.0413
CH_ALLOPT	+	0.003	0.0433
CH_DISP	+	0.174	<0.0001
CH_SIZE	–	-0.012	<0.0001
CH_DEBT	+	0.021	<0.0001
CH_BM	+	0.042	<0.0001
CH_UBETA	+	-0.013	0.0003
CH_LTGRTH	+	0.141	<0.0001
N		1,036	
R-squared		32%	

All regression variables are defined at the firm-level. *CH_COE* is the difference between the average *COE* for the pre-123R and post-123R periods, *CH_ALLOPT* is the difference between the average *ALLOPT* for the pre-123R and post-123R periods, *CH_DISP* is the difference between the average *DISP* for the pre-123R and post-123R periods, *CH_SIZE* is the difference between the average *SIZE* for the pre-123R and post-123R periods, *CH_DEBT* is the difference between the average *DEBT* for the pre-123R and post-123R periods, *CH_BM* is the difference between the average *BM* for the pre-123R and post-123R periods, *CH_UBETA* is the difference between the average *UBETA* for the pre-123R and post-123R periods, *CH_LTGRTH* is the difference between the average *LTGRTH* for the pre-123R and post-123R periods. The p-values are based on two-sided tests using standard errors corrected for firm clustering. *COE, ALLOPT, DISP, SIZE, DEBT, BM, UBETA*, and *LTGRTH* are defined in the appendix.

Table 7: Regressions of Cost of Equity on Option Grants (alternative COE measure)

Panel A: Regressions of Cost of Equity on Total Option Grants (Time periods combined)

Dependent variable = AVGCOE

	Predicted	All firms		New Economy		Traditional Economy	
	Sign	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	?	0.104	<0.0001	0.111	<0.0001	0.103	<0.0001
POST	?	-0.021	<0.0001	-0.030	0.0039	-0.022	<0.0001
ALLOPT	?	-0.003	<0.0001	-0.005	<0.0001	-0.003	<0.0001
ALLOPT*POST	?	0.002	<0.0001	0.005††	<0.0001	0.002	0.0064
N		8,736		1,866		6,870	
R-squared		34%		32%		36%	
Control variables		Included		Included		Included	

Panel B: Regressions of Cost of Equity on Residual Option Grants (Time periods combined)

Dependent variable = AVGCOE

	Predicted	All firms		New Economy		Traditional Economy	
	Sign	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	?	0.103	<0.0001	0.103	<0.0001	0.101	<0.0001
POST	?	-0.020	<0.0001	-0.022	<0.0001	-0.021	0.0002
RESOPT	?	-0.005	<0.0001	-0.003	<0.0001	-0.003	<0.0001
RESOPT*POST	?	0.004	<0.0001	0.002†††	0.0064	0.002	0.0149
N		8,736		6,870		6,870	
R-squared		34%		36%		36%	
Control variables		Included		Included		Included	

††† and †† indicate significance at the 0.01 and 0.05 level, respectively, of the Z-statistic for the test of a significant difference between the coefficient for the new economy and traditional economy subsamples. *AVGCOE* is the average of the cost of capital measures from Easton (2004), Gebhardt et al. (2001), Claus and Thomas (2001), and Ohlson and Juetter-Nauroth (2005). The p-values are based on two-sided tests using standard errors corrected for firm clustering. All other variables are defined in the appendix.