CEO equity-based compensation and abrupt performance declines

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We study stock and option grants to continuing CEOs around abrupt performance declines and find that stock grants are more likely granted than options as the decline is more severe. We find that stock grants are preferred to option grants when firms face operational decline but option grants are preferred when firms face financial decline. Firms making these adjustments outperform those that do not for three years following the decline and are less likely to engage in asset restructuring. Employing the passage of SFAS 123R as a quasi-natural experiment and a paired year design, we provide causal evidence in support of the negative relation between CEO effort and exercise price. We conclude that not only are stock and option grants viable alternatives to addressing performance declines for continuing CEOs, but that the choice matters.

Keywords: CEO; Option; Stock; Performance decline; Operational; Financial; Exercise price

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1. Introduction

We examine how firms compensate their continuing CEOs at the onset of financial distress. Existing evidence is limited to newly-appointed CEOs but with conflicting results.[1] For example, Chen, Hill and Ozkan (2014) find that financial distress risk has a negative impact on the level of total compensation and the fraction of equity-based compensation, while Chang, Hayes and Hillegeist (2015) find that new CEOs receive higher total compensation.[2] However, other studies show that compensation contracts of newly-appointed CEOs include premia for skills and other attributes.[3] Thus, we argue that continuing CEOs provide a better instrument to isolate the impact of financial distress on compensation contracts. The aim of the present paper is to examine how unexpected performance declines impact on the compensation contracts of continuing CEOs. Unexpected performance declines disturb existing compensation contracts and increase the likelihood of observing adjustments to the compensation contract. We show these adjustments depend on the whether the source of distress is operational (non-viability risk) or financial (default risk). Further, since Hall and Murphy (2002) argue that for a given level of effort a lower option exercise price increases CEO incentive we expect that as distress risk increases firms are more likely to grant continuing CEOs stock rather than options.[4,5]

A concern that needs to be addressed when examining continuing CEOs is to ensure

[1] Newly-appointed CEOs likely break the inherent endogeneity link between executive compensation and performance.

[2] A negative relation is consistent with Douglas (2006) and Henderson (2007) who argue that CEOs require less compensation as agency costs of debt dominate those of equity while a positive relation is consistent with the argument that CEOs are paid a premium for bearing human capital risk.

[3] For example, Falato, Li and Milbourn (2015) report that newly-appointed CEOs earn up to 0.5 per cent total pay premium per credential decile, highlighting that differences in CEO skills are an important empirical determinant of CEO pay. Credentials (reputation, career and education) are found positively correlated with unobserved CEO heterogeneity in pay and performance. Similarly, Custódio, Ferreira and Matos (2013) find that CEOs with general skills earn a pay premium of 19% relative to CEOs with more specialist skills. Further, for new CEOs appointed at distressed firms they find a significantly stronger positive relation between pay and general managerial ability.

[4] Given Murphy (1999) reports that 94.8 per cent of option grants to U.S. CEOs in fiscal 1992 are granted at-the-money with Banerjee, Gatchev and Noe (2008) documenting that in 2005 99.92 per cent of option grants were granted at-the-money, we assume that options are granted at-the-money.

[5] The standard principal-agent model (Holmstrom, 1979) is silent as to the proportions of restricted stock (stock) and stock options (options) to employ. Meulbroek (2001), Hall and Murphy (2002) and Dittmann and Maug (2007) advocate stock as an efficient incentive-creation device relative to options, whereas Aseff and Santos (2005) and Armstrong, Larcker and Su (2007) advocate a stronger role for options. Using a multiperiod model Tang (2012) shows that both stock and at-the money options can increase executives incentives under different circumstances.

separation of the effects of financial distress from performance on total and equity-based compensation. We address this concern in two ways. First, we adopt a paired-year design for the same firm and same CEO in order to observe changes in equity-based compensation to unexpected performance declines. Unexpected performance declines are identified when a non-distress (or healthy) year (year -1) is followed by a year (year 0) in which industry-adjusted stock returns drop three quartiles (an abrupt decline). Abrupt falls in industry-adjusted stock returns from one year to the next would seem to maximize our chance of observing equity-based compensation adjustments. We further partition abrupt performance declines into financial and operational to show that financial decline leads to a preference for option grants while operational decline leads to a preference for stock grants. Financial decline is characterized by high leverage and therefore is expected to attract option compensation because higher financial leverage induces higher stock volatility and also implies less cash to pay executives (Yermack, 1995). In contrast, operational decline is characterized by deteriorating operating performance irrespective of financial leverage which implies more CEO effort is required than for financial decline and therefore implies zero-exercise price options, that is, stock (Hall and Murphy, 2002). Operational decline is defined to require a significant fall in industry-adjusted stock returns along with below-median industry adjusted operating performance. On the other hand, a financial decline also requires a significant fall in industry-adjusted stock returns but is coupled with above-median industry-adjusted operating performance and leverage. Both types of decline are mutually exclusive.

Our second defence against endogeneity is to follow Hayes, Lemmon and Qiu (2012) and Anderson and Core (2013) who employ the introduction of option expensing (SFAS 123R) as a quasi-natural experiment which affects executive compensation but not the likelihood of a performance decline. Hayes, Lemmon and Qiu (2012) document a significant decline in option grants post-SFAS 123R but no corresponding change in firms' investment and financing policies, while Anderson and Core (2013) find no association between the change in CEO vega and changes in firm risk. Hence, option expensing should not impact on performance declines. To the extent that firms facing operational (financial) declines grant more stock (options) pre- versus post-SFAS 123R than firms not facing either type of decline demonstrates robustness with respect to reverse causality. In other words,

if firms experiencing financial decline continue to grant options post-SFAS 123R then we can attribute the option grant to financial decline.

We find that firms facing both abrupt operational and financial declines increase total compensation to continuing CEOs consistent with such CEOs receiving a pay premium for bearing human capital risk (Chang, Hayes and Hillegeist, 2015). However and consistent with Chemmanur, Cheng and Zhang (2013), we find no change in the fraction of equity-based compensation for firms facing either type of decline. But we do find that firms facing abrupt financial declines grant more options than stock in the year prior to the decline, while firms facing operational decline grant more stock than options. Thus, studies of equity-based compensation that aggregate stock and option grants in a distress setting are at risk of masking the stock versus option preference in this setting. We also track firm performance for three years post-decline to see if equity-based compensation changes made in year -1 result in improved long-run firm performance. We find that firms granting stock (options) at the onset of operational (financial) decline exhibit higher industry-adjusted market-to-book ratios and stock returns for three years following relative to firms that do not make these equity adjustments. We also examine whether firms facing performance declines engage in more asset and financial restructuring. We find that firms making adjustments to equity-based compensation as expected in year -1 are less likely to engage in asset restructuring relative to firms that do not. We find no such difference for financial restructuring. Taken together, our results imply that the choice of equity instrument matters and is sensitive to the type of decline.

This study makes several contributions to the literature. First, it extends the literature on executive compensation and distress by focusing on how abrupt performance declines influence compensation contracts of continuing CEOs. Continuing CEOs provide a more stable platform for observing changes in managerial compensation as a result of distress. Second, by examining stock and options separately we extend our understanding of their roles in addressing abrupt performance declines. Given operating performance declines (as defined) require more CEO effort than financial declines, our finding that proportionately more stock is employed when firms experience operating performance declines provides support for Hall and Murphy (2002), who posit a negative relationship between CEO effort and exercise prices.

Third, we contribute to the literature on responses to performance declines. Responses to performance decline may include performance-enhancing restructuring (Denis and Kruse, 2000), reducing expenditure on employment and investment (John, Lang and Netter, 1992), debt restructuring (Denis and Denis, 1995) and CEO replacement (Goyal and Wang, 2014). Evidence shows that performance declines inflict costs on firms and instigate changes in corporate structure and decision making. Our finding that firms making adjustments to CEO equity-based compensation improve firm performance and avoid subsequent asset restructuring suggests an alternative response to performance decline not yet considered by the literature. Finally, by adopting a paired year design along with the introduction of SFAS 123R as well as a battery of robustness checks we attempt to address endogeneity concerns which are inherent in the relation between compensation of continuing CEOs and performance declines.

The remainder of the paper is organized as follows. The relevant literature, encompassing equity-based compensation in a distress context is reviewed in the next section. Sample construction and measures are covered in Section 3, as are our definitions of financial and operational decline. The dependent and control variables are also defined in this Section. Data issues with respect to reporting requirements pre- and post-SFAS 123R are discussed in Section 4. Descriptive statistics relating to performance decline and equity-based compensation are presented in Section 5. Our paired-year analysis and consideration of endogeneity issues takes place in Section 6. Robustness checks are detailed in Section 7 and the paper concludes in Section 8.

2. Relevant studies

2.1 Equity-based compensation and distress

Knowledge of the extent to which firms adjust their CEO's equity-based compensation in a distress setting is mostly limited to Chapter 11 filings and firms otherwise at significant risk of nonviability. For example, Gilson and Vetsuypens (1993) find that CEOs of financially distressed firms often receive option grants along with salary increases and bonuses tied to successful restructuring, particularly for outside replacement CEOs. They also find that the performance sensitivity of CEO compensation increases after a firm has fallen into financial distress implying a change in the equity-based compensation toward options. However, these changes are observed in the

same year as distress entry, i.e., when Chapter 11 protection has been filed. In a recent study, Eckbo, Thorburn and Wang (2014) report that CEOs who remain take substantial cuts in their salary and bonus while outside replacement CEOs typically receive large option grants.

Executive compensation studies based on Chapter 11 filings are vulnerable to selection bias. Chang, Hayes and Hillegeist (2015) seek to control selection bias by restricting analysis of compensation packages to CEOs who are newly appointed to firms with substantial ex ante risk of financial distress. These CEOs are paid less than CEOs appointed to firms with low ex ante risk of bankruptcy with respect to both cash pay and total compensation which includes stock and options implying that CEOs are not paid more for joining firms with higher bankruptcy risk. Although new outside CEOs receive higher total compensation than inside CEOs, consistent with Gilson and Vetsuypens (1993) and Eckbo, Thorburn and Wang (2014), they also find that new outside CEOs have less incentive to take risks. Chen, Hill and Ozkan (2014) also examine the relationship between financial distress risk and new CEO compensation using a UK sample. They find that total compensation and the fraction of equity-based compensation is reduced when new CEOs are appointed to firms with high financial risk and especially firms with high bank debt. They attribute their finding to creditors taking a more active role in firms even in the absence of default. On the other hand, Goyal and Wang (2014) argue that retention bonuses are likely a more efficient solution for working out of bankruptcy. Hence, given that distress risk is not beneficial for shareholders, when retention is less costly than replacement, a less costly alternative for shareholders is to adjust CEO equity-based compensation.

Kadan and Swinkels (2008) alone examine firms in distress without requiring a Chapter 11 filing or default trigger. Employing a fully specified optimization model where the agent's compensation contract consists of salary and either options or stock but not both, Kadan and Swinkels (2008) show that option grants always dominate stock grants except when nonviability risk is high.[6] A

[6] Nonviable firms include those that are unable to market their products or raise additional capital to finance or develop their products leading to bankruptcy. Given options contain a leveraged position in the firm's equity, Kadan and Swinkels (2008) argue that they can increase a risk-averse manager's exposure to firm risk thereby causing her to take less risk. Thus, for nonviable firms where a small increase in managerial effort has the most impact, granting more options can be detrimental in that managers become increasingly numb to changes in the stock price.

zero exercise price option (i.e., stock) is optimal because it is near zero that price distribution is most affected by managerial effort. In other words, when high effort is required to effect a turnaround large option grants have little incentive impact in that managers become 'numb' to incentive. Employing a sample of continuing CEOs, they report supportive evidence finding a positive relation between the level of bankruptcy risk and the likelihood of incentivizing with stock. Their finding implies that the stock versus option choice matters in that an 'incorrect' choice can accelerate bankruptcy. The economic consequences of this choice are expected higher the earlier the choice is made.

However, Armstrong, Larcker and Su (2007) argue that firms rarely experience nonviablity risk to the degree required by Kadan and Swinkels (2008) to induce a stock grant, implying options should generally dominate stock in setting CEO incentive. By examining adjustments to the equity-based compensation as firms experience abrupt operating or financial performance decline, we not only document that stock grants have a role outside of nonviability but that the form of adjustment is sensitive to the type of the decline. While either operational or financial decline may result in nonviability we argue that operational decline more likely precedes a nonviability state than financial decline because industry-adjusted operating performance and stock returns are both adversely affected. Thus as Dittmann and Maug (2007) argue, given that nearly all options are issued at-the-money and assuming that exercise prices already impound expected effort then options have little incentive effect because the payoff to the CEO will be small in expectation. Hence, if financial decline is less likely to lead to nonviability given superior operating performance relative to that observed in operational decline, then we expect firms to grant options prior to financial decline but not prior to operational decline. In so doing, we provide evidence in support of the negative relation between CEO effort and exercise price as predicated by Hall and Murphy (2002).

2.2 Operational and financial decline

We determine operating from financial performance declines by reference to existing literature that addresses the distinction between economic and financial distress employing proxies that are associated with one or the other, respectively. For example, Hotchkiss (1995) cites negative operating performance prior to Chapter 11 filing as evidence of economic distress, while Denis and Rogers (2007) associate higher leverage with greater financial distress and less economic distress.

Studies that more explicitly isolate the effects of financial versus economic distress include Andrade and Kaplan (1998) who employ a small sample of 31 highly levered transactions and Denis and Denis (1995) who employ a sample of 29 leveraged recapitalizations. Both studies consider these highly levered transactions financially rather than economically distressed in part because many firms in their sample exhibit above industry operating margins. Inability to service even a modest debt level is usually due to problems with operating performance. Lemmon, Ma and Tashjian (2009) refer to economically distressed firms as those characterized by low or negative operating profitability and having questionable going concern value even in the absence of leverage, while financially distressed firms are viable as going concerns but have difficulty servicing their debt due to poor synchronization of cash flows. In other words, if firms of financially distressed firms were to reduce leverage to an optimal level the firm would be viable, whereas economically distressed firms would be nonviable even if firms could reduce leverage to an optimal level. In general, economic distress can be removed only by asset redeployment or downsizing whereas creditors of financially distressed firms accept debt rescheduling pending resolution of uncertainty concerning the firm's future cash flows (Kahl, 2002). The latter explains the high post-distress debt levels observed by Gilson (1997).

Financial and economic distress is empirically difficult to distinguish because financial distress is often triggered by underlying economic distress (Korteweg, 2007).[7] The identification problem arises when trying to separate an observed drop in firm value into the value lost due to a deteriorating business model (economic distress) and the value lost due to an increase in default risk induced by the level of the firm's debt (financial distress). In other words, the two forms of distress overlap when poorly performing firms (with even modest outstanding debt) have difficulty in servicing debt obligations (Denis and Rodgers, 2007). Nonetheless, following the literature that distinguishes economic from financial distress by employing industry-adjusted operating performance and financial leverage rather than distress probabilities which combine the two arguments (see, e.g., Bartram, Brown and Waller, 2015; Lemmon, Ma and Tashjian, 2009; Gertner and Scharfstein, 1991; Haugen and Senbet, 1978), we employ industry-adjusted operating performance and financial

[7] Korteweg (2007) reports that distress costs, both economic and financial, average 5 per cent of firm value.

leverage to distinguish operating from financial decline.

3. Sample and measures

3.1 Sample

We obtain executive compensation data from Standard and Poor's Execucomp, firm data from Compustat, and stock return data from CRSP. Institutional ownership data are from Thomson Reuters. All other governance data are from ISS (formerly RiskMetrics). We exclude firms not incorporated in the United States. We source our firms from the population of Execucomp firms for 2002-2010. The population is the total number of firms stored on Execucomp on 16 November, 2011 and having fiscal years commencing on or after 1 January, 2002 and ending no later than 31 December, 2010. As reported in Table 1, Panel A, our sample of firm-years with sufficient Execucomp/CRSP data is 12,751.[8] There are no exclusions for firms in the financial industry or utilities because we argue that equity-based compensation considerations should embrace a wide range of industry risks. Nonetheless, we test this assumption in the robustness section. We include firm-years in which firms grant neither stock nor options to reduce selection bias ensuing from choosing only firms that have equity-based compensation. Thus, by including observations where stock and option grant proportions vary between 0% and 100% we generalize Kadan and Swinkels (2008) findings. New CEOs are excluded from our analysis because our focus is on changes in the equity-based compensation due to performance declines for continuing CEOs for whom the evidence is that their recontracting differs from the contracting of replacement CEOs. Further, since our difference-in-difference analysis requires observations pre- and post-SFAS 123R appointments of new CEOs are excluded. Nonetheless, we re-introduce new CEOs as a robustness check to ensure our results are not attributable to the hiring of new CEOs (see Section 7). As there are 1,211 new CEOs, the final sample is 11,540 firm-years. To maximize the generality of our results we begin our analysis with this number but this is subsequently reduced as lags and changes are required and missing data are encountered.

Consistent with Opler and Titman (1994), Gilson, John and Lang (1990) and Gilson (1989) the

[8] Given our focus on at-the-money options and zero exercise price options (stock), we remove 10 option grant observations which were not issued at-the-money.

basis of our measure of performance decline is industry-adjusted stock returns. An abrupt decline is defined when a firm moves from top- to bottom-quartile industry-adjusted stock returns in consecutive years (-1, 0).[9] We further require that a decline in industry-adjusted stock returns not be followed by a Chapter 11 filing or a default trigger within 24 months to ensure nonviability risk is not severe. Performance declines are then partitioned into operating and financial decline. Following Lemmon, Ma and Tashjian (2009), a state of financial decline is defined when both industry-adjusted operating performance and industry-adjusted financial leverage are above sample median in year 0. A state of operational decline requires industry-adjusted operating performance be below the sample median, independent of financial leverage in year 0.

Consistent with Denis and Kruse (2000) and Lemmon, Ma and Tashjian (2009), operating performance is defined as EBITDA to total assets and financial leverage is defined as total debt to total assets. We do not require operational decline to be characterized by below-median industry-adjusted financial leverage because even if leverage could be reduced to zero, firms in operational decline still face nonviability risk consistent with Denis and Rogers (2007) who associate higher financial leverage with greater financial and less economic distress. Thus, financial and operational decline years are non-overlapping. Movement from top- to bottom-quartile industry-adjusted stock returns from year -1 to year 0 and having both industry-adjusted operating performance and industry-adjusted financial leverage be above the sample median in year 0 are defined as entering financial decline (H_FD). While entering operational decline (H_OD) is characterized by movement from top- to bottom-quartile industry-adjusted stock returns from year -1 to year 0 and having industry-adjusted operating performance be below the sample median in year 0, independent of financial leverage. A firm having top-quartile industry-adjusted stock returns in consecutive years is assigned healthy status (H_H) (refer Figure 1).

Industry-adjusted stock returns are calculated by subtracting the median stock return for all other firms having the same four-digit GICS industry code for each firm's stock return. Consistent with Lemmon, Ma and Tashjian (2009) each four-digit GICS industry group must contain five or

[9] Our measure is more stringent than that of Denis and Kruse (2000) in that we require a firm to have industry-adjusted returns moving from top to bottom quartile, and not from above-median to bottom quartile.

more firms excluding the sample firm. If there are less than five firms then we broaden the classification from four-digit to three-digit GICS industry code.[10] This process results in 2,867 (24.8 per cent) firm-years classified as healthy or having top quartile industry-adjusted stock returns and 2,885 (25.0 per cent) classified as decline years or being in bottom quartile industry-adjusted stock returns, leaving 5,788 firm-years as unclassified. The healthy sub-sample provides a sensible experimental control because firms do not need to adjust the equity-based compensation for performance decline.

Of the 2,885 firms experiencing performance decline, Table 1 Panel A shows that 1,512 firms are classified as in financial decline and 1,373 in operational decline. The initial quartiling of industry-adjusted stock returns generates near-parity between the number of healthy firms (2,867) and the combined number of performance decline firms (1,512 and 1,373). The incidence of financial decline (13.1 per cent) and operational decline (11.9 per cent) in our sample is lower than the 20.4 per cent and 22.0 per cent, respectively, reported by Lemmon, Ma and Tashjian (2009), but this is to be expected given their sample is based on Chapter 11 filings and not performance declines. Pryshchepa, Aretz and Banerjee (2012) report a healthy/distressed firm ratio of 6,511/3,275 (or 1.988) for (effectively) 1992-2008 using an Altman Z-Score of 1.80 which if applied by us would result in a similar ratio of 8,753/3,998 (or 2.198).

Panel B of Table 1 shows the distribution of healthy, financial and operational decline firms by year, while Panel C shows the distribution by four-digit GICS industry codes, which largely follows industry size. Financials and utilities do not figure prominently and have similar incidences of performance decline to the rest of the sample.

3.2 Dependent variable

Given our focus on switching between stock and (at-the-money) options, our dependent variable is option grants less stock grants divided by total compensation (*Options–Stock*)/*Total Compensation* measured in year -1. Stock and options are new grants as distinct from stock and

[10]As recognized by Guay (1999), in adopting a strict 4-digit GICS industry-relative approach we also control for the impact of stock volatility on shareholders' preference for options versus stock.

options granted in previous periods for reasons other than to address a performance decline. Total compensation comprises salary, bonus and long-term incentive payouts as well as the value of stock and option grants. Issues with reporting changes in executive compensation due to SFAS 123R and SEC disclosure requirements are dealt with by following the procedure outlined in the Appendix of Coles, Daniel and Naveen (2013, 2014) and Hayes, Lemmon and Qiu (2012). A firm granting more (less) stock by value than options in a given year has a negative (positive) (*Options–Stock*)/*Total Compensation*. (*Options–Stock*)/*Total Compensation* assumes a value of zero if equal values of option and stock awards are granted (with the option grant being multiplied by delta) or neither stock nor options are granted. However, in either case incentive has not changed which implies equity-based adjustments are not required. We employ total compensation as the deflator to control for size (Gabaix, Landier and Sauvagnat, 2013), as well as other forms of compensation.

3.3 Control variables

We select control variables suggested by prior compensation studies (see e.g., Hayes, Lemmon and Qiu, 2012; Jayaraman and Milbourn, 2010; Kadan and Swinkels, 2008; Coles, Daniel and Naveen, 2006). All variables are defined in the Appendix and include *CEO Equity Ownership*, *Size*, *Asset Sales*, *Market-to-Book*, *R&D Expenditure*, *Capital Expenditure*, *Cash & Short-term Investments* and *Dividend Payer* along with *Innovative Industry*. We expect negative coefficients on *CEO Equity Ownership*, *Capital Expenditure*, *Asset Sales* and *Dividend Payer* because in general these variables reflect an underlying inverse relationship with idiosyncratic risk and hence a propensity to not grant options. On the other hand, *Market-to-Book, R&D Expenditure* along with *Innovative Industry* are expected positively signed because these variables imply a higher level of risk taking and hence a propensity to grant options. *Cash & Short-term Investments* is also included to capture the incentive to conserve cash (Jayaraman and Milbourn, 2010). Given that Aggarwal and Samwick (1999) and Core and Guay (2002) present opposing arguments for the relation between firm size and equity-based incentives, we do not enter an expectation on the direction of the coefficient. To control for firms voluntarily adopting SFAS 123R earlier than 2005 and following Kadan and Swinkels (2008) we include an *Option Expense* dummy coded 1 if the firm has announced that it voluntarily expenses options before 2005 and 0 afterwards.

We also include governance variables to ensure that our results are robust with respect to corporate governance practices. *CEO-Chairman* represents CEOs that hold both titles and are less likely to accept change. Larger boards (*Board Size*) are less able to proactively make changes before a performance decline occurs (Yermack, 1995). *Institutional Ownership* is included consistent with Denis, Denis and Sarin (1997) to represent the possibility that CEOs of poorly performing firms have a greater incentive to make the correct equity-based adjustments so as to avoid dismissal. On the other hand, Denis, Hanouna and Sarin (2006) contend that optioned CEOs have an incentive to engage in fraudulent activity when institutional ownership is present. *Busy Boards* may not have the time or focus to foresee potential declines. An *Independent Board* is more likely to make necessary adjustments to the equity-based compensation. Finally, entrenchment, as measured by *E Index*, is used to capture the propensity for entrenched CEOs to belong to more static boards which are less likely to make the equity-based compensation changes. Further, entrenched managers are more likely to accept the changes if the alternative is dismissal.

Acharya, Bharath, and Srinivasan (2007) show that industry distress is associated with lower creditor recoveries for defaulted firms. Since a relative performance measure does not detect whether an entire industry is distressed (e.g., auto manufacturers during the Global Financial Crisis), we include a dummy for distressed industry. To determine whether a sample firm's industry is distressed, we calculate the industry median stock return for the 12 full months immediately prior to the performance decline/healthy classification (i.e., year -1). The industry median is based on the 4-digit GICS code, again provided that five firms reside in the industry. If the 4-digit GICS code contains fewer than five firms, we then move to the 3-digit, or if necessary 2-digit, GICS code to calculate the industry median. Following Lemmon, Ma and Tashjian (2009) an industry whose median 12-month stock return is less than -30 per cent is considered distressed, whereupon *Distressed Industry* is coded 1.

4. Impact of SFAS 123R

Expensing of options was mandated by SFAS 123R (irrespective of the exercise price) effective

from December, 2005.[11] Brown and Lee (2013) and Hayes, Lemmon and Qiu (2012) attribute the marked fall in option grants from 2006 onwards to this event. Accordingly, we specify a *Post-SFAS 123R* dummy coded 1 for 2006 and later.[12] Consistent with the average total compensation of $4,934 thousand paid to the CEOs in Coles, Daniel and Naveen (2014), CEOs in our sample are paid, on average, $5,224.7 thousand. Further, compensation characteristics as a proportion of total compensation are similar to those of Hayes, Lemmon and Qiu (2012). The mean pre-SFAS 123R *Options / Total Compensation* is 31.8 per cent falling to 21.4 per cent post-SFAS 123R, while mean pre-SFAS 123R *Stock / Total Compensation* is 8.7 per cent rising to 24.0 per cent post-SFAS 123R. Hayes, Lemmon and Qiu (2012) report a decline in *Options / Total Compensation* from a mean of 38.9 per cent to 21.8 per cent and a rise in mean *Stock / Total Compensation* from 7.4 per cent to 18.5 per cent.

Although we follow Coles, Daniel and Naveen (2014) in calculating option and stock grant values as well as total compensation, the inability to calculate performance-based pay remains an issue for the calculation of total compensation. As a further check we exclude performance-based pay from total compensation in a later robustness check of our main model, as well as limiting our post-SFAS 123R sub-sample to years 2008-2010 to recognise that not all firms in Execucomp had adopted the new reporting requirements in years 2006 and 2007.

5. Summary statistics

5.1 Performance declines

Table 2 presents summary statistics for the full sample. All variable definitions are provided in the Appendix. Our firms exhibit similar stock volatility, size, growth opportunities, R&D expenditure, capital expenditure, cash and financial leverage to those of Hayes, Lemmon and Qiu (2012). Dividend payers make up 52.2% of our sample, while innovative and distressed industries separately account for no more than 15% of firm years. We also calculate three ex ante distress measures, namely, those

[11] See Hayes, Lemmon and Qiu (2012) for a summary to the introduction of option expensing.
[12] Specifying the implementation of SFAS 123R as an exogenous event is weakened to the extent some firms commenced voluntary expensing of stock options in prior years. Although (i) Hayes, Lemmon and Qiu (2012) obtain similar results whether or not the subsample of 117 early adopters were included or excluded from their sample and (ii) we include a dummy variable for early adopters, we nonetheless later test the robustness of our results by excluding firms that voluntarily adopted option expensing pre-SFAS 123R.

of Altman (1968) (*Z-Score*), Ohlsen (1980) (*O-Score*) and Campbell, Hilscher and Szilagyi (2008, 2010) (*CHS Prob.*) to provide assurance that our classification of performance decline is not a consequence of a firm having a single year of negative stock returns. *Z-Score* and *CHS Prob*. are also used by Pryshchepa, Aretz and Banerjee (2012) to measure distress, ex ante. Our mean (median) *Z-Score* of 3.995 (2.950) is similar to that reported by Kadan and Swinkels (2008) and Pryshchepa, Aretz and Banerjee (2012).

5.2 Operating versus financial decline

Table 3 reports the results of three probit regressions distinguishing financial from operational decline, with each regression containing one of the distress measures. The dependent variable in all three regressions is a dummy variable equal to one if the firm year is classified as operational decline and zero if financial decline. With both operating performance and market returns adversely effected, we argue that operational decline requires more effort than financial decline. Thus, relative to firms facing financial decline, firms experiencing operational decline are not only more likely to grant stock but are also more likely to sell assets, be smaller and riskier and invest in R&D expenditure (Lemmon, Ma and Tashjian, 2009), as well as have worse distress measures. We also include *Capital Expenditure* and *Dividend Payer* as variables that are likely associated with distress risk. Capital expenditure is considered a relatively safer investment (Coles, Daniel and Naveen, 2006) and is therefore expected negatively related to distress risk, as is dividend payer given DeAngelo and DeAngelo (1990) find firms respond to distress by reducing dividends.

The coefficients of the three distress measures have the right sign and are significant in 2 out of 3 of the models. Model (1) employing *O-Score* and model (3) employing *CHS Prob.* show that firms facing operational decline are associated with higher distress risk relative to firms facing financial decline. Further, apart from *Dividend Payer* which is insignificant, relative to firms experiencing financial decline, firms facing operational decline are found to (i) sell more assets (ii) be smaller and riskier, and (iii) engage in more R&D expenditure and less in capital expenditure. Thus, our results imply that firms facing operational decline have characteristics that are associated with higher distress risk or closer to nonviability than firms facing financial decline thereby requiring more CEO effort.

5.3 Prior-year changes in compensation and performance declines

Table 4 describes trends in CEO compensation (Panel A) along with the corresponding trends in measured distress (Panel B). Trends are reported for continued healthy status and entry to either performance decline to determine whether adjustments in equity-based compensation are associated with performance declines. Year -1 is always a healthy year, while decline, if any, occurs in year 0. Year by year differences are also reported. Apart from 2005 when SFAS 123R was introduced, we do not expect H_H firms to exhibit any year-to-year changes in their equity-based compensation. In contrast, for H_OD firms we expect to observe an increase in stock grants relative to option grants from year -2 to year -1 followed by a decline in stock grants relative to option grants from year -1 to year 0. On the other hand, for H_FD firms we expect to observe an increase in option grants relative to stock grants from year -2 to year -1 followed by a decline in option grants relative to stock grants from year -1 to year 0. Year mean differences show that H_H firms gradually increase stock grants from year -2 to year 0 but this could be due to SFAS 123R. All other forms of pay seem to remain constant apart from a fall in cash pay from year -1 to year 0. H_OD firms clearly exhibit an increase in stock grants relative to option grants over the same period, while H_FD firms exhibit an increase in option grants relative to stock grants. As with H_H firms all other forms of compensation exhibit no year-to-year change for H_OD and H_FD firms, apart from a decline in cash compensation from year-1 to year 0. Thus, we document early evidence that firms not only adjust equity-based compensation prior to performance declines, but that the choice of equity instrument is sensitive to the type of performance decline. Further, the adjustment seems to be in stock and options and not long-term incentive awards (LTIA).[13]

To provide some assurance that we have correctly identified initial performance declines we calculate *Z-Score*, *O-Score* and *CHS Prob.* for the same periods as in Panel A. Panel B shows that the year -1, 0 change in all three distress measures declines significantly for both H_OD and H_FD firms but not for H_H firms. However, for H_OD and H_FD firms the three distress measures in both years -2 and -3 are statistically indistinguishable from that of year -1. Thus, it appears that we have accurately identified the commencement of performance declines given the year -1, 0 change in all

[13] Hayes, Lemmon and Qiu (2012) raise the possibility that options could have been replaced by LTIAs as vehicles structured to provide convexity.

three distress measures is unusual relative to prior-year changes.

If firms are able to choose the equity instrument in year -1 based on the type of performance decline in year 0, then firms must have some degree of information on next-period performance. Hutton, Lee and Shu (2012) find that managers have a unique information advantage especially when the firm's situation is unusual such as when a loss year is forecasted. Firms are therefore expected to manage risks differently depending on whether an initial healthy year is followed by either type of performance decline, or not. Following LoPucki and Whitford (1993), Gilson (1997) and Lemmon, Ma and Tashjian (2009), we proxy degree of managers' information advantage by industry-adjusted R&D expenditure. Industry-adjusted R&D expenditure is calculated by subtracting the median R&D expenditure for all other firms having the same four-digit GICS industry code for each firm's R&D expenditure. Consistent with Lemmon, Ma and Tashjian (2009) each four-digit GICS industry group must contain five or more firms excluding the sample firm. As before, if there are less than five firms then we broaden the classification from four- to three-digit GICS industry code. We expect industry-adjusted R&D expenditure to increase as performance decline becomes more likely.

Table 5 presents a multinomial logit regression in which the baseline case is H_H firms, with the dependent variable for model (1) being H_FD firms and the dependent variable for model (2) being H_OD firms. We measure the difference in industry-adjusted R&D expenditure as *Change in Rel R&D* and include *Change in CEO Equity Ownership*, *Change in Salary/Total Compensation* and *Change in Equity/Total Compensation* as controls. All change variables are measured for the difference from year -1 to year 0. As expected, *Change in Rel R&D* is positively signed in both models, implying that a healthy year followed by a performance decline year triggers an increase in R&D expenditure in year -1 relative to two consecutive healthy years. Hence, despite having top-quartile industry-adjusted stock returns in year -1, firms have some knowledge that the following year, i.e., year 0 is less likely to be the same.

6. Analysis

6.1 Equity-based compensation and performance declines

The association between performance declines and equity-based compensation could be due to an unobserved and therefore omitted variable. For instance, if high-growth firms are predisposed to

granting options then failure to control for this correlation will yield an estimated relation between option grants and firms entering financial decline that is biased upwards. Another potential source of endogeneity is that both performance declines and equity-based compensation are jointly determined. A solution would be to include a valid instrument for the endogenous (*Options–Stock*)/*Total Compensation* variable that is not related to performance declines. Such an instrument is difficult to find, so in common with Anderson and Core (2013) we exploit the introduction of SFAS 123R in 2005 as a quasi-natural experiment. SFAS 123R imposed disclosure costs on option grants resulting in firms substituting stock for options when setting CEO pay. However relative to firms not experiencing performance declines, we expect firms suffering financial decline to continue granting options and firms suffering operational decline to grant more stock, post-SFAS 123R.

Since firms may have already independently decided to switch from options to stock coincidentally with implementation of SFAS 123R, we perform difference-in-difference tests for firms entering performance declines relative to firms that do not. To employ difference-in-difference testing the data need satisfy the 'parallel trend' assumption. As Lemmon and Roberts (2010) note this assumption requires similar trends in the outcome variable during the pre-SFAS 123R period for both treatment and control groups. Figure 2 plots the mean (*Options–Stock*)/*Total Compensation* for H_H firms (the control group), H_OD firms and H_FD firms (the treatment groups) during the pre- and post-SFAS 123R periods and shows that (*Options–Stock*)/*Total Compensation* is trending downwards for all three groups at similar rates during the pre-SFAS 123R period. The parallel trend assumption does not require that (*Options–Stock*)/*Total Compensation* be identical across the three groups or the two periods as these distinctions are differenced out in the estimation (Lemmon and Roberts, 2010).

For the difference-in-difference analysis we have four pre-SFAS 123R firm-years (2002-2005) and four post-SFAS 123R firm-years (2006-2009). We require each firm to have at least one observation in pre- and post-SFAS 123R periods (which precludes the possibility of retaining observations where the CEO has been replaced). Our difference-in-difference regressions are:

$$\frac{(Options-Stock)}{Total\ Compensation} = \alpha + \beta_1(H\_OD\ x\ Post - SFAS123R) + \beta_2(Controls) + \varepsilon \quad (1)$$

$$\frac{(Options-Stock)}{Total\ Compensation} = \alpha + \beta_1(H\_FD\ x\ Post - SFAS123R) + \beta_2(Controls) + \varepsilon \quad (2)$$

where H_FD and H_OD are dummy variables for whether firm is in financial decline or in operational decline, respectively, and are coded 1 with H_H coded 0 in both estimations. The main variable of interest is the interaction term *H_OD x Post-SFAS 123R* and *H_FD x Post-SFAS 123R*. A negative (positive) coefficient on the interaction term indicates that more (less) stock than options are granted post-SFAS 123R. Since the specification includes fixed effects the non-interactive variables are not included. However, for completeness we do include a full specification with all terms. To account for potential heteroskedasticity and serial correlation within firms over time, robust standard errors clustered at the firm level are calculated.

Prior to our difference-in-difference analysis, we perform three fixed-effects panel regressions of total compensation, proportion of equity-based compensation as well as (*Options–Stock*)/*Total Compensation* along with controls on the full sample. Apart from *Post-SFAS 123R* all control variables are lagged one period to reduce endogeneity. Table 6, model (1) shows that *Log*(*Total Compensation*) increases for both H_FD and H_OD consistent with the argument that CEOs require compensation for bearing increased human capital risk (Chang, Hayes and Hillegeist, 2015). Of the control variables, CEOs receive higher total compensation if they are employed by larger firms (*Size*), firms with higher growth opportunities (*Market-to-Book*), firms that pay dividends (*Dividend Payer*), firms located in distressed industries (*Distressed Industry*) and firms having higher institutional ownership (*Institutional Ownership*). Model (2) shows that neither distress type influences the fraction of equity-based compensation consistent with Chemmanur, Cheng and Zhang (2013) who find that the effect of the Z-Score on CEO's equity-based compensation is insignificant. On the other hand, when equity-based compensation is partitioned into stock and options, model (3) shows that adjustments are observed in year -1 for both H_FD and H_OD in the expected direction. The positive coefficient of 0.073 on H_FD implies that firms entering financial decline grant, on average, 7.3 per cent more options than stock as a proportion of total compensation. In turn, the negative coefficient of -0.101 on H_OD implies that firms entering operational decline grant, on average, 10.1 per cent more stock than options as a proportion of total compensation. The coefficient on H_H firms is not

statistically significant suggesting such firms do not adjust their equity-based compensation. Of the controls, and apart from *Post-SFAS 123R*, *Size*, *Market-to-Book*, *R&D Expenditure*, *Asset Sales*, *Dividend Payer*, *Distressed Industry*, *Option Expense* and *E Index* achieve statistical significance. Firms with higher growth opportunities (*Market-to-Book*) are more likely to grant options (Smith and Watts, 1992) as are firms engaging in more R&D expenditure. On the other hand, firms selling assets and paying dividends are less likely to grant options (Fenn and Liang, 2001), while firms in distressed industries and those voluntarily expensing options are more likely to grant stock (Kadan and Swinkels, 2008). The negative coefficient on *E Index* implies, ceteris paribus, that entrenched CEOs prefer stock to option compensation.

Model (4) presents the first difference-in-difference regression including all three interaction terms, while models (5) and (6) present the difference-in-difference analog regressions of Eqns. (1) and (2), respectively. The positive coefficient (0.015) and (0.056) obtained on the interaction term *H_FD* × *Post-SFAS 123R* for models (4) and (6), respectively and the negative coefficient (-0.142) and (-0.191) obtained for *H_OD* × *Post-SFAS 123R* for models (4) and (5), respectively, corroborate the earlier results of model (3). Thus, our results provide strong evidence that not only do firms adjust equity-based compensation on the onset of performance declines but that the type of instrument chosen is sensitive to the severity of the performance decline implying stock and options are not interchangeable consistent with Hall and Murphy (2002).

6.2 Asset and financial restructuring

Although we find that firms adjust equity-based compensation when facing performance declines, firms have alternative means to deal with such declines (Denis and Kruse, 2000). Koh, Durand, Dai and Chang (2015) identify four types of restructuring in dealing with increased distress risk: managerial, operational, asset and financial. In the event that our results are not driven by firms adjusting equity-based compensation at the same time as implementing a restructuring strategy, we analyse the restructuring strategies of firms facing performance declines. Managerial restructuring examines CEO turnover which, given our requirement for continuing CEOs is not relevant. We collect the additional data on operational, asset and financial restructuring from Compustat; all variable definitions are found in the Appendix.

Following Koh, Durand, Dai and Chang (2015), we measure operational and asset restructuring by examining reductions in investments, fixed assets, COGS and employees. Following Kang and Shivdasani (1997) and Koh, Durand, Dai and Chang (2015), a value of 1 is given to a firm (0 otherwise) if it reduces investment (proxied by IVNCF) and fixed assets (proxied by PPE, net) by at least 15 per cent between year -1 and year 0 or year +1, with year 0 being the year of performance decline. A fall in COGS is coded 1 (0 otherwise) when a firm's COGS (scaled by sales) is above-industry median in year -1 and falls to bottom quartile in year 0 or year +1 (Atanassov and Kim, 2009 and Koh, Durand, Dai and Chang, 2015). Finally, following Denis and Kruse (2000) and Koh, Durand, Dai and Chang (2015), a fall in employees is coded 1 (0 otherwise) if the number of employees falls by at least 20 per cent between year -1 and year 0 or year +1. A firm is deemed to have undertaken asset restructuring (which includes operational) and takes a value of 1 (0 otherwise) if either a fall in investment, fixed assets, COGS or employees has occurred.

Financial restructuring is recognized when a firm reduces its dividend, issues new securities and exchanges debt for equity (Koh, Durand, Dai and Chang, 2015). Following Chen and Zhang (1998) and Koh, Durand, Dai and Chang (2015), a value of 1 (0 otherwise) is given to a firm if it reduces dividends by at least 25 per cent between year -1 and year 0 or year +1. Following Hovakimian, Hovakimian and Tehranian (2004) and Koh, Durand, Dai and Chang (2015), a firm is deemed to have issued debt or equity and is assigned a value of 1 (0 otherwise) if the firm's net debt or equity exceeds 5 per cent of total assets at year 0. A firm is deemed to have undertaken financial restructuring and is assigned a value of 1 (0 otherwise) if a firm either reduces dividends or issues debt or equity.

The results are reported in Table 7. Model (1) examines the impact of asset restructuring on (*Options-Stock*)/*Total Compensation* while model (2) examines the impact of financial restructuring. Apart from *Asset Sales* and *Dividend Payer* both fixed-effects regressions include the same controls (lagged one period) as in Table 6. Model (1) shows that firms facing financial decline continue to prefer option grants while firms entering operational decline prefer stock grants. The negative coefficient on *H_FD x Asset Restructuring* (-0.139) is statistically significant implying that H_FD firms engaging in asset restructuring tend to grant stock rather than options. In contrast, the positive

coefficient on *H_OD x Asset Restructuring* (0.068) implies that H_OD firms engaging in asset restructuring tend to grant options rather than stock. Thus, it appears firms not adjusting equity-based compensation as hypothesized face increased asset restructuring. Model (2) examines the impact of financial restructuring on (*Options-Stock*)/*Total Compensation* when firms face performance declines. Our main result of firms facing financial decline granting options, and firms facing operational decline granting stock, continues to hold. However, none of the interaction terms is significant. The negative coefficient of *Financial Restructuring* (-0.027) suggests that firms are more likely to engage in financial restructuring when granting stock irrespective of performance declines.

6.3 Incentive consequences

A change in equity-based compensation in the hypothesized direction for firms entering performance declines should result in lower distress risk as early as the year following our paired-years, i.e., year 1, while 'incorrect' changes should not. We distinguish cases where the *Correct Choice* is applied in year -1 for state changes H_OD and H_FD from cases where it is not. H_OD firms with stock grants dominating in year -1 are coded 1 (0 otherwise), while H_FD firms that have granted predominately options in year -1 are coded 1 (0 otherwise). Of our 699 paired-year observations 517 are coded 1 and 182 are coded 0, implying that 74.0 per cent of firms are adjusting equity-based compensation as expected. Of the 517 observations coded 1, 210 (or 41.0 per cent) observations are H_OD firms and 307 (or 59.4 per cent) are H_FD firms. The difference between the two sub-samples is not significant, implying that firms respond 'correctly' to the two types of performance declines equally.

We track observations for a further three years from year 0 to examine whether industry-adjusted *Market-to-Book* ratios and *Stock Returns* differ based on the choice made in year -1. Table 8 reports the results. H_OD firms making correct equity-based compensation choices (i.e., granting predominately stock) in year -1 exhibit higher industry-adjusted *Market-to-Book* ratios and *Stock Returns* relative to H_OD firms not making correct incentive choices in year -1. For example, H_OD firms making the correct choice in year -1 outperform H_OD firms not making the correct incentive choice by an average 11.55% in industry-adjusted stock returns. Although, for H_FD firms the disparity between firms making correct (i.e., granting predominately options) versus non-correct

incentive choices in year -1 is less strong, nonetheless our results show that it is costly for firms facing performance declines making an incorrect choice.

Not only are firms making the correct incentive choice expected to outperform those firms that do not, they are also expected to engage in less asset and financial restructuring if adjustments to equity-based compensation are effective. We check by examining the occurrences of both asset and financial restructuring based on whether firms facing performance declines have made the correct incentive choice in year -1. Table 9 shows that firms making correct incentive choices are less likely to engage in asset restructuring in year +1 and financial restructuring in year 0 and year +1, than firms making incorrect incentive choices. Thus, again we show that firms adjusting their CEO's incentive mix in the correct direction are less likely to need either asset or financial restructuring.

7. Robustness checks

Seven robustness checks are performed. First, we control for the influence of LTIAs which have become more prevalent since the introduction of SFAS 123R (Hayes, Lemmon and Qiu, 2012). Second, we exclude firms located in financial services and utilities which are different by virtue of their higher leverage to ensure our results are not driven by having coded more H_FD cases than warranted. We rerun model (1) of Table 6 excluding firms located in those industries. Third, following Denis and Kruse (2000), we redefine healthy years as firms having above-median rather than top-quartile industry-adjusted stock returns to ensure we have not coded fewer healthy years than exist. Thus, H_H firms are redefined as having above-median industry-adjusted stock returns for two consecutive years. FD and OD years continue to be defined as in Figure 1. We re-run model (1) of Table 6 with the redefined paired year states.

Fourth, a number of firms voluntarily decided to adopt option expensing prior to the introduction of SFAS 123R, i.e., in years 2002-2004. Such firms are shown to prefer stock indicated by the significant negative coefficient of *Option Expense* obtained in model (1) of Table 6. We guard against the possibility that H_OD firms were granting stock in anticipation of SFAS 123R and not to manage a performance decline by excluding firms identified as being voluntary adopters of SFAS 123R. We obtain a list of all public firms that announced their intention to voluntarily expense options

between 2002 and 2004.[14] The list contains 483 firms of which 180 are in the Execucomp database with each firm specifying the year option expensing started. We rerun model (1) of Table 6 excluding all firms that voluntarily adopted option expensing in fiscal years 2002-2004. Fifth, a possibility exists that the change in (*Options-Stock)/ Total Compensation* is due to a rebalancing of CEO incentive rather than as a response to performance declines. To address this possibility, we include CEO delta and CEO vega in our analysis. CEO delta is the expected dollar change in CEO wealth for a 1% change in stock price, while CEO vega is the expected dollar change in CEO wealth for a 1% change stock return volatility. We follow the methodology of Core and Quay (2002) to calculate CEO delta and the methodology of Quay (1999) to calculate CEO vega. Sixth, our analysis has excluded observations where there has been a change in CEO as we are concerned with equity-based compensation changes for existing CEOs in addressing performance declines. The possibility exists that changes in performance are attributable to the threat of CEO turnover as well as these changes. To address this we include a dummy variable (=1) if there has been a change of CEO. Finally, given our firms (by construction) are in the top quartile of industry-adjusted returns in year -1, the possibility exists that the increase in stock price or a change in volatility is driving the change in stock grants and/or option grants rather than an active decision by the board to grant more stock or options. To address this concern we perform three probit regressions with (*Options–Stock*)/*Total Compensation*, *Stock volatility* and *Stock returns* lagged for up to three periods.

7.1 Controlling for LTIA grants

LTIAs comprise staggered stock grants which can also operate as incentive devices, but thus far have been excluded from our analysis because our arguments are couched in terms of stock and option primitives. However, as Hayes, Lemmon and Qui (2012) point out, LTIAs can be substitutes for stock or options depending on their structure. A typical LTIA delivers to the CEO a number of shares based on having achieved varying accounting or market performance targets. However, given that firms rarely disclose the details needed to determine convexity (Coles, Daniel and Naveen, 2014) it is difficult to determine whether LTIAs are substitutes for stock having zero convexity or options

[14] We are grateful to Ohad Kadan for supplying the dataset.

having non-zero convexity (Hayes, Lemmon and Qui, 2012). To determine if our results are sensitive to LTIAs, models (2) and (3) of Table 6 are replicated with LTIAs excluded from the denominator of the dependent variable, (*Options–Stock*)/*Total Compensation*. The results are reported as models (1) and (2) of Table 10, for pre- and post-SFAS 123R periods, respectively. Model (3) of Table 10 is a rerun of model (2) but with years 2006 and 2007 removed to avoid the problem identified by Coles, Daniel and Naveen (2014) that not all firms in Execucomp switched to the new reporting requirements until year 2008 and as a consequence could be influencing our results.

The results for pre-SFAS 123R reported as model (1) and for post-SFAS 123R reported as model (2) continue to show positive coefficients for H_FD firms and negative coefficients for H_OD firms. Thus, we conclude that LTIAs neither complement nor substitute stock and option grants in the context of firms experiencing performance declines. Model (3) shows that for the period 2008-2010 the preference for options (0.088) by H_FD firms and the preference for stock (-0.058) by H_OD firms continues. Hence, overall, it appears there is no evidence that grants of LTIAs cause a spurious relation between equity-based compensation and performance declines.

7.2 Controlling for firms located in financial services and utilities

Although we control for industry differences by subtracting industry medians from our classifying variables, the possibility remains that a portion of our H_FD firms are dominated by highly-levered firms located in the financial services and utilities industries. We therefore rerun model (1) of Table 6 excluding all firms located in financial services and utilities. The results, which are reported as model (4) of Table 10, show that excluding these firms has virtually no effect on our main result. The coefficient for H_FD firms continues to be positive. Hence, we find no evidence that our results are driven by the inclusion of firms located in financial services and utilities.

7.3 Redefining healthy firm-years

We relax our definition of a healthy firm-year by defining a healthy firm-year as having above-median rather than top-quartile industry-adjusted stock returns in year 0. This process results in substantially larger subsamples: specifically, 2,012 H_H firms, 504 H_OD firms, 652 H_FD firms. The results of rerunning model (1) of Table 6 on larger subsamples are reported in model (5) of Table 10. H_OD firms continue to prefer stock and H_FD firms continue to prefer options to virtually the

same degree. Hence, the result in this section suggests that our main result is not driven by under-representation of H_H firms.

7.4 Controlling for pre-SFAS 123R option expensing

A number of firms voluntarily adopted option expensing prior to 2005 possibly in response to the number of accounting scandals tied to options during the early 2000s. Of the 180 early adopters represented in the Execucomp database, just 6.9% are classified as H_OD firms, 5.7% as H_FD firms, and 5.6% as H_H firms. As a consequence, we doubt that the presence of these firms in our sample would materially alter our results, but as a precaution we rerun model (1) of Table 6 excluding all firms identified as early adopters. The results are reported as model (6) of Table 10. We continue to observe a positive coefficient (0.046) for H_FD firms and a negative coefficient (-0.090) for H_OD firms. Thus, our result is robust with respect to firms voluntarily adopting option expensing prior to introduction of SFAS 123R.

7.5 Controlling for prior stock and option grants

We include *CEO Delta* (using entire portfolio of stock and options) and *CEO Vega* (using entire portfolio of options) as added control variables to ensure that our result is not due to firms rebalancing their CEO's incentive but instead due to performance declines. We rerun model (1) of Table 6 and report the result as model (7) of Table 10. We continue to observe a positive coefficient (0.061) for H_FD firms and a negative coefficient (-0.082) for H_OD firms. Both *CEO Vega* and *CEO Delta* are not significant implying that incentive rebalancing is not influencing our results.

7.6 *New CEO*

We have excluded new CEOs in our analysis as the paper is concerned with observing compensation changes for continuing CEOs in addressing performance declines. To ensure that our results are a consequence of compensation structure changes and not due to the hiring of a new CEO we rerun model (1) of Table 6 including observations where the CEO is a new CEO in the current fiscal year. We identify new CEOs as those firm-years where Execucomp lists a different CEO in year 0 than year -1. For many observations Execucomp provides the date the executive became a CEO, 'becameceo'. We hand-collect observations where 'becameceo' is blank or dates listed in 'becameceo' are inconsistent with the year that the executive was first listed as CEO. The process

yields 1,211 new CEO observations. The results are reported as model (8) of Table 10. Despite *New CEO* exhibiting a negative association with (*Options–Stock*)/*Total Compensation* implying that new CEOs are more likely granted stock rather than options, our results remain robust with a positive coefficient (0.074) for H_FD firms and a negative coefficient (-0.100) for H_OD firms.

7.7 *Controlling for mechanical effects of changes in stock price and/or volatility*

A possibility exists that our finding of an increase in stock awards relative to option awards for firms facing operational declines is due to such firms having top quartile industry-adjusted stock returns in year -1 and not due to boards actively granting more stock. A similar possibility exists for options. To address this concern, we perform three fixed-effect probit regressions with H_OD, H_FD and H_H as the dependent variable and (*Options–Stock*)/*Total Compensation*, *Stock volatility* and *Stock returns* as independent variables (all lagged for up to three periods). The results are presented in Table 11. Despite *Stock returns* having a positive coefficient in all three estimations, we continue to observe a positive coefficient (0.405) for H_FD firms, a negative coefficient (-0.171) for H_OD firms and no change for H_H firms. Further, model (1) shows that *Stock volatility* is negatively correlated with the likelihood of being a H_FD firm which should induce a reduction in options if the relation were mechanical not an increase. Thus, our result is robust with respect to concurrent changes in stock volatility and stock returns.

8. Concluding remarks

We use a quasi-natural experiment created by the issuance of SFAS 123R along with a paired-year design to examine both the choice and timing of adjustments to equity-based compensation of continuing CEOs when firms experience abrupt performance declines. We find that firms increase total compensation consistent with continuing CEOs receiving a premium for bearing human capital risk, but not so for the fraction of equity-based compensation. However, when we partition equity-based compensation into stock and options, firms facing operational decline are found to grant proportionately more stock than options but when facing financial decline are found to grant proportionately more options than stock. In addition, we show that firms making these adjustments outperform firms that do not for three years post-decline. Both industry-adjusted market-to-book ratios and stock returns are found higher for firms making a correct choice, highlighting the long-term cost

of not making a correct choice. We also show that firms making a correct equity-based compensation choice are less likely to engage in asset restructuring relative to firms not making a correct choice. Taken together, our results suggest that the choice and timing of adjustments to equity-based compensation of continuing CEOs plays a significant role when firms experience abrupt performance declines.

To the best of our knowledge, we are the first to examine adjustments to equity-based compensation of continuing CEOs in the context of performance declines without requiring a Chapter 11 filing. Our results suggest that both stock and option grants have a role in managing abrupt performance declines which occur outside of a state of nonviaiblity. The generality of our findings is enhanced by use of a sample that allows for simultaneous grants of options and stock, or neither. Our results are robust with respect to a number of tests, including addressing endogeneity. Our finding of a preference for stock (a zero exercise option) grants when performance declines are relatively more severe provides evidence of the causal relation between CEO effort and exercise price as predicated by Hall and Murphy (2002), thereby contributing to the compensation literature. Our evidence also increases our understanding of the relation between stock and options and performance declines. Specifically, highlighting the effectiveness of the stock versus option choice in ensuring that continuing CEOs are incentivized so as to address performance declines in a manner that also increases firm value.

Appendix

A.1 Variable definitions

Accounting data are from Compustat; stock return data from CRSP; and compensation data are from Execucomp. We also give the mnemonics used by Compustat to define these variables.

A.1.1 Firm-level variables

Variable	Definition	Mnemonic
Operating Performance	EBITDA / Assets	EBITDA / AT
Industry-adjusted Operating Performance	Operating Performance adjusted by median operating performance for the four-digit GICS industry	
ROA	EBIT / Assets	EBIT / AT
Financial Leverage	Total Debt / Assets	(DLTT + DLC) / AT
Industry-adjusted Financial Leverage	Financial Leverage adjusted by median financial leverage for the four-digit GICS industry	
Stock Returns	Stock Returns over the fiscal year including reinvested dividends expressed as a percentage	
Industry-adjusted Stock Return	Stock Return adjusted by the median stock return for the four-digit GICS industry	
Stock Volatility	Standard deviation of the 36 monthly returns × square root of 12 calculated to the prior fiscal year-end	
MVE	Market equity	(PRCC_F × CSHO)
Market-to-Book	(Market equity + Total Debt) / Assets	(PRCC_F × CSHO + DLTT + DLC) / AT
R&D Expenditure	R&D expenditure / Assets Missing values are coded zero.	XRD / AT
Capital Expenditure	Capital expenditure / Assets	CAPX / AT
Asset Sales	Sale of property, plant & equipment / Assets	SPPE / AT
Cash & Short-term Investments	Cash and short-term investments / Assets	CHE / AT
Dividend Payer	Coded 1 if the firm is a dividend payer; 0 otherwise	DVC > 0
Size	Natural log of assets	ln(AT)
Option Expense	Coded 1 if firm voluntarily expenses options in years 2002-2004; 0 otherwise	
Post-SFAS 123R	Coded 1 for fiscal years 2006 through 2010; 0 otherwise	
Innovative Industry	Coded 1 if firm is in computer, software, internet, telecommunications or networking industries; 0 otherwise	
Asset Restructuring	Coded 1 if firm either reduces investment, COGS, employees or assets; 0 otherwise	
Investment	Coded 1 if firm experiences a fall in investment >=15% between year -1 to year 0 or year +1, where year 0 is the year of performance decline; 0 otherwise	IVNCF
COGS	Coded 1 if firm experiences a fall in	COGS / REVT

	COGS / Total sales from above industry median in year -1 to bottom industry quartile in year 0 or year +1, where year 0 is the year of performance decline; 0 otherwise	
Employees	Coded 1 if firm experiences a fall in employees >=20% between year -1 to year 0 or year +1, where year 0 is the year of performance decline; 0 otherwise	EMP
Assets	Coded 1 if firm experiences a fall in property, plant & equipment >=15% between year -1 to year 0 or year +1, where year 0 is the year of performance decline; 0 otherwise	PPE (NET)
Financial Restructuring	Coded 1 if firm either reduces dividends or issues debt or equity; 0 otherwise	
Dividends	Coded 1 if firm experiences a fall in dividends >=25% between year -1 to year 0 or year +1, where year 0 is the year of performance decline; 0 otherwise	DVC
Debt Issue	Coded 1 if net debt >= 5% of book assets at year 0 of year +1); 0 otherwise	Net Debt = DLTIS - DLTR
Equity Issue	Coded 1 if net equity >= 5% of book assets at year 0 of year +1); 0 otherwise	Net Equity = SSTK - PRSTKC

A.1.2 Performance decline/distress variables

Variable	Definition
Healthy firm-year (H)	Firm year with top-quartile industry-adjusted stock return
Financial decline firm-year (FD)	Firm year with bottom quartile industry-adjusted stock returns & above-industry median operating performance & above-industry median financial leverage
Operational decline firm-year (OD)	Firm year with bottom quartile industry-adjusted stock returns & below-industry median operating performance
Z-Score	$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$, where X_1 is Net Working Capital / Assets, X_2 is Retained Earnings / $Assets_{i,t}$, X_3 is Pretax $Earnings_{i,t}$ / $Assets_{i,t}$, X_4 is Market Equity / Total Liabilities, and X_5 is Sales / Assets
O-Score	$O = -1.32 - 0.407X_1 + 6.03X_2 - 1.43X_3 + 0.076X_4 - 1.72X_5 - 2.37X_6 - 1.83X_7 + 0.285X_8 - 0.521X_9$, where X_1 is ln(Assets / GNP price-level index), X_2 is Total Liabilities/ Assets, X_3 is Working Capital / Assets, X_4 is Current Liabilities / Current Assets, X_5 =1 if Total Liabilities > Assets, X_6 is Net Income / Assets, X_7 is Funds from Operations / Total Liabilities, X_8 = 1 if Net Loss for current and prior years, and X_9 is (Net Income – Net $Income_{-1}$) / (|Net Income| + |Net $Income_{-1}$|)
CHS Prob.	From Campbell, Hilscher and Szilagyi (2008, 2010), $P_{-1}(Y) = \frac{1}{1+exp(-\alpha - \beta x_{-1})}$, where α is the intercept of their logit regression of fail/non-failure on a vector of explanatory variables for which the linear combination is βx_{-1}, specifically, $-20.12X_1 + 1.60X_2 - 2.27X_3 - 7.88X_4 + 1.55X_5 - 0.005X_6 + 0.07X_7 - 0.09X_8$, where X_1 is NIMTAAVG (annualized), X_2 is TLMTA, X_3 is CASHMTA, X_4 is EXRETAVG, X_5 is SIGMA, X_6 is RSIZE, X_7 is MB, and X_8 is PRICE. Variables are defined in Campbell, Hilscher and Szilagyi (2008, 2010).
Distressed Industry	Coded 1 if an industry is in distress when the median stock return in the industry is less than -30% in the 12 months immediately prior to firm distress/non-distress status; otherwise 0

A.1.3 Compensation variables following Coles, Daniel and Naveen (2014, 2013)

Pre-2006, Execucomp estimated the value of annual stock grants (RSTKGRNT) and the value of annual option grants (OPTION_AWARDS_BLK_VALUE), whereas post-2006, the comparative items are STOCK_AWARDS_FV which includes both annual stock grants and stock earned once a performance condition is met and OPTION_AWARDS_FV which also includes both annual grants and unearned options. Hence, to ensure consistency across the two periods we follow the procedure of Coles, Daniel and Naveen (2014, Appendix A.3.2 and A.3.3) in calculating RSTKGRNT, OPTION_AWARDS_BLK_VALUE, STOCK_AWARDS_FV and OPTION_AWARDS_FV, separately.

Variable	Definitions*
Stock	We follow Daniel, Coles and Naveen (2013)
Options	We follow Daniel, Coles and Naveen (2013) except that our stock volatility is calculated over 36 months
Equity	Sum of stock and options
Long-term incentive awards (LTIA)	Following Hayes, Lemmon and Qui (2012, Table A1) pre-2006: SHRTARG, VALTARG; otherwise EQ_TARG
Total Compensation	Pre-2006: SALARY + BONUS + LTIA + RSTKGRNT+ OPTION_AWARDS_BLK_VALUE + OTHANN + ALLOTHTOT; otherwise SALARY + BONUS + NONEQ_INCENT + STOCK_AWARDS_FV + RSTKGRNT + OPTION_AWARDS_FV + LTIA + OTHCOMP + DEFER_RPT_AS_COMP_TOT
CEO Pay-Performance Sensitivity (CEO Delta)	Expected dollar change in CEO wealth for a 1% change in stock price (using the entire portfolio of stock and options) following the methodology of Core and Quay (2002) scaled by AT
CEO Vega	Expected dollar change in CEO wealth for a 1% change is stock return volatility (using the entire portfolio of options) following the methodology of Quay (1999) scaled by AT
CEO Equity Ownership	SHROWN_EXCL_OPTS / CSHO × 1000
Correct Choice	Coded 1 if the CEO is 'correctly' incentivized with majority stock (option) grants when the firm is in operating (financial) decline; 0 otherwise

* All mnemonics except AT and CSHO are from Execucomp; AT and CSHO are from Compustat.

A.1.4 CEO and Governance variables

CEO characteristics data are from Execucomp. Institutional ownership data are from Thomson Reuters. All other governance data are from ISS (formerly RiskMetrics).

Variable	Definition
CEO Age	Age of CEO in years
CEO Tenure	Number of years as CEO in the firm
CEO-Chairman	Coded 1 if the CEO is also the Chairman
Institutional Ownership	Aggregate voting percentage of all shareholders who own at least 5% of the common stock
E Index	Following Bebchuk, Cohen and Ferrell (2009) each firm is assigned one point for each of the six provisions; staggered board, limits to amend bylaws, limits to amend charter, supermajority, golden parachutes and poison pill
Board Size	Number of directors
Independent Director (=1)	A director is coded dependent if she is a full-time employee, associated with the firm, a previous employee or having any family or commercial tie, else coded independent
Independent Board (=1)	A board is classified as independent if at least 50% of the board are independent directors
Busy Director (=1)	An independent director is classified busy if she serves on 3 or more boards
Busy Board (=1)	A board is classified as busy if at least 50% of the board are busy directors

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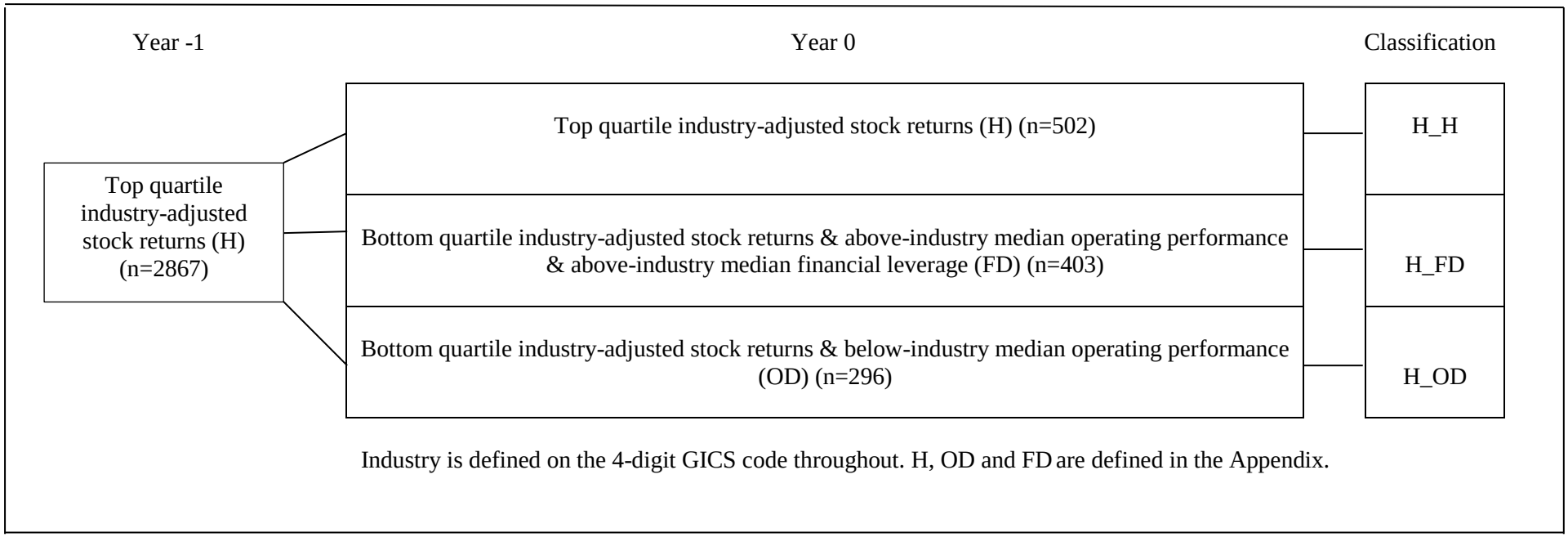
Figure 1
Paired-year classifications



Firms having two consecutive firm-years with top quartile industry-adjusted stock returns within our sample period are classified as H_H. Firms with top quartile industry-adjusted stock returns in year -1 and bottom quartile industry-adjusted stock returns coupled with above-industry median operating performance and above-industry median financial leverage in year 0 are classified as H_FD. Firms with top quartile industry-adjusted stock returns in year -1 and bottom quartile industry-adjusted stock returns with below-industry median operating performance in year 0 are classified as H_OD. Each pair of firm-year observations represent distinct firms in each group.

Table 1
Sample construction

Panel A: Sample construction					
All Execucomp 2002-2010 observations having CEOANN disclosures				16646	
Less observations not CRSP-matched				3895	
				12751	
Less new CEOs				1211	
Final firm-year sample				11540	
Firms with top-quartile industry-adjusted stock returns (H firms)				2867	
Firms with bottom-quartile industry-adjusted stock returns (Performance decline firms), comprising				2885	
FD firm-years				1512	
OD firm-years				1373	
Unclassified				5788	

Panel B: Incidence of healthy and performance decline firm-year observations by year				
	H	FD	OD	Unclass,
2002	303	179	179	693
2003	417	192	189	654
2004	325	172	150	760
2005	286	135	150	720
2006	306	132	155	848
2007	380	175	179	728
2008	338	137	245	716
2009	452	212	230	517
2010	60	39	35	152
Total	2867	1512	1373	5788

Panel C: Incidence of healthy and performance decline firm-year observations by industry					
GICS code		H	FD	OD	Unclass,
1010	Energy	164	74	76	332
1510	Materials	193	79	104	337
2010	Capital Goods	218	119	137	524
2020	Commercial & Professional Services	107	77	33	199
2030	Transportation	54	26	28	124
2510	Automobiles & Components	32	18	19	54
2520	Consumer Durables & Apparel	146	76	77	219
2530	Hotels Restaurants & Leisure	128	82	61	228
2540	Media	60	50	12	152
2550	Retailing	188	106	83	235
3010	Food & Staples Retailing	26	17	14	77
3020	Food, Beverage & Tobacco	69	23	26	208
3030	Household & Personal Products	16	13	6	66
3510	Health Care Equipment & Services	243	139	96	347
3520	Pharmaceuticals & Biotechnology	132	87	59	161
4010	Banks	105	74	51	475
4020	Diversified Financials	94	33	38	159
4030	Insurance	65	27	30	271
4040	Real Estate	57	14	49	316
4510	Software & Services	269	118	156	355
4520	Technology Hardware & Equipment	258	135	113	319
4530	Semiconductors & Semiconductor Equipment	146	76	53	209
5010	Telecommunication Services	31	19	20	70
5510	Utilities	66	30	32	351
	Total	2867	1512	1373	5788

Table 2
Summary statistics for the full sample

	N	Mean	Median
Firm characteristics			
Financial Leverage	11540	0.221	0.195
Operating Performance	11540	0.080	0.092
Stock Returns (%)	11540	19.706	8.583
Stock Volatility	11540	0.450	0.387
CEO Equity Ownership	11540	0.024	0.004
Firm size	11540	7.165	7.055
Market-to-Book	11540	1.509	1.170
R&D Expenditure	11540	0.028	0.000
Capital Expenditure	11540	0.044	0.028
Asset Sales	11540	0.003	0.000
Cash & Short-term investments	11540	0.154	0.085
Dividend Payer	11540	0.522	
Innovative Industry	11540	0.141	
Distressed Industry	11540	0.122	
Distress measures			
O-Score	11540	-1.948	-1.800
Z-Score	11540	3.995	2.950
CHS Prob.	9456	0.088	0.001
CEO and Governance characteristics			
CEO Age (years)	10548	55.35	55.00
CEO Tenure (years)	11138	8.224	6.000
CEO-Chairman	11540	0.263	
Board Size	9893	9.234	9.000
Institutional Ownership	11540	0.258	0.200
Busy Board	9893	0.098	
Independent Board	9891	0.909	
E Index	9751	2.907	3.000

This table reports summary statistics for the complete sample. All variables are defined in the Appendix. The number of observations (N) differ due to data availability. Means and medians are reported for all variables except for *Dividend Payer*, *Innovative Industry*, *Distressed Industry*, *CEO-Chairman*, *Busy Board* and *Independent Board* which are sample proportions.

Table 3
Distinguishing operating from financial decline firm-years

	(1)	(2)	(3)
Distress measure:	O-Score	Z-Score	CHS Prob.
Asset Sales	5.597***	5.996***	4.855***
	(1.816)	(1.858)	(1.758)
Size	-0.060***	-0.052**	-0.057**
	(0.021)	(0.012)	(0.023)
Dividend Payer	0.087	0.100	0.106
	(0.069)	(0.069)	(0.077)
Stock Volatility	0.799***	0.951***	0.894***
	(0.187)	(0.185)	(0.222)
R&D Expenditure	2.619***	2.501***	2.817***
	(0.643)	(0.614)	(0.669)
Capital Expenditure	-1.729***	-1.976***	-1.692***
	(0.555)	(0.561)	(0.598)
Distress measure	0.048***	0.000	0.219**
	(0.014)	(0.004)	(0.125)
Year fixed-effects	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes
Intercept	0.114	-0.115	-0.001
	(0.224)	(0.226)	(0.231)
Number of observations	2377	2377	1917
Pseudo *R*-squared	0.053	0.048	0.052

This table reports results from a probit regression for an OD, FD dichotomy on selected variables suggested by the literature. The dependent variable in all the regressions is a dummy variable equal to 1 if OD and 0 if FD. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. The models differ in the distress measure. Model (1) uses *O-Score*, model (2) uses *Z-Score*, while model (3) uses *CHS Prob.* All other variables are defined in the Appendix and are lagged one period. The standard errors reported in brackets are clustered at firm level and are robust to heteroskedasticity. *** and ** denote 1 and 5 per cent significance, respectively. The number of observations varies due to lagging.

Table 4
CEO compensation and the evolution of performance decline for firm paired-year combinations

						Year mean differences		
	Year:	-3	-2	-1	0	(-3,-2)	(-2,-1)	(-1,0)
Panel A: CEO compensation								
H_H	Options/Total Compensation	0.299	0.269	0.269	0.267	-0.030	0.000	-0.002
	Stock/Total Compensation	0.101	0.117	0.137	0.165	0.016	0.020*	0.028**
	LTIA/Total Compensation	0.040	0.039	0.036	0.031	-0.001	-0.003	-0.005
	Cash/Total Compensation	0.520	0.529	0.519	0.494	0.009	-0.010	-0.025**
	(Options - Stock)/Total Compensation	0.198	0.152	0.131	0.102	-0.046*	-0.021	-0.029
	Number of observations	206	350	502	502			
H_OD	Options/Total Compensation	0.275	0.299	0.217	0.286	0.024	-0.082***	0.069***
	Stock/Total Compensation	0.128	0.150	0.217	0.178	0.022	0.067***	-0.039**
	LTIA/Total Compensation	0.039	0.034	0.027	0.027	-0.005	-0.007	0.000
	Cash/Total Compensation	0.515	0.480	0.495	0.467	-0.035	0.015	-0.028**
	(Options - Stock)/Total Compensation	0.148	0.149	0.000	0.108	0.001	-0.149***	0.108***
	Number of observations	147	232	296	296			
H_FD	Options/Total Compensation	0.250	0.258	0.314	0.266	0.008	0.056***	-0.048***
	Stock/Total Compensation	0.140	0.165	0.145	0.196	0.025*	-0.020*	0.051***
	LTIA/Total Compensation	0.033	0.036	0.030	0.034	0.003	-0.006	0.004
	Cash/Total Compensation	0.538	0.497	0.479	0.452	-0.041**	-0.018	-0.027**
	(Options - Stock)/Total Compensation	0.109	0.093	0.168	0.070	-0.016	0.075***	-0.098***
	Number of observations	221	311	403	403			
Panel B: Distress measures								
H_H	Z-Score	4.118	4.313	5.623	6.881	0.195	1.310**	1.258**
	O-Score	-1.870	-2.000	-2.361	-2.754	-0.130	-0.361**	-0.393**
	Number of observations	206	350	502	502			
	CHS Prob.	0.144	0.086	0.115	0.114	-0.058	0.029*	-0.001
	Number of observations	90	135	235	350			
H_OD	Z-Score	6.452	5.191	6.987	4.358	-1.261	1.796	-2.629***
	O-Score	-2.201	-2.013	-2.285	-1.922	0.188	-0.272	0.363***
	Number of observations	147	232	296	296			
	CHS Prob.	0.139	0.123	0.109	0.148	-0.016	-0.014	0.039**
	Number of observations	83	115	166	232			

H_FD	Z-Score	4.581	4.580	5.342	4.411	-0.001	0.762	-0.931***
	O-Score	-2.241	-2.186	-2.523	-2.441	0.055	-0.337	0.082***
	Number of observations	221	311	403	403			
	CHS Prob.	0.065	0.068	0.086	0.114	0.003	0.018	0.028**
	Number of observations	106	174	251	311			

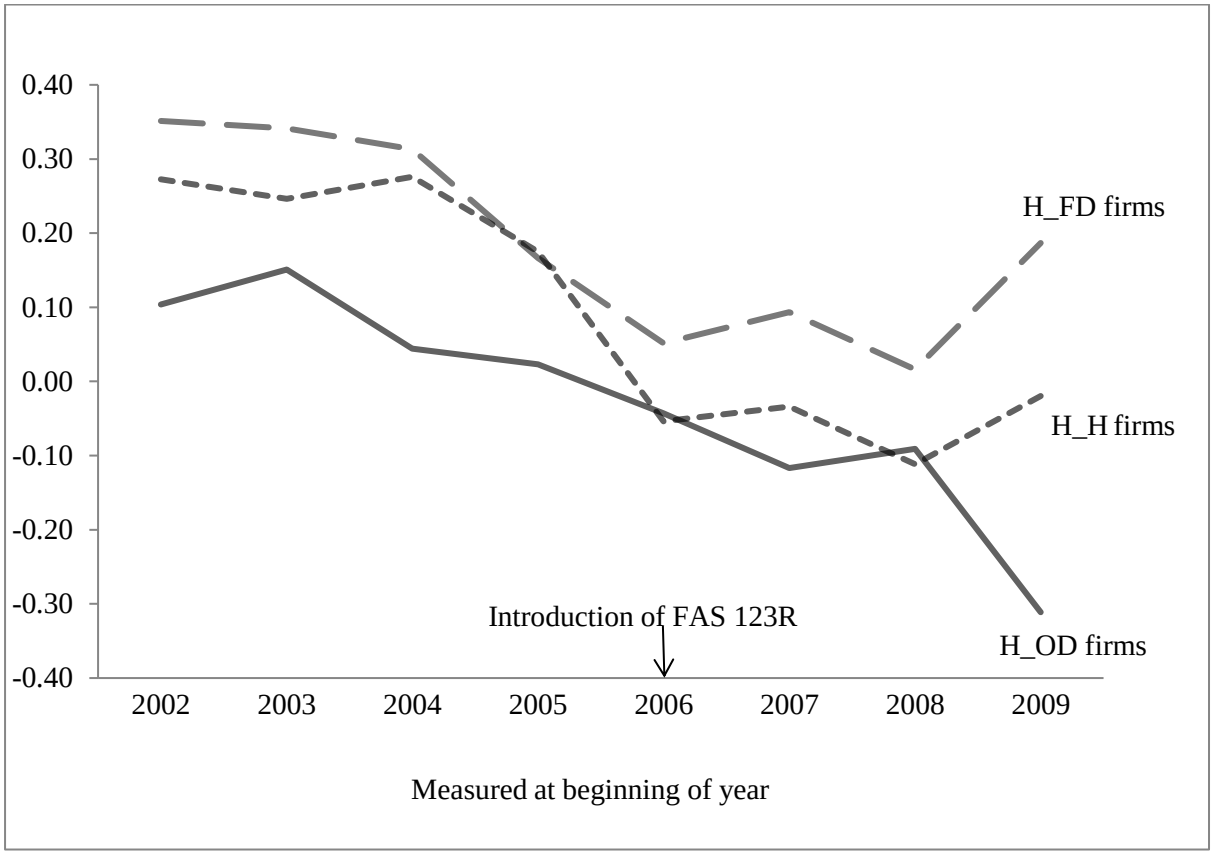
Two- and three-year prior compensation (Panel A) and distress variables (Panel B) for a given year -1, 0 state change. Distress measures are *Z-Score*, *O-Score* and *CHS Prob*. All compensation variables are defined in the Appendix. A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return*; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. *H_FD* represents entry to financial decline. *H_OD* represents entry to operational decline. Significance on mean values is determined by a two-tailed *t*-test. ***, ** and * denote 1, 5 and 10 per cent significance, respectively and represent the difference in mean values between firm-years. The number of observations differ due to data availability.

Table 5
Relative R&D expenditure as a precursor of performance decline

	(1) H_FD firms	(2) H_OD firms
Change in Rel R&D	3.436*	3.683**
	(3.291)	(4.856)
Change in CEO Equity Ownership	-3.586*	-1.362
	(2.022)	(2.080)
Change in Salary/Total Compensation	0.313	0.583*
	(0.539)	(0.286)
Change in Equity/Total Compensation	0.082	0.090
	(0.391)	(0.422)
Year fixed-effects	Yes	
Intercept	-0.099	-0.375***
	(0.080)	(0.086)
Number of observations	1201	
Pseudo *R*-squared	0.060	

This table reports results from multinomial logit regressions for R&D expenditure for the sample of *H_H*, *H_OD* and *H_FD* firms. Change in Rel R&D is the change in industry-adjusted R&D expenditure. All change variables are measured as the change from year -1 to year 0, with year 0 being the year of decline. The reference category is the *H_H* firms. The alternative categories are *H_FD* firms (model (1)) and *H_OD* firms (model (2)). A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return*; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. *H_FD* represents entry to financial decline. *H_OD* represents entry to operational decline. All other variables are defined in the Appendix. The standard errors reported in brackets are clustered at firm level and are robust to heteroskedasticity. ***, ** and * denote 1, 5 and 10 per cent significance, respectively.

Figure 2
Mean (Options-Stock)/Total Compensation



A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return*; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*ED*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. *H_FD* represents entry to financial decline. *H_OD* represents entry to operational decline. *H_OD* and *H_FD* are treatment groups with *H_H* firms being the control group.

Table 6
SFAS 123R effects of state changes on CEO compensation

	Log (Total Compensation)	(Options + Stock)/ Total Compensation	(Options - Stock)/Total Compensation			
	Fixed-effects regressions			Difference-in-difference regressions		
	(1)	(2)	(3)	(4)	(5)	(6)
H_FD	0.113***	0.020	0.073***	0.083**		
	(0.036)	(0.015)	(0.021)	(0.037)		
H_OD	0.128**	0.028	-0.101***	-0.195***		
	(0.057)	(0.018)	(0.028)	(0.052)		
H_H	0.057	-0.007	0.019	0.050		
	(0.039)	(0.014)	(0.022)	(0.028)		
H_FD × Post-SFAS 123R				0.015**		0.056**
				(0.045)		(0.043)
H_OD × Post-SFAS 123R				-0.142**	-0.191***	
				(0.062	(0.047)	
H_H × Post-SFAS 123R				-0.065		
				(0.042)		
Control variables						
CEO Equity Ownership	-0.001	-0.010*	0.020	0.006	0.216	0.158
	(0.001)	(0.002)	(0.087)	(0.014)	(0.214)	(0.205)
Size	0.237***	0.039***	0.013**	0.011*	0.024	0.025
	(0.040)	(0.012)	(0.006)	(0.006)	(0.014)	(0.014)
Market-to-Book	0.089***	0.021***	0.033***	0.033***	0.018	0.014
	(0.023)	(0.006)	(0.007)	(0.007)	(0.016)	(0.016)
R&D Expenditure	-0.784	-0.111	0.325***	0.573***	0.413	0.395
	(0.540)	(0.137)	(0.188)	(0.175)	(0.318)	(0.321)
Capital Expenditure	0.009	0.098	0.274	0.272	0.631	0.695
	(0.352)	(0.124)	(0.170)	(0.170)	(0.402)	(0.410)
Asset Sales	-0.151	-0.031	-0.858***	-0.863***	-0.125	-0.399
	(0.546)	(0.167)	(0.265)	(0.264)	(2.396)	(2.288)
Cash & Short-term Investments	-0.016	0.110	0.084	0.078	0.136	0.102

	(0.135)	(0.045)	(0.050)	(0.050)	(0.106)	(0.109)
Dividend Payer	0.149***	0.054***	-0.064***	-0.064***	-0.034	-0.033
	(0.048)	(0.017)	(0.016)	(0.016)	(0.035)	(0.036)
Innovative Industry	0.041	0.021	0.031	0.031	0.132	0.130
	(0.002)	(0.001)	(0.044)	(0.043)	(0.068)	(0.070)
Distressed Industry	0.107**	0.011	-0.080***	-0.080***		
	(0.042)	(0.014)	(0.022)	(0.022)		
Option Expense			-0.051*	-0.051**	-0.059	-0.069
			(0.026)	(0.026)	(0.061)	(0.063)
CEO-Chairman (=1)	-0.039	0.057	0.015	0.006	-0.032	-0.031
	(0.075)	(0.021)	(0.009)	(0.014)	(0.035)	(0.035)
Institutional Ownership	0.001***	-0.002	0.001	0.000	0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
E Index	-0.002	-0.001	-0.012***	-0.012***	-0.015	-0.019
	(0.010)	(0.004)	(0.005)	(0.005)	(0.011)	(0.012)
Board Size	-0.015	-0.010***	0.003	0.001	-0.001	-0.001
	(0.009)	(0.003)	(0.003)	(0.003)	(0.008)	(0.001)
Independent Board (=1)	0.075*	0.009	-0.022	-0.021	0.012	0.009
	(0.039)	(0.013)	(0.017)	(0.017)	(0.044)	(0.044)
Busy Board (=1)	0.035	-0.026**	-0.002	0.004	0.060	0.058
	(0.035)	(0.013)	(0.023)	(0.003)	(0.051)	(0.052)
Post-SFAS 123R			-0.220***	-0.221***		
			(0.010)	(0.010)		
Intercept	6.030	0.171	0.058	0.075	0.021	0.030
	(0.307)	(0.101)	(0.052)	(0.050)	(0.156)	(0.157)
Year fixed-effects	Yes	Yes	No	No	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	No	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes	No	No
Number of observations	7684	7684	7684	7684	721	721
R-squared	0.749	0.540	0.598	0.262	0.362	0.342

The dependent variable is *Log(Total Compensation*) in model (1), (*Options + Stock*)/*Total Compensation* in model (2) and (*Option -Stock*)/*Total Compensation* in models (3 - 6). Models (1 - 3) present panel fixed-effects regressions results on the full sample. Models (4 - 6) present difference-in-difference regression results of (*Options - Stock*)/*Total Compensation* to the introduction of SFAS 123R in 2005. Model (4) includes all indicators and interaction terms. Refer Equ. (1) for model (5) and Equ. (2) for model (6). A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return*; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-

year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. *H_FD* represents entry to financial decline. *H_OD* represents entry to operational decline. All other variables are defined in the Appendix. All control variables are lagged one period. The standard errors reported in brackets are clustered at firm level and are robust to heteroskedasticity. ***, ** and * denote 1, 5 and 10 per cent significance, respectively. The number of observations differ due to data availability and lagging.

Table 7
Asset and financial restructuring effects of state changes on (Options –Stock)/Total Compensation

	(1)	(2)
H_FD	0.174***	0.052**
	(0.050)	(0.030)
H_OD	-0.143**	-0.131***
	(0.071)	(0.039)
H_H	0.034	0.004
	(0.038)	(0.029)
Asset Restructuring (=1)	-0.007	
	(0.078)	
H_FD × Asset Restructuring	-0.139**	
	(0.057)	
H_OD × Asset Restructuring	0.068**	
	(0.032)	
H_H × Asset Restructuring	-0.046	
	(0.047)	
Financial Restructuring (=1)		-0.027**
		(0.011)
H_FD × Financial Restructuring		0.047
		(0.051)
H_OD × Financial Restructuring		-0.040
		(0.060)
H_H × Financial Restructuring		0.003
		(0.048)
Control variables	Yes	Yes
Intercept	0.034	0.045
	(0.042)	(0.041)
Year fixed-effects	Yes	Yes
Industry fixed-effects	Yes	Yes
Number of observations	5039	5039
R-squared	0.282	0.283

The dependent variable is (*Options-Stock*)/*Total Compensation* in all models. *Asset Restructuring* takes the value of one if a firm either reduces investment, COGS, employees or assets between year -1 and year 0 or year+1, and zero otherwise. *Financial Restructuring* takes the value of one if a firm either cuts dividend, issues debt or equity between year -1 and year 0 or year+1, and zero otherwise. Year 0 being the year of decline. A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return*; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. *H_FD* represents entry to financial decline. *H_OD* represents entry to operational decline. All other variables are defined in the Appendix. All control variables are lagged one period. The standard errors reported in brackets are clustered at firm level and are robust to heteroskedasticity. *** and ** denote 1 and 5 per cent significance, respectively. The number of observations differ due to data availability and lagging.

Table 8
Longitudinal analysis of industry-adjusted market-to-book ratios and stock returns of firms entering performance decline

Year-1	H_OD firms				H_FD firms			
	Correct equity-based compensation choice		Non-correct equity-based compensation choice		Correct equity-based compensation choice		Non-correct equity-based compensation choice	
	N	Median	N	Median	N	Median	N	Median
Panel A: Industry-adjusted market-to-book								
Year 0	210	0.009	86	0.317***	302	-0.128	101	-0.093**
Year 1	142	0.078	66	0.235***	231	-0.054	75	-0.069
Year 2	82	0.116	39	0.062**	142	-0.074	28	-0.088
Year 3	49	0.225	25	0.026***	100	-0.070	13	-0.243***
Panel B: Industry-adjusted stock returns								
Year 0	210	-0.299	86	-0.365*	302	-0.299	101	-0.306*
Year 1	142	0.049	66	0.002**	231	0.082	75	0.052
Year 2	82	0.010	39	-0.001***	142	0.009	28	-0.057***
Year 3	49	0.018	25	-0.187***	100	0.051	13	-0.100***

This table shows median values for industry-adjusted market-to-book and stock return outcomes of firms in financial and operational decline dependent on a correct or non-correct equity-based compensation choice in year -1. Year 0 is the year of decline. Median values are used given the small sub-samples. A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return*; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. *H_OD* represents entry to operational decline and *H_FD* represents entry to financial decline. All other variables are defined in the Appendix. Significance of within-group differences is reported only for non-correct versus correct group values. ***, ** and * denote 1, 5 and 10 per cent significance, respectively. The number of observations (N) differ due to data availability.

Table 9
Asset and financial restructuring of firms entering performance declines

	Year-1	Correct equity-based compensation choice		Non-correct equity-based compensation choice	
		N	Mean	N	Mean
Asset Restructuring	Year-1	387	0.744	156	0.679
	Year 0	415	0.781	154	0.805
	Year 1	297	0.764	85	0.870**
Financial Restructuring	Year-1	387	0.372	156	0.377
	Year 0	415	0.361	154	0.423**
	Year 1	297	0.350	85	0.459***

This table shows mean values for occurrences of asset and financial restructuring of firms in financial and operational decline dependent on a correct or non-correct equity-based compensation choice in year -1. *Asset Restructuring* takes the value of one if a firm either reduces investment, COGS, employees or assets between year -1 and year 0 or year+1, and zero otherwise. *Financial Restructuring* takes the value of one if a firm either cuts dividend, issues debt or equity between year -1 and year 0 or year+1, and zero otherwise. Year 0 is the year of decline. A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return*; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. *H_OD* represents entry to operational decline and *H_FD* represents entry to financial decline. All other variables are defined in the Appendix. Significance of within-group differences is reported only for non-correct versus correct group values. *** and ** denote 1 and 5 per cent significance, respectively. The number of observations (N) differ due to data availability.

Table 10
Robustness tests

	Full sample excluding LTIAs			Full sample excluding firms located in financial services and utilities	Full sample with healthy firms defined as having above-median industry-adjusted stock returns	Full sample with voluntary SFAS 123R adopters removed	Previous grants	New CEO
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Pre-SFAS 123R	Post-SFAS 123R	2008-2010					
H_FD	0.075**	0.065***	0.088***	0.050***	0.049***	0.046***	0.061***	0.074***
	(0.036)	(0.022)	(0.032)	(0.017)	(0.013)	(0.016)	(0.018)	(0.021)
H_OD	-0.176***	-0.033***	-0.058**	-0.085***	-0.080***	-0.090***	-0.082***	-0.100***
	(0.043)	(0.022)	(0.028)	(0.022)	(0.016)	(0.022)	(0.021)	(0.027)
H_H	0.016	-0.038	0.029	0.027	0.010	0.019	0.005	0.024
	(0.032)	(0.026)	(0.052)	(0.019)	(0.009)	(0.018)	(0.020)	(0.021)
Post-SFAS 123R				-0.198***	-0.189***	-0.193***	-0.190***	-0.218***
				(0.009)	(0.008)	(0.009)	(0.011)	(0.010)
CEO Delta							-0.000	
							(0.000)	
CEO Vega							0.000	
							(0.000)	
New CEO								-0.044***
								(0.013)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.464*	-0.144	0.100	0.094***	0.104***	0.121***	0.264	0.126***
	(0.279)	(0.188)	(0.357)	(0.035)	(0.031)	(0.033)	(0.132)	(0.039)
Year fixed-effects	Yes	Yes	Yes	No	No	No	No	No
Industry fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2970	4722	2601	6184	9456	6817	9269	7684

R-squared	0.038	0.033	0.037	0.151	0.148	0.196	0.125	0.285

This table presents results on robustness tests where the dependent variable is (*Options-Stock*)/*Total Compensation* in all models. Models (1) - (3) show the importance of state changes on (*Options –Stock*)/*Total Compensation* with LTIAs excluded, model (4) is based on the full sample with firms located in financial services and utilities excluded, model (5) is based on full sample with a healthy year redefined from top-quartile to above-median industry-adjusted stock returns, model (6) controls for voluntary adopters prior to 2005 and model (7) controls for prior grants of stock and options. A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return*; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. *H_FD* represents entry to financial decline. *H_OD* represents entry to economic decline. All regressions include the same lagged control variables as in model (1) of Table 6 but are not tabulated. *CEO Delta* and *CEO Vega* in Model (7) are also lagged one period. The standard errors reported in brackets are clustered at firm level and are robust to heteroskedasticity. ***, ** and * denote 1, 5 and 10 per cent significance, respectively. The number of observations differ due to data availability, lagging and subsamples.

Table 11
Relationship between (Options –Stock)/Total Compensation, stock volatility and stock returns

	(1) H_FD	(2) H_OD	(3) H_H
(Options –Stock)/Total	0.405***	-0.171***	-0.215
Compensation	(0.128)	(0.174)	(0.177)
L.(Options –Stock)/Total	-0.217	0.011	-0.188
Compensation	(0.145)	(0.159)	(0.153)
L2.(Options –Stock)/Total	-0.113	0.201	0.100
Compensation	(0.148)	(0.173)	(0.188)
L3.(Options –Stock)/Total	0.013	-0.168	0.313**
Compensation	(0.123)	(0.145)	(0.149)
Stock volatility	-1.234***	-0.221	0.630**
	(0.428)	(0.357)	(0.287)
L.Stock volatility	1.153**	0.777	-0.530
	(0.502)	(0.460)	(0.474)
L2.Stock volatility	0.224	0.131	0.937**
	(0.458)	(0.463)	(0.435)
L3.Stock volatility	0.134	0.135	0.099
	(0.373)	(0.333)	(0.380)
Stock returns	0.707***	0.645***	0.417***
	(0.111)	(0.127)	(0.135)
L.Stock returns	-0.047	0.108	0.078
	(0.112)	(0.119)	(0.136)
L2.Stock returns	0.034	0.104	-0.041
	(0.091)	(0.090)	(0.116)
L3.Stock returns	0.018	-0.080	0.099
	(0.084)	(0.094)	(0.072)
Year fixed-effects	Yes	Yes	Yes
Intercept	-2.035***	-2.377***	-2.476***
	(0.147)	(0.596)	(0.160)
Number of observations	4371	4371	4371
Pseudo *R*-squared	0.139	0.151	0.107

This table presents results from three probit regressions with *H_FD, H_OD* and *H_H* as dependent variables. A healthy firm-year (*H*) has top-quartile industry-adjusted *Stock Return* for two consecutive years; industry is defined on the 4-digit GICS code throughout. A performance decline firm-year has bottom-quartile industry-adjusted *Stock Return*. A financial decline firm-year (*FD*) is a performance decline firm-year concurrent with above-industry median *Operating Performance* and above-industry median *Financial Leverage*. An operational decline firm-year (*OD*) is a performance decline firm-year concurrent with below-industry median *Operating Performance*. All other variables are defined in the Appendix and are lagged for one, two and three periods. The standard errors reported in brackets are clustered at firm level and are robust to heteroskedasticity. *** and ** denote 1 and 5 per cent significance, respectively. The number of observations varies due to lagging.