TESTS OF TWO OPTIMAL INCENTIVE MODELS FOR EXECUTIVE STOCK OPTIONS

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Abstract

Using a unique data set, we test theoretical propositions relating to grant size and exercise price in determination of optimal executive compensation. For Hall and Murphy, pay-performance sensitivity does not behave as predicted with respect to CEO risk aversion and diversification, but the latter supports observed grant size while ATM grants exhibit positive abnormal returns as predicted. Consistent with Choe, exercise price is found inversely related to leverage. The unexpected positive relation between grant size and stock volatility is conjectured driven by CEOs' influencing large grants, which are found associated with weak corporate governance but ameliorated by outside directors.

Keywords: Executive, Stock Options, Optimal, Grant Size, Exercise Price, Influence

JEL Classification: G39, G34

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Introduction

While evidence of a positive association between pay-performance sensitivity and firm performance has been documented, there is scant evidence on the relative impact of exercise price and grant size (for example, Jensen and Murphy, 1990; Hall and Liebman, 1998; Guay, 1999 and Core and Guay, 2005). This paper adds to the empirical literature on executive compensation by testing for the first time key propositions of Hall and Murphy (2000, 2002) and Choe (2003).

Hall and Murphy (2000, 2002) and Choe (2003) both derive an optimal exercise price but differ in their treatment of grant size and in the domain of argument: Hall and Murphy internalize the private characteristics of executives, whereas Choe internalizes firm characteristics impacting on return volatility. In general, the incentive imparted by executive stock option grants (as measured by the option delta) is expected to benefit shareholders. The extent of this benefit depends on the level of investment opportunities available to the firm, and on the extent to which they are accepted by executives. Pay-performance sensitivity (delta multiplied by grant size) is increasing in the value of these investment opportunities. Hall and Murphy argue that pay-performance sensitivity is optimized when the exercise price is set in relation to the executive's risk aversion and degree of private diversification. For example, for a given grant size low risk aversion and high private diversification imply an out-of-the-money (OTM) grant (i.e., a premium option), while high risk aversion and low private diversification imply an in-the-money (ITM) grant (i.e., a discounted option). This implies that after controlling for risk aversion, private diversification and grant size, pay-performance sensitivity is inversely related to the exercise price. However, at-the-money (ATM) grants are more likely optimal because deeper discounts rapidly become too costly and increasing premiums rapidly erode incentive for common values of risk aversion and private diversification. They show analytically that optimal exercise price relative to the stock price declines (i.e., grant discounts are deeper) as risk aversion and under-diversification increase. On the other hand, OTM grants are predicated only for low risk aversion coupled with higher personal diversification.

On the other hand, Choe (2003) argues that pay-performance sensitivity implied by grant size and exercise price choices is adjusted for exogenous changes in stock price volatility and leverage to maintain a preferred incentive. Choe distinguishes change in stock volatility induced by acceptance of new investments from change induced by changed financial risk when debt financing is used. When new investment is riskier than existing assets, for a given grant size the exercise price is increased to maintain a desired pay-performance sensitivity, while for a given exercise price grant size is reduced. On the other hand, if leverage is increased to finance new investment, the higher financial risk results in a larger grant for a given exercise price, while for a given grant size the exercise price is reduced. However, Choe's model predicts that increased stock volatility induces smaller grants but does not impact on the exercise price, while increased leverage induces a lower exercise price but does not impact on grant size.

Neither model countenances the wealth implications of CEO influence over the exercise price or grant size, or both; in short, agency problems of equity. Self-interested CEOs have an incentive to increase pay-performance sensitivity to increase their payoff but without adding value for shareholders. A lower exercise price or larger grant than shareholders require to deliver a given incentive also increases pay-performance sensitivity, but not optimally. Thus, empirical evidence on the pay-performance sensitivity/shareholder wealth relation is deficient to the extent the potential for CEO influence is not adequately recognized.

Our primary objective is to test the key propositions of both models. We employ an Australian data set because in the Australian institutional setting (principally in the 1990s) exercise prices and grant sizes were free to vary: exercise prices were not constrained by disclosure or taxation considerations, while stakeholders were considerably less pro-active than at present in monitoring or challenging large grants to CEOs. The common U.S. practice of awarding executives ATM options means exercise prices are constrained (eliminating all but a few discounts and premiums), thereby preventing a complete test of the theoretical propositions. For U.S. firms, Hall and Murphy (2002) report that 94 per cent of options granted to CEOs of S&P 500 companies in 1998 were granted at-the-money. Narayanan and Seyhun (2006) suggest two reasons why ITM grants are rare in the U.S.: first, FASB rules require ITM options (as distinct from option value) to be expensed and, second, ITM options are not deductible under the Internal Revenue Code if an executive's total non-performance-based compensation exceeds $1 million a year. A secondary objective is to examine the extent to which CEO influence over their grants might impair application of these models through an adverse effect on pay-performance sensitivity.

There are several empirical findings. First, our descriptive statistics show that CEO stock option grants are found to generate approximately zero cumulative abnormal returns (CARs) for a [-1, 1] window around grant announcement. However, this aggregate masks positive CARs found associated with small grants (i.e., below-median) and ATM grants, and also masks negative CARs associated with large, OTM grants. Second, the Hall and Murphy (2000, 2002) model receives little empirical support. The motivating arguments of CEO risk aversion and CEOs' private diversification do not influence pay-performance sensitivity in the predicted directions, and there is no evidence of grant size and exercise price being determined interactively. Supporting evidence is confined to an inverse relation between private diversification and grant size, plus association of positive grant CARs with ATM grants. Third, the Choe (2003) model fares somewhat better. Choe relates the exercise price and grant size choices to expected change in stock return volatility and financial leverage to maintain a given pay-performance sensitivity. We find that exercise prices vary negatively with financial leverage as predicted, but that stock volatility is not inversely related to grant size. We attribute the observed positive relation between grant size and stock volatility to CEO influence over their award conditions, indicating an agency problem of equity which neither model incorporates. The inference is that stock option grants are larger than necessary to maintain a given pay-performance sensitivity when stock volatility is high and smaller when stock volatility is low. Fourth, further analysis reveals that grant size is significantly influenced by governance variables: CEO control of voting stock (positively), the proportion of outside directors (inversely) and CEO turnover (inversely). Evidence that the exercise price is inversely related to the proportion of outside directors suggests that as outside monitoring increases, the exercise price falls to compensate for smaller grants. This latter finding provides additional empirical support for Choe (2003).

This study therefore makes two contributions to the empirical literature on executive option grants. First, we conduct the first empirical tests of the key propositions of Hall and Murphy (2000, 2002) and Choe (2003). A successful test requires a data set where the exercise price and grant size are unconstrained by institutional requirements, and where grant backdating is not a problem. These criteria are satisfied by our use of Australian data. The second contribution is the finding that CEO influence is exerted through grant size and not the exercise price. The remainder of the paper is organized as follows. Section 2 reviews present understanding and evidence on the relations between compensation structure, grant moneyness, incentive and CEO performance. The data, sample and measures used are described in Section 3, which is followed in Section 4 by the analysis. Finally, conclusions are presented in Section 5.

2. Literature review

Executive stock option plans both in Australia and the U.S. typically set the parameters under which subsequent grants are made. Plans usually specify the term, the vesting period (and rationing, if any), a hurdle price, other restrictions (e.g. staging exercise of ITM options), a schedule (if any) and often capping the number of options that can be granted over a fixed interval (e.g. a moving five-year total)[46]. Such plans require shareholder approval. Typically, the exercise price is determined in relation to a formula with some imbedding discounts or premiums, while some companies grant full discretion to the compensation committee[47]. The size of a grant is usually less restricted and is sometimes capped at a given number on a rolling basis for a fixed interval[48]. The timing of a grant is least restricted, with most plans granting shareholders the right to award as they see fit, but lack of a timing constraint can also be exploited by CEOs. In other words, compensation committees are able to use their discretion in making grants under the auspice of a given plan. A risk facing shareholders is that a self-interested CEO exerts influence on the deliberations of the compensation committee to secure grant terms favoring the CEO at shareholder expense. If so, stock price responses to grants would tend negative.

Announcements of adoption of executive stock option plans are associated with small positive abnormal stock returns (DeFusco, Johnson and Zorn (1990), Morgan and Poulsen (2001), Martin and Thomas (2005)), and are construed as evidence that stock option plans beneficially increase top management incentive. Yermack (1997) and Aboody and Kaznick (2000) report higher market-adjusted stock returns following grants, Chauvin and Chenoy (2001) report lower adjusted stock returns prior to grant, while Narayanan and Seyhun (2006) report both. All four studies therefore report non-negative shareholder returns after the notional grant date. However, all obtain their grant dates from subsequent proxy statement filings, so grant announcements can lag effective grants by several weeks or months. Hence, the stock market is likely to have become informed during this interval, as evidenced by the flat stock returns around SEC insider filing dates (Narayanan and Seyhun, 2006).

Furthermore, the positive stock price response to grant announcements may not reflect an incentive effect. Narayanan and Seyhun (2006) attribute the stock price reversal (a prior stock price decrease followed by after grant by a stock price increase) to executive influence on grant timing (including backdating) because prior to Sarbanes-Oxley Act of 2002 investors did not usually observe grants around the issue date[49]. Narayanan and Seyhun find the degree of the stock price reversal is increasing in grant size and the seniority of the manager. The former regularity is consistent with, but not conclusive evidence of, CEOs timing option grants (through influence on their compensation committee) prior to stock price runups because grant size is smaller at other times, while the relation with manager seniority suggests influence. However, Yermack (1997) finds that post-grant abnormal returns have no association with grant size. Narayanan and Seyhun also find that abnormal stock return reversals are greater for unscheduled than scheduled grants, consistent with CEO influence on grant timing.

In a more recent paper, Billett, Mauer and Zhang (2006) examine monthly stock and bond price reactions to first-time grants of options and/or restricted stock to CEOs. First grants are argued to have a higher probability of information content than second and subsequent grants. They find significantly positive stock price reactions and negative bond price reactions. The stock price gain is pervasive across CEO pre-grant stock ownership (limited to beneficial interests), while the loss to bondholders is lower for higher CEO stock ownership. However, when grants coinciding with other major announcements are omitted from the sample the positive stock price response disappears. They test the Coles, Daniel and Naveen (2006)

[46] Australian executive stock option plans are partially surveyed in Rosser and Canil (2004) and Taylor and Coulton (2002), while U.S. executive stock option plans are partially surveyed in Hall (1999).

[47] For example, North Limited, ICI Australia Limited and Ashton Mining Limited prescribe an exercise price being the average of the stock price for the prior 5 trading days, with some companies (e.g., Energy Equity Limited) adding a requirement for a premium to market and others (e.g., Orbital Engine Limited) adding a requirement for a discount. Amcor Limited and BRL Hardy Limited, for example, grant full discretion to their compensation committees.

[48] One plan states that "the total number of unissued shares… shall not exceed 7.5 per cent of the company's total number of shares on issue from time to time" (F H Faulding & Co Limited Employee Share Option Plan: Plan Rules as of 18 February, 1988).

[49] Prior to August 29, 2002, back-dating in U.S. grants cannot be ruled out because the intent of SOX accelerated disclosure requirements (Section 403) did not come into effect until this date. Before this date, Form 4 beneficiary ownership reports were filed within 10 calendar days following the end of month in which the options were granted, while Form 5 filings could have been delayed until 45 days following fiscal year end.

proposition that risk-averse and under-diversified managers are encouraged to avoid more risky (and potentially valuable) new investment when their compensation has high pay-performance sensitivity (as measured by delta). In contrast, when option compensation has high sensitivity to stock volatility (as measured by vega), managers have an incentive to accept more risks. Hence, the stock price response is expected negatively related to delta but positively related to vega, which is supported by the evidence of Billett, Mauer and Zhang (2006).

Two studies examine the relation between pay-performance sensitivity and the propensity for risk-taking. First, Guay (1999) finds that stock options significantly increase the sensitivity of CEO wealth to equity risk, and interprets the result as consistent with managers receiving incentives to invest in risk-increasing projects, particularly when the potential loss from underinvestment is greatest. The positive relation between stock volatility and pay-performance sensitivity (measured by delta multiplied by grant size) increases the convexity of the relation between manager's wealth and the stock price. Second, Aggarwal and Samwick (1999) find that pay-performance sensitivity necessarily decreases in the variance of firm performance, i.e., more volatile stocks require lower executive pay-performance sensitivity to maintain a given incentive.

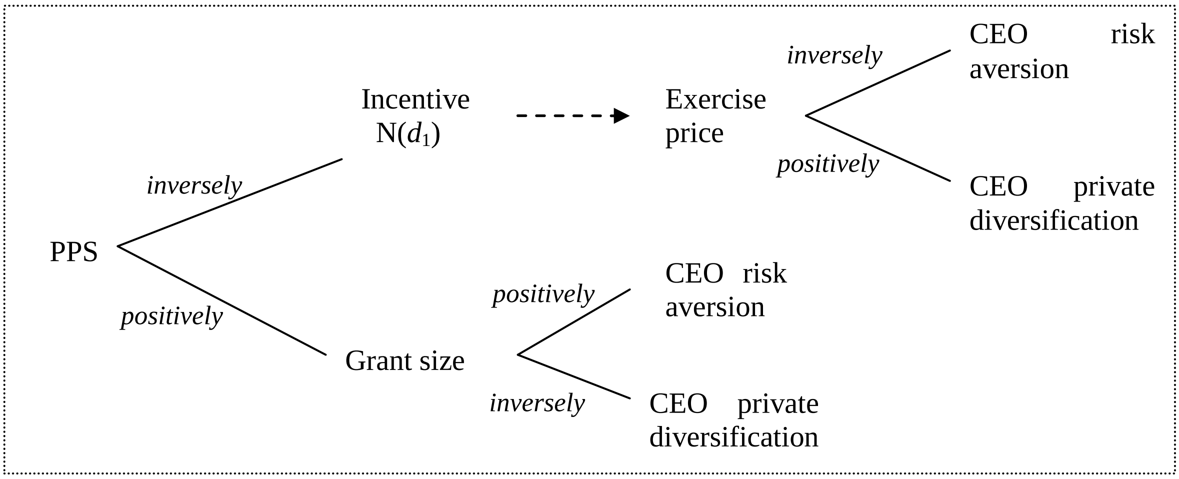
Hall and Murphy (2000, 2002) and Choe (2003) propose different incentive-optimization mechanisms that nonetheless are complementary. In the Hall and Murphy model, pay-performance sensitivity (measured by delta multiplied by grant size) is influenced by the degree of executive risk aversion and private diversification, whereas in Choe changes in stock volatility and financial leverage determine the level of pay-performance sensitivity. Assuming add-on grants in the Hall and Murphy model, increasing risk aversion and/or lower private diversification require higher incentive (delta) *via* a lower exercise price, for a given grant size. For example, for risk aversion of three and 50 per cent private investment in company stock a grant discount of approximately 35 per cent to market is implied. Alternatively, for a given grant size, decreasing risk aversion and/or higher private diversification require lower incentive (delta) *via* a higher exercise price. For example, for a risk aversion value of 2 and 50 per cent private investment in company stock a grant premium of approximately 20 per cent is implied. Thus, for given risk aversion and private diversification, Hall and Murphy argue that pay-performance sensitivity is increasing in exercise price/stock price. Since their model has shallow convexity of pay-performance sensitivity in exercise price/stock price, they recommend ATM or near-ATM grants[50,51]. ATM grants are generally expected to be the most efficient means to create incentive because the probability of exercise is balanced by the change in pay-performance sensitivity. For OTM grants, the lower probability of exercise induced by a higher grant premium is more than offset by the fall in pay-performance sensitivity. On the other hand, discounted grants increase the probability of exercise but do not deliver a commensurate increase in pay-performance sensitivity. Hall and Murphy also consider early exercise and show that for a fixed grant size early exercise is increasing in delta across grant moneyness. Hence, the propensity for early exercise is higher for executives with more risk aversion and less private diversification. Since add-on option grants never lower pay-performance sensitivity, abnormal returns observed around grant announcement are expected non-negative. Given optimization of grant size and exercise price for given levels of risk aversion and private diversification, Hall and Murphy would predict (i) generally positive abnormal returns on unanticipated grant announcements, and (ii) a positive relation between these positive returns and pay-performance sensitivity.

Hall and Murphy's argument is depicted in Figure 1. Pay-performance sensitivity (PPS) varies inversely (positively) with incentive (grant size). Incentive through the exercise price varies inversely with risk aversion and positively with private diversification. Higher risk aversion and lower private diversification require lower exercise prices to maintain a given PPS. On the other hand, grant size varies positively with risk aversion and inversely with private diversification. Higher risk aversion and lower private diversification require larger grants to maintain a given PPS.

50 Alternatively, when stock option grants substitute for some component of existing compensation, Hall and Murphy (2000, 2002) show that the optimum policy shifts to stock options with a zero exercise price, or restricted shares, which increase executive incentive relative to options. Thus, ATM substitute grants are less efficient than restricted shares and also inferior to ATM add-on grants. Substitute grants also do not lower incentive because CEOs do not rationally exchange cash benefits for lesser option value.

51 Hall and Murphy (2000, 2002) also recognize the executive valuation and incentive consequences of early exercise, the right to which increments executive value towards the Black-Scholes value.

Figure 1. Schema of Hall and Murphy's argument



Choe (2003) generates a complementary set of compensation predictions with respect to financial characteristics without recourse to risk aversion and private diversification arguments. He argues that pay-performance sensitivity implied by grant size and exercise price choices is adjusted for exogenous changes in stock price volatility and leverage to maintain the optimum pre-existing incentive. These predictions can be directly tested assuming that current stock return volatilities and leverage do not change. Changes in leverage and stock volatility induced by acceptance of a desired new investment cause the exercise price or grant size to adjust to arrive at the optimal pay-performance sensitivity necessary to capture new investment opportunities[52]. Two scenarios are identified. The first draws upon the positive relation between stock volatility and option value. An increase in stock volatility (caused by acceptance of riskier investments) increases option value, so for a given exercise price grant size is reduced to maintain optimal pay-performance sensitivity[53]. Alternatively, when grant size is given, a higher exercise price is necessary to maintain optimal pay-performance sensitivity when volatility is increased. The second scenarios introduce the two-edged impact of leverage on option value. Higher leverage (e.g., from financing the proposed investment) reduces the residual claim of equity and increases financial risk, so for a given exercise price grant size is increased. Alternatively, for a given grant size the exercise price is reduced. Hence, ITM (OTM) grants are expected more likely when stock volatility is lower (higher) and/or debt is higher (lower).

Paraphrasing these arguments in relation to pay-performance sensitivity (i.e., delta multiplied by granted options) leads to the prediction that pay-performance sensitivity is (i) decreasing in stock volatility and (ii) not decreasing in financial leverage. With respect to (i), for an all-equity firm the argument is that a fall in volatility can be compensated by either a lower exercise price (conditional on grant size) which increases delta, or by a larger option grant (conditional on the exercise price), such that pay-performance sensitivity is restored. However, to generate the pay-performance sensitivity necessary to capture given investment opportunities, adjusting the exercise price is ruled out in favor of operating on the grant size. An increase in stock volatility (consequent on accepting a new project) increases delta and hence pay-performance sensitivity, without intervention. However, reducing the exercise price (for a given grant size) is counter-productive because a lower exercise price reinforces the higher volatility effect[54]. Hence, the only alternative for shareholders is to increase grant size.

With respect to (ii), leverage impacts on both the exercise price and financial risk. Since equity-related compensation ranks after debt, the effective

[52] The argument is consistent with Guay (1999) who finds that stock options significantly increase the sensitivity of CEO wealth to equity risk, where the sensitivity is positively related to fims' investment opportunities.

[53] Carpenter (2000) has constructed a model that optimizes the portfolio choice problem of a risk-averse manager compensated with call options that she cannot hedge. One of the predictions is that giving the managers more options causes her to reduce the volatility of the marginal investment, which is opposite to Choe (2003). Thus, a positive relation between grant size and stock volatility (proxying for future stock volatility) supports Choe, whereas a negative relation supports Carpenter.

[54] Carpenter (2000) has a related proposition that deep OTM grants possibly provide incentive for excessive risk-taking to increase the probability of exercise. However, Carpenter's approach differs from that of Choe (2003) in at least two respects: first, grant size is not optimized to maintain a given pay-performance sensitivity, and second, Carpenter (contrary to Choe) models a change in the exercise price as impacting on stock volatility.

exercise price is increased by the face value of new debt that requires an increase in pay-performance sensitivity. On the other hand, higher financial risk requires a downward adjustment to pay-performance sensitivity *via* either a higher exercise price or a smaller grant. The dual impacts of leverage are therefore offsetting with respect to pay-performance sensitivity. Since the exercise price effect dominates the financial risk effect, a lower exercise price is expected because increasing grant size at the higher exercise price (due to higher leverage) is less effective in increasing pay-performance sensitivity. Hence, for a given pay-performance sensitivity, Choe posits an inverse relation between the option exercise price and leverage.

Both Hall and Murphy's (2000, 2002) and Choe's (2003) optimal contracting models tacitly assume that CEOs do not influence the terms and conditions of their option grants. Bertrand and Mullainathan (2000) and Bebchuk and Fried (2003), among others, marshal evidence suggesting that CEOs are able to influence their compensation contracts and extract rents as a result of ineffective board monitoring. For example, Bebchuk and Fried argue that senior executives indirectly influence the exercise price in their favor by controlling both the timing of grants and the timing of corporate information disclosures. The presence of CEO influence is suggested by (i) exercise prices are set lower than optimally, and/or (ii) larger option grants than shareholders require. Both factors result in higher pay-performance sensitivity than optimal, implying that self-interested CEOs have an incentive to increase pay-performance sensitivity at shareholder expense. Since Choe's model does not depend on risk aversion and private diversification arguments, the marginal impact of influence on pay-performance sensitivity can be directly observed because financial leverage and stock volatility are independent of CEO influence.

3. Data, sample and measures

Testing the propositions of Hall and Murhpy (2000, 2002) and Choe (2003) ideally requires an institutional setting in which both grant size and exercise are free to vary. Since U.S. stock option grants are typically ATM, an Australian data set is an ideal setting because both decision variables are observed to be unrestricted. In Australia, as in the United States, shareholders must approve CEO stock option plans put to them by company compensation committees, usually in the Annual General Meeting. The procedure for granting options comprises the following steps: (i) notice of a shareholder meeting to approve a grant is issued, (ii) if approved, execution of the grant is usually left to the discretion of the compensation committee and notified to the ASX in the *Notice of Directors' Interests* (pursuant to the then *Corporations Act*, Section 235). For the duration of our sample period the notice was to be lodged within 14 days of the grant (Section 205G) [55]. Any issue of securities (including options) to a director of a company must be approved by shareholders of the company prior to the issue (ASX *Listing Rule* 10.11). The grant announcement date is the date on which the ASX publishes the notification by the granting company, and is the date used for determining abnormal returns. To avoid the problem of information leakage, the sample was confined to grants occurring only on the announcement date or subsequently, thereby excluding all cases where grants were made prior to announcement[56]. Hence, our sample is free of backdating. The grant date was used to calculate CEO gains (i.e., discounts and premiums). Exercise details were obtained from the ASX *Additions to the Official List*.

Following Morgan and Poulsen (2001), a three-day window [-1, 1] is employed to capture grant announcements made after the close of trading on day zero[57]. Cumulative abnormal returns are the cumulative differences between expected and raw (or observed) stock returns, where expected returns are calculated from application of the market model, with the S&P/ASX All Ordinaries Accumulation Index used to proxy market returns on the market portfolio. Beta factors for this model are estimated using the excess return form of the market model (Brown and Warner, 1980). CARs are aggregated across the sample with each case being equally-weighted.

Hall and Murphy (2000, 2002) measure pay-performance sensitivity by $\delta V_e(n)/\delta S$, where $V_e(n)$ is the executive's valuation and *n* is the number of granted options. Executive value is determined after taking into account risk aversion and diversification but not early exercise, which is treated as a separate adjustment[58]. Theoretically, executive value should be adjusted for all three factors. However, for add-on grants, Hall and Murphy (2002, p. 25) show that $\delta V_e(n)/\delta C_{BS}(n)$ is approximately constant

[55] More recently, disclosure rules in both the U.S. and Australia have been tightened. In the U.S., in line with Section 403 of the *Sarbanes-Oxley Act* of 2002, the SEC amended the disclosure rules for beneficiary ownership reports to be filed under Section 16(a) to be reported within two business days of receiving notification of the grant. In Australia, ASX *Listing Rule* 3.19A introduced in 2001 requires any change in directors' interests to be notified within 5 business days of the change.

[56] Announcement and grants occurred on the same day in 56.5 per cent of sampled cases, with 29.6 per cent within four weeks.

[57] Daily abnormal returns for a week either side of this window are not statistically significant.

[58] Ingersoll (2006) presents an algorithm for adjusting the Black-Scholes call value for all three factors.

over a wide range of grant discounts/premiums. In any event, no data on private diversification is available. Since in our sample, the interval to actual exercise is clustered around a median off 3.33 years and time to maturity has a median of five years, we consider there is also no need to adjust executive value for early exercise. We derive further support from the fact that Australian maturities are about half those in the U.S. (five years vs. ten years), so executive values are closer to the Black-Scholes value and hence there is smaller error in not adjusting $N(d_1)$ for early exercise. Incentive is therefore measured by the partial derivative of the Black-Scholes call value with respect to the stock price, $\delta C_{BS}/\delta S$ or $N(d_1)$, adjusted for dividends. Grant size and risk aversion are controlled through explanatory variables. Risk aversion is measured by $MRP/.01(\sigma^2)$ where the market risk premium (*MRP*) is set at eight per cent and σ is the standard deviation of stock returns for a given company[59]. In the absence of a direct measure of CEO diversification on private account, private diversification is proxied by $ln(1/\text{Percentage of stock held})$, given by the intuition that private diversification increases as the percentage of firm stock held by the CEO decreases.

CEO influence over the conditions of their award is proxied by their control of voting stock, comprising the sum of beneficial and non-beneficial interests held. Typically, CEOs own a tiny portion of their company's stock in their own name but exert considerably more voting influence by virtue of trustee and family ownership structures (i.e., non-beneficial interests). Non-beneficial interests therefore also include insider blocks controlled by the CEO. Although a beneficial equity interest nominally aligns a CEO's interest with shareholders'[60], non-beneficial interests are typically much greater: in the present sample, the median non-beneficial interest exceeds the median beneficial interest by a factor of 56.72. In the absence of other disciplinary influences, an extensive non-beneficial interest creates an opportunity for CEO self-interest to dominate the alignment property of direct equity ownership. In the absence of a corporate governance index for Australian companies in the style of Gompers, Ishii and Metrick (2003), we employ two measures of governance quality: CEO turnover and proportion of outside directors on the board, both suggested by Weisbach (1988). Turnover is measured by the number of CEO appointments in a given interval divided by the interval in years, commencing three years before the first option grant and ending three years after the last grant where there are several grants. For a single grant the turnover index is therefore 0.167 years. A turnover index close to unity suggests a higher degree of entrenchment[61]. A higher proportion of outside directors (i.e., not employed within the corporate group) strengthens board independence which also lowers the probability of CEO entrenchment. Thus, high CEO turnover and a high proportion of outside directors suggest a lower probability of CEO influence over the terms of their option grants.

The sample period is 1987-2000. This period was chosen to ensure that ITM and OTM grants were voluntary choices and not influenced by subsequent controversy concerning the accounting treatment of non-ATM grants. In Australia, the expensing debate was unresolved until July, 2004 when AASB 2 became effective. Prior accounting debate in Australia can be traced back to the release of the International Accounting Standards Board (IASB) in mid-2002 which stated that all share-based payments should be recognized in the financial statements of issuing companies[62]. Hence, to avoid any anticipation of expensing requirements, cases were not selected after the year 2000.

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[59] Our measure appears satisfactory because a regression of risk aversion so measured on delta and stock volatility yields a strong fit (adjusted R^2 = 0.526) with delta and stock volatility positively and negatively signed, respectively, and both achieving significance at better than 1 per cent.

[60] Jensen and Murphy (1990) and Hall and Liebman (1998) both report a positive pay-performance relation between CEO and shareholder wealth.

[61] Kuhnen and Zweibel (2007), Berger, Ofek and Yermack (1999) and Morck, Shleifer and Vishny (1988) show that entrenchment is costly to shareholders.

[62] A useful summary of the Australian debate on accounting for executive stock options may be found in the March, 2002 issue of the *Australian Accounting Review*.

Number of hits from 'options' keyword search	1162
less deletions for non-CEO stock options and quoted stock options	395
less all occurrences of companies for which an option plan was unavailable	257
less observations where grant date occurs prior to announcement date	98

	412
less further deletions for data deficiencies:	
Inadequate or inconsistent date and related disclosures	(186)
Grants made within 3 days of other major announcements	(58)

Final sample	168

Since no Australian executive compensation database is available for this period, all grant data were obtained from an 'options' keyword search of all ASX-listed companies included in *Huntleys' DatAnalysis* service. Of the 1,162 hits obtained, 395 hits attributable to non-CEO stock options (e.g., employee options) and quoted stock options were discarded. A further 257 observations representing 107 companies that did not provide a copy of the underlying option plan were also deleted, as were observations for which grant dates preceded announcement dates. These filters resulted in an initial selection of 412 observations, representing 104 companies. After further deletions for data deficiencies, including inadequate or inconsistent date and related disclosures along with grants made within 3 days of other major announcements (such as earnings releases), the final sample comprised of 168 stock option grants made by 51 companies to 65 CEOs[63]. The sample derivation is summarized thus:

The 168 cases represent a wide range of industrial sectors. Resource stocks make up almost 18 per cent of the selection, while industrial stocks (including manufacturing, engineering, conglomerate and technology stocks) account for the remainder. No distinction was made between first and subsequent grants to the same CEO. In other words, grants are treated as independent observations even if two grants are made in the same calendar year to the same CEO. Where portions of a grant are exercised or lapse on different dates, each portion is counted as a separate grant. Grant moneyness is determined with reference to the stock price on the grant date, while shareholder returns were determined around the grant announcement date. As in the U.S., compensation committees in Australia typically have discretion as to the frequency, the size and timing of grants along with determination of the exercise price[64]. The quality of Australian disclosure is on a par with the U.K. data of Conyon and Sadler (2001)[65]. Of the 168 grants 74 were multiple grants, being associated with other grants made on the same date but differentiated either by expiry date or exercise price. Spreads in exercise prices and exercise dates were intended to increase the probability that at least one of the grants would be exercise. Otherwise, such grants have the same properties as single grants. Compensation specialists in Australia consider that nearly all stock option grants made during this period were add-ons and not substitutes. Add-on grants are also common in the U.S., as indicated by Hall and Murphy (2002) and Baranchuk (2006) who notes simultaneous growth in option grants along with CEO salaries, bonuses and other benefits. Regular grants are grants made annually for at least three consecutive years to the same CEO and with a maximum variation of two months; the remainder are defined as irregular.

An OTM grant is defined to occur when the stock price at grant exceeds the exercise price by five or more per cent; likewise, an ITM grant occurs when the stock price falls below the exercise price by the same percentage. Notional ITM grants/OTM grants below five per cent are therefore classified as ATM awards. The resulting ten per cent spread is considered wide enough to classify virtually all ATM grants correctly, i.e., Type 1 error is believed negligible[66]. A wide spread also captures many near-ATM grants that are desirable given the non-exactitude of the Hall and Murphy (2002) predictions. The likelihood of Type 2 error (misclassifying non-ATM grants) is therefore likely higher than Type 1 error. Thus, grants classified as ITM or OTM are almost certainly not due to noise in stock prices. Further, the risk of classifying some non-ATM grants as ATM grants is not a problem for the Hall and

63 Given CEO turnover, many companies granted stock options to different CEOs during the sample period.

64 Few plans specify grant frequency schedules; most leave this to the discretion of the compensation committee. Scheduled *versus* unscheduled grants in the U.S. are examined by Collins, Gong and Li (2005).

65 In the U.K., Urgent Issue Task Force (UITF) Abstract 10 of the Accounting Standards Board forms the basis of executive stock options disclosure, and is similar to the Australian disclosure rules as embodied in s.205G of the *Corporations Act*.

66 The analysis was also performed with a two per cent cut-off, i.e., with a four per cent spread. Although not reported, the results were not significantly different.

Murphy (2002) predictions of add-on optimality because their model does not present corner solutions. Rather, their model permits some variation in moneyness around exact ATM without materially affecting their predictions. If their prediction were to hold only for exact ATM grants, such evidence would not be supportive of their position.

4. Analysis

Grant characteristics are described in Table 1 by grant moneyness. There are marginally more ITM grants (65) than ATM grants (55) and marginally fewer OTM grants (48) than ATM grants. There is little evidence that once an ITM (OTM) grant is made that the same moneyness status is maintained in subsequent grants[67]. Grants by companies in the resource sector make up just 17.9 per cent of all grants, but these percentages are makedly lower for ITM grants (12.6 per cent) and higher for OTM grants (29.2 per cent). Since resource stocks are riskier than industrial stocks, with therefore have an early indication that OTM grants are more characteristic of resource stocks. Irregular grants dominate the sample (73.8 per cent), with ITM grants exhibiting the highest percentage (80.0 per cent) and OTM grants the lowest (66.7 per cent). Since irregular grants imply more timing flexibility than regular grants, a higher loading on ITM grants is interesting because it suggests either that shareholders are able more closely to time incentive with need, or alternatively that self-interested CEOs are more able to influence the timing of their grants. The percentage of subsequent exercised options is 60.7 per cent for the whole sample and approximately 64 per cent for both ITM and ATM grants, but not surprising is lower for OTM grants (52.1 per cent). For the whole sample, the median CEO gain at grant is 0.013 (or 1.3 per cent) relative to the stock price on the grant date. For ITM grants, the median CEO gain is 0.186 (or 18.6 per cent) relative to the stock price on the grant date, while for OTM grants the median CEO gain is -0.151. Reassuringly, ATM grants show a median CEO gain very close to zero (0.010). The median grant size is 0.145 per cent of outstanding ordinary shares prior to grant. ITM and OTM grants both exhibit a higher median grant size percentage (about 0.200 per cent), while the median ATM grant is about half that size. Thus, the smallest grants are seen associated with ATM grants. In Australia, the regular maturity (expiry) of executive stock option grants is five years and the regular vesting period is two years. The median maturity for the whole sample is in fact 5.00 years, while the actual interval to exercise is 3.33 years indicating early exercise but not necessarily the day after vesting[68]. There is little variation in maturity by grant moneyness: not surprisingly however, OTM grants take longer to exercise.

Pre-grant firm characteristics are analyzed by grant moneyness in Table 2. Relative to ATM grants, ITM and OTM grants exhibit higher stock volatility and are awarded by smaller firms. ITM grants have higher marker-to-book ratios (proxying for growth opportunities) than either ATM or OTM grants. The implication is that shareholders are prepared to grant ITM options when growth opportunities are high. There is no discernible impact by financial leverage on grant moneyness. The finding that ATM grants are associated with lower stock volatility and large firm size suggest ATM grants are preferred by shareholders of large firms. The lower volatility characterizing ATM grants implies a lower likelihood of exercise relative to non-ATM grants, but we do not observe a compensating increase in grant size (refer Table 1). The higher volatility of non-ATM grants relative to ATM grants implies that ITM and OTM grants are reserved for awards in more volatile scenarios, which we construe as an initial piece of evidence in support of Choe (2003). On the other hand, and against Choe, financial leverage appears insensitive to grant moneyness choices.

Table 3 reports selected governance characteristics by grant moneyness. There is virtually no difference in CEO turnover (sample median 4.5 years) according to grant moneyness, but OTM grants are associated with a lower proportion of outside directors than ATM grants. Finally, evidence of lower CEO control of voting stock over ATM grants suggests that non-ATM grants are more likely subject to CEO influence. If so, ITM grants would appear driven by the opportunity for higher payoffs for a given level of effort, whereas OTM grants are rationalized in an influence context by the argument that shareholders would not have otherwise permitted an option grant.

Table 4 shows incentive and performance measures of incentive by grant moneyness. For the whole sample, the median incentive (delta) value is 0.971. ITM grants have a higher median delta (0.994) than OTM grants (median delta = 0.807); this is attributed to the disparity in moneyness because as noted in Table 1 the maturities for ITM and OTM grants are similar. In contrast, pay-performance sensitivity (defined as delta multiplied by the number of granted options) is virtually flat across grant moneyness, indicating that grant size counter-balances the incentive effect. At this stage,

[67] There were six cases in the data of multiple (more than two) ITM grants by the same company in the same year, and three cases of multiple OTM grants.

[68] Performance vesting is not at all common in our sample: $^{44}/_{168}$ of grants have hurdle requirements, of which 40 relate to stock price thresholds with the remainder specifying earnings performance hurdles.

we cannot discern whether the trade-off is prompted by shareholders or self-interested CEOs. Raw shareholder returns at grant for a three day event window [-1, 1] are virtually zero for the whole sample except that OTM grants attract significantly lower returns. The corresponding CARs are also effectively zero for the whole sample, but are positive for ATM grants and negative for OTM grants[69]. Thus, shareholders appear not to benefit from ITM grants, lose when OTM grants are made, and benefit only from ATM grants. These early results are broadly not supportive of Hall and Murphy (2000, 2002), but partial support is evident for ATM grants which exhibit positive CARs.

Table 5 presents a breakdown of CARs by above- and below-median grant size (small and large, respectively). On a priori grounds, positive CARs are expected in all intersections because shareholders adjust grant conditions, including exercise price and grant size, to arrive at the desired pay-performance sensitivity. Unexpectedly, positive CARs are not pervasive. There are several regularities of interest. The first is that, sample-wide, shareholders benefit from small grants (median CAR = 0.43 per cent) and not from large grants (insignificantly different from zero). This regularity is unexpected because, other things equal, large grants do not reduce incentive. The second regularity is that all ATM grants show positive CARs, along with small ITM grants. The positive CARs for ATM grants are general across small and large grants, providing early support for Hall and Murphy (2000, 2002). The positive CARs associated with small, ITM grants (median CAR= 1.08 per cent) suggest that the incentive created by the ITM grant is not offset by its cost, whereas the effectively zero CARs associated with large ITM grants imply the incentive is balanced by the cost of the discount. Lastly, large OTM grants are costly to shareholders (median CAR = -2.74 per cent), implying that any disincentive of OTM grants is exacerbated by larger grants. Further, OTM grants that are small have no shareholder wealth effect that implies the disincentive effect of an OTM grant offsets the lower cost to shareholders. Of these regularities, the negative CARs for large OTM grants demand the closest analysis.

Tests of the key propositions of Hall and Murphy (2000, 2002) are reported in Table 6. Their basic proposition is that pay-performance sensitivity is negatively related to exercise price/stock price and positively related to grant size. More risk-averse and less-diversified CEOs demand higher pay-performance sensitivity *via* lower exercise prices or larger grants, or both, while less risk-averse and more highly-diversified CEOs require lower pay-performance sensitivity. In regression (1), pay-performance sensitivity is regressed directly on CEO risk aversion and private diversification with an expectation of an inverse relation with risk aversion and a positive relation with private diversification. The results show almost the opposite. Since pay-performance sensitivity is the product of delta and grant size, the inference is that either or both is not adjusting as Hall and Murphy specify. To pursue the anomaly, two 2SLS regressions are performed with exercise price/stock price and grant size specified as the dependent variables, respectively. The set of equations estimated in regression (1A) is

[69] Daily CARs for the week following grant announcement are generally insignificantly different from zero.

$$Grant\ size = \alpha_0 + \alpha_1\ Risk\ aversion + \alpha_2\ Private\ diversification + \varepsilon \quad (1)$$

$$Exercise\ price/stock\ price = \beta_0 + \beta_1\ Grant\ size + \beta_2\ Risk\ aversion + \beta_3\ Private\ diversification + \varepsilon \quad (2)$$

and in regression (1B) is

$$Exercise\ price/stock\ price = \alpha_0 + \alpha_1\ Risk\ aversion + \alpha_2\ Private\ diversification + \varepsilon \quad (3)$$

$$Grant\ size = \beta_0 + \beta_1\ Exercise\ price/stock\ price + \beta_2\ Risk\ aversion + \beta_3\ Private\ diversification + \varepsilon \quad (4)$$

The estimation for regression (1A) is unsuccessful, indicating that the Hall and Murphy specification does not hold empirically. Regression (1B) fares a little better in that private diversification is negatively signed, as predicted by Hall and Murphy. However, risk aversion is incorrectly signed (negative) and grant size is unrelated to the exercise price, indicating zero interaction between grant size and exercise price. We conclude that grant size rather than the exercise price is operated on, even after recognizing the fact that (in Australia, at least) exercise prices are more flexible. These results are closely corroborated by OLS regressions of equations (2) and (4), not reported, further indicating that exercise price and grant size choices are made independently of each other and not simultaneously.

We test also to see if these relations are reflected in abnormal returns around grant announcement. First, we regress grant CARs on the components of pay-performance sensitivity: incentive (measured by delta) and grant size, with both coefficients expected positive. Regression (2) of Table 6 shows that grant CARs are increasing in incentive, as expected, but decreasing in grant size. The latter result (consistent with Table 5) is puzzling because, for a given incentive, larger grants are implied detrimental to shareholders. This outcome is anomalous because larger grants cannot lower incentive. Second, to distinguish the contribution of the exercise price to incentive creation, we regress grant CARs on grant size and exercise price/stock price in regression (3). Surprisingly, exercise price/stock price is found unrelated to grant CARs, suggesting that exercise prices are determined by factors other than incentive. Finally, in regression (4) we provide superficial support for Hall and Murphy (2000, 2002) in that grant CARs are found higher for ATM grants. The implication is that for ATM grants, grant size is close to optimal, whereas for OTM grants grant size appears larger than the OTM grant would suggest.

Tests of Choe's (2003) model are presented in Table 7. Choe predicts that pay-performance sensitivity is decreasing in stock volatility and not decreasing in leverage. His argument is that for a given exercise price stock volatility and grant size are inversely related, while for a given grant size leverage and the exercise price are also inversely related. Regression (1) confirms that pay-performance sensitivity is positively related to financial leverage and inversely related to stock volatility. The latter relation is consistent with Aggarwal and Samwick (1999) but not with Guay (1999). In regression (2), exercise price/stock price is shown to be inversely related to financial leverage and unrelated to stock volatility after controlling for grant size, as predicted. In regression (3) grant size is found unrelated to financial leverage and exercise price/stock price as expected, but is found to be positively related to stock volatility (expected negative). A positive relation implies that CEOs benefit at the expense of shareholders because grants are larger (smaller) when options are more (less) valuable, contrary to what is required to maintain pay-performance sensitivity[70]. This cannot be seen from the pay-performance sensitivity test of Hall and Murphy (2000, 2002) (Table 6, regression 1) because grant size is predicted linear with pay-performance sensitivity. The behavior of grant size explains the poor showing of stock volatility in regression (1) because the grant size component of the dependent variable does not decline in volatility as much as predicted by Choe (2003). Overall, apart from the grant size anomaly, Choe's model receives broad empirical support.

Earlier descriptive evidence (Table 5) suggests that adverse wealth transfers occur with large grants. Taken together, these findings suggest shareholders are more concerned with CEOs being rewarded for no effort (Type II error) than failing to provide sufficient incentive (Type I error). Specifically, as stock volatility increases grant size should decline, but the observed increase coupled with negative abnormal returns for large grants indicates shareholders lose only when option value is driven by higher stock volatility. Given an incentive motive, granting fewer options than optimal as stock volatility declines should also result in negative abnormal returns, but does not (Table 5).

[70] Regressions (2) and (3) were recast as 2SLS in recognition of the positive relation between leverage and stock volatility: financial leverage was omitted from regression (2) and stock volatility was omitted from regression (3). The results were generally inferior to those of the reported OLS regressions and hence do not affect our interpretation.

Our remaining task is to establish whether large grants are an outcome of undue CEO influence. In general, we expect governance factors to be correlated with CEO influence: well- (poorly-) governed firms should exhibit less (more) CEO influence. Specifically, higher CEO control of voting stock, lower CEO turnover and smaller proportions of outside directors are all characterize poor corporate governance, i.e., higher agency costs of equity. As a consequence, CEOs of poorly-governed firms are expected to exhibit larger grants. Further, to the extent financial leverage disciplines self-interested managers (Jensen, 1986), financial leverage is expected negatively signed with respect to grant size. Regression (1) of Table 8 confirms empirically that grant size is at least in part determined by governance factors contrary to shareholders' interests. Leverage alone is insignificant, suggesting an absence of a disciplinary role attributed to debtholders. In contrast, when exercise price/stock price is substituted for grant size as the dependent variable (reported as regression (2)) the significance of the governance variables fades, except for the proportion of outside directors. The negative coefficient on this variable suggests outside directors are more likely to approve ITM grants when grants are small. In other words, shareholders through independent outside directors are effectively compensating CEOs for smaller grants with a discount. Such a trade-off is consistent with Choe (2003). The inverse relation (albeit weak) between the exercise price and leverage is also consistent with Choe. On balance, the evidence bestows qualified support for Choe *vis à vis* Hall and Murphy (2000, 2002).

5. Conclusions

We report the first tests of the key incentive-related propositions contained in the models of Hall and Murphy (2000, 2002) and Choe (2003). Our use of Australian data is justified on the dual grounds of (i) freely-adjusting exercise prices and grant size, and (ii) a sample period 1987-2000 that in Australia pre-dates not only executive stock option expensing requirements but also more sophisticated contracting techniques. Descriptively, we find that ATM grants are associated with positive abnormal returns at grant, while large OTM grants attract negative abnormal returns. The latter result is difficult to rationalize given that options do not have negative payoffs.

In Hall and Murphy (2000, 2002), the degree of executive risk aversion and private diversification determine pay-performance sensitivity. To the extent higher pay-performance sensitivity leads to higher new investment, stockholder returns are expected to increase in grant size and decrease in exercise price/stock price. ATM grants are generally expected to be the most efficient means to create incentive because the probability of exercise is balanced by the change in pay-performance sensitivity. ITM grants increase the probability of exercise but do not deliver a commensurate increase in pay-performance sensitivity. Conversely, the lower probability of exercise induced by a higher OTM grant is more than offset by the fall in pay-performance sensitivity of an OTM grant. However, empirical tests support only the general proposition of the optimality of ATM grants and otherwise provide little empirical support for the internal arguments of Hall and Murphy. Abnormal returns around grant test the effectiveness of the incentive provided by stock option grants in capturing new investment opportunities. ATM grants are generally found to exhibit higher (and positive) grant CARs than non-ATM grants, as suggested by Hall and Murphy. Controlling for pay-performance sensitivity, grant CARs are found decreasing in the grant size and exercise price/stock price. While the latter result reflects shareholders' predicted adjustment of exercise prices, the negative impact of grant size is anomalous with respect to their model.

In a complementary model, Choe (2003) develops a set of arguments linking optimal incentive creation with firm characteristics. In Choe's model, pay-performance sensitivity increases with changes in financial leverage and decreases with changes in stock volatility. Further, for a given exercise price, grant size is predicted to increase as option value (implied by lower stock volatility) decreases. On the other hand, for a given grant size the exercise price is predicted decreasing in leverage. Choe's propositions receive broad empirical support. The most anomalous result is the observed positive relation between stock volatility and grant size, suggesting grants are larger than shareholders require, but only when stock return volatility is high. While CEOs are found often to influence grant size, we uncover no evidence of undue influence on the exercise price because the negative relation between the exercise price and grant CARs is consistent with both optimal incentive compensation models.

The tests of Choe (2003) indicate an incentive problem with grant size: grants appear to be smaller than optimal for shareholders when stock volatility is low but appear larger than necessary when stock volatility is high. We trace the propensity for large grants to weak corporate governance. Further research is required to identify the agency problems that drive CEOs to influence grant size in their own interest. A possible solution is for shareholders to restrict individual grant sizes through the executive option plans rather than rationing (if at all) option grants during a given calendar interval. A restriction of this nature involves optimizing a trade-off between incentive creation and flexibility:

larger grants may be necessary when shareholders adjudge that more incentive is needed, but at the increased risk of wealth transfers flowing to influential CEOs.

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Table 1. Grant characteristics by moneyness

An in-the-money (ITM) grant occurs when exercise price on the grant date exceeds the stock price by 5 or more per cent; an out-of-the-money (OTM) grant occurs when the stock price on the grant date exceeds the exercise price by 5 or more per cent. Irregular grants are grants not made annually for at least three consecutive years to the same CEO and with a maximum variation of three months. Contingent CEO gain is the stock price at grant *minus* the exercise price, divided by the stock price at grant. Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant (expressed as a percentage).

	Whole sample	ITM grants	ATM grants	OTM grants
Number of grants	168	65	55	48
Number of granting companies	51	25	28	29
Percentage of companies in resource sector	17.9	12.6	18.2	29.2
Percentage of irregular grants	73.8	80.0	72.7	66.7
Percentage of subsequently exercised options	60.7	64.6	63.6	52.1
Contingent CEO gain at grant				
mean	0.015	0.182	0.003	-0.196
median	0.013	0.186	0.010	-0.151
Grant size (%)				
mean	0.340	0.427	0.169	0.420
median	0.145	0.206	0.116	0.196
Term to expiry (years)				
mean	4.60	4.53	4.86	4.41
median	5.00	5.00	5.00	5.00
Interval to actual exercise (years)				
mean	3.18	2.90	3.17	3.67
median	3.33	3.07	3.41	3.72

Table 2. Firm characteristics by grant moneyness

An in-the-money (ITM) grant occurs when exercise price on the grant date exceeds the stock price by 5 or more per cent; an out-of-the-money (OTM) grant occurs when the stock price on the grant date exceeds the exercise price by 5 or more per cent. All book data are calculated with respect to the most recent fiscal year pre-grant. Stock volatility is measured by the annualized standard deviation of pre-award monthly stock returns (in percentage terms) over a minimum of 36 months prior to grant. Firm size is measured by *ln*(total assets). Market-to-book of assets is the sum of the market value of equity at grant plus the book value of debt, both divided by total assets of book. Financial leverage is the ratio of total debt to total assets, all at book.

	Whole sample	ITM grants		ATM grants		OTM grants
Number of grants	168	65		55		48
Stock volatility						
mean	12.33	13.63		11.23		11.85
median	9.90	10.80		7.40		10.76
Group differences:						
t statistic			2.100††		2.102††	
Z statistic			2.516†††		2.103††	
Firm size						

mean	5.912	5.480		6.667		5.593
median	5.947	6.057		6.315		5.717
Group differences:						
t statistic			3.687†††		3.329†††	
Z statistic			3.234†††		2.539††	
Market-to-book of assets						
mean	1.297	1.528		1.056		1.283
median	1.043	1.140		0.929		0.954
Group differences:						
t statistic			2.806†††		0.980	
Z statistic			3.658†††		0.198	
Financial leverage						
mean	0.190	0.201		0.195		0.171
median	0.180	0.191		0.207		0.138
Group differences:						
t statistic			0.270		0.946	
Z statistic			0.831		1.729†	

††† indicates two-tailed statistical significance at the 0.01 level.
†† indicates two-tailed statistical significance at the 0.05 level.
† indicates two-tailed statistical significance at the 0.10 level.

Table 3. Selected governance characteristics by grant moneyness

CEO turnover index is the number of CEO appointments for a given interval divided by the interval in years, where the interval commences three years before the first option grant and ends three years after the final option grant in the event of multiple grants. The proportion of outside directors is the number of directors not employed within the corporate group divided the number of directors on the board. CEO control of voting stock is the sum of beneficially and non-beneficially held stock divided by the number of outstanding ordinary shares, expressed as a percentage.

	Whole sample	ITM grants		ATM grants		OTM grants
Number of grants	168	65		55		48
CEO turnover index						
mean	5.222	5.753		4.933		4.934
median	4.500	5.000		4.500		4.000
Group differences:						
t statistic			1.193		0.001	
Z statistic			-1.768†		-0.581	
Proportion of outside directors						
mean	0.395	0.398		0.423		0.359
median	0.375	0.375		0.500		0.375
Group differences:						
t statistic			-0.929		-2.090††	
Z statistic			-1.118		-1.899†	
CEO CONTROL OF VOTING STOCK (%)						
mean	1.960	1.521		0.803		3.879
median	0.036	0.115		0.007		0.083
Group differences:						
t statistic			1.963†		2.370††	
Z statistic			3.756†††		3.276†††	

††† indicates two-tailed statistical significance at the 0.01 level.
†† indicates two-tailed statistical significance at the 0.05 level.
† indicates two-tailed statistical significance at the 0.10 level.

Table 4. Incentive and performance measures by grant moneyness

CEO gain is the stock price at grant *minus* the exercise price, divided by the stock price at grant. An in-the-money (ITM) grant occurs when exercise price on the grant date exceeds the stock price by 5 or more per cent; an out-of-the-money (OTM) grant occurs when the stock price on the grant date exceeds the exercise price by 5 or more per cent. The value per CEO granted option is the Black-Scholes call value adjusted for dividends. Incentive is the partial derivative of the call value with respect to the stock price. Pay-performance sensitivity is incentive multiplied by the number of granted options. [-1, 1] raw shareholder returns at grant comprise a three-day stock return around the grant date, which is day 0; all stock returns are adjusted for capitalization changes and dividend payments occurring during the event window. [-1, 1] cumulative abnormal returns (CARs) at grant are determined by subtracting expected stock returns from observed returns for this interval, where the expected returns are given by the market model.

	Whole sample	ITM grants	ATM grants	OTM grants
Number of grants	168	65	55	48
Incentive (delta)				
Mean	0.877	0.965	0.944	0.682
median	0.971	0.994	0.974	0.807
Group differences:				
t statistic			-1.819†	5.263†††
Z statistic			-1.968††	4.648†††
Pay-performance sensitivity				
Mean	0.479	0.568	0.470	0.369
median	0.196	0.249	0.200	0.133
Group differences:				
t statistic			-.0656	-0.873
Z statistic			-0.340	-1.567
[-1, 1] raw shareholder returns at grant				
Mean	-0.0001	0.0023	0.0094	-0.0143**
median	-0.0001	-0.0006	0.0076	-0.0052
Group differences:				
t statistic			-0.962	-2.530††
Z statistic			-1.876†	-2.903†††
[-1, 1] CARs at grant				
Mean	0.0021	0.0063	0.0140**	-0.0171**
median	0.0018	0.0021	0.0114**	-0.0150**
Group differences:				
t statistic			0.927	2.935†††
Z statistic			1.573	3.091†††

*** indicates two-tailed statistical significance at the 0.01 level.
** indicates two-tailed statistical significance at the 0.05 level.
††† indicates two-tailed statistical significance at the 0.01 level.
†† indicates two-tailed statistical significance at the 0.05 level.
† indicates two-tailed statistical significance at the 0.10 level.

Table 5. Cumulative abnormal returns around stock option grant

An in-the-money (ITM) grant occurs when exercise price on the grant date exceeds the stock price by 5 or more per cent; an out-of-the-money (OTM) grant occurs when the stock price on the grant date exceeds the exercise price by 5 or more per cent. Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant (expressed as a percentage). [-1, 1] cumulative abnormal returns (CARs) at grant are determined by subtracting expected stock returns from observed returns for this interval, where the expected returns are given by the market model.

	Whole sample	ITM grants	ATM grants	OTM grants
Below-median grant size				
Number of cases	84	29	35	20
mean	0.0114**	0.0199**	0.0120**	-0.0019
median	0.0043**	0.0108**	0.0114**	-0.0063
Above-median grant size				
Number of cases	84	36	20	28
mean	-0.0072	-0.0047	0.0175**	-0.0279**
median	-0.0088	-0.0088	0.0106*	-0.0274**
Group differences:				
t statistic	2.362††	2.271††	-0.426	1.948††
Z statistic	2.257††	2.061††	0.263	1.969††

** indicates two-tailed statistical significance at the 0.05 level.
* indicates two-tailed statistical significance at the 0.10 level.
†† indicates two-tailed statistical significance at the 0.10 level.

Table 6. Tests of Hall and Murphy (2000, 2002)

Pay-performance sensitivity is incentive multiplied by the number of granted options, where incentive is the partial derivative of the call value with respect to the stock price adjusted for dividends. CARs are [-1, 1] cumulative abnormal returns at grant. Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant. Risk aversion is *MRP*/.01(σ^2) where the market risk premium (*MRP*) is set at 8 per cent and σ is the standard deviation of stock returns for a given company. Private diversification is proxied by $ln(1/\text{Percentage of stock held})$. Incentive is the option delta adjusted for dividends. At-the-money (ATM) grants are those where the stock price at grant minus the exercise price, divided by the stock price at grant, is within ± 5 per cent of the stock price at grant. *t* statistics are shown in parentheses. All regressions are White-corrected for heteroskedasticity.

Dependent variable: *n=168*	OLS (1) Pay-performance sensitivity	2SLS (1A) Exercise price/stock price	2SLS (1B) Grant size	OLS (2) [-1, 1] CARs at grant	OLS (3) [-1, 1] CARs at grant	OLS (4) [-1, 1] CARs at grant
Adjusted R^2	0.035	0.003	.099	0.086	0.072	0.020
F	4.019	1.772	10.763	8.836	7.517	4.415
Probability	.020	.173	.000	.000	.000	.037
CONSTANT	0.316	1.175***	0.613***	-0.038	0.027**	-0.004
	(2.871)	(11.835)	(3.561)	(-1.572)	(2.106)	(-0.727)
Grant size		-0.005		-0.014*	-0.016*	
		(-0.068)		(-1.744)	(-1.862)	
Exercise price/stock price			-0.007		-0.018	
			(-0.068)		(-1.440)	
Risk aversion	0.018**	-0.005*	-0.008**			
	(2.482)	(-1.735)	(-2.223)			
Private diversification	-0.012	-0.015	-0.056***			
	(-0.590)	(-1.374)	(-3.139)			
Incentive (delta)				0.051**		
				(2.030)		
ATM grant (=1)						0.018**
						(2.202)

*** indicates two-tailed statistical significance at the 0.01 level.
** indicates two-tailed statistical significance at the 0.05 level.
* indicates two-tailed statistical significance at the 0.10 level.

Table 7. Tests of Choe (2003)

Pay-performance sensitivity is incentive multiplied by the number of granted options, where incentive is the partial derivative of the call value with respect to the stock price adjusted for dividends. Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant. Financial leverage is the ratio of total debt to total assets, all at book. Stock volatility is measured by the annualized standard deviation of pre-award monthly stock returns (in percentage terms) over a minimum of 36 months prior to grant. *t* statistics are shown in parentheses. All regressions are White-corrected for heteroskedasticity.

	OLS (1)	OLS (2)	OLS (3)
Dependent variable:	Pay-performance sensitivity	Exercise price/ stock price	Grant size
n=168			
Adjusted R^2	.089	.039	.021
F	9.190	3.727	2.191
Probability	.000	.023	.091
CONSTANT	0.315***	1.275***	-0.024
	(2.679)	(11.812)	(-0.128)
Financial leverage	1.633***	-0.989**	0.482
	(3.279)	(-2.488)	(0.721)
Stock volatility	-0.012**	-0.003	0.015**
	(-2.059)	(-0.653)	(2.410)
Grant size		0.050	
		(0.763)	
Exercise price/ stock price			0.078
			(0.733)

*** indicates two-tailed statistical significance at the 0.01 level.
** indicates two-tailed statistical significance at the 0.05 level.

Table 8. Effects of CEO influence

Grant size is the number of granted options divided by the number of outstanding ordinary shares prior to grant. Financial leverage is the ratio of total debt to total assets, all at book. CEO control of voting stock is the sum of beneficially and non-beneficially held stock divided by the number of outstanding ordinary shares, expressed as a percentage. The proportion of outside directors is the number of directors not employed within the corporate group divided the number of directors on the board. CEO turnover index is the number of CEO appointments for a given interval divided by the interval in years, where the interval commences three years before the first option grant and ends three years after the final option grant in the event of multiple grants. *t* statistics are shown in parentheses. All regressions are White-corrected for heteroskedasticity.

	(1)	(2)
Dependent variable: *n=168*	Grant size	Exercise price/stock price
Adjusted R^2	.080	.066
F	4.650	3.940
Probability	.001	.004
CONSTANT	0.531**	1.381***
	(2.399)	(8.085)
Financial leverage	0.659	-0.696*
	(1.154)	(-1.926)
CEO control of voting stock (%)	0.038**	0.015
	(2.145)	(1.392)
Proportion of outside directors	-0.725**	-0.533**
	(-2.062)	(-2.115)
CEO turnover index	-0.335**	0.014
	(-2.091)	(0.096)

*** indicates two-tailed statistical significance at the 0.01 level.
** indicates two-tailed statistical significance at the 0.05 level.
* indicates two-tailed statistical significance at the 0.10 level.